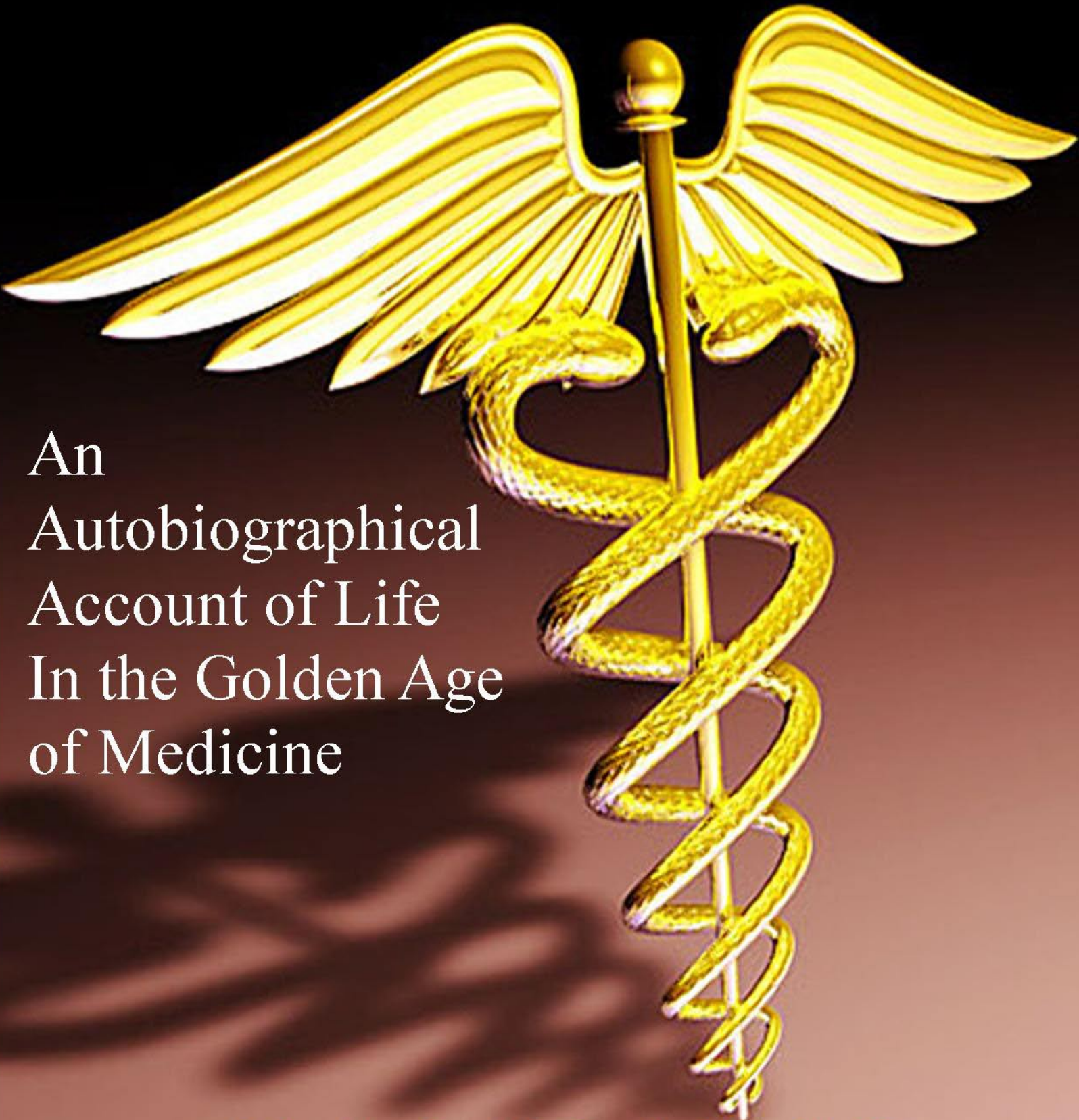


# Stewart G. Wolf

An  
Autobiographical  
Account of Life  
In the Golden Age  
of Medicine



Edited by Paul J. Rosch, MD, FACP

# STEWART G. WOLF

## An Autobiographical Account Of Life In The Golden Age of Medicine

(Edited by Paul J. Rosch, MD., F.A.C.P)

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## Foreword : “A MAN FOR ALL SEASONS”

Anyone who has worked with Stewart Wolf or knows him well will immediately recognize that much has been omitted or minimized in this autobiography because of his humility and modest nature. It is also likely that Stewart may be unaware of how much he has benefited countless friends, colleagues and students and contributed to their success through his wise counsel and other generous and unselfish efforts to promote their future success. Throughout this book he frequently refers to how lucky he was to have been placed in a certain situation or to have met someone - when in actuality, the reverse was more apt to be true.

Tom, the patient with the esophageal stricture whose gastric function he studied for years in New York and Oklahoma is one example that reminds me of Thomas Jefferson’s “I am a great believer in luck and I find the harder I work the more I have of it.” Once Stewart embarked on any assignment, he was always an indefatigable and painstaking researcher. Tom is also an illustration of Pasteur’s assertion that “Chance favors the prepared mind”, as were the decades of Roseto investigations and so many of Stewart’s other achievements, many of which he failed to mention or miniaturized.

There is no reference to his presidency of the Psychosomatic Society in 1961 (and his vigorous promotion of a scientific basis for that discipline), presidency of the American Society Of Clinical Pharmacology And Chemotherapy in 1966 and numerous other honors and achievements. He neglected to note that as president of the Pavlovian Society, he resurrected it after Horsley Gantt passed on and was responsible for its subsequent growth by attracting other distinguished clinicians and basic science researchers. He also downplayed his role as editor of its journal and deciding to rename it Integrative Physiological and Behavioral Science to more accurately reflect Gantt’s goals and values.

When the American Institute of Stress established its annual International Congress on Stress in Switzerland in 1988 to commemorate the memory of Hans Selye, Stewart was the unanimous choice to be the recipient of the first Hans Selye Award. He was an active participant in all subsequent Congresses and although he refers to these events and to me in a very laudatory fashion, he neglected to mention how much he contributed to their success through his presentations and discussion of other papers, all of which he attended, usually in the front two rows so he would not miss anything. His professional renditions of La Vie en Rose and other songs in various languages during get togethers in the Hotel’s main salon after dinner set the festive tone for these soirées and the collegial character of our annual Congress. He was often accompanied by some of the other distinguished participants who were also



accomplished musicians, and from past experience had brought their own instruments. Stewart's interests were diverse and eclectic, ranging from a thorough analysis of what was known about the practice of medicine in Mesopotamia several thousand years ago and a biography of the Nobel Laureate Charles Richet, who was responsible for Walter Cannon's concept of homeostasis, to complex mechanisms underlying the dive reflex and baroreceptor influences on heart rate variability that are still not fully appreciated. Numerous recent reports have now clearly demonstrated that decreased heart rate variability (HRV) is associated with significant health problems and predicts increased risk for sudden death. This observation was first made by his neurocardiology group at the University of Oklahoma in the early 1960s based on a ten year prospective project designed to identify physiological and behavioral factors that might contribute to sudden death in patients following a myocardial infarction. It was found that neither age, serum cholesterol, good and bad cholesterol ratios, nor treadmill testing results had any significant prognostic power. The only predictive indicators for mortality were specific electrocardiographic changes reflecting diminished HRV, when compared to survivors. These preliminary findings were submitted to several medical and cardiology journals, but were rejected by all, with one reviewer commenting, "we have known about heart rate for centuries. The authors' findings concerning variability of heart rate could hardly have significant medical importance".

Talk about tenacity, it was not until 30 years later, that Stewart was able to publish the complete results of this study in a paper entitled, "Oscillatory Functions Affecting Outcome of Coronary Heart Disease: The Hazard of too Much or too Little Stability". In a masterful summary, he pointed out that particular periodicities are peculiar to all living systems, ranging from cells to civilizations. Recent advances in our understanding and interpretation of time domain measurements and spectral analysis of power components of heart rate variability suggest that HRV may be the most accurate method of assessing the significance of certain stressors as well as the severity of cardiovascular and other stress related disorders. Diminished HRV is seen during depression as well as anxiety, which may explain why these stressful emotional states are associated with increased cardiac morbidity and mortality following a heart attack. There are also very important metabolic correlations with obesity, insulin resistance and metabolic syndrome that result from stress related increases in cortisol. Although resting heart rate does not change significantly with advancing years there is a progressive decline in HRV. Conversely, regular physical activity, which can slow down the aging process as well as reduce stress, raises HRV, which is why it is also being used as a method for determining athletic fitness as well as "biological" as opposed to chronological age. So much for the reviewer's assertion that Stewart's "findings concerning variability of heart rate could hardly have significant medical importance."

Heart rate variability refers to the imperceptible alterations in beat-to-beat time intervals that occur during respiration that differ by only a few milliseconds and can only be accurately measured by computerized electrocardiographic monitoring techniques. Heart rate increases slightly during inspiration and the reverse occurs when exhaling. This normal variability called sinus arrhythmia is a measure of how well you are able to adapt to changes in both the internal and external environment. A decrease in HRV reflects a relative inability to maintain homeostasis that could be potentially dangerous. Stewart was one of the first to recognize this, and as he concluded in his paper, “proper physiologic balance requires some degree of instability, but not too little or too much”. He noted that Walter Cannon, in his initial description of homeostasis, had credited the French physiologist Charles Richet for proposing this principle in 1900, when Richet wrote “The living being is stable... in a sense, it is stable because it is modifiable, the slight instability being the necessary condition for the true stability of the organism.” This resilience and ability to adapt to various stresses in order to maintain what Cannon called the “steady state” or homeostasis as a hallmark of health is implicit in Claude Bernard’s concept of the internal environment (*milieu intérieur*), and the importance of maintaining its stability. Hans Selye’s “Stage of Resistance” in his General Adaptation Syndrome represented an evolution of this concept from Bernard to Richet to Cannon that was made possible by progressive advances in relevant physiologic, biochemical and eventually endocrine parameters. However, Richet was rarely referred to in this lineage and Stewart wanted to rectify this omission. To set the record straight, he spent several months in France researching original documents and contacting family members to be certain that his biography of this great French physiologist was accurate.

Stewart was also one of the first to point out the fallacy of the prevailing fatty or dairy rich diet → high cholesterol → coronary heart disease dogma and to emphasize the dangers of artificial trans fats designed to preserve the shelf life of foods. His own cholesterol has been well over 400 since his college days and approached 900 when he was making the stressful move from Oklahoma to Galveston but other than the early appearance of arcus senilis apparently suffered no ill effects from these elevated levels. As Barbara Wolf recently indicated, “He never worried about it as he thought that was normal for him”. He never complained of chest pain and although his electrocardiogram has shown some minor but stable T wave changes, this is not unusual for someone in his ninth decade and there is no history or ECG evidence of a past heart attack. In one of our early Congresses Stewart delivered a paper on why fresh dairy products were healthy because they contained powerful antioxidants that blocked free radical damage at a time when many people thought that free radicals were Communists who had settled in the U.S.

Similarly, he was a pioneer in the scientific study of the importance of a firm faith and the placebo effect in his classic studies showing the irritating effects of ipecac on the gastric mucosa that explained its common use as an emetic. In one experiment, syrup of ipecac administered through a stomach tube to a pregnant woman with no symptoms produced the expected changes in gastric secretion and motility and a feeling of nausea. However, on another occasion, when the same patient was actually complaining of morning sickness and nausea and the identical dose of ipecac was administered in the identical fashion, not only did the anticipated changes in the gut fail to occur but her symptoms also promptly disappeared, simply because she had been told that she was receiving a very potent anti nausea medication. In another study, the same placebo was administered to 12 healthy young men on two occasions by two physicians with very different personalities and patient rapport. Those who received the placebo from Dr. A reacted with an increase in gastric HCL secretion whereas a decrease in acid secretion followed the administration of a placebo by Dr. B., again illustrating the power of what his good friend Horsley Gantt had referred to as “the effect of person”.

“Doctor” means teacher in Latin and Stewart was one of the best illustrations and exemplifications of this definition I ever met. I witnessed a vivid example of this when I was invited to be the featured speaker and Stewart Wolf Visiting Professor for the 1999 annual meeting of the Stewart Wolf Society at the University of Oklahoma Medical School. The Dean and Faculty of the Medical School had established this group of previous, present and future residents and faculty members and provided for an annual lecture in 1966, shortly after Stewart resigned his position as Chairman of the Department of Medicine. Since my visit was more than three decades later, I was amazed not only by the huge turnout, but the sincere displays of warm affection by numerous friends during the reception that followed. Even after he left, Stewart regularly invited Oklahoma researchers, technicians, house officers, fellows and medical students to visit his Totts Gap facility and farm in eastern Pennsylvania for a week or more to discuss their research interests as well as his own progress with the Roseto research and other studies. He continued for many years to house a handful of promising Oklahoma medical students during their summer vacation and arranged for me and some of his other friends to give lectures on subjects that he thought would appeal to them and open their minds to new possibilities. Stewart continued his interest in medical education because he was particularly concerned about the decline in the bedside teaching of students as well as the lack of intellectual cultivation that seriously impaired their ability to understand patients and why they developed certain illnesses. Both of these had been emphasized by William Osler in the early days of Johns Hopkins and had become firmly entrenched traditions that Stewart and I felt had greatly enhanced our insight into how and why some patients got sick while others remained well under similar circumstances.

This led to his 1996 book *Educating Doctors: Crisis in Medical Education*, which provided a thorough analysis of these and other problems that had resulted in a deterioration in the practice of medicine. He also suggested ways that medicine could be restored to the status of a distinguished profession rather than a trade whose goal was perceived by many to be more the pursuit of commercial rewards and fame rather than protecting the patient's interests. The book was well accepted and sold many copies and although most leaders in academic medicine were sympathetic to his cause, few were willing to join him in his crusade. At one of our Congresses a year or two later, I introduced Stewart to Brian Crawford, Director of the Center for Health Futures in Celebration, Florida, whom I had invited to give a presentation on the purpose of this space age medical facility. Brian was so inspired and impressed with Stewart's vision that he agreed to fund a four-day *Renaissance in Medicine* colloquium under the auspices of Totts Gap Medical Research Laboratories. Stewart was eager to invite leading academicians, educators and prominent physicians to discuss issues relevant to medical education, research and practice in order to establish a model for a new and revolutionary medical school and hospital. He asked me to invite others who might make a meaningful contribution and to give a keynote address at the preceding opening dinner explaining the purpose of this colloquium. The response was outstanding and one of my friends came from Hawaii at his own expense and brought another educator with an intense interest in these issues. One could not help being impressed with the willingness of well over two dozen leading medical figures to take three or four days out of their busy schedules to help Stewart in his efforts to revitalize medicine. I was again delighted and amazed to witness the display of high esteem, admiration and sincere and warm affection for him. One dignitary subsequently created a handsome medal with Stewart's portrait to commemorate the "Stewart Wolf Colloquium Renaissance in Medicine, Nov. 30-Dec. 3, 1999, Celebration, Florida" that was sent to all the participants. The reverse side of the medal had a portrait of Andreas Vesalius, whose *De Humani Corporis Fabrica*, arguably the best known book in the history of Western Medicine, had been published at the height of the Renaissance.

Stewart Wolf was an archetype and exemplar as a teacher, but his approach to treating patients also represented the epitome and quintessence of Hippocrates' *primum non nocere* ("First of all, don't hurt the patient) as well as Francis Peabody's advice to the 1926 Harvard Medical School graduating class, when he reminded them that "The secret of the care of the patient is in caring for the patient." Stewart not only conducted himself in this fashion as a physician but in his interactions with everyone. Whether it was a taxi driver he would never see again or a chambermaid at the Grand Excelsior Hotel in Montreux, he always treated everyone with respect and took a genuine interest in his or her well-being. Jim Lynch, another admirer, recently reminded me, "As you know, Stewart was a gentleman in the best



sense of that term a really gentle-man who never did understand the crassness of some of the people who surrounded well-being. Jim Lynch, another admirer, recently reminded me, “As you know, Stewart was a gentleman in the best sense of that term a really gentle-man who never did understand the crassness of some of the people who surrounded him at times”. Gentle comes from the Latin *gentilis*, (of the same clan). which became *gentil* in Middle English to allude to someone of noble birth. What Jim was referring to are other synonyms that signify someone who is genteel, courteous, cultivated, cordial, considerate, chivalrous, kind, amiable, tender, refined, polite and elegant. Although Stewart certainly exhibited all of these admirable attributes, they are concealed in his rendition of various events because humility and modesty were equally entrenched aspects of his character.

Stewart also neglected to mention or fully explain many other important contributions. Fortunately, the appendix of this autobiography contains more than two dozen of his medical articles dealing with his Roseto research, Pharmacology of Placebos, Stress and Heart disease, Social Anthropology, Talking With the Patient, Final Studies of Tom, Old Terms and Modern Concepts in Medicine and others that help fill in some gaps that likely resulted from his modest and unpretentious nature. They also illustrate the wide range of topics he could comment on authoritatively, comprehensively and forcefully, ranging from the basic principles of good medical practice to intricate biochemical and physiologic phenomena that contribute to health and disease. A good example is “The Place of the Person in Medical Education” published over 30 years ago, from which the following excerpts are taken.

“The etymology of the word cultivation is interesting: the Latin *colere* means to care for. The past participle of *colere* is *cultus*, the root for cult, culture and cultivate. *Colere*, therefore, means not only to care for but to till, to refine, and also to venerate or worship. The word worship comes from a Middle English root that means worth, merit or value. To value highly is to worship. Care or caring is the common denominator in the etymology of both roots. As Francis Peabody insisted many years ago, the care of the patient begins with caring for the patient.”

“At one of the institutes of the Association of American Medical Colleges held in Swampscott, Mass. on the subject of clinical teaching, it was agreed after considerable thoughtful discussion that education implies growth, training and discipline. An excess of training might lead to the beautiful symmetry of the espaliered tree, pleasing to the eye but bearing little fruit. Growth undisciplined, on the other hand, might lead to the leafy fullness of the tree in the untended wilderness, dense and green but again bearing little fruit. The best yield of fruit comes from the tree in the well-kept orchard, trimmed and disciplined but growing free and not necessarily identical with its neighbors. A second component of the education process is discipline. A third element in education is inspiration, or in the current

vernacular, being “turned on.” I liken the role of the teacher in education to that of the starting motor used in the old days at airports. The great plane parked at the ramp cannot possibly fly on the power of the starting motor, and yet the starting motor is required to activate the plane’s own engine. So it is with the student. Often the teacher, mistaking his role as the starting motor, thinks that the student can fly on the power that he can transmit. The student can fly only if his own engines are activated. “

“The proper function of the educator is reproduction, not duplication. *Educo* in Latin means to lead out. Teachers sometimes apply a Latin derivative that means to lead into, namely to indoctrinate. Such behavior on the part of teachers and the consequent less-than-optimal motivation among many students may be, in part, due to the fact that our social patterns encourage conformity rather than distinction or originality.”

“A wise Oklahoma City man once compared the modern scholar to a squirrel: He should be free to garner the best from the topmost boughs of the boundless forest. Committed to the annulling tread of conformity within the confines of a miserable cage, however, he cracks only the nuts supplied by his keeper. Emerson, in these words, saw the business of cracking only nuts supplied by a keeper: ‘Men grind and grind in the mill of truism, and nothing comes out but was put in. But the moment they desert the tradition for spontaneous thought, then poetry, wit, hope, virtue, learning, anecdote, all flock to their aid.’ Unfortunately those with creative imagination are not always equally endowed with courage. It takes a hardy soul to withstand the pressure of disapproval and continue running on the topmost bough. Too many of us walk voluntarily in the cage of conformity. Thus in our efforts to achieve acceptance we cultivate habits of thinking that lack freshness and originality.”

## **ENVOI**

“The capacity for education has evolved as a unique attribute of man. It utilizes the vast neural interactions in the human brain that can yield almost limitless variety in thought and behavior. It allows for development of insight and understanding based on learning and on access to the accumulated wisdom of the ages. Few of us approach our potential for education, for personal cultivation. Those who do have usually been inspired by another individual or by a rich personal experience. Thus the person is central to medical as to all education.”

As with many of Stewarts other papers included in the Appendix, the above illustrates how his broad cultural roots enabled him to better understand his patients and the roots of their problem as well as his early concerns about deficiencies in the education of medical students and “the effect of person”.

Stewart recognized more than anyone I have ever met that to receive something might make you wealthier but that being able to give something made your life much richer. I am sure that there are numerous individuals featured in this book who can attest to this but Ray Rosenman; a mutual good friend had previously provided an unsolicited example. In 1959, a paper entitled “Association of specific overt behavior pattern with blood and cardiovascular findings” by Meyer Friedman and Ray Rosenman appeared in the Journal of the American Medical Association. However, the term “Type A behavior” did not appear until their later papers and it was not until the 1974 publication of their best seller Type A Behavior And Your Heart that Type A became part of vernacular speech. Type A was subsequently acknowledged by a committee of authorities assembled in 1978 by the National Institutes of Health to be an independent risk factor for coronary heart disease of the same magnitude as smoking, elevated cholesterol and hypertension. This highly supportive statement that confirmed the significance of Type A coronary prone behavior would not have been possible without the Western Collaborative Group study of over 3000 healthy middle-aged male workers without evidence of heart disease. The study began in 1961 and the participants were followed for approximately 8.5 years, at which time 70 percent of those who had developed coronary heart disease during this period had been rated as being Type A on entry into the study. Men characterized as Type A had roughly twice the risk of developing heart disease as their Type B counterparts, irrespective of the presence or absence of the other three standard risk factors.

Reproduced below is an excerpt from an interview with Ray Rosenman that appeared in one of the monthly American Institute of Stress Newsletters. (The complete interview is available at [www.stress.org](http://www.stress.org))

“PJR: Why did you decide to label this apparently male pattern of conduct “Type A” behavior?

RHR: We realized it was necessary to do a prospective study and I submitted a grant proposal that was twice rejected, and then successfully modified by a suggestion from the Public Health Service Director that we simply term the two behavior types as “Type A and B”. After a site visit the grant was approved for two years. Later site visits led to grant extensions for long-term follow-up, largely due to the efforts of the remarkable Dr. Stewart Wolf. We became good friends many years later through your annual Congress and other activities of the American Institute of Stress.”

Stewart was a member of the first site visit group around 1959 that approved Ray’s participation in the Western Collaborative Group study during its planning phase and his strong support then and subsequently probably played a significant but again silent role in promoting the Type A hypothesis. In that regard, it should be noted that around the time Ray and Mike Friedman were developing their theory, Stewart had independently described what he referred

to as the “Sisyphus syndrome”. In Greek mythology, Sisyphus was the cunning King of Corinth who allegedly cheated death and had been condemned to spend the rest of his life repeatedly pushing a large boulder to the top of a steep hill, only to have it roll back to the base as soon as the summit had been reached. Other Greek mythological portrayals of Hades also viewed Hell as a place of perpetual but fruitless labor. Stewart described individuals who were constantly preoccupied with their work, even if it was not productive, as suffering from the “Sisyphus syndrome” and demonstrated that they were at increased risk for heart attacks. He characterized coronary prone individuals as constantly striving against real but often self-imposed challenges – and even if successful, not being able to relax or enjoy the satisfaction of achievement. Preoccupation with work and an inability to relax along with time urgency and a fierce competitive and aggressive attitude are now recognized as characteristic Type A traits. I have included this brief vignette to emphasize the first sentence of this feeble tribute to a remarkable man. Despite Stewart’s obvious contributions to the Type A concept, Rosenman and Friedman are not mentioned in this book, nor do the words Sisyphus, Western Collaborative Group Study or even Type A ever appear.

A true Renaissance figure in medicine, whose likes will not be seen soon again, Stewart has always been “a man for all seasons”. This was the expression the great German humanist Erasmus used to describe his good friend, Sir Thomas More. The phrase became popularized by the 1966 Academy Award winning movie with that title depicting More’s life and relationship with King Henry VIII. Erasmus was alluding to 1 Corinthians 9:22, “I become all things to all men, that I might save all” when he wrote (in Latin), “More is a man of an angel’s wit and singular learning. He is a man of many excellent virtues; I know not his fellow. For where is the man (in whom is so many goodly virtues) of that gentleness, lowliness, and affability, and as time requires, a man of marvelous mirth and pastimes and sometime of steadfast gravity. A man for all seasons.” Although this was written over 500 years ago, it is still a very accurate and particularly appropriate description of Stewart Wolf. it would be hard to find anyone who was more truly a man for all seasons and all men.” (omnibus omnium horarum homo).

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## **Preface: Remembering Dr. Stewart Wolf, Professor and Head of Medicine**

Stewart George Wolf, Jr., was a product of the Twentieth Century East-coast establishment. His father was from Baltimore, Maryland, and his mother from Long Island, New York. His childhood education in Baltimore was supplemented with many trips to Europe encouraged by his mother who had accompanied her father to Europe several times. As did other male members of his family, he attended Phillips Academy at Andover, Massachusetts. He attended Yale University and entered John Hopkins Medical School. His medical school interview was all about “collecting antiques” and is a charming vignette of that era. During the summer before he entered medical school, he traveled to England with his cousin as a part of the youth exchange program of the English Speaking Union. They motored with two young women through England and France. His Hopkins years were the formative time when he developed the scientific curiosity and skills from his professors and mentors that he would carry with him throughout his career and would serve as a basis for his ability to inspire students. His desire to “push back” the frontiers of medicine with research clearly embodied the “spirit of inquiry” that permeated his career. At New York Hospital with Dr. Eugene F. DuBois and Dr. Harold Wolff, he established himself as a clinical investigator and developed new ideas for understanding the pathophysiology of the nervous system, the gastro-intestinal tract, and the effect of emotions and life experience in the pathogenesis of disease. The war years are entitled “War Stories” because his good friend and colleague, Dr. Robert Bird, used to “swap” these stories with him for the residents.

Dr. Wolf came to Oklahoma to the medical school as the first full-time head of a clinical department. His objective was to turn a “trade school” into a society of scholars, perhaps even to inspire some students to enter the “grove of academe.” His first encounter with my medical school class was on the very first day. He dramatically entered the lecture hall dressed in a white double-breasted laboratory coat and addressed our one hundred student members. He promised us hard work as we developed the same keen powers of observation that Sherlock Holmes used to solve his mysteries. He followed our class with close attention because we were the first class he had selected as a member of the Board of Admissions.

He initiated a weekly combined Neurology/Neurosurgery conference for the medical students so that we could observe the effects of a neurological disorder, such as Huntington’s chorea, on a person who was actually suffering with the bizarre motor derangement produced by a familial disorder. The next week he demonstrated a patient with chronic mercury poisoning (Minimata disease) and compared the disorders. He treated us and all of our patients with respect. He embodied an example of the philosophy that the “care of the patient depended on the (physician) caring for each patient as a person.”

Dr. Wolf once lectured to us on the doctor as “teacher.” Our role, he said, is to teach patients about their disease. We also must learn to inform our colleagues what we know about the person and their disease for points of discussion. He recruited an outstanding faculty around him. Dr. Robert M. Bird led his department as vice-chairman and inspired his house staff to seek answers at the bedside. With a laboratory close to the wards, Dr. Bird’s laboratory became a center for the house staff to exchange information and ideas about clinical problems and how to solve those problems at the bedside. Dr. John Colemore orchestrated the fourth-year outpatient medicine rotation with a clinical experience that offered Oklahoma students a clinical experience that made them competition for such prestigious clinical training programs as Duke, Johns Hopkins, New York and Boston hospitals. They enthusiastically recruited Oklahoma graduates for their house staff programs. As other Professors of Medicine had done, such as Drs. Donald Deldin, Max Wintrobe and Bill Bean, Stewart Wolf carried the “East Coast” philosophy of medical school teaching to another of the “states schools west of the Mississippi.” Medicine A was a teaching experiment at the Cornell service of New York Hospital to instruct internists about the psychiatric and emotional aspects of disease. This he transplanted to his department in Oklahoma. The impact of “lifestyle” on health and the pathophysiology of a person’s interpretation of stress were clinical phenomena that he investigated and he taught his students to emulate his observations. His ability to inspire his students, house staff and faculty have continued over the years even after he left Oklahoma to head the Marine Biomedical Institute in Galveston, Texas, and the Totts Gap Research Institutes in Bangor, Pennsylvania.

Dr. Wolf was a community leader in Oklahoma City and his magnetic personality helped “save” the symphony for several years when he served as the President of the Board. He brought an outstanding Episcopal priest to St. Paul’s Cathedral in Oklahoma City, Dean John Van Dyke, who inspired many to convert to Christianity and strengthened that Episcopal church in the community. Dr. Wolf also helped initiate the organization of a chapter of the English Speaking Union in Oklahoma City. The first meeting was held at the Faculty House on January 8, 1959. This group of anglophiles has continued to meet and discuss historic issues pertinent to the English language and the British culture.

Dr. Wolf, in a unique sociological study, compared the death rates due to myocardial infarction within four small communities in Eastern Pennsylvania, each with very different historic backgrounds and ethnic populations. For several summers, a group of University of Oklahoma researchers, including technicians, house officers, fellows and medical students, visited his farm in eastern Pennsylvania and examined the health of these rural communities. The “farm” became the center of research activity and the farm houses which dotted the rolling countryside became the residences of the investigators and workers. For some Oklahomans, it was their first experience living on the East coast in close proximity to the megalopolis of Manhattan. For others, it was an opportunity to expose their young

children to the colonial history of the United States.

The farm was a social center as well as a research center. Robert K. Massie, author of *Nicholas and Alexandra*, visited the Wolf farm to gather information about the community studies for a feature article. He spent the afternoon discussing his forthcoming book. He had been inspired to write a book about the last Russian Czar and his family because he also had a son with hemophilia. At this time, I was the resident Hematologist with more than a passing interest in the problem, and we had a long conversation about the disease and the last days of the Russian royal family. Massie's article about Roseto and the Eastern Pennsylvania communities, which appeared in *Look* magazine, was quite accurate and descriptive of our research.

In an editorial published in *The Pharos*, Dr. Wolf wrote, "In an earlier day from 1880 to 1912, American education advanced with almost explosive speed. It was a time when ambitious young physicians applied themselves to what might be called open-ended learning, without curricular or qualifying requirements. They learned from 'hanging around' and from myriad unplanned exposures to special people, ideas and experience. At the turn of the century, young American doctors, innocents abroad, visited and worked in the great laboratories and clinics of Europe, electing and digesting their experiences in their own way. Returning home, they brought forth on this continent a new and vital form of medical education that, in turn, made America the Mecca! Faculties then understood that the proper function of the educator is procreation not duplication.... Every tendency in our profession, especially every trend that seeks to strengthen its position by means of standardization, obligatory uniformity and unvarying acceptance deserves to be challenged as a threat to variety and survival. Intellectual conformity may confer a sense of belonging and of acceptance by one's fellows, but often at the sacrifice of freshness and originality. Carried to an extreme, efforts to gain acceptance can result in a continuous intellectual minuet in which we bow to each other and walk around arm in arm, according to a cadence that cannot be broken for risk of disapproval."

C. P. Snow, the English novelist and essayist, in an essay entitled "Personal Medicine" wrote a description of Twentieth Century medicine that elaborates on Dr. Wolf's premise. "As medicine becomes more technological, we all know that this constant personal attention doesn't always happen. There are good, and perhaps ineluctable, reasons why it doesn't. Technology often presents us with great benefits with one hand and knifes us pretty sharply with the other, just as, by reducing infant mortality and also conquering many diseases, medical technology has given us many benefits our grandfathers wouldn't have thought possible. Probably a third of the people here wouldn't be alive today if it weren't for these particular benefits. On the other hand, though, we are presented with the flux of population -- perhaps the most insoluble problem that has ever faced the human race. On a tiny human scale, so it is with personal medicine. We can be operated on with a new order of skill, cured of many kinds of sickness, and yet,

psychologically, when receiving medical care, we are likely to be more anxious and disturbed than our fathers were. In some conditions, perhaps many, and most of all in those when one is face to face with mortality, there is no substitute for one good physician. One good physician who knows his patient and doesn't need to be told anything more.... We have all known physicians who are wise. We have known some who are wise and have learned nothing from books. We have known some, in fact, who are wise and nearly illiterate. I want to suggest to you that they would have been a shade wiser with the elements of a humanistic education. You can't teach wisdom. You certainly can't teach empathy. Yet, if the potentiality of empathy exists in anyone, then it can be encouraged by those who have possessed it and have tried to express it in words. That is why I am inclined to think that there ought to be a literary component throughout the course of medical education."

Dr. Wolf's international travel and education gave him that unique "humanistic education" which stimulated his inspiration of his students. Stewart Wolf is well known to the Oklahoma community as the first full-time head of the clinical department of Medicine at the University of Oklahoma College of Medicine. His contributions to the College and to the education of doctors now practicing in the community are phenomenal. His continued interest in "educating doctors" was demonstrated again recently in a conference which he sponsored, "Renaissance in Medicine." This conference, held in Celebration City, Florida in December 1999, brought together many people interested in medical education and offered a forum for them to express their ideas. Some of the participants were past, current and future leaders in medicine. As Dr. Wolf has written, "The education of a physician involves, to a large extent, the shaping of attitudes, sensitivities and perceptions in a student.... This task calls for a certain erudition and an attitude of humility, optimism, warmth and patience -- sorely needed are inspiring teachers as role models who spend time with their students on and off hours in a reflective environment as well as at times of medical crisis."

Stewart became my friend as well as my mentor. We worked on many projects together and I always respected his counsel. This collegial relationship still exists. He can entrance me with reminiscences and stories from his life experiences. Stewart's "thoughtful compassion" for patients was a role model. His desire to learn not only about the natural history of a clinical problem but also how to seek a solution for that person's problem was charismatic. His mentoring for me has created a joy for practicing medicine that is immeasurable. I am eternally grateful to him and the opportunity to work with him. I am honored to be asked to write the preface for this autobiography, and trust that Stewart's many friends and associates will find it equally fascinating.

James W. Hampton, M.D.

January 2003



## **Introduction**

My purpose in writing this book is to examine life experiences that form from the personal development of human beings and specifically the development of a medical doctor. I also want to examine social forces that participate in human development. The book will appear in three sections -- the first autobiographical, the second essays and commentaries, and the third, research. The book will take the reader from the human-interest aspects to research.

While I touch on evolution and culture, my intent is not to write a history of the evolutionary cultural development of our kind. Rather, I wish to attempt an assessment of a few of the multiple factors that shape man's growth, physical, metaphysical, social, environmental, educational, vocational, and recreational. I also wish to reflect upon some of the ways in which an individual's growth and even survival are shaped by experiences, opportunities, challenges, and education. From a general consideration of human adaptation to life on earth, I turn to the particular account of my development. I want to share with the reader how one life, which has nearly spanned the 20th century, has been affected by demands and rewards, encouragement and discouragement, teaching and learning. As a professor of medicine, I have been especially concerned, both personally and professionally, about the quality of education in this country. I also want to explore and critique the education of young people in the United States at the beginning of the 21st century and to offer some suggestions for improving its quality.

## **Acknowledgement and Dedication**

The preparation of this book has been a long and often difficult process, very different from the preparation of a medical research paper or the planning of a laboratory project. In writing about my life, I became the subject of my own research -- a task that was at once both unusual and personally rewarding. Without the support and participation of close friends and associates, this book might never have been completed. I appreciate the critical review by Dr. John Coates and Peggy Wolf. They never spared in their opinions and suggestions, and their input helped bring direction to the memories and assessments of my younger years. I am also indebted to Dr. James Hampton, my close friend and colleague of long standing. He offered helpful suggestions to the text and stayed firm in his encouragement that the book should be published. He arranged an introduction to my editor and collaborator, Michele Marie Moore. Mrs. Moore's efforts to bring the manuscript to a publishable state have been immense. Her enthusiasm for the project kept us both on track and brought a real structure to the manuscript. In bringing this book to the birth, we became fine and affectionate friends. Her probing questions and ready laughter always brightened my day. I am also most appreciative of the skillful assistance of my secretary, Joy A. Lowe, who tirelessly made all of the editorial changes to the manuscript as it began to take shape.

I dedicate this book to two outstanding Oklahoma physicians, Richard Marshall, Chairman of Medicine at St. Francis Hospital in Tulsa, Oklahoma, and John Coates, Chairman of Neurosurgery at the same institution. Both men represent the highest qualities in medical education and medical care. I salute them as first-class doctors and long-time friends.

I also wish to dedicate this book to my wife, Barbara, whose devotion and companionship are a constant blessing to me. We share in this project together, and she has been a model of generosity. I offer her my grateful love and the fulness of my heart until the end of my days.

## Chapter 1: The Early Days of Growing Up (1914-1927)

Baltimore was the city of my birth, and in the early 1900s it was flourishing. Beginning in the 19th century, there had been a large immigration of Germans and Irish, followed by Czechs, Italians and eastern European Jews. By 1900, this immigration was at its peak. The city's population reached a half-million people, making Baltimore the second-largest city in the United States, and it became a thriving center of commerce and trade. The Baltimore community had an active interest in education and culture, and the city boasted many institutions of higher learning. Its residents also had a well-established concern for the quality of life, and later established the first municipal orchestra supported by public funds, the Baltimore Symphony.



Group Photo of Wolf Family. Dr. Wolf on Far Right

But this thriving and bustling metropolis faced a major setback. On Sunday, February 7, 1904, a fire alarm summoned firemen to the John Hurst & Company building. Although the fire had started in the basement, the men entering the building saw fire rolling across the ceiling toward the elevator shaft, followed by an explosion in the shaft, powerful enough to blow off the roof, break windows, and throw large burning embers into several of the

surrounding buildings. Seven minutes later, four more alarms sounded, and within an hour, a general alarm called all Baltimore Fire Companies to the scene. After 31 harrowing hours, the Great Baltimore Fire was finally brought under control.

This devastating fire had a tremendous impact on the community and the direction of its future. The fire destroyed more than 70 blocks of the downtown area, including 2,500 businesses, banks, and enterprises, leaving 35,000 people jobless in the dead of winter. Fortunately, no homes were destroyed, and the fire claimed only one life, that of a fireman who developed pneumonia and died a few days later.

Downtown Baltimore was in a state of complete destruction after the Great Fire. But the people of Baltimore had a dedicated commitment to the city and joined together to restore the community and recover from the devastation. The newly constructed Baltimore featured wider streets, modernized docks, fireproof construction, and a much-improved firefighting system. New industries and increased trade made Baltimore even more prosperous than ever. It was into this remarkable community that my father and mother settled together, and it was there in 1914 that I was born.

My father, Stewart George Wolf, was the son of Marcus Wolf, the owner of the dry goods store, and his wife, Sarah LeGare. My father came from an intellectually developed family. His father had grown up in a well-educated, cultivated family in Germany. An essay that was written by my grandfather to my father is recorded later in this book.

My mother, Angeline Griffing Wolf, was born to County Judge Timothy Griffing and Caroline Perkins Griffing, and grew up in Riverhead, Long Island, New York. My mother's background was also highly intellectual. Her father had been educated at Andover and Yale. At the Yale graduation, he gave the valedictorian lecture in ancient Greek.

As was quite common when Mother was a young girl, her parents invited her friends over for weekend house parties. Among those invited was a young Baltimorean, John Baer, who was a friend of my father's. Mother almost became engaged to him until, at another house party, my father was invited. Grandfather Griffing greatly admired him and apparently made it very clear to his daughter that he highly favored George Wolf.

Grandfather's opinion may have had an effect on my mother's engagement to my father. They married in 1902 and lived for a time in the Cecil, a hotel-like apartment house in Baltimore, until mother became pregnant with my sister, Carol. My father owned his own business, and was the head of a straw hat manufacturing company. In 1904, the year of the Great Fire, my parents built a house at 103 Longwood Road in Roland Park, Baltimore, and its construction was completed before Carol was born in February.





My Parents, Stewart George and Angeline Griffing Wolf

The whole area of Roland Park had once belonged to Jérôme Bonaparte, the youngest brother of Napoleon. He had married Elizabeth Patterson in Baltimore and they had a son who was also named Jérôme Napoleon Bonaparte. Their large estate, called Longwood, became what was later known as Roland Park.

It was a very handsome, upscale neighborhood, with beautiful houses and nice streets, settled within a rolling landscape of Maryland piedmont forest. Throughout the area still stand numerous old forest trees, alive since colonial times, and the neighborhood development followed the natural contours of the land, preserving and heightening the picturesque succession of hill and valley, open space, and forest.

In 1891 a consortium called the Roland Park Company purchased the area, and for several years it controlled home construction and homestead sales in Roland Park. When my parents moved from the area, Roland Park was purchased by the pharmaceutical magnate, Dr. A. R. L. Dohme, of the Sharp and Dohme Company, which later merged with Merck.

At the time of my parents' residency in the neighborhood, my father did not approve of the exclusive policy of the Roland Park Company. Although Roland Park was one of the most successful and highly emulated planned streetcar suburbs, it was also Baltimore's first residential development where deed restrictions governed the use of property and who could own that property. My father found the construction and ownership restrictions onerous and

unjust. The district property restrictions included minimum house prices, and no owner could sell or rent his property without the written consent of the Roland Park Company, which gave itself the right to pass upon the character, desirability and other qualifications of the proposed purchaser or occupant. In those days, the “desirable” qualities for occupancy were that one be prosperous, white, and a Christian.

In spite of the fact that many of our neighbors had a live-in Black nanny who cared for their children, the Roland Park Company would not allow minorities to purchase property in Roland Park. African-Americans could work in that neighborhood community, but they could not establish ownership there. My father had among his business colleagues a number of Jewish men whose friendships he valued highly, and I know he regretted the fact that restrictive covenants made it impossible for Jews to own property in Roland Park. His strong views in support of the equal value and potential of each person, regardless of race, creed or color, had a lasting influence on my own opinions and contributed greatly to my sense of justice and equality.

But in the opening decades of the 20th century, very different social strictures and class separations divided most communities in the United States. Unfortunate and unfair though it was, such discrimination was practiced openly and accepted, even by those such as my father, who did not approve of or condone that division. Eventually in the 1930s the discriminatory restrictions were removed -- an action that I am sure greatly pleased my father.

It was not long after my parents built their home on Longwood Road that their family began to grow. Carol arrived in 1904, a beautiful girl and a beautiful woman. My brother Van followed. He was five years older than I. And I was born on January 12, 1914, my parents' third child. I used to tell people who asked about the family that Carol had all the beauty, Van had all the brains, and I was the third child.

My parents created a very warm and relaxed atmosphere at our house. They treated Carol, Van and me with interest and respect, and we each had our own peculiarities. For example, Carol was the little mother type and very attentive. Van was extremely smart with leadership ability, and he always wanted to take charge. He was also very athletic. I was the naughty one, always talking and wanting to be a part of whatever was going on. What ever it was, I wanted to do it.

The influence of my father differed somewhat from that of my mother. What I felt from my father was approval, respect, fairness and strong encouragement. The most obvious characteristic of my father was kindly generosity. Whether there was to be a change in our life, decorating or possibly moving to the country, my father solicited our thoughts in a most generous way. He was an earnest, great person who always welcomed the opinions of others.



My Brother, George Van Velsor Wolf

The feeling from Mother was gentle intimacy. I felt a need to reach to my mother and to enjoy the outcome. To all three of us children her subtle message was, “I will always be there.” Mother was a strong supporter of intellectual cultivation and she urged it on all three of her children. My father and mother attended every play or special occasion at school for Carol, Van and me.

From Carol and Van, I received respect and strong backing. Throughout my youth, both my brother and sister were very attentive to my learning and performances. It was an easy environment in which to grow.

I also enjoyed close relationships with all of our neighbors, and most of them took an interest in the three of us. But I received special attention since I was the youngest. All of the neighborhood children played together, argued together, and had a wonderful time devising games and activities from their childish imaginations. Dr. Swope, a kindly radiologist who lived two houses down from me across the street, occasionally stepped in to settle childhood disputes or to greet us as we played throughout the neighborhood. He was a very nice man, and a very busy doctor.

It was from Dr. Swope that I acquired the nickname, “Do-It-Right, Tudie.” The name, “Tudie,” came about presumably because as a baby, I could not pronounce “Stewart.” Dr. Swope thought I was a good child, and he added the “Do-It-Right” prefix. “Tudie” stuck with me until medical school, and even now a few of my friends and family

members still call me “Tudie.”

Mine was a closely knit family within an active and supportive community. I received strong and affectionate parental guidance, and had supportive, interested siblings. It was a fertile field for nurturing, character-building, education and fun. It was, in short, a very loving family into which I was born.

Although I was too young to remember the start of World War I in August of 1914, I am able to recall a few things from my early childhood. I remember Tanta and Helena, two young German-Swiss women who had been hired by my parents to help my mother care for us when we were young.

Tanta was about 20 years old at the time she joined our household. She was tall, blond, very neat and well dressed, and her manners were excellent. She was a gentle girl who listened to my childish conversations and took a great interest in my welfare. Tanta had considerable influence on me, partly through her stories of the bad little German boy, Drüvelpeter. Tanta made him a model of what not to do. I remember one of his “bad examples” was that he let his fingernails grow long and refused to have them cut. I don’t know how much the Drüvelpeter stories improved my behavior, but when Tanta read the stories to me, I often wanted to defend Drüvelpeter’s actions. I felt sorry for him because I thought he was treated unfairly. I felt they were far too hard on him. Even at a young age, I was a sympathetic supporter of the “underdog.” Although she was strict, I did love Tanta dearly, and she obviously loved me.

Helena was 18 years old, prettier than Tanta, blond and blue-eyed. She was fun-loving and encouraged me to talk to people we met. At age two, I was taken on a family trip to California, and Tanta and Helena went with us. I remember a few things about this trip, probably from photographs and hearing my family retell the story later. To me, the most remarkable thing was the swimming pool, which they called, “the plunge.” I knew nothing about swimming before this time. I remember being held close against Helena’s bosom while we were in the water, and she took very good care of me. I was so proud of myself for swimming. I also remember my older brother Van being punished for climbing on one of the bell towers along El Camino Real, and I recall the wonderful odor of orange blossoms as we entered “Los Anglis,” as we easterners called Los Angeles.

Helena also taught me to say German words and phrases to her. I especially remember the nursery rhyme, “Bakke, bakke Kuchen, der Bäcker hat gerufen.” (Patty-cake, patty-cake, baker’s man.) By the time World War I was over in November 1918, I was four years old and could speak both English and elementary German, an accomplishment that I owed to Helena’s affectionate teaching and companionship.

We children were always welcome at dinner with our parents and their guests, and this made us feel very special. These were the days in which many parents felt that children should be seen and not heard, and the other

children I knew had to eat supper in the kitchen if their parents had dinner guests. But our family always enjoyed dining together. My parents felt that our association with their guests would be an educational as well as a beneficial social experience for us. My father wanted us to have the opportunity to talk with these people, some of whom were quite wise and intelligent.

My parents invited dinner guests often, and many were notables of Baltimore society or important people visiting the city. Some were personages in the world of business, others in charge of charities. One frequent dinner guest was the evangelist (and former professional baseball player) Billy Sunday. My parents were close friends with Billy Sunday and his wife, Mary. The worst that was ever said of him was that he occasionally let his humor run wild; the best was that he reached and changed a million lives. It was quite an honor to have him as a dinner guest.

Dining with my parents' guests was always a great occasion. Otherwise, my family had its share of lawyers in its circle of relatives, and when I was young, the dinner conversations and arguments over issues of law left me bored and disinterested. I remember one evening when I was very young, I stood up and told all at the table to drink a toast to the Kaiser. I do not recall what led to this display, but I remember that someone had been saying unpleasant things about him, and I didn't like to hear others badly spoken of -- just as I had felt that poor Drüvelpeter must have been sadly misunderstood. Perhaps it offended my childhood sense of justice.

Though I was ten years younger than my sister Carol, we were very close. Carol was tall, brunette, very neat, and had a friendly face. She sang and played the piano very well. I think I learned all of the words of her songs in various languages. My favorite was the German version of Röslein, Röslein, as well as the lullaby, Guten Abend, gute Nacht (Good Evening, Good Night). She may have learned those songs from Tanta and Helena. I also liked some Italian songs, especially the way Carol sang them. She urged me to learn the piano, but I did not feel that I had enough time. I was a typical little boy and wanted instead to play baseball with the neighbor kids on a vacant lot and hoped someday to become a great pitcher.

When Carol later married Roszel Thomsen, the oldest son of my father's best friend, Ed Thomsen, my cousin Bob Griffing and I served as pages in the wedding. Carol and her husband bought a home only two or three miles away from my parents' home on Longwood Road. Carol used to serve tea in her living room every day. People just dropped in and I was a frequent guest. I think I was much closer to her than was my brother Van. She and I were wonderful companions together.

When I became five years old, I began attending the Friends School in Baltimore. By this time, we had lost Tanta. She had married a German man who owned an umbrella shop in downtown Baltimore. Helena drove me to school in my parents' car until I was seven and in the third grade. She then moved

to Riverhead, Long Island, where she joined the staff of my maternal grandfather, the county judge. Thereafter, the maid, Betty, took me to school downtown until I was old enough to take the streetcar by myself.

The Friends School was the oldest in Baltimore, founded in 1784 by members of the Religious Society of Friends (Quakers). Although it was not operated as a strictly religious school, the philosophy of its education stressed the fundamental equality of all persons, a perspective I first learned from my father. Friends was a private school, with beautiful two- and three-story graystone buildings. I would leave the house for school right after breakfast, and returned home around 3:30 in the afternoon. I thought the teachers were very nice.

I had two teachers in the first grade: Miss Newby for arithmetic and Miss Gibson for English. I loved them both, as did the other 12 students in my class. In contrast to Miss Gibson who was more serious, Miss Newby impressed me because she seemed so important, so well organized. She was a slender woman, a sweet person, and very intense. I could tell that she liked me. She made me feel that arithmetic was the most important route to learning, and believed that understanding mathematical principles would lead to a better understanding of life. She used to say, "The world runs on numbers." Although it did not fascinate me, I worked hard on my homework every evening after dinner, especially arithmetic.

During the summer after third grade, when I was seven or eight years old, my mother and father took the family on a Mediterranean cruise on the good ship *Cameroonian*. We departed from the port at New York on a trip that would last a couple of weeks. The Chief Justice of the Supreme Court, William Howard Taft, was a fellow passenger on the cruise and became friends with my father. They spent a lot of time together and, during later years, my dad hoped that Taft would run again for the presidency, although that was not Mr. Taft's preference.

On the *Cameroonian*, a pleasant Turkish man paid a lot of attention to me. He was a good-looking fellow, quite strong with a heavy musculature, but he was a gentle man. He began talking to me and we became friends. We had long talks on the top deck, during which he tried to convince me that religion should be avoided. I believe he was the first atheist I had ever met.

Although I enjoyed talking with him and learning about life in Turkey, I didn't pay much attention to his remarks about religion. I was a staunch supporter of my parents' views. They were Methodist, very religious, and served as officials in the church. I grew up in this atmosphere, was a member of the youth group, and sang solos in the choir. My neighbor, Art Limerick, and I sang solos and duets at the Episcopal Church every Sunday as well.



I even taught Sunday School when I was about 12 years old. As a family, we were very involved in church life, and this may have set us apart from others in our circles of friends. I don't recall that many of my other friends participated much in religious activity, but I enjoyed it a great deal. I found the views of my Turkish friend unusual and interesting, but they had no real influence on me.

The Cameroonian made several stops along the cruise to allow the passengers to make day-long visits in Portugal, Spain, North Africa and Italy. I have vivid memories of my eagerness to see the famous erupting volcano, the Stromboli, near Sicily. We expected to pass it at 10:00 p.m., so Mother put me to bed with a promise to awaken me in time to see the Stromboli. I awoke the next morning in a frenzy, certain that I had missed the great sight. Although my mother had brought me up on deck to look at the volcano, I wasn't aware of having seen it. This made Van worry about my brain. Even at the age of 12, he was a take-charge person, and was certain that I must have been suffering from some grave dysfunction to have no memory of the Stromboli. But of course, I had been so deeply in slumber that I simply did not remember it.

The journey was very enjoyable. Every evening Mother would talk with us children about what we would be seeing the next day. She made sure we knew about the origins, history and other interesting facts about the locations we visited. This was something she did during every trip we took together, and it greatly increased our understanding and appreciation of all that we encountered on our travels. Mother was an excellent travel guide. She had journeyed frequently with her father as she was growing up, and it had an immense effect on her and, subsequently, on me.



My Maternal Grandfather, Timothy Griffing

During Mother's youth, her father, Timothy Griffing, made frequent trips to Europe. Being a judge, he was entitled to long vacations. Although his other two daughters accompanied him occasionally, Mother was his traveling companion most often. She had many adventures in Europe with her father and became proficient in some of the languages, especially German. It is not surprising that such experiences added a great deal to my mother's intellectual cultivation while she was growing up.

Mother was immensely encouraging and nourishing with respect to her love of travel and experiencing the environment and achievements of other nations. She took great pains to instill in all of her children an interest in culture and her fondness for travel. She never missed a trick in her efforts to be sure that we children saw the pictures and statues. I believe her idea was not to increase quantity of what we knew, but to get us to feel the quality of the experience, to enjoy it and to want to talk about it.

In later trips, Mother was so keen to see us achieve intellectual cultivation that she decided that we would not stop for lunch when we were driving around a city in Europe. Many museums and other sites of interest, especially in Italy, were closed by the mid-afternoon with a Chiuso (Closed) sign on the door. Rather than have us lose precious time over the formalities of a midday meal, Mother would equip herself with large chocolate bars which she gave to my brother, sister and me to serve as our lunch. Fortified by the chocolate, we were able to enjoy the museum, palace or gallery, making the most of the time available to us.

Mother's purpose was to help us achieve intellectual cultivation as distinct from the accumulation of information. She radiated a very strong persona and had come by that capability through the numerous trips she had taken to Europe with her father. Mother loved to tell one especially memorable tale about his journeys. I will always remember the story of how my grandfather was once mistaken for the Austrian Emperor.

My grandmother had not been so keen on traveling. She was susceptible to episodes of anxiety and weakness, and thus she rarely traveled with Grandfather. But on one occasion while accompanying him to Austria, she witnessed a peculiarly Viennese comedy of errors. As they entered the Hotel d'Angleterre in Vienna, Grandfather was mistaken for royalty.

The proprietor of the hotel met them in the entrance corridor and spoke quietly to Grandfather, who actually bore a remarkable resemblance to the Emperor Franz Joseph. Grandmother, although she was quite a handsome lady, did not resemble the Empress at all. So the hotel proprietor whispered to Grandfather, "Have no concern, Your Majesty. No one will know that you are here." Thereupon my grandparents were escorted to the royal suite. Flowers and chocolate candies were promptly delivered. Later, thinking that they were safely incognito, Grandfather and Grandmother went down to the dining room for dinner. As they entered, all the people at the tables stood up as the

band struck up the Austrian national anthem.

After dinner back in their suite, my grandparents decided to make it a short visit, and chose to depart in the morning. When they came down the next morning to check out, they were not allowed to pay. As they marched through two columns of employees to the front door, Grandfather handed out more money in gratuities than the hotel would have charged him.

I loved traveling with my parents, but most often traveled with my mother. This was a direct legacy from my grandfather, who had always arranged for different members of his family to travel to Europe every summer. Mother continued the tradition, and this exposure to different cultures, countries and people greatly expanded my understanding of the world around me.

At the end of the cruise on the Cameroonian, we returned home on a small ship called the Algeria. Before World War I, it had been a yacht for Kaiser Wilhelm. During the war, it had been captured by the British, but was later retired from military service to become a commercial vessel. After experiences in other countries, the return to America made me aware of the post-war social changes occurring.

It was the flapper era, and young men and women were celebrating the peace with “no holds barred” in dress and behavior. Carol did not get caught up in this fad, but showed great interest in another social focus -- President Wilson’s proposed League of Nations. Carol became an enthusiastic supporter and attended many meetings, sent letters and spoke to groups urging support for the proposal. She also brought young people, many of them foreigners, to visit and have dinner with our family. Everyone seemed to be disappointed that America was not going to support President Wilson’s plan. I did not understand what it was all about, but I listened to the discussions at the dinner table and was convinced that countries needed to understand one another and work together. I think my later aspiration to join the diplomatic service had its birth at that time.

Friends School owned a summer camp for boys called Camp Red Cloud at Silver Lake, east of Buffalo, New York. Across the lake was Camp Red Wing for girls. Camp Red Cloud was a beautiful place, but rather rugged. The campers all lived in tents, and there was a central meeting area where everyone ate their meals together. The tents were like portable dormitories, with cots for sleeping. Several boys would share a tent together.

Although I enjoyed living in a tent, I did not adjust easily to the rules and traditions of summer camp. My father and maternal grandfather, who both dealt with life’s barriers and restrictions by ignoring them and pursuing their conviction willy-nilly, heavily influenced my own character and methods of dealing with everyday social challenges.

The director of the camp was a Friends School teacher named Major Lamborn, who carefully organized the

activities for the campers. We were all expected to participate in certain group activities each morning and afternoon. There was a time for swimming, a time for canoeing, a time for tennis, and so forth. I enjoyed horseback riding with Captain Kilbourne, an ex-cavalry officer. He was in charge of the horses and stable. He liked me and was very patient in teaching me to ride. Although there was supposed to be a “time for everything,” I ignored the scheduled activities and spent my time learning how to ride and helping Captain Kilbourne currycomb the horses and clean the barn.

Major Lamborn, the camp director, did not pull me away from this rich opportunity -- I had not yet been caught -- until I failed to participate in “policing,” a daily duty required of each camper before breakfast. Policing involved going about the grounds with a stick that had a nail on the end of it and picking up and bagging scraps of all sorts, including candy wrappers. I rebelled because, since my parents had paid for my three-month camping experience, I felt that the management should have taken the responsibility of cleaning up the place. Furthermore, I wanted to spend as much time as possible with Captain Kilbourne and the horses.

At this point, Major Lamborn restricted me to my tent for ten days. Except for trips to the bathroom, I had to remain on my bed. Captain Kilbourne, bless his heart, visited me and sat and talked with me in my tent every afternoon. He felt that the punishment was a bit extreme for so slight an infraction of the rules. After the ten days, I went back to my daily activities at the stable, not having really learned a lesson from the punishment.

Throughout the summer, the Captain taught me how to ride through a series of small jumps on horseback while taking off my sweater. He also taught me Roman riding, which consists of standing on the backs of two horses while holding the reins of both and trying to maintain balance and direction while the horses are on the move. Captain Kilbourne tried to teach me polo, but I was not equal to it. I persisted in trying to hit the ball with the end of the mallet, as in croquet, instead of hitting the ball with the side of the mallet.

Near the end of the summer, a camp tournament was held that included each of the sports. I signed up for boxing, track and equestrian. Perhaps because of my rebellious attitude, Major Lamborn did not allow me to participate in the equestrian event, but I took second place in boxing and won the track competition.

A few days later at Chapel, Major Lamborn was to announce the result of the voting among the kids for the Gold Medal Camper, the boy who best represented the traditions of Camp Red Cloud. I knew some boys would vote for me because they liked my rebellious behavior, but I was rooting for Buddy Boyd, a very genial and friendly boy who seemed to like everyone and whose behavior was perfectly in line. Fortunately, at Chapel the next Sunday, it was announced that Buddy had won the Gold Medal, and I came in second. After that, Major Lamborn wrote to my parents about my resistance to the rules. Although they seemed to agree with Major Lamborn, they did not take up

the issue very seriously with me.

In 1924 when I was ten, my brother Van graduated from Friends School at the head of his class with an honor's scholarship to Johns Hopkins. But because Van was only 15 years old, Mother and Father felt that he was not yet mature enough to attend college. The runner-up was given his scholarship. That summer, in order to enhance Van's social development, Mother took all three of us to France for a year of schooling. Van and I entered the École Alsacienne on Rue d'Assas in Paris, and Carol took courses at the Sorbonne.

My father, who was president of a straw hat manufacturing company in Baltimore, had to stay home. But he persuaded his sister to move into our house with her family for the school year to take care of the house and the meals.

During that summer, before École Alsacienne opened, Mother took me to Dijon to stay with the Bongrand family, friends of my uncle. The Bongrands had three children: two boys, ages nine and six, and a girl, four. I got on well with the family. Wine was served at lunch and dinner. Robert, the older boy, was given a glass partially diluted with water. Jacquot, the younger boy, had a bit less in his glass. The little girl was given only a few drops of wine. I was urged to accept a glass of diluted wine but to their surprise and amazement, I declined the wine altogether because my parents were teetotalers and Mother was especially opposed to alcohol.

Mme. Bongrand took me sightseeing nearly every day. Dijon was an interesting city of historic importance, but I did not absorb very much of Mme. Bongrand's teachings about the city or the rest of Burgundy. I much preferred hanging out with Robert. Robert had a bicycle, so his mother got one for me and the two of us went exploring as often as possible. Our favorite place to visit was Beaune, the major wine-producing town of Burgundy. With its chateaux and wineries, Beaune was really more beautiful and more interesting than Dijon.

Robert and I had a great summer. We tried to keep in touch for several years after I left France, and his mother and I exchanged Christmas cards every year. Sadly, Robert was killed in World War II, but I continued exchanging correspondence with Mme. Bongrand until her death.

Thanks to the Bongrand family, I could converse in French fairly well by the time the École Alsacienne in Paris opened in the fall. Both Van and I were pensionnaires (boarding students) at the school, and we each lived in separate dormitories. Though many students attended the school, there were few boarders. There were only two other boys in the dormitory and we had dinner every evening with our housemaster, M. Marcel Texier. Van, in the upper school, had the school principal, M. Pekinya, as his housemaster. M. Pekinya taught Van how to play bridge and he immediately fell in love with the game. After that, M. Pekinya and Van played bridge together most evenings.

At École Alsacienne, grades were distributed at the end of each month. An honor was called a "bonne

note.” I was awarded a *bonne note* every month except for one. The English teacher contended that I could not speak English. She taught the students by writing English words on the blackboard and asking me to pronounce them for the class. One day, she wrote the word “castle,” and I pronounced it for her, but she then corrected me and pronounced it “castile” for the class. I then re-corrected her and informed her that she had pronounced the name of soap. She became furious and shouted, “Dis donc, le petit américain ne peut pas parler Anglais!” (The little American can’t speak English!)

We celebrated Christmas in Chamonix. Chamonix is located at the heart of the French Alps and very close to Mt. Dolent where the French, Swiss and Italian borders meet. The first Winter Olympic Games had been held there earlier in the year so the place was in perfect shape for winter sports. I was afraid of downhill skiing, so I spent my time trying to learn to ice skate.

Since I was comfortable with horses (thanks to Captain Kilbourne at Camp Red Cloud), I also decided to try skijoring, which involved being pulled on skis behind a horse. I found this to be great fun until I fell off into the snow on a curve. I managed to put my skis back on and was wondering what to do next when I saw that the horse had stopped a short distance ahead, so I walked forward on the skis until I could pick up the reins. I was comfortably pulled back to the barn, with pride and pleasant recollections of Captain Kilbourne. We left Chamonix and were soon aboard a ship on the way home.

After our return home from France, Van tried to teach me to play bridge, but it did not go well. I kept missing the point. Van was so troubled by my performance that he spoke to Mother quietly one day, telling her that he feared I was mentally deficient.

When I entered the sixth grade in Baltimore, eight boys and I organized a club we called “Triple S,” for “Secret Service Society.” The headquarters was established in the basement of my house. My father created a clubroom there and moved his pool table down from the third floor for us to use. Except for playing pool and planning when the next meeting should be, I can’t remember if we ever organized any activities.

On my twelfth birthday, my parents arranged a party at our house. Mother invited all of the boys in my class to the party and encouraged each of them to invite one of the girls to accompany them. Only three brought girls along. I was one of them. The central hall of our house extended about 30 feet from the front door to the stairway. Mother had strung wires at three-foot intervals along the hallway and gave every kid rolls of confetti to throw over the wires. What resulted was a rainstorm of confetti strips, creating something like a maze throughout the hall. Before long, most of the boys were sorry that they had not invited girls. I think they were envious of the three of us who had dates.



At a very young age, when asked what I planned to do when I grew up, I replied that I wanted to be a policeman or fireman. A few years later, I wanted to be a singer, an actor, a navy officer or a writer. At the age of 14, my choice was to be an ambassador, minister or doctor. I finally settled on becoming a doctor during my first year at Yale. I should acknowledge that neither my parents nor my siblings tried to influence my plans for a career. Carol's hope was to be affiliated with the League of Nations. Van always wanted to be a lawyer and practice with my uncle, Rob Griffing. As my days at Friends School were nearing an end, it was time for me to consider my future.

Mother was eager for me to be admitted to Andover, where Grandfather Griffing, Uncle Rob, my two cousins and my brother had gone to school. I wondered if the world surrounding Boston would differ widely from that in and around Baltimore.

When the school year at Friends was over, I felt very grown up at the age of 13. I had participated in several plays and presentations at Friends School, and my mother and father had attended every one of them. I had played tennis and baseball with the boys in the neighborhood, and I knew most of their parents. Throughout my childhood years in Baltimore, the cohesive social forces had been families and church. Life outside of Baltimore would require that I adapt to a new set of rules, make new friends and discover new activities. The prospects before me were very exciting.

Before entering Andover, I took one more trip to Europe with Mother, this time to England and Greece. Joining us in our travels were Uncle Rob, Aunt Ethel, and their children, Dorothy and Bob. Although I was to enter Andover at the end of the summer, the administrators suggested that I needed to work on my arithmetic before starting, so Uncle Rob agreed to tutor me over the summer while we were abroad. By this time, Van had completed his first year at Yale and was a member of the Harvard-Yale track team. His team was about to race against the Oxford-Cambridge team in England.

The track event at Oxford was a dramatic experience for us. Van tied for first place in the high jump with an English aristocrat. The trip through Greece was spectacular as well. Mother gave us a rich account of ancient history and told us about how Grandfather Griffing had studied Greek culture and had given an oration in ancient Greek at his Yale graduation.

As far as my studies were going, Uncle Rob was diligent in his arithmetic tutoring, and by the end of the trip I was able to pass the arithmetic test he had prepared for me to submit to Andover upon arrival. My life was about to take an important turn as I began to mature. Those years growing up in the bosom of my family had been warm and full of affection. I was now going to spread my wings a little and leave the comfort of my Baltimore upbringing to test my mettle in the freshman class at Andover.

## **Chapter 2: Andover and Yale (1927-1933)**

In the fall of 1927, I entered the freshman class of Philips Academy, Andover, at age 13. During my first year, the school staged a gala celebration of the 150th year of American independence with lectures by distinguished historians who spoke of changes in social patterns, important innovations and lessons learned since the U.S. was founded. The celebration was very impressive, but a bit over my head. I tried to remember some of the highlights so that I could write to Mother about them, but I was only able to recall the significance of the Continental Congress in 1776.

My first roommate at Andover was Teddy Dunn. We were assigned to Williams Hall, where all entering students under the age of 16 resided. Teddy looked to me like a kid who was not very good at defending himself, one the other boys would probably beat up. But there was a quality of decency about Teddy, and we enjoyed each other very much and became great friends.

The boys in our dormitory were very nice, but life at Andover was definitely different from life in Baltimore. Many of the boys at Andover had parents who were divorced. Divorce was not something with which I was familiar, but I knew that it happened. I did not really understand how or why parents dissolved their relationships, but I took the attitude that people are different and let it go at that. Although there was chapel every Sunday, most of my classmates were not active in church. During my stay at Andover, I did remain active in church, and this made me a bit different from the other boys.

Andover was a wonderful experience, mostly because of friendly, enthusiastic students and inspiring faculty members. The faculty not only taught us scholarly material, but they made it fun -- or rather, they made learning fun. I particularly recall the Latin literature teacher, Charles Forbes, bringing Ovid to life for us. One day, when telling us about the sites in Rome, he urged us to think about Italy as an appropriate place for our honeymoon when we should marry. To quote him as closely as I can recall, he said, "As you walk with her into a palace, call her attention to the decorative ceiling and say, 'What lovely laquearia.' Suzie will be so impressed with you."

One of the English teachers, Allan Healy, was in charge of dramatic arts. Since there were no girls attending Andover at that time, boys had to perform the female roles. I volunteered to play the title role in the play, *Dulcey*, and the Queen in, *The Queen's Husband* during my third year. I eventually became president of the Dramat, Andover's drama club.

I was appointed to the debating team with the two smartest boys in our class, Max Millikan and Lyman Spitzer, Jr. Max's father, Robert Andrews Millikan, was the physicist whose famous oil-drop experiment provided the first measurement of the electric charge carried by a single electron. Lyman, himself, would go on to become a

prominent astrophysicist, who made efforts over several decades to convince the U.S. government to place an observation platform in orbit. Finally this resulted in the deployment of the Hubble Space Telescope in 1990. Lyman's father had been Uncle Rob Griffing's roommate at Yale.

The Andover forensic team debated against the freshmen teams from Exeter, Harvard and Yale, and teams from other boys' schools as well. Thanks to the brilliance of my two colleagues, our team, in which I played a relatively minor role, won all of the debates. I did achieve, however, the distinction of winning the declamation competition, in which both Max and Lyman were also entered. We all enjoyed ourselves immensely.

Despite my active participation in Andover's culture, or maybe because of it, I was not an ideal student. My rebelliousness re-emerged at times, especially during my senior year. When "on leave for a dental appointment," I sometimes bought a bottle of whiskey at a speakeasy called the Casa d'Italia in Boston. It was to share with my then-roommate, Frank Platt, whose father was an attorney and the mayor of Rye, Connecticut.

Although we were close friends, Frank and I had quite different personalities and behavior. He was very intrigued by challenges of all sorts. When we were both in the honors class in literature, one task was to select an author and critique one of his books. Frank chose Kant's Critique of Pure Reason, while I picked Balzac's *Le Peau de Chagrin*. Frank's habit was to stay up each night one hour longer than I in order to pursue some sort of challenge. At one point he became fascinated by chess and, after many late-night practice sessions, he challenged the captain of the chess team. Frank's diligence paid off handsomely because the captain accepted the challenge and was checkmated in less than two hours. The unexpected victory became a favorite topic of discussion among our classmates, but most of them dismissed it as a fluke and insisted that there be a rematch. It took place two weeks later, and Frank defeated the captain again, this time in only 45 minutes. Thereafter, Frank seemed to lose his fascination with chess. He had other worlds to conquer.

Shortly before graduation, Frank chose another achievement -- to graduate cum laude. During the late evening hour, he practiced removing a pair of plain glass spectacles as if he were responding thoughtfully to a question asked by a teacher. It was a very dignified, engaging maneuver. He did not succeed in graduating cum laude, but at the headmaster's lunch party held after our graduation, the chairman of the English department rewarded Frank. I had been invited to attend and sat to the right of a lady seated next to the headmaster and directly across from the English professor. The lady asked the English professor about the quality and achievements of his students. He promptly mentioned Frank Platt as one who gave careful thought to his answers in class, while so many students answered with a quick, perhaps correct, but thoughtless reply. The professor even displayed Frank's gesture and earnest stance as he removed his glasses.

We seniors were allowed to smoke on a path outside the dormitory, but not indoors. Our quarters consisted of a living room with fireplace and two bedrooms. Our “quiet time” was spent lying on the floor close to the fireplace, sipping whisky, smoking, blowing the smoke up the chimney and flipping the butt onto a ledge inside the chimney.

Our dorm proctor used to inspect the rooms from time to time in the evening. Fortunately, he never caught us red-handed, although once or twice as he walked out he said he thought he smelled smoke. He was also the baseball coach, and Frank happened to be the number-one pitcher. I played on the tennis team. Among our other slightly rebellious activities, Frank and I kept a locked trunk full of cooking utensils in our quarters, even though students were not allowed to cook in their rooms. One evening I discovered that someone had broken into the trunk and stolen the cooking equipment. The theft caused an uproar because other students also had caches of cooking utensils. Outraged, I visited the campus electrician’s shop during the night -- (we suspected that the equipment might just be there) -- and recovered our utensils. At morning chapel, the headmaster repeatedly demanded that the guilty student confess to the break-in at the electrician’s shop. Not surprisingly, I declined to do so. Ironically, the headmaster mentioned the break-in to the lady sitting between him and me at the post-graduation lunch and said that if he had ever been able to identify the culprit, the student would never have graduated. The situation was reminiscent of Camp Red Cloud, in that I felt my actions in rescuing my belongings were justified. In any case, I graduated in 1931 and entered Yale that fall, at the age of 17, with 90 classmates from Andover.

On entering Yale, I again roomed with Frank, still an ambitious and somewhat dramatic fellow. Our room was in the freshman quadrangle. Across the hall was a scion of the Johnny Walker whiskey family. His father, who lived in Canada because of Prohibition in the U.S., kept him well supplied with spiritus frumenti. About once a month, the boy held a party in his quarters. The cocktail parties provided a new challenge for Frank, this time a political one.

At Yale, general elections were held for most school responsibilities, such as class officer, manager of a major sport, editor of the magazine, and so forth. Frank’s strategy -- (he had already acquired the nickname, “Boss Tweed”) -- was to invite to the monthly parties the less well-known boys, those generally categorized as “bookworms.” Most of them lived on the top floor of the dormitory and did not participate much in group activities. Nevertheless, they came to the parties with alacrity and obviously enjoyed being part of the crowd. Frank would start his political engineering with a touching story of a student who aspired to a particular office, but who was being ignored by the “in group” of our class. Characteristically, the bookworms became sympathetic and offered to vote for the student Frank was trying to help. At that point, one of Frank’s friends whose father was a member of the House of Representatives, produced a ballot which only needed to be signed.

By Frank’s junior year, he did in truth become “Boss Tweed,” as he virtually controlled Yale undergraduate

politics. Unfortunately, however, because of the time spent electioneering and giving cocktail parties, he did not graduate in 1935 with quite the same academic distinction he had achieved at Andover. Frank had planned to enter the law school at Yale, where his father had studied. Instead, Frank started at the University of Virginia and then switched to and graduated from Columbia Law School. He married a lovely young woman, and raised a family with her in Rye, Connecticut.

During the weekend of the annual Yale-Harvard football game, I visited my brother, Van, in Cambridge, Massachusetts, where he was studying at Harvard Law School. I stayed in his apartment, and we ate lunch at the Lincoln's Inn Club, where Van was a member. I learned about law school and how hard the students worked and how late they stayed up at night reading and writing. Van got good grades but did not win any honors such as appointment to the Law Review, perhaps because he was so dedicated to playing bridge. I was glad to be headed to medical school because I was not sure I could cut the mustard in law school.

Since that day during our childhood when Van tried in vain to teach me to play bridge -- the occasion after which he warned my mother that I might be mentally retarded -- Van had been addicted to bridge. On one of my visits to Cambridge, I went directly to the Lincoln's Inn Club and found Van sitting at a table in the living room with a foursome, playing bridge with gloves on. Later he explained that he had fallen behind in his studies and had taken an oath not touch another card.

After his graduation from Harvard Law School, Van wanted very much to enter the practice of our uncle, Rob Griffing. Father and Mother backed him strongly, but Uncle Rob did not offer him a chance to join his practice in Riverhead. As he told Mother, Van was not serious enough in his endeavors and was too much of a playboy. It did not seem to Uncle Rob that Van was ready to settle down and seriously pursue the profession. Van was terribly disappointed by this turn of events, as he had had good success with everything in the past. But Van needed to mature a bit. Eventually he received a bid from a firm in Ohio where he worked for a time until he was invited to join one of the most prominent law firms in Baltimore. He stayed with that Baltimore firm for the rest of his life, until his death from leukemia at the age of 81.

Although Van and I had different personalities and interests, we were emotionally close. Close bonding was evident among most of the Wolfs and Griffings. After my graduation from Johns Hopkins Medical School, no one in our family would consult a doctor or take a treatment without first consulting me, and I did not get involved in any legal matter without Van's help. Carol and I were also close in a different way -- more related to loyalty than sentiment.

Carol married Roszel, who was practicing law in Baltimore. He was the oldest son of the Thomsen family,

the best friends of my father. He later became a judge of the Federal Court of Appeals that included Baltimore and Washington. Carol and Roszel had three children: a son, George Edward, who became a lawyer in his father's former office, and two daughters, Grace and Peggy.

Van married Alice Kimberly, the daughter of a family friend. They also had three children, two boys and a girl. When their children were in their early teens, I urged both Carol and Van to give them the rich opportunity of schooling in France, which our parents had given us. Although both of them were more financially capable of doing so than I was, they did not give their children that opportunity. I felt that this decision may have had something to do with the influence of their spouses, and also I wondered if this was a reflection of Baltimore's "small town" sociology. In spite of Baltimore's bustling trade and elevated business status, it was still rather provincial.

But I knew their children would be missing those truly enriching experiences that had so influenced all of us as we were growing up. I knew this was a legacy from our grandfather, carried on by our mother. I think I understood Mother better than my siblings did. Her motivation had been to develop us intellectually by exposing us to different places and cultures. I thought it was a shame that Carol and Van were not taking advantage of that opportunity, and the chance to carry on the family tradition into the third generation. I knew within myself that when I married and had children, I would provide those same pleasurable and enriching activities that had so strongly influenced my life.

During the summer after my first year at Yale, I got a job tutoring a 13- year-old boy named Tom White from Smithtown, Long Island. His father was the general manager of Hearst Enterprises. His mother had hired Van to tutor a few summers before. This summer, she wanted me to teach Tom arithmetic, English literature, tennis and golf, and prepare him for prep school. I was keen to do so, except for the golf. I was very awkward with a golf club. In any event, I taught him and his two sisters to play tennis, which they all enjoyed very much.

Mr. White's job, as far as I could see, was to entertain businessmen who were potential advertisers in Hearst publications. Nearly every day, his chauffeur would drive in with one or two businessmen, often accompanied by their wives. The first item on the agenda was usually swimming in the river on the edge of their property. My job was to find bathing garments that would fit the guests. I was also to converse with them while we swam, with the intent of finding out more about their businesses and so forth. After about 45 minutes in the water and on the beach, it was time to dress for dinner. Mrs. White, with the maid, usually prepared cocktails before dinner. At dinner, I was placed next to the wife of the man that Mr. White had judged as the more promising advertiser. As dessert time approached, Mr. White would ask me to produce a particular after-dinner drink. At that point, any ladies present would withdraw with Mrs. White, and Tom and I would take care of his homework. Mr. White would then remain closeted with his guests until it was time for the chauffeur to take them back to the city.



It was during that summer that I met Wigsy. I've long since forgotten her real name, but she was a very good-looking girl, very friendly. Her father had been a friend of the Whites, but had died a month or so before I met her. Her mother was pleased and relieved to have someone pay attention to Wigsy and accompany her to dances and parties. I was delighted to escort Wigsy and squired her around town. We shared a wonderful summer together and remained great friends for some time thereafter.

I returned to Yale for the fall semester to face a most embarrassing experience. The track coach, who had trained my brother, decided that if he could only spend enough time working with me, he could turn me into an even bigger track star than Van. I was reluctant to even attempt to match Van's record -- he had become the U.S. indoor high jump champion. But the coach insisted that I report to the track every afternoon for the next several days so he could work with me. I complied with much trepidation until he gave up because I did not show the promise for which he had hoped.

Even more embarrassing, but eventually more productive, was the decision of my parents to take me out of Yale. I was spending every weekend going to debutante parties in New York and spending time with Wigsy. It wasn't that my friends were a problem, but my parents felt that I needed to be more focused in my studies. New York was too much of a distraction, and I had become just a bit too footloose and fancy-free. They wanted me back in Baltimore, where I could finish college at Johns Hopkins.

I did not want to leave Yale, but Mother and Father had a strong point. My peregrinations back and forth to New York were taking up too much of my time. Moreover, the Depression was nearing its worst period. Hoping to stay at Yale, and despite my parents' feelings, I approached the self-help office to see if I could sign up to work for my tuition. The answer was "No," so at the end of the academic year I went back to Baltimore. By this time, Wigsy had become engaged to a classmate of mine. I was very happy for them both, and certainly had no marital ambitions of my own at that moment. Clearly, it was time to move on.

It is evident that my academic career at Yale was not distinguished, but I was very active in extracurricular activities. I joined Zeta Psi, which had been Uncle Rob's fraternity years before. I was also the manager of the freshman wrestling team, which was fun, but a bit strenuous. Although I never wrestled in a competitive match, I had to fill in as opponent to each member of the squad during the practice sessions. My only distinction during my two years at Yale was that I was a member of the honors class in English. I also sang in the glee club and was an active member of the Dramat, Yale's dramatics club.

Despite the fact that I was unable to stay on and graduate from Yale, I did keep in touch by becoming a class agent and collecting contributions from fellow classmates for the Alumni Fund. I worked with the Alumni Fund for the next 45 years. I also supported the fund and attended several gatherings, including the 25th reunion of my class.

### **Chapter 3: Back in Baltimore – Johns Hopkins (1933-1934)**

Throughout the world at large, the Depression brought frightful upheavals. Among the many demoralizing circumstances, Russia was in turmoil, Hitler and the Nazis were stirring Germany, Spain was in civil war, the American economy was prostrate, and Huey Long was in full feather.

As the Depression took its toll, my father's hat manufacturing company began to fail. His main concern, however, was for the welfare of his employees and the wives of the company's founders, Mr. Townsend and Mr. Grace. I knew very well of my father's incorruptible sense of responsibility and his enormous generosity of spirit, and nothing demonstrated this more clearly than the way he handled the closure of his company.

He managed to find all of his employees jobs in another company, except for one engineer. For him, my father bought a gasoline service station and instructed all members of our family to buy their gas from him. My father then rented out all of the space in his large factory, and instructed that the corpus of Mr. Townsend's and Mr. Grace's investments in the company be given to their wives. My father also performed an important community service for many years as the treasurer for many of the charitable organizations in Baltimore. His compassionate example was a beacon throughout my life.

When I returned home to Baltimore, my father informed me that I had already been accepted at Hopkins for advanced status into the class of 1935, but my academic advisor wanted to discuss my future at Hopkins. When I entered his office, I noticed that he had my Yale academic record on his desk. He looked up from the pages and asked, "Do you have a reason to want to spend two more years in college? With your Yale record, you could graduate in one year if you took one more science and perhaps advanced calculus." I readily agreed to do so and spent a highly enjoyable year at Hopkins. I took the required organic chemistry course during the summer.

Once I felt comfortably settled, I obtained an interview for admission to the medical school for the following autumn. It was an impressive experience -- but a little unnerving -- to find myself for the first time sitting in the office of the Director of Admissions, Dr. Cowles Andrus. Three other applicants and I were sitting in a room adjacent to his office. When my name was called, I entered Dr. Andrus' office with something less than confidence. He was gracious, asked me to sit down and said, "Tell me what you are interested in." At a loss, I quickly replied, "Collecting antiques." Having traveled a good deal in Europe with my parents during childhood, I had acquired a small collection of relatively unimportant old items. As soon as I mentioned this unscientific hobby, my heart sank. I knew I should have replied that I was interested in some activity such as dissecting rats in the cellar. Dr. Andrus, however, did not seem perturbed or surprised. He asked, "What have you got?" I replied, "I have some pages of

Gregorian chants from a monastery in Italy.” “Splendid,” he said, “Are they four-bar or five-bar?” I really did not know, but since staves having five lines are standard in the notation of modern-day music, I replied, “I think they may be four-bar.” That set off a discussion of sacred music in which, with little success, I tried to inject an occasional relevant comment. A short time later, Dr. Andrus stood up, turned to me and asked if I had any questions. I lamely said, “Since I am applying to the medical school, I thought you might ask me a question about chemistry or math.” He replied, “Well, if I were you, I wouldn’t worry about it.” Nevertheless, two weeks later I learned that I had been accepted to the Hopkins medical school to start in the fall.

Admissions officers at the time were guided by the belief that students should have a broad liberal education before applying to medical school. While they demanded that applicants have a strong record of academic performance in college, they were less concerned with grades than with indications of breadth of interest, strength of motivation, emotional maturity and the ability to think and communicate. I felt fortunate to have been admitted under that pattern of selection, the basis of which I owed to my parents.

After completing the chemistry course during the summer of 1934 and prior to my entry into Johns Hopkins in the autumn, I received an invitation from the English Speaking Union, offering me an opportunity to be a part of their America-Great Britain youth exchange program. The purpose of the program was to foster cohesion among the English-speaking countries of the world. I was supposed to represent Maryland, and my cousin, Bob Griffing, was selected to represent New York. I suspect that some family member had a hand in securing this unusual opportunity for Bob and me.

Early in June, Bob and I sailed to England. We encountered two engaging young women on the ship and agreed to share a table in the dining room with them. They intended to travel in France after spending a few weeks in England. We did not plan to see them during our sojourn in England but suggested that we cross the Channel with them after they concluded their visit. One of the girls brought her Buick roadster with her on the ship and offered to drive us during the trip around France.

Since I had been accepted into medical school, my schedule of activities was centered on visiting the many hospitals in Great Britain. Bob, on the other hand, was primarily interested in art and architecture. Nearly every afternoon, we were free for sightseeing.

Visiting the famous British hospitals was, of course, a thrilling experience for me, but what I found most remarkable was the reaction of the professors upon learning that I was about to enter Johns Hopkins Medical School in the fall. I suppose they were surprised that a young squirt like me was about to go to Hopkins, but they expressed deep respect for the institution. Some of them mentioned the names of Hopkins professors whom they had met. They



Caricature of Cousin Bob Griffing and Stewart Wolf

were impressed.

Our most intriguing visit was to Stratford-on-Avon, William Shakespeare's birthplace and the site of the Shakespeare Memorial Theater where the annual Shakespearean festivals are held. In 1926, the theater had burned down. Sir Archibald Flower, then the mayor of the town, provided the funds for rebuilding the theater in 1932. Since there were no medical schools in Stratford-on-Avon, my time was spent playing tennis with Sir Archibald Flower's son. Although he beat me pretty easily, he was very gracious about it. Every time I missed a play, he would shout a friendly, "Bad luck, old boy." One evening Bob and I went to the Shakespearean Theater with our hosts and their dinner guests, filling up a large Daimler and a similar sized Rolls Royce to get there. We noticed that the seats at the theater were all occupied except for the fourth row. As we entered, the entire audience stood up until our party had been seated in the fourth row, in recognition of Sir Archibald Flower. Within a minute or two, the performance of *King Lear* was underway.

After our very interesting and enjoyable visits with our British hosts and the professional engagements each morning, Bob and I began writing thank-you notes and preparing for the trip to France. We asked the two girls we met on the ship to put the Buick on the ferry and off we'd go. The four of us drove to Dover and took the ferry to

Calais. We made the rounds of France together, following fairly closely the route taken by the bicycle sportsmen every year. Because the hotels tended to charge Americans higher prices for rooms than the French travelers, and since I was fluent in French, I was selected to make the arrangements at the front desk. And since a blue Buick driving up to the entry would be a dead giveaway, the car was parked in a nearby alley with Bob and the girls inside. When we reached Biarritz, we decided on a beautiful hotel near the ocean. The clerk at the desk asked me to describe our group. I told her we had two men and two women, and we wanted one room for the men and one room for the women. At first she looked at me as if I had a screw loose, but since I insisted on that arrangement, she smiled a friendly smile and said, “Bien, pour le moment.” (Okay, for the moment.)

The whole trip went very well, except for one near calamity. The Buick was a roadster with a rumble seat. The older girl (about 23) and I occupied the rumble seat, while the younger girl (about 19) drove with Bob beside her. We passed a young man on a motorcycle. Then, behind us, he picked up speed and ran into our back bumper. The impact nearly threw him into the rumble seat and sent his motorcycle flying off the road. The young man ran back to inspect his motorcycle so he did not appear to be hurt, but the condition of his motorcycle was doubtful. Nevertheless, despite our offers of help, he insisted on waiting there with his bike. We were uneasy about the whole situation, but eventually we concluded there was nothing we could do, so we drove on to our next destination. We never did know what became of the motorcyclist.

We concluded our trip in Paris, where the girls took off in the car, drove to the port and sailed back to the U.S. A short time later, Bob and I sailed home, full of news and stories for our families. With several days of free time before starting my freshman year of medical school, I gave a good deal of thought to the opportunities and challenges that lay ahead of me. I did not want to repeat my Yale experience. I looked back on that as an opportunity that I had not taken seriously enough. I began to wonder about how prepared I was for the intellectual challenges and the personal growth that would be required in medical school.

When I was at Yale, there were several outstanding scholars enriching the intellectual environment and making themselves available to the students, but I had lacked the wisdom to sign up for their courses. Although at every level of schooling I was able to earn good grades, it was not until I entered medical school that my mind and spirit were truly opened to scholarship. I felt that I had been late in coming to an appreciation of the intellectual opportunities that were available to me in college and I was determined to take full advantage of the opportunities in medical school.

## Chapter 4: The Medical School Years (1934-1938) at Johns Hopkins



Johns Hopkins University

It was the end of August 1934, I was 20 years old and was about to begin medical school with feelings of gratitude for my family and a resolve to really start growing up.

To travel from Roland Park to the Johns Hopkins Medical School and Hospital, it was necessary to cross Baltimore from the northeast to the southwest. Fortunately, I had been able to purchase a Ford Phaeton before leaving Yale, so on the appointed day I drove over to start medical school.

There was no matriculation, no ceremony and I saw no instructions posted. I knew the first lesson would be in anatomy, so I entered the anatomy building where I saw a notice board on the wall, but there were no notices on it. I waited a few minutes for someone to come by and post instructions and directions to the dissecting room. No one came. Finally, another student walked by and told me where to go.

Three of us, whose names were near the end of the alphabet, were assigned to a single cadaver. This was not my first experience with a cadaver, but it was the first time I had ever had to do such a dissection by myself, or with other freshmen students. We were told to start at the chest and work down, saving the brain for last. Every now and then, an instructor would come by to help us. We did pretty well until we began to dissect the abdomen.

We thought we were doing a fairly good job of it when the professor, Dr. Lewis Weed, arrived. Dr. Weed asked me to name the branches of the celiac artery. Fortunately, I had studied the abdomen in the standard anatomy book so I easily listed the names for him. "Well, let's see," he said, and began to clear the field below the diaphragm to display the branches. As luck would have it, there was an anomalous branching of the celiac artery in this particular cadaver, so my answer in this case was wrong.

There was an important lesson in that experience, but it escaped me at that moment. I felt that Dr. Weed had



been unfair, as if the abnormal celiac artery had been the equivalent of a “trick question” asked at my expense. This, of course, was not the case. It was only later that I understood this lesson, as well as the lesson of the empty notice board.

These were not moments of unfairness, inequality, or persecution. I simply needed to learn that the world would not be changed to suit my convenience or perhaps my expectations. It was I who needed to adapt. These were also lessons in taking personal responsibility and initiative, in not making assumptions without an adequate investigation into the possibilities. In a way, these were the same lessons I should have learned at Camp Red Cloud as a child, but my youthful rebelliousness had prevented such objectivity at the time.

The lessons that we fail to learn are often repeated until we do learn them. It was all a part of maturing and adapting to life in such a way as to increase and enhance one’s experiences and contributions. Today, I am grateful for those experiences, and the lessons I finally learned from them. They made me a better person and a better doctor. The learning at Johns Hopkins was far greater than simply mastering materials in a textbook. It was there that I finally began to understand life. That first year was a significant time of maturing and finding a focus for my career.

During the summers while I was in medical school, the time was largely dominated in some way by music. With my sister and brother, I participated in a series of Gilbert and Sullivan operettas that were presented by our church. All three of us had leading roles in *The Gondoliers*, *The Mikado*, and *Pirates of Penzance*. That love of music never left me.

We also organized a Sunday evening singing club with a half dozen friends, and from that, our idea for a dance club emerged. We felt that the local restaurants were too crowded for dancing. Three of the members in our singing club had houses that contained large, danceable ground floors, so our dance club rotated among these houses throughout the summer. Each house could provide room for about 35 couples, so we had to limit the invitations to join the club. That, of course, meant that somebody’s sister or brother or neighbor could not be invited. Our invitations, we decided, would go to friends who enjoyed dancing at social gatherings as distinguished from just visiting. We wanted people who would actually spend the time out on the dance floor rather than just standing around.

I decided to call the society editor of the *Baltimore Sun* to let her know that we were not planning a party, but that our get-togethers were spontaneous and informal. My intention was that these monthly dance events should not be announced in the paper; I did not want anyone not invited to feel left out. The society editor agreed not to publish anything, but when the date for the first dance arrived, she nevertheless announced it in her column. Those evenings of music and dance were wonderful times of recreation with my family and friends. The social gatherings continued

every summer while I was at Johns Hopkins. When autumn came and it was time to return to my studies, those activities ended until the next summer, and medical school took precedence again.

Class time at Hopkins was spent doing things on a laboratory table with hands-on help and guidance from faculty members -- not only in anatomy but also in all of the pre-clinical classes such as pathology, biochemistry, physiology, pharmacology, microbiology and so forth. There were very few lectures, and tests were rare. The teacher's job was to inspire, guide, and assist when necessary.

During free time, many of the students involved themselves in research activities in one of several departments. The relationships between students and faculty were cordial and informal. Often, a handful of students would work with a departmental chairman. There was a lot of one-on-one instruction and training, and the personal nature of the student-teacher interaction was invaluable.

In the third year of medical school, we began seeing patients on the wards. We were instructed in the art of taking the patient's history, talking with the patient, understanding him and learning how to gather clues to the patient's problem or disorder. We also learned how to conduct a physical examination, to recognize disturbances in the anatomy or in the bodily functions. These were the critical skills of the diagnosis, without which an appropriate treatment cannot be devised.

We were assigned to study individual patients. The process was designed so that each student, through dialogue and physical examination, could discover and understand what was wrong with the patient. Then the student was to report his suggestion for how the problem should be solved. These exchanges were usually handled on morning rounds with the intern, resident and supervising faculty doctor in attendance.

In addition to the chief professors, there were several younger faculty members who were teaching while still studying and doing research. The older, more mature volunteer faculty members were some of the most valuable resources at Hopkins. Several physicians whose practices were located elsewhere in the city would make rounds and attend conferences with the house staff and students every morning, have lunch in the faculty dining room, and tend to their private patients in the late afternoon. Some of these inspiring teacher-practitioners had served under Dr. William Osler or had attended Hopkins as students before Dr. Osler left for England in 1905. So influential and significant were Osler's contributions to medicine, that a few words about his life are appropriate here.

Dr. William Osler was -- and still is -- known as the father of modern medicine. At the turn of the 20th century, he was the best-known physician in the English-speaking world. Many have called him "the most influential physician in history." He was considered a man of dynamic personality and immense personal magnetism. Through his years of study, Osler developed positive principles about how clinical medicine could work more efficiently and

with a greater human touch. Both the University of Pennsylvania and Johns Hopkins University gave him a free hand to develop clinical medicine as he believed it should be. In 1889, Osler became the first professor of medicine at Johns Hopkins University, and was an expert in the diagnosis of diseases of the heart, lungs and blood. He also combined the physiological and psychological treatment of patients, understanding that a patient's state of mind was vitally important in achieving a cure. For this development, he was also called the father of psychosomatic medicine.

At Johns Hopkins, he helped create the system of postgraduate training for physicians that emphasized the need for medical students to spend time with patients to understand them culturally and intellectually, as well as medically. He felt that a medical doctor should not just take care of patients, but should also have the quality of being able to understand the life experiences of the patient which might provide generous clues about a patient's medical problem. A patient's ailment might have a contributing factor from his type of employment, recreational activities, home environment, or family history. Dr. Osler was the first physician to put these possibilities together and formalize them into a methodology for taking a patient's history.

Prior to Dr. Osler's innovations, patients were handled by practitioners who might not even be doctors, who might have no training or education at all. Osler was instrumental in bringing real doctors to Baltimore to improve the condition of medical treatment in the city, and also to eliminate practitioners who had no medical training or qualifications. His description of the deplorable treatment methods of most disorders was a major influence which led to the creation of the Rockefeller Institute for Medical Research in New York.

Osler led a generation of young doctors away from the textbooks and directly to the bedsides of the afflicted. For many years, his textbook, *Modern Medicine*, was the standard text for all students. Osler remained an outstanding example of the complete physician -- medically educated, intellectually astute, culturally sensitive, socially aware, and well-rounded in all areas. He built an international reputation as a brilliant and humane clinician that endured until his death in 1919.

Osler made contributions to knowledge in a wide spectrum of clinical fields, stimulating students who later became leaders of the medical profession. I was privileged to study under such men who had been trained by Dr. Osler or who had served under him. Dr. Louis Hamman was representative of such generous professors who, by example, taught us how to know patients and care for them with a penetrating warmth and understanding.

These invaluable opportunities for growth and learning abounded at Johns Hopkins. The clinical schedule was flexible and the teaching was very personal. It was available to encounter a faculty member or senior resident almost anywhere around the hospital. We were thus able to form personal acquaintances, and often warm mutual relationships, with the members of the faculty. Both faculty and residents whom we encountered during the day

taught and helped us in a person-to-person fashion. This was true whether the encounter was on the ward, in the emergency room, in the laboratory, or during a conference in the hall.

There were a half-dozen well-established, full-time faculty who represented the various medical specialties, among them the chief professor of medicine and the head of the Osler Medical Clinic, Dr. Warfield T. Longcope. Dr. Longcope was an aristocrat related to Wallace Simpson, who had married Edward, Prince of Wales, the latter having abdicated the crown of England in order to do so. Dr. Longcope, a recognized medical scientist, was a superb physician and clinical teacher, and a man fully immersed in William Osler's methods. He believed that the relationship between doctor and patient presupposed not only knowledge of his fellow men but also sympathy. In his later years, Dr. Longcope wrote, "This aspect of the practice of medicine has been designated as the art; yet I wonder whether it should not, most properly, be called the essence." He taught this belief and method both theoretically in discussions and personally as we observed his interactions with his patients.

On one occasion, I was examining a man with a serious respiratory ailment. Before listening to the patient's chest, Dr. Longcope spoke graciously to him and inquired about the sort of work the man did. "Farming," said the patient. Dr. Longcope sat down close to him and said, "I'm something of a farmer myself," then chatted a bit with the man and listened to his chest. Dr. Longcope and his colleagues on the faculty taught us that the first approach to a patient was to show respect.

Much of the Hopkins education was offered not during scheduled class time, but at the request of the students. Most of the students in my class elected to do research in the clinical or basic science departments. One classmate, George Engle, and I were so impressed by the Chairman of Psychiatry, Dr. Adolf Meyer, that we wanted to spend some time in his department as clinical clerks.

Dr. Meyer had come to Johns Hopkins in 1909 as a world-renowned psychiatric clinician and administrator, and was a distinguished neuroanatomist and neuropathologist. He had a view of humanity that was comprehensive, believing humans to be both psychobiological and social organisms whose unique and unusual characteristic was the power to symbolize. Dr. Meyer believed that the way language is used by an individual can reveal much about the state of his health, and the well-rounded physician will be sensitive to this when taking a patient's history. Understanding this ability to symbolize was yet one more open door to reaching a more complete understanding of the patient.

For example, there are states and conditions that are not easily represented in a linguistic symbolic mode. When words are used such as "love," "hate," "anger," "desire," or "anxiety," the speaker is attempting to symbolize conditions that are not concrete. To understand what that symbolic language may mean to the speaker, it is

necessary to learn a different mode of observation. Language may symbolize only an aspect or a part of a whole and thus become a symbol for an entire event. And because such terms and “right” and “wrong” are not concretely demonstrable (as are words such as “hot” and “cold”), a patient’s use of language will reflect the arbitrary and changeable symbolic system for governing behavior that reflects the attitudes of those from whom he absorbed it -- the influence of the patient’s life experiences and relationships on his behavior and beliefs.

In proposing an explanation for any disorder, Dr. Meyer encouraged a complete study of each patient’s body, brain and biography -- again, a methodology that harked back to Dr. Osler’s most basic premise of knowing the whole man. Dr. Meyer believed that every mental disorder originated in the responses of the patient to the experiences he encountered over a lifetime. He did not hold with the idea of a “fixed entity diagnosis,” but rather emphasized an approach to psychiatry in which patients were both diagnosed and treated as individuals, rather than seeking to fit a particular symptom into a textbook definition of mental illness and thus derive a “treatment.”

George and I found this methodology particularly fascinating, and were very keen to work with Dr. Meyer. We set about arranging permission for the clinical clerkship. We presented a proposal for our clerkship to the Dean, Dr. Alan M. Chesney. This was not a formal affair, but was a typically non-bureaucratic process. Dr. Chesney was a personable man and easy to approach. He had received both his bachelor’s degree and medical degree from Johns Hopkins, spent nearly his entire career on the faculty of the School of Medicine where he served as Dean for 24 years, and had a passion for his work. When we inquired about the clerkship, Dr. Chesney’s answer was, “Yes, if Dr. Meyer will have you.” Dr. Meyer readily agreed, and George and I spent an immensely valuable four weeks in the Department of Psychiatry.

Dr. Meyer held his assistants to the highest standards and was a strict disciplinarian. We learned a great deal under his tutelage. During our month-long clerkship, we each worked with three new patients whom Dr. Meyer assigned to us. He supervised our work and invited us to sit in on his regular morning conference rounds. We learned so much from Dr. Meyer’s uncanny ability to communicate with patients and to understand and help them deal with their problems.

Dr. Meyer’s person-to-person approach to teaching was not confined to the classroom or the hospital. Every month, he and his charming wife, Mary Potter Brooks Meyer, invited 12 members of our class to their house for cocktails, dinner and discussion. On the table in his living room was a wicker bowl filled with various puzzles he had solved. Before dinner was called, we students would try our skills on them -- with very little success, I must confess.

During these dinner evenings, Dr. Meyer would talk with us about the meanings of words, gestures and other behaviors, and about “reading” and understanding patients. This was a rich experience for me. One regular visitor to

these social gatherings described Meyer as “an informal host who entertained us with amusing reminiscences, often slightly wicked, of the luminaries around the world he had known.”

I thought these social gatherings were wonderful and enjoyed them immensely. However, the idea of spending an evening with a professor of psychiatry was not a preference among many of my classmates. Dr. Meyer’s approach to medicine and to life in general was beyond the textbook -- intuitive and subjective, the result of many years of research and experience. It was not something which could easily be absorbed if one was not open to this kind of learning. Many of my classmates did not find psychiatry at all interesting, and some would not come when invited.

Realizing that if some of the invited students did not show up, Mrs. Meyer might be embarrassed, I volunteered each month to substitute for a student who did not want to attend. Mrs. Meyer always welcomed me graciously, as she did those who had been expressly invited. I was sure that she knew what I was doing and probably she appreciated it, but it was never mentioned.

Another subject in which I did special clinical work was pathology. The Professor of Pathology, Dr. William G. MacCallum, was a remarkable man. He had been a member of the first graduating class of Johns Hopkins in 1897 and joined the medical faculty the following year. In 1917, he became the chairman of the department of pathology, a position he held until his retirement in 1943. Dr. MacCallum, like so many of the wonderful men under whom I studied, embodied the principles and practices of William Osler. He traveled extensively and used his trips to broaden his knowledge of pathological anatomy. He also wrote the definitive Textbook of Pathology. It was an honor and great privilege to study with Dr. MacCallum, and we became good friends.

Dr. MacCallum selected five students in our class to work with him during the summer of our third year. My classmates and I already had a great deal of experience performing autopsies under the guidance of Dr. MacCallum’s associate professor, Dr. Arnold Rich. Our job was to help Dr. MacCallum with the revision of his book and, at the same time, learn about doing research.

My special assignment was to gather data on cancer of the prostate. I needed to make microscopic studies of the testes of patients with and without cancer of the prostate. Dr. MacCallum’s hypothesis was that prostate cancer was caused by a disturbance in the Leydig cells of the testes. All complete autopsies on males include tissue samples from all bodily structures, which were preserved in formaldehyde. Shortly after starting the investigation, I discovered that the slices of the testicle obtained for microscopic examination at the time of the autopsy had been taken from different sites in the testicle. Furthermore, the location of the slices varied from person to person and the slices were cut from different directions. Therefore, the number and appearance of the Leydig cells differed from



case to case, making it impossible to study a standard number of cells or to make reliable comparisons.

With some trepidation, I reported my findings to Dr. MacCallum. He was surprised at the inconsistency, and immediately thanked me. He recognized that the Leydig cells could not shed any light on the cause of cancer of the prostate unless the tissue samples were prepared at autopsy in a uniform fashion. As a result of these findings, the autopsy procedure was changed and the process became more systematized.

By this time I had become interested in urea, the first organic chemical to be synthesized in the laboratory. The original synthesis had been done by Friedreich Wöhler in 1828. As I began to work with urea, I became intrigued by the fact that this chemical becomes cold when it goes into solution and that it will dissolve proteins, including the white of an egg. I thought it might have some usefulness in treating bacterial diseases. I had an opportunity to study the antibacterial power of urea in the pathology laboratory. Two years later, while in Newfoundland, I was able to demonstrate the therapeutic value of urea as a powerful dissolver of inflammatory tissue in patients suffering from tuberculosis.

Dr. Saul Jarcho, one of the youngest, most highly educated and inspiring members of the Hopkins faculty, was working at this time as a junior faculty member in the department of pathology. I had great affection and admiration for him as a model teacher, and he was quite influential -- another true example of the well-rounded doctor.



Dr. Saul Jarcho

Over the years, Dr. Jarcho made powerful contributions to the history of medicine, especially in his translations and interpretations of original documents relating to the history of medicine from Renaissance and early-modern Italy. He was a prolific writer with a deep intellectual understanding of his subjects combined with a rapier wit. Dr. Jarcho published extensive research in public health, cardiology, Roman literature, the history of medicine, and the history of New York -- among other things -- totaling over 500 scholarly articles. He also had a humorous side to his nature, and published a number of satirical works under the pseudonym, S. N. Gao.

Many years later at a special tribute luncheon, one of Dr. Jarcho's close friends mentioned his translations of the Latin inscriptions on the New York Academy of Medicine building, noting that Dr. Jarcho had made numerous and humorous remarks about the faulty Latin grammar and spelling he discovered engraved in the building's stone exterior. Dr. Jarcho's humor was as legendary as his scholarship.

On two occasions he elected to give our class a lecture. One was on Hodgkin's disease. He went to the podium and placed three large impressive books on the adjacent table. Looking over the group, he said, "I must apologize to you for selecting the text of this lecture from a book of the Apocrypha from the book of Ecclesiasticus." Then he read, "What will be shown to you, no man can understand." Then he added, "So it is with Hodgkin's disease."

On another occasion, Dr. Jarcho carefully scanned the students sitting in the front row who were frantically writing notes. "Stop!" he shouted. "This material is too important to write down!" Dr. Jarcho was one of those men of depth whom you couldn't help but admire, respect and enjoy.

During our second year of laboratory work in pathology, I was in a group of five students who had been assigned to Dr. Jarcho. One day, he stopped by my desk as I was busily looking at a slide through my microscope and said, "Wolf, I don't think we are learning enough. The group needs to gather with me once a week, perhaps over a keg of beer."

That seemed an unusual proposal but sensible to me, so I talked with the others in the group. One offered the living room at his house for a Friday evening gathering. Another volunteered to bring an eighth of a keg of beer each week. The experience was superb, opening our eyes and our minds to inquiry, and focusing less on memory exercises. The talk among us, led by Dr. Jarcho, might have sounded like a discussion of shoes and ships and sealing wax, but it was as nourishing as a rich dinner. I considered Dr. Jarcho a superior human being and admired him tremendously.

Since graduating from Hopkins, I stayed in touch with Dr. Jarcho. His work as a medical historian was nothing short of outstanding. I had an opportunity to work with him several years later when I was chairman of

the Wood Institute of the History of Medicine at the College of Physicians of Philadelphia. At that time, Dr. Jarcho was editor of the Bulletin of the College of Physicians of Philadelphia. My then future wife, Barbara, and I had opportunities to take Dr. Jarcho to lunch in New York where he lives, and to our great delight, he attended our wedding on February 14, 1998. He became a friend for life and has always been a great example, leader and mentor.

As our class rose to the senior year after the summer of 1937, I think most of us had become deeply impressed by and grateful for the liberal attitude of the faculty and for the traditions of the school, including some unique opportunities, one of which I shared with my classmate, Mason Knox.

Mason Knox and I were selected to work and learn at the Notre Dame Bay Memorial Hospital in Newfoundland during the summer preceding our senior year. The opportunity had been created by Dr. John M. Olds, a Hopkins graduate who, after concluding his surgical residency several years before, became the director of the hospital at Twillingate, a small island in a cove on the east side of Newfoundland.

Newfoundland was Great Britain's very first colony. The Vikings had visited the area in the year 1000, and in 1472 some Portuguese had settled in the area. Toward the end of the 15th century, John Cabot explored it, and in 1583 Sir Humphrey Gilbert claimed the land for England. France contested England's claim, and for several years the island changed hands until 1763, when the Treaty of Paris awarded Newfoundland to England. The French, however, had already named most of the towns. Toulinguet was then anglicized to Twillingate.

At the end of the First World War, the people of Twillingate began a movement to build a hospital as a memorial to the casualties of that war. At that time, the nearest hospital was 90 miles away by sea in St. Anthony, and the only other hospital was at St. John's, to which access was even more difficult. A community committee was formed to design the hospital and raise the money for its construction, and in 1924, the original Notre Dame Bay Memorial Hospital admitted its first patient.

In 1930, Dr. John Olds came to Twillingate from the United States, and four years later, took over as the director of the hospital. His was an interesting life of service and dedication. Olds fell in love with Newfoundland as a student, settled there, and stayed for the next 40 years. He has been described as "crusty, caring and unconventional," but his skill and service made him a real hero to the people of area. For two years during World War II, Dr. Olds was the only doctor at Twillingate.

In his later years, Dr. Olds received Canada's Centennial Medal and the Medal of the Order of Canada for his service to the people of Notre Dame Bay. The high school at Twillingate is now named after him. He was a legend for his medical service, and for often doing what others thought impossible. His biographer, Gary Saunders, recalls that in 1970, Newfoundland declared a province-wide "Dr. Olds Day." During the festivities, he was asked why he

came to Twillingate for one year and stayed for 40. He replied simply, “Because I liked it.”

The practical field experience of working at Twillingate with Dr. Olds would be a rare chance to learn and appreciate the depth of cultural differences between the practice of modern medicine and the traditional lifestyle and fatalism of Newfoundlanders. Mason Knox and I had many similarities, among them the belief that we should never ignore an opportunity, and this was an occasion not to be missed. We were very excited about the prospects before us experiences at this distant outpost in Canada.

When the date of our departure arrived, Mason and I took a ship from Boston to the southeast coastal city of St. John’s in Newfoundland. During our voyage, the ship stopped at a port in a small group of islands of which the French had kept ownership. Since it was a free-trade island, we decided to purchase some French wines and liqueurs to sustain us through the summer. However, when we reached the port of St. John’s, the customs officer informed us that alcoholic beverages were contraband in Newfoundland. He suggested that if we left our cartons with him, he would return them to us on our way back to the U.S. at the end of the summer. We were a bit skeptical, but obeyed his instructions to put them there on the dock. It was a sorrowful parting, but there was no alternative.

We proceeded to Twillingate to meet Dr. Olds. He was a very gracious host, showing us our quarters and promptly describing our tasks and putting us to work. Mason Knox aspired to a career in surgery, while I leaned toward internal medicine. We both got involved in everything, from assisting Dr. Olds in the operating room to studying patients suffering from various forms of tuberculosis. The work load was very intense. We later discovered that the reason for the flood of surgical and medical cases was that during the winter, when the mainland was deep in snow, access to medical facilities was impeded. Accordingly, as soon as the snow disappeared, the people who needed medical care flocked to Twillingate.

Many of the tuberculosis patients had developed a very thick deposition on the membrane that covered their lungs, tuberculous pleurisy. It was a serious disorder because the density of the secretion made it impossible to drain it from the chest through even a fairly large needle. Here I thought was a priceless opportunity to see what urea could do. I started infusing urea into the pleural space through a syringe. The urea worked perfectly to dissolve the thick secretion in the patient’s lungs just as it had dissolved egg whites in the lab, and it became possible to drain the chest cavity of the thick tuberculous deposits. Dr. Olds was delighted that we could do something truly helpful for many of the TB patients. When we later told Dr. MacCallum back in Baltimore, he was delighted and quite impressed with our findings and their potential importance for treating pleurisy.

Both Mason and I enjoyed assisting Dr. Olds at the operating table, and Mason was eventually to take full charge of some operations. I did only two by myself, one on a 40-year-old man who had injured his hand and

developed a tumor, and the other operation on my friend Mason, who had a lymphoma on his scalp. During the hand case, sweat was dripping from my brow as I cut through the skin and attempted and expected to have many new and unusual to isolate the cancerous mass so that it could be removed. Throughout the operation, the patient repeatedly warned me not to cut any nerves or tendons. At long last, I was able to remove the mass and sew up his skin. He soon had full movement and strength in his hand, which was a big relief for both of us.

Our highly enjoyable and profitable summer with Dr. Olds drew to a close, and Mason and I headed back to the port at St. John's. We both had serious misgivings about the fate of our supply of wine but were pleasantly surprised when the man at the dock pointed to the boxes just where we had left them, covered with spider webs, but otherwise untouched. On the voyage back to Boston, we offered our bottled prizes to the chief steward during a special Captain's dinner for all passengers. There was enough for everyone at the dinner and a liter of champagne for us to take home. Fortunately, by the time we landed in Boston and filled out our duty documents, we were under the limit.

My fourth year at Hopkins was, for the most part, spent with patients on the medical and surgical wards, in the pediatric clinic, and in delivering babies at the City Hospital. I also learned a great deal by spending time in the Hopkins Hospital, encountering residents and faculty members who were eager to help with guidance, bedside demonstrations and questions. I was most comfortable with the senior "thinking doctors," the diagnosticians with encyclopedic minds and an interest in patients as people.

One of these was Dr. Frank Ford, the chief of neurology. I was immensely impressed by his diagnostic skills and his willingness to teach at any time. I think he had a great deal to do with my preference for neuroscience throughout my subsequent medical career. Although my later efforts were focused mainly on the gastrointestinal tract and the cardiovascular system, I was particularly fascinated with how the brain and nervous system regulated the functions of these organs.

At about this time, Dr. MacCallum took a great deal of interest in our little group of students who had worked with him. He often invited us to have dinner with him at the Maryland Club. The Maryland Club was an effort on the part of Johns Hopkins to provide a place where the faculty could meet, converse and have parties. It was very comfortably appointed, and it was a great honor to be invited. I was a very frequent guest, and Dr. MacCallum and I had grown close during my years of study at Johns Hopkins. I had a great appreciation for him and felt he was not appreciated enough by the other students.

Perhaps in this way I was a bit different from my fellow students. I had no qualms about asking questions or seeking guidance and instruction. Some of the other students were concerned only about getting through medical

school and making good grades. From that perspective, they sensed an element of risk in becoming too personally involved -- that they might not appear quite as smart as they thought they were if they became too close to an instructor. But I relished the opportunity to grow and learn, to question and discuss. It was a direct reflection on the way I was raised to believe that being involved with other people is the way to learn from them, to understand them, to both benefit from and contribute to the relationship.

When dining with Dr. MacCallum, the conversation was rarely centered on pathology. Rather, we talked about sociological topics or education in general. One of the most stimulating evenings was when he brought up the subject of medical specialty boards. The ophthalmology board was the first to be established around 1930. Others followed, always requiring a written and oral examination for an applicant to be certified. The pathology board was one that had been recently established. Dr. MacCallum told us that he had received a letter from the board offering him a membership without examination because of a "grandfather clause" that welcomed pathologists who were already established. Dr. MacCallum was annoyed, and he thoroughly disapproved of the boards because, as he thought, they would only establish ceilings for intellectual aspirations -- so that being certified would dampen a person's desire to reach further in his development. He counseled us to have nothing to do with boards. Dr. MacCallum's advice was further urged on us by the Dean, Dr. Chesney, who also took the view that a Hopkins graduate should not have a ceiling for his growth in medical capability.

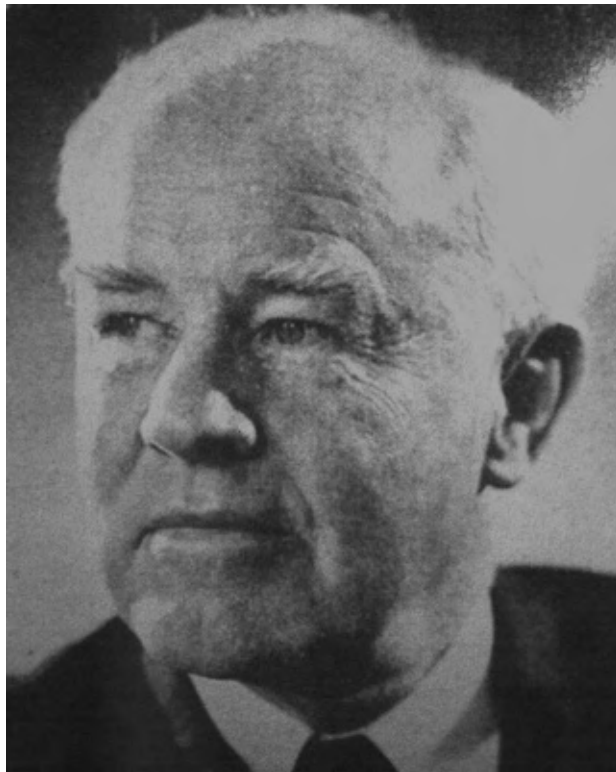
The final words on the specialty boards and their examinations were given, to my delight, by Dr. Alan Gregg, director of the Rockefeller Foundation Medical Research Program. In a lecture to an American College of Physicians meeting in San Francisco in 1940, he said to the attentive audience of doctors, "Gentlemen, you are fooling yourselves with these board examinations. You are not finding out what these young people can do. You are not even finding out what they know. You are only finding out whether or not they know the same things you know."

Alan Gregg was a hero to me. He was widely esteemed and had a very temperate character. Working without committees or assistants, Dr. Gregg would visit the laboratories of applicants for research support from the Rockefeller Foundation. After going over the applicant's work first-hand for an hour or more he might decide to support it. After settling the amount of support needed, he would promise to send the money. Then, on his way to the door, he would turn and say, "Don't send me any reports. Send me the reprints." Later on, Dr. Gregg took an interest in our work at Cornell and graciously wrote the preface to our book, *The Human Colon* (Grace, Wolf & Wolff, 1951).

Dr. Gregg understood that great discoveries are made by individual workers, often laboring in great isolation, largely by accident. He called this general state preceding discovery, "puzzlement" -- a state of mind which does not



lend itself to any accurate verbal description. He understood that same beyond-the- textbook intuitive subjectivity that I had so frequently observed and admired in Dr. Meyer. He operated under a directive that was not really verbalized until years later when Curt P. Richter wrote in support of Gregg's views: "There are researchers who do not work on a verbal plane, who cannot put into words what they are doing -- whose thinking functions in terms of experiences, subconscious observations -- who don't know what they have been after until they actually arrive at their discoveries. Let us encourage researchers to return to their work benches; to make first-hand observations; and let us question whether a proposed 'team research' is a product of experimental design or whether it grows out of genuine supplementation of contributions." This was how Dr. Gregg operated, and his level-headed assessments and support helped many a research project reach fruition.



Dr. Alan Gregg

As we approached graduation, our main concern was where we should seek an internship. I was clearly committed to internal medicine, where the "thinking doctors" were, but as happy and grateful as I was, I wasn't sure I wanted to stay in Baltimore and intern at Hopkins. I suppose it was my rebellious nature showing its face again. In many ways, Baltimore was still a large "small town," and I was ready to grow up and move on. I was not exactly sure what I was seeking that Baltimore could not provide, but I did feel that the people in Baltimore were not interested enough in the important things -- the "big picture" issues. I was much happier with the attitudes, thinking processes and behaviors learned from my family, and those reflected a broader view of life, people and culture. I did

not feel that I would ever become a first-class doctor, person or leader if I was continually influenced by the inward-looking, self-containment of the Baltimore community, which was at times convenient, but was not always expedient. One can pursue an approach to any endeavor that does little more than “work,” but that approach may not develop the individual or lead to a greater fulfillment of one’s inherent potential to its fullest capacity. I both wanted and needed to expand my horizons.

With respect to the internship dilemma, it was evident that at Hopkins, most medical internships were not awarded on the basis of formal applications from students, but were simply selected by Dr. Longcope, and one could not decline his invitation. I was not sure by any means that he would select me, but I was afraid to talk with him about my preference for an internship outside of Baltimore. I shared my concern with Miss Hanley, his secretary, who was always very gracious with the students. She reassured me that my preference would not affect Dr. Longcope in any way adversely and said she would arrange an appointment.

When the appointment came around, I entered Dr. Longcope’s office with a few trembles. Miss Hanley must have warned him because his first words were, “Well, Wolf, what do you want to do in medicine?” Lamely I responded, “I thought I might want to do research.” “Well,” he replied, “if you want to do research, you should work with Gene DuBois because he is the finest researcher in the country.” Of course I knew who Dr. DuBois was, but I murmured, “Suppose Dr. DuBois would not have me?” He looked at me as if I had stuck a knife in his chest. Then he smiled and said, “I’ll send him a telegram, Wolf.” I thanked him profusely and also thanked Miss Hanley and melted away.

The next day I received a telegram from Dr. Eugene F. DuBois, accepting me into his department at Cornell-New York Hospital. Later on, I learned that it was Dr. DuBois’ custom to take one intern each year from Hopkins, one from the University of Virginia and one from Washington University in St. Louis. I felt fortunate to have been accepted to work under the guidance of one of the premiere researchers in the country.



Dr. Eugene DuBois

## **Chapter 5: Cornell (1938-1942)**

When I arrived at Cornell-New York Hospital, it reminded me of a high-class hotel. The medical school, which had been in downtown New York for many years, had been moved to York Avenue and 68th Street near the East River where its magnificent hospital, an architectural copy of the Palace of Popes in Avignon, had been built.

I was assigned to a room on the 24th floor that had a magnificent view of the city and its towers. We had breakfast in the basement cafeteria, but were served lunch and dinner by waitresses in an 18th floor dining room overlooking the East River. After dinner, coffee was served in an adjoining sitting room. The clinical faculty members joined us for lunch and sometimes dinner. The verbal exchanges were friendly and informal. Some senior residents would even call faculty members by their first names.

The atmosphere was quite different from the formality of the faculty dining room at Hopkins where, on either side of the entry door, sat Miss Hanley and the secretary for the professor of surgery. In a far corner of the room was a long table where the department heads sat politely, but not in a chummy fashion. At another end of the dining room was a table that accommodated the younger “bright lights” of the faculty who were engaged in research. Near them was another table where the five of us who were doing special work in pathology with Dr. MacCallum were allowed to eat lunch. That sort of formalized segregation was not in evidence at Cornell.

At the hospital, interns were on duty every day and night and every other weekend. Two of us were assigned to each ward supervised by one resident. The most frequent diseases among our patients were syphilis, rheumatic fever, pneumococcus pneumonia and a good deal of poliomyelitis.

Sulfa drugs had been discovered while I was a student at Hopkins, but they were not helpful against various types of pneumococci. To kill them required specific antiserum. Typing of various pneumococci had been established at the Rockefeller Institute next door to the New York Hospital, so we had antiserum for nearly all of the types. Our method in treating a patient with pneumonia was to inject a sputum sample from the patient into a mouse and then recover from its blood a sample to use for typing, after which we could identify the appropriate antiserum for treatment. We usually had to perform these procedures at night, often very late at night if the patient was admitted late. It was a long and tiring process, but invigorating when we saw that our patients were recovering.

Each morning at 9:30, after we had made our rounds on the patients with a nurse, a senior faculty member would make teaching rounds with us, visiting and assessing the condition of each patient on the ward. We were expected to have made a real personal contact with each patient, to understand the patients as people and to have interviewed and examined them carefully. Not surprisingly, many friendships were made on the wards of New York Hospital.

I made one such friendship with Mr. Alfred DeVitelle. He was a chauffeur who had been admitted with a severe case of pneumonia. I promptly treated him with proper serum, but he was so sick that I sat up with him for several nights. He told me that his job was to drive the Rolls Royce of Perle Mesta, widely known as the “hostess with the mostest.” Perle Mesta had a knack for combining politics and parties with a skill and savvy that was appreciated by ten U.S. presidents. She had a natural gift of diplomacy and a warm personality. This ultimately led to her appointment as minister to Luxembourg by President Harry Truman in 1949.

Mr. DeVitelle made a full recovery from his pneumonia and went back to work day and night for her. He was most grateful for my care and we became good friends. Pearl Mesta was in the habit of buying tickets to Broadway shows, often more than she could use. Mr. DeVitelle would frequently come to the hospital and give a few of the tickets to me. His kindness certainly enhanced my education and created something of a social life for me in New York.

One day, Mr. DeVitelle came to the hospital and lent me his Ford car. He said he was fully occupied in working with his boss’s Rolls Royce and in keeping it in perfect shape, and he was unable to get much use out of his own car. I was privileged to drive his Ford, and I kept it in the hospital garage for nearly four years until the U.S. entered World War II.

One immensely valuable experience enjoyed by our group of medical interns and residents was to procure a psychiatric consultation for a patient from Dr. Herbert Ripley, a junior member of the faculty of psychiatry at Cornell. Dr. Ripley’s perspicacity in history-taking and interviewing patients was impressive to all of us. He was able to see the significance of situations more quickly than most people, and he had an intuitive sense of what to ask next. His patient interviews were like friendly casual conversations, and he had a very warm and personable manner that put his patients at ease.

Dr. Ripley wanted to understand the patient, and he taught us that this understanding was essential to the intellectual development of the doctor. He had a big influence on me, and I began to fully understand the difference between intellectual goals that made sense in application, and the mere memorization of facts or methods. Dr. Ripley did not, like most consultants, simply write a note in the patient’s chart and then leave the ward. Rather, he would always seek out the one among us who had requested the consultation and then teach us how he had learned what he had learned from the patient and how we should proceed from there. His consultation invariably added highly relevant and useful data to that which each of us had already learned from the patient, and his example was one I sought to fully absorb and emulate.

During my early years at Cornell, I still enjoyed a close link with some of my idols at Hopkins. Among them

were Dr. MacCallum and Dr. Hamman. The professor of pathology at Cornell, Dr. Eugene Lindsay Opie, was a 1933 graduate of Hopkins and was a classmate of Dr. MacCallum. During my second year on the house staff at Cornell, a dinner in New York was planned in honor of Dr. Opie, who was receiving an LL.D. (Doctor of Laws) from Washington University, St. Louis.

Dr. Opie was an inspiring teacher and scientist who made the important discovery of the relationship between diabetes mellitus and an abnormality in the islands of Langerhans within the pancreas. He also made outstanding contributions to the studies of tuberculosis and malaria. During his years at Cornell, Dr. Opie was highly influential in developing the College of Medicine as a center of medical education, and made great strides in the development of New York Hospital as a medical center. He held many important administrative posts as well, and was highly respected by one and all.

When I learned that Dr. MacCallum and Dr. Hamman were going to attend the dinner honoring Dr. Opie, I wrote to ask them to have a mint julep with me in my quarters at New York Hospital, and both men accepted the invitation. My letter to Dr. MacCallum is reproduced below, as is Dr. Hamman's reply.

June 7, 1941

Dr. W. G. MacCallum  
Department of Pathology  
Johns Hopkins Hospital  
Baltimore, Maryland

Dear Dr. MacCallum:

I understand that you are arranging a dinner for Dr. Opie after the Cornell Medical School graduation on June 11th. The graduation is at 4:00 P.M.

Would you be agreeable to drinking a mint julep up in my quarters in the hospital, Room 2025 at 5:00 P.M. on that day. Dr. Opie and Dr. Lewis A. Conner and a few of the Medical House Staff will be there. It will be a Baltimore julep transported north. I do hope that you will come. There will be plenty of time to dress for dinner afterwards.

Very sincerely,

SW/T

Stewart Wolf



DR. LOUIS HAMMAN  
DR. CHARLES W. WAINWRIGHT  
DR. BENJAMIN M. BAKER

9 EAST CHASE STREET  
BALTIMORE, MARYLAND

June 4, 1940

Dear Tadie:-

I think it extraordinarily gracious of you to invite me to come to the hospital and have a mint julep with you and other members of the staff. I shall look forward to coming with the very greatest pleasure and can come most any day in the late afternoon. Friday will suit me as well as any day and since you suggest Friday, I shall come to the hospital about five o'clock or a little later and inquire for you. If I do not hear from you I shall understand that this is satisfactory.

Sincerely,



Dr. Stewart G. Wolf, Jr.  
New York

### Reply Letter from Dr. Hamman

Each of us who graduated from internship to residency joined the junior faculty as an assistant professor and was selected by the head of one of the medical departments: cardiology, neurology, hematology or metabolism. Under this plan, most of the residents spent half of their time in the hospital and clinic and the other half doing research. This was an educational pattern developed by Dr. DuBois and was instrumental in making his residency program one of the most outstanding in the country.

When I was promoted to residency, I was selected by Dr. Harold Wolff, chief of neurology. This was one of the best things to happen to me in my life. Dr. Wolff was tough, demanding and intolerant, but he was also brilliant and very generous.

His major research focused on headache, especially migraine headache. During earlier research at Harvard, he had discovered that the pain of a migraine came from the stretching of the walls of the arteries of the temple and brow. Dr. Wolff was not only a pioneer in the study of migraine, but he himself had suffered from the disorder for several years. He discovered that vigorous exercise could reduce the pain of migraine, or even abort an attack. If he felt a headache coming on, a game of squash on the 27th floor of the hospital was an antidote. Many times he would phone me in the middle of the day, sometimes when I was busy with a patient. I would pick up the phone to hear, "Dr. Stewart Wolf, this is Wolff speaking. Could you join me for a consultation on the 27th floor?" I, of course,

always complied. Harold Wolff usually beat me at the game, but occasionally I would get ahead of him. Then he would murmur, “Come on Wolff,” and I would reply, “I don’t need any encouragement.”



Dr. Harold Wolff

On at least one occasion the squash court was the site of an experiment. One of the students assigned to Dr. Wolff’s service had attacks of migraine preceded by blindness in one quarter of his visual field. Dr. Wolff wanted to examine him at such a time and requested that the young man page him whenever he felt an attack coming on. The student did so one day when we were in the midst of a game of squash. Dr. Wolff grabbed the phone and instructed the student to come up at once, bringing with him an ophthalmoscope, smelling salts and a blood pressure apparatus. As soon as he arrived, we started to examine him. Harold Wolff was delighted to see that the retinal arteries in his blind eye were indeed constricted and that they dilated upon taking a whiff of the smelling salts. The student was pleased that the maneuvers had aborted his headache.

Beyond his pioneering work on headaches, Harold Wolff was interested in the broader field of pain itself. He and his assistant, Helen Goodell, had developed an original technique with which to study pain, in which the painful stimulus was a sharp ray of electric light focused on a black spot on the subject’s forehead. The black spot absorbed the light and intensified a sensation of heat. They developed a method for measuring a person’s pain threshold with Dr. James Hardy who was also collaborating in research with Dr. DuBois. Later on, I had an opportunity to work with Dr. Hardy on cold pain. He was an inspiring teacher with many of the warm and gentle characteristics of Dr. DuBois.

After four years of working with Harold Wolff, he began calling me by my first name and allowed me to so

address him, although he continued being formal with his colleagues on the faculty. Dr. Wolff had taken me under his wing very early after my arrival at Cornell, and he introduced me to the people who were teaching specialties. He wanted me to know all of them and learn as much as I could from them. We also developed a more social relationship and I was often invited to his home for dinner.

Dinner at the Wolffs' involved a good deal of ritual. Harold and his wife, the well-known artist, Isabel Bishop, often had other guests as well, including anthropologist Margaret Mead or an artist friend of Isabel's. Their dinner parties usually began with a cocktail in a small solarium adjoining the living room, after which guests would be invited into the living room to enjoy recorded music.

At dinner, I was usually placed next to the guest at Harold's right, usually a woman. There was no preliminary small talk. Harold would launch immediately into a weighty topic directed to the lady on his right and to the others seated near him. He was very interested in the differences between men and women with respect to social behavior, preferences and their expectations of one another. Overall, he thought that most men believed they were entitled to occupy the number-one position. This was not to say that men were superior to women, but only that most men seemed to think that they were. Dr. Wolff found this sociological phenomenon fascinating and almost universal. It was a perspective he studied with great zeal, as well as with good humor.

One evening, the guest of honor was a very dignified and impressively polite lady of impeccable dress. She sat on Harold's right and my left. As I held her chair to seat her, Harold opened the conversation by turning to her and asking, "How would you define the essence of maleness?" As she hesitated for a moment while I pushed in her chair, I noticed her neck had turned purple. I leaned forward and whispered, "Don't you think the male needs to be number one?" "Oh, yes," she said and repeated what I had whispered to her. Her sense of relief quickly restored her skin to its normal color. The atmosphere during the rest of the dinner was intellectual and cordial.

It was under Dr. Wolff that I encountered Tom Little, "the man with a hole in his stomach," whom I studied for 18 years. I learned of Tom by an accidental encounter with the librarian for patients' records at New York Hospital. She asked me one day to help with a letter to a Dr. Florence T. Donovan in Staten Island. Dr. Donovan had requested the records of a patient named Tom, who had been operated on in 1895 when New York Hospital was located in downtown New York. Fortunately, the hospital records had been preserved in handwriting in huge volumes.

Tom, at the age of nine, had developed an esophageal stricture from swallowing hot clam chowder that he thought was beer. He was thirsty, after playing, in the yard, when his father brought in a large keg from a tavern next door and set it up in the kitchen. Tom assumed the keg contained beer because there had been a Democratic party

rally at the tavern the night before, so he ran into the kitchen and took a large swallow from the keg. He fell to the floor in extreme physical distress and was promptly taken to the local hospital.

At the hospital, where vain efforts were made to prevent the burned surfaces of his esophagus from growing together. Swallowed food could no longer reach his stomach. A gastrostomy (a surgical opening through the abdominal wall) was performed. Since there was no further chance of making a channel down the esophagus it would be necessary to make a permanent opening directly through the abdominal wall into the stomach. The surgeons had planned to make this channel into the stomach long and indirect so that it could be closed off by pressure after food had been put in. Unfortunately, during the operation Tom's condition had suddenly failed, and it was necessary to finish up quickly and without the refinements.

Within a few weeks Tom was up and about the ward. He wore thick gauze dressing over his stoma, held in place by a wide bandage encircled in the middle. At mealtime a screen was placed about Tom's bed. He lay down, removed the bandage, and poured his meal, a thick, yellowish, liquid gruel, into his stomach through a rubber tube. There had been successful gastrostomies performed in England for cancer of the esophagus, but this appears to have been the first one ever done in the U.S.



Tom Little, Young and Old

I was very interested in learning more about Tom. While I was working with Dr. Wolff on his pain studies, he and his colleagues, James Hardy and Helen Goodell, had helped me with some investigations of esophageal pain. I was eager to meet Dr. Donovan and Tom so we could extend our inquiry to stomach pain. We presented a case report to Dr. Donovan and added a request that he bring Tom in to participate in a gastroenterological conference at the hospital. Both he and Tom graciously accepted and appeared on the appointed day.

The small conference room was filled, and the professor of surgery had the floor in the center of the room.

I was attending Tom, who was lying on a wheeled stretcher in front of the blackboard. After Tom had given an account of his history, the professor of surgery shouted across the audience to Dr. Donovan to invite him and Tom to the visitor's dining room for lunch. Dr. Donovan shouted a thanks and accepted the invitation, but explained that Tom would not, of course, be able to join them. I then spoke up to assure them both that I would take care of Tom during the lunch hour. When the conference concluded I wheeled Tom to an inconspicuous end of a corridor, where we talked and I began to learn about his life. He gave me his address and phone number in Staten Island and told me about his wife and teenage daughter.

Tom and I also talked about his experiences living “with a hole in his stomach.” He had unhappy relations with surgeons over the years. On one occasion when there was troublesome bleeding on the exposed lining of his stomach, Tom had consulted a surgeon at Columbia Hospital. The surgeon took him to a first floor examining room, but was called away and stayed away for what Tom considered too long, so Tom climbed out of the window and went home. Tom had apparently had unsatisfactory encounters with other surgeons as well. After our conversation in the corridor, Tom left with Dr. Donovan saying, “I don't want to see any more surgeons.”



RESEARCHER WOLF & PATIENT LITTLE  
The most damaging emotion: anxiety.

George T. Hall

Dr. Stewart Wolf and Tom Little

The next day, I proposed to Dr. Wolff that we create a job for Tom so that he could be compensated for letting us study him and his stomach. Dr. Wolff agreed, made the necessary arrangements and found a laboratory for me in the adjoining psychiatric building.

Having Tom's address, I decided to drive over to Staten Island and visit with him and his wife. I drove to the ferry in the Ford car that Mr. DeVitelle had loaned me. Tom and his wife could not have been more cordial. Tom had enjoyed his visit at New York Hospital and was very pleased with the prospect of a job. He agreed to start in a few days.

Tom would appear at the laboratory at 8:30 every morning. I studied the contractions of the gastric wall, the gastric juice, the mucous lining over the acid-secreting cells and the mechanisms that governed their secretion. Of particular concern were the variations in the stomach's blood circulation and acid production that accompanied changes in Tom's emotional state or that were triggered by certain foods and fluids. When Tom was angry, his exposed stomach lining would turn red from a surge of arterial blood, and his gastric juice would become more acidic. Sometimes, there was gastric pain. On the other hand, when Tom was sad or frightened, gastric blood flow was reduced and the stomach lining turned pale. Occasionally during these episodes, Tom would feel nauseated.

The link between gastric function and emotions was one of our most important discoveries, and our study of Tom attracted a great deal of interest in the U.S. and Europe. I was invited to give several presentations in the U.S., Great Britain and South America, and we had several visits from medical scientists, including Walter Cannon, professor of physiology at Harvard. He visited at a very opportune time. Our work was being supported by the Josiah Macy Foundation and the director, Dr. Frank Fremont-Smith, had scheduled an evaluation of our research to determine whether or not to continue support. Dr. Cannon had been asked to judge our work, so he decided to visit our laboratory.

Tom, who had been annoyed by some of our previous distinguished visitors because of their lack of a soft touch during examination of his stomach, fell in love with Dr. Cannon, who, after watching our morning experiments, stayed with Tom after I excused myself. He questioned and talked with Tom and examined his stomach mucosa for another hour or two each day for the next three days.

The final report to the Josiah Macy Foundation was given the following Saturday. Dr. Fremont-Smith chaired the meeting, and Dr. Wolff, Dr. DuBois, Dr. Cannon and I attended the session. My report was the first item on the agenda. After my presentation and several questions from the group, Dr. Cannon was asked to make his report. He stood up and said, "These three days have been very useful to me. I learned that emotional stimuli could arouse as well as inhibit gastric function." That was it, and the Macy support was renewed. Dr. Cannon visited again once or twice, much to the delight of both Tom and me. Beyond that, Dr. Cannon wrote the forward for our book, *Human Gastric Function*, which was published by Oxford Press in 1943 (Wolf & Wolff, 1943).





Dr. Walter Cannon

I also had opportunities to present some of our work on Tom and his stomach at the annual meeting of the American Gastroenterological Association in Atlantic City. At the next year's meeting, I was made a member of the Association, and the following year I was awarded a prize for gastric research. Not counting my period of service during World War II, our study of Tom and his stomach continued for 17 more years. (See Appendix).

In 1941 we experienced a painful disappointment -- Cornell's decision to replace Dr. DuBois as head of medicine. This administrative shift emerged from a political attack on Dr. DuBois by two other department chairmen who claimed that Dr. DuBois was a scientist, not a clinician, and hence should not head the department of medicine. They claimed that because Dr. DuBois' worldwide reputation was based on his scientific achievements and because he spent one day a week in the laboratory, he was not an appropriate leader for the department of medicine. On the contrary, Dr. DuBois was a skilled clinician, and had developed what was widely considered the strongest residency program in the country -- a program that qualified the residents for careers in academic medicine, with the capacity to become teaching clinicians as well as medical scientists.

As it happened, the dean had an opportunity to make Dr. DuBois' change in responsibility look like a promotion. He had learned that the head of the medical school's department of physiology, Dr. Detlev Bronk, was badly matched with his responsibilities and had made arrangements for Dr. Bronk to move next door to the Rockefeller Institute, where he took charge of one of the research sections and was eventually promoted to the post of director.

When Dr. DuBois took over the chairmanship of physiology, he asked Dr. Robert Montgomery Bird, who was working on fat metabolism, to participate in his teaching program, and he asked me to work with his students in the gastrointestinal area. This was a real privilege for both of us, and it was a pleasure to be working under Dr. DuBois again.



Dr. Robert Montgomery Bird

Dr. Bird, a southern gentleman, became my best friend. He came to Cornell from the University of Virginia as an intern a year after I did. His father had been the professor of chemistry at the University of Virginia, so his family lived on the "Lawn," a large field near the entrance of the university. It was a distinguished address. Dr. Bird had such a heavy southern accent that many patients and some of the faculty had difficulty understanding him. His work with patients, however, was excellent. When he became a first-year resident, he was selected to work with a professor whose special interest was in blood disorders and cancer. This had led him to his interest in fat metabolism.

In the department of medicine, Dr. DuBois was succeeded by Dr. David Barr, who had been chairman of medicine at the Washington University, St. Louis, Medical School. Some years before, Dr. Barr had studied and worked with Dr. DuBois. Dr. Barr took over the department very well and continued most of Dr. DuBois' policies. He did not, however, have Dr. DuBois' confidence and warmth. Hating to be surprised, he always insisted on knowing beforehand what was to be discussed at each conference or gathering. Unlike Dr. DuBois, who felt that

all doctors should be expert in all medical specialties, Dr. Barr believed that the specialties could be self-contained beyond internal medicine.

I had become very critical of medical specialties because their focus left out many aspects of a clinical problem. Physiological systems are all, to some degree, controlled by the brain, so neurology should be a major emphasis in educating internists, as should the other specialties. They interact a great deal. Therefore, I felt that a doctor whose capability and understanding is limited to a single system is not sufficiently educated or experienced. Instead of limiting his practice to a specialty, the doctor could reasonably emphasize in his practice an area of special interest, but he would need a broad knowledge in other systems in order to analyze the patient's disorder in full.

At one of our conferences, without prior warning to Dr. Barr, I ventured to criticize an innovative teaching method that had been sponsored by the Western Reserve University. In an effort to marry the basic science-teaching program to that of clinical exposures, their strategy was to hold teaching conferences focused on a particularly illustrative disease such as diabetes, for example. The students were brought into a conference room where a biochemist, a diabetic specialist, a gastroenterologist, a neurologist, and a statistician were brought together. It reminded me of the old story of the blind men who were asked to describe an elephant. Each described the beast differently, and none of them was really aware of what an elephant was.

Dr. Barr questioned me in a way that made me feel that he regarded me as insubordinate because I had criticized the method at Western Reserve as being disjointed. To further my argument, I used pernicious anemia, the causes of which can be traced to two separate sites in the intestinal tract, as an example. Pernicious anemia results from a failure to secrete a substance in the stomach, plus a failure to combine that substance with another one in the large intestine. But this picture is still incomplete because pernicious anemia also involves the function of the nervous system. In fact, pernicious anemia is just one of a host of disorders that involve interactions between different physiological systems. Fragments of information from a collection of narrowly focused specialists will not give students an overall understanding of the patient being examined, his disease or how to cope with it.

Despite my sometimes outspoken views, Dr. Barr appointed me chief resident at Cornell during my fourth year of residency. During residency, the young doctor accumulates vast experience, including being called for consultations with attending physicians in several departments such as surgery, ophthalmology, pulmonary, oncology, endocrinology, neurology and so forth. For most academically trained physicians, the final years of residence will be the closest they will ever be to possessing a truly comprehensive command of medical knowledge.

During my third year as a resident, I met my first wife, Virginia Danforth, at a dinner party. There were half-dozen people there, including Tom White, the young man whom I had tutored during the summer of my first year at

Yale. He thought that I should meet Virginia, and it was he who suggested to the hostess that I be invited.

After dinner, we sat around on the floor of the living room. Virginia was sitting quietly on a chair directly in front of me when one of the other girls suggested that I sing a big band song. I did it with alacrity and continued on when the girls called for encores. Virginia was visibly not enchanted by that display, enough that I felt I was not likely ever to see her again. I was disappointed because I had been deeply impressed by her, especially after our dinner conversation. While we were talking around the table, her words had reflected an extraordinary generosity of spirit.



Virginia Danforth

Like many New York debutantes, Virginia had spent the summer after her coming out away from the city. She went to Dr. Grenfell's missionary clinic in Newfoundland with a half dozen other ex-debutantes. Serving at Grenfell's mission was a popular type of social service for young ladies who had come out. The girls were content in caring for the patients, but as soon as the summer was over, they were eager to return home to New York. Virginia, on the other hand, was a rare exception. She offered to stay over and work throughout the winter. Dr. Grenfell assigned Virginia to a dog sled team that covered the mainland territory throughout the winter, stopping at small settlements where she inoculated and immunized a great many children and adults. After the dog sled travels ended in the spring, Virginia stayed over for another summer of work in Dr. Grenfell's hospital.

Having learned about Virginia's noble mission, I hoped to meet her again. Within a few weeks, she phoned me at the hospital and invited me to attend an amateur play in which her mother had a part. I was delighted to accept that invitation. When the closing curtain fell, I suggested to Virginia that we have a drink at a downtown hotel before driving her home.

We sat in a far corner of the bar and talked until nearly 2 a.m. During the course of our conversation, she told me that she had become interested in a young man she had met in Newfoundland who had promised to build her a house and wanted her to marry him. She told me that she felt obliged to return to Newfoundland to meet him. I reminded her that the U.S. was now involved in the war and needed the support of all of us. I did my best to persuade her not to make the trip to Canada.

Within a few days Virginia and I were engaged, although her mother initially expressed some reluctance. Virginia's older sister had recently married a young surgeon at Cornell who was greatly admired by her mother, and he had given Virginia's mother a totally incorrect notion that I was a "ladies' man."

I felt that this title was unjustified, as I certainly did not make a point of "playing the field" or dallying in the affections of young women just for the sake of making a reputation for myself as an eligible bachelor. But the fact was -- whether I intended it or not -- my name was on almost every New York socialite's list as an available escort for debutante parties, and that situation put me in the social circles of eligible young ladies of wealth. Ultimately, my dedication and devotion to Virginia convinced her mother that I was a serious suitor of honorable intent, and our engagement was announced.

A few weeks later, I took Virginia to Baltimore for a weekend with my parents. They gave her a very warm welcome and she liked them at once. There was no question that she would be a welcomed member of the Wolf family.

Back in New York, we made plans with her parents to have a wedding on August 1 at the Central Presbyterian Church and a reception at their house on 68th Street near New York Hospital. A large contingent of our extended families gathered in New York for the occasion, which was marred only by the sudden unexpected failure of the church organ to function. We were married to piano music. The reception was a great, friendly occasion. Virginia's father, a warm and enthusiastic host, greeted everyone despite the fact that they and their guests had never before met any member of my family.

As Virginia and I got into Alfred DeVitelle's Ford, Mr. Danforth and my uncle, Rob Griffing, were waving wildly on the balcony over the front door, conveying their love and enthusiasm. We drove on to Connecticut for our wedding night and back to Boston the next day. A few weeks later, we spent our honeymoon at Martha's Vineyard.



Wedding Day of Stewart and Virginia Wolf



## Chapter 6: War Stories (1942-1945)

In early December 1941, my cousin, Bob Griffing, and I were vacationing in Mexico City. We had decided to go to a movie, and as we were walking toward the theater, a newspaper boy accosted us. We made a gesture to decline the opportunity to buy a paper, but the boy came face to face with us, spreading the front pages before us.

The headlines were bold and very mysterious: “Utah Hundido, Delaware Hundido, California Hundido, Oklahoma Hundido.” We could not resist buying the paper, but were totally baffled as to the apparently important message. We decided to postpone the movie and go into a nearby café to find somebody who could help us translate the words. The waiter in the café explained to us that “Hundido” meant, “Sunk.” The rest was easy. This was the story of the Japanese bombing of Pearl Harbor that started the war in the Pacific. We decided to send a cable to the War Department in Washington, informing them that we were in Mexico but were available for service at their call. Needless to say, we did not receive any immediate reply, but when we got back to the States, we both found ourselves in the service, Bob in the Navy and I in the Army Medical Corps.

Several of us on the Cornell faculty signed up to create an Army hospital corps to serve in the war as commissioned officers. A few of the faculty became majors, while we younger ones were commissioned as captains. We were to be sent to Massachusetts for “staging” and then to the Pacific theater. Our gathering of 50 senior and junior Cornell faculty left New York Hospital and were taken as a group by rail to Boston and then by boat to Fort Andrews Island in the Boston Harbor. The unit, as it was called, waited there for one year to be deployed to Australia and then to New Guinea. We were trained in how to place a medical facility at the foot of a hill on the far side when an artillery battery was shooting from the other side. This was a standard protective maneuver in World War I, but would hardly be useful in World War II. The rest of our time was taken by 20-mile hikes and leisure activity in the form of touch football.

My rebellious feelings that had emerged earlier at Camp Red Cloud caused me to look for a more interesting change. I had heard that the Harvard Medical School had recruited a new chairman of their neurology department, Dr. Derek Denny-Brown, from Queen Square, London, where he had been a consultant-physician since 1935 and a member of the head injury unit with Sir Charles Symonds during the war. Despite his reluctance to leave his duties that served Great Britain’s protective activities in the war, a political agreement among ambassadors and the persuasion of a Harvard trustee caused Dr. Denny-Brown to be transferred to Boston. I wrote to him, and he was kind enough to give me a fellowship in neurology with him. It turned out to be a most valuable year.

Shortly before the war, Virginia and I rented a house west of Boston near her cousins, Nick and Nancy Danforth. It was a lovely area of Boston, and Nick drove me to the City Hospital every morning on his way to work.

Dr. Denny-Brown put me to work studying intracranial physiology and taking care of patients with head injuries. Graciously, Dr. Denny-Brown arranged a job for Virginia as secretary to one of his staff. Also, on the strength of his knowledge of and admiration for Harold Wolff, he frequently invited us to dinner at his home.

My work with Tom before going into the Army had focused on nausea. Knowing that we would eventually be shipped to the Pacific, I had hoped for a chance to learn something from seasick passengers. I therefore asked Dr. Denny-Brown if I could do some experiments with willing subjects in the hospital. He liked the idea and said that he would assign a laboratory space to me. Unfortunately, however, his laboratory space was already filled, so he offered the use of his office each morning. I demurred, of course, but he countered with, "All I do is read my mail before spending the whole morning making teaching rounds. I'll sit on the edge of my secretary's desk to read my mail." I said, "I can't accept. The patients may vomit on your floor." But he replied, "No matter, we have people who can clean that up."

Overcome by his generosity, I studied and performed experiments on the subjects which focused on the effects of syrup of ipecac and other emetics on the human stomach and duodenum, in search of reliable data on the sensory experience of nausea. These experimental studies continued until the end of the year, after which when our hospital unit was sent overseas.

At about the same time, Dr. Denny-Brown was sent to the Far East with the British Army. He was stationed in Rangoon, Burma. He found our hospital, and continued a correspondence with me for the rest of the war. After the war ended, Dr. Denny-Brown resumed his responsibilities as professor of neurology at Harvard.

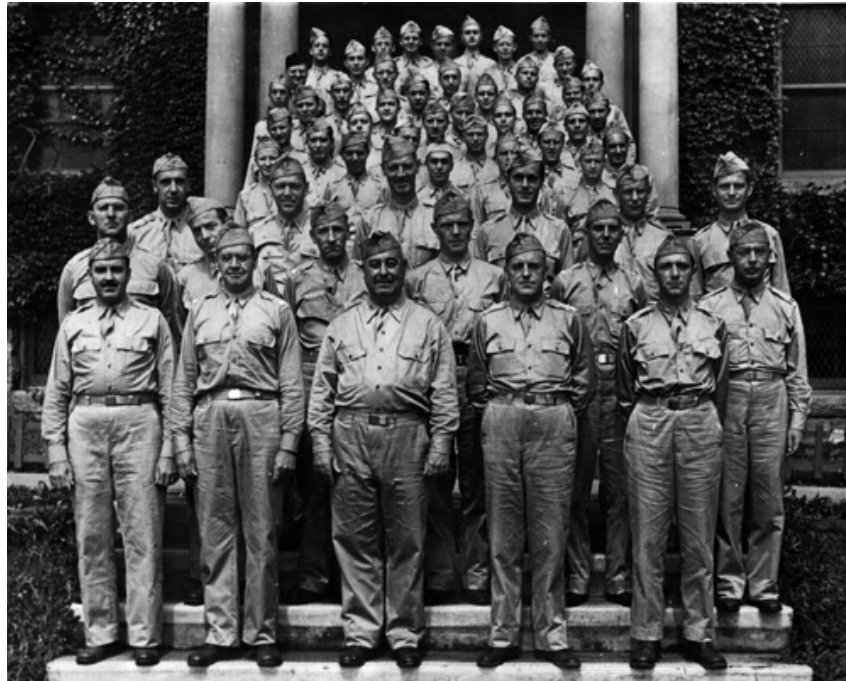
During the war, my cousin, Bob Griffing, who was on the Fine Arts faculty at Johns Hopkins University, joined the Navy as the captain of a submarine chaser in the Atlantic Ocean. Periodically, the Navy ships would dock in the Boston Harbor for a week or two of rest. At those times, Bob would get in touch with Virginia to take her to dinner or a movie. Both she and I appreciated his attention.

At the end of the war, Bob was appointed director of the Honolulu Academy of Arts in Hawaii, where he enriched and strengthened the Academy's collection of art immensely. He became engaged to an American girl whose family lived in Hawaii. Virginia and I were invited to the wedding in Honolulu and were also asked to join the newlyweds on their honeymoon, which was celebrated at a magnificent coastal mansion on Kawai. As a bow to convention, Bob suggested that after the wedding reception Virginia and I take a separate plane to Kawai. We did so and were welcomed by the Hawaiian staff who assigned the guesthouse to the newly married couple and put Virginia and me in the main house. It was, of course, an unusual honeymoon, but it was a great deal of fun.

A few years later, when the Korean War began, Bob was approached by the director of an art museum in

Seoul which would, of course, be in great danger. Bob persuaded his friends in the U.S. Navy to find a ship that would bring the entire collection from Seoul to Honolulu, along with three members of the museum staff. After the Korean War ended, the art collection was loaded back up in a Navy ship for return to the Seoul museum, but since there were still a good many American troops stationed in the Pacific Islands, the ship docked at each military station and displayed the items to the soldiers and sailors before finally returning to Korea. The traveling art gallery received a great deal of publicity and became a matter of pride for the military.

Our 9th General Hospital spent two-and-a-half years in the Pacific theater, first in Brisbane, Australia for a few weeks, and then at Goodenough Island off the coast of New Guinea, where we were to build a thousand-bed hospital in an open area near a small mountain. Our 9th General Hospital had originally been assigned to a large hospital building in Brisbane, but by the time we reached Australia, we learned that the building had been reassigned to the University of Maryland's hospital unit.



The Men of the 9th General Hospital

We sailed to Goodenough Island in a Dutch ship. On arrival, we were driven by bus to the site for the hospital. I was assigned the task of obtaining from the local headquarters the necessities required for us to establish and maintain our living quarters. The headquarters people were very helpful. They assigned us dozens of outdoor stoves, electrical wires, equipment, beds and so forth. We already had the hospital equipment, such as X-ray machines and ECG equipment, because we had brought them with us on the ship. Several tents of various sizes had already been put up, but there were no bathing facilities. I set about finding a remedy for this situation. There was a

huge spring near the mountain less than a mile away. I asked for pipe to bring the spring water to the living quarters but headquarters did not have any to spare.

While we were wondering what to do about the water situation, a couple of Australian aviators who were stationed nearby came by to greet us. I spoke to the one who looked as though he might be the boss and explained our bathing problem. The airman said that his outfit had metal pipes to spare and suggested that best way to solve our water problem would be to build a line to the spring on the mountain and construct a series of water facilities. He then asked if we had anything to trade. All I could think of was the bourbon whiskey from the hospital supplies that came with us on the ship. The trade went well. We soon had showers and the Aussies had the pleasure of a cocktail before dinner.

By the time we had set up the hospital, our 50 physicians had been supplemented by 50 enlisted men who served as nurses and aides of all sorts, including X-ray and operating assistants, pharmacists and laboratory technicians. Within a month to six weeks, we were joined by a corps of nurses for whom we built an adjoining campus.

My good friend, Bob Bird, was in charge of the officer's ward in the hospital and disciplined every officer who was uncooperative or arrogant. He also gave some of the officers special privileges, such as 15 cc (about half an ounce) of medicinal Bourbon whiskey twice a day, or whenever appropriate.

Patients began to come arrive, primarily from two sources: the 42nd Reserve Corps of the National Guard who had been stationed in Honolulu at the outbreak of the war, and the 1st Marine Division who had achieved the conquest of Guam earlier in the war. The National Guard was an unhappy group, disenchanted because they were the final people to be blamed for the Japanese attack on Hawaii. At first, the top military brass was held responsible for lack of warning. Then the politicians were blamed and finally the National Guard. No wonder they were dispirited and low.

In contrast, the Marine division came to us in such high spirits that they dismissed their pain from wounds and sickness. They couldn't wait to be discharged from the hospital. It was all a strange paradox for us, as we were getting our hospital in shape to meet whatever was ahead.

Not far from us, in a small clearing in the jungle, was a small station hospital coping with an outbreak of scrub typhus, a devastating rickettsial disease that was rampant in New Guinea and the surrounding area. The disease was transmitted by the bite of infected chiggers, and scrub typhus caused more deaths than malaria during World War II. This was a very serious outbreak. The military headquarters asked our commander for a consultant for that station's hospital. I was appointed to report one morning a week to make rounds at the hospital.

Before long, a few of our staff caught scrub typhus and we had one fatality, a Jewish enlisted man who was a ward assistant. We managed a beautiful Jewish funeral for him with the help of Sydney Weintraub, who was chief of our X-ray department. He had suffered a myocardial infarction several weeks earlier and had recovered, thanks to Dr. Bird who had taken care of him. Another of our doctors, Ralph Tompsett, also caught scrub typhus and was admitted to our hospital under the care of the chief of the medicine section. Shortly afterward I was asked to take him to Australia, where the affiliated hospital of the University of Maryland was located. Ralph and I were assigned a small airplane and flew to Brisbane, where I left him. Ralph received very good care and recovered within a month and then joined us again.

During the year that we were stationed on Goodenough Island, there were three occasions when one of our enlisted men was put on trial for a punishable act. Each of the accused requested that I serve as the defense attorney for the trial. The Army had three levels of court martial. At the level of the military unit itself, the person who is to be tried for an offense has the right to choose any officer in the unit, except the commanding officer, as his defense attorney. Despite my naivete concerning legal issues, I agreed. There appeared to have been misunderstandings, rather than deliberate breaches of duty, in each case. Moreover, in each case the accused had a record of good behavior. To the delight of the accused, all three of the cases were dismissed.

The next contact I had with the system came in the form of an order from the regional Shouten Islands headquarters, stating that I had been appointed defense attorney for the Shouten Islands division. There I defended three more accused soldiers before a court martial consisting of five graduates of West Point. I was bewildered by this appointment when, among the officers in the region, there were a good many who were graduates of American law schools.

The way in which the Army handled misbehavior of military personnel seemed quite imperfect to me. My most difficult job was to defend an officer from another hospital in a general court martial. The accused had come back to base late from recreational leave in Australia. His wife was pregnant and had eclampsia, a sickness serious enough for her doctor to insist that her husband get permission to lengthen his leave until her delivery date (about two weeks). He was denied the permission, but postponed his return to the unit anyway until after the birth of the child. The accused was a man with an otherwise unblemished record. I decided that I had to mount a strong defense. I focused on the contrast of moral merit between the humanity of protecting mother and child by staying on and providing emotional support, and leaving the mother simply to comply with a strict regulation. In my mind, the regulation could have been temporarily eased to serve the humanitarian without compromising in any way the strategic needs of the military unit at that time.

During the trial, I asked permission to address the court, and the chief judge granted my request. I asked the judges whether or not they would have deserted their wives under similar circumstances. Unfortunately, it was a question that showed, if not my stupidity, certainly my insufficient education in the trial tactics despite my many years of Sunday dinners with family members who were lawyers. I got no reply to my question, I was reprimanded by the judge and the decision went against my client.

In addition to being appointed defense counsel, I was also designated as the voting officer for our region at the time of the presidential election between Harry Truman and Thomas Dewey. My job was simply to distribute absentee ballots to American citizens and to collect the completed ballots and carry them to headquarters.

After a year in Goodenough, our 9th General Hospital was moved to Biak on the north shore of New Guinea, where General MacArthur had had his headquarters when planning the attack on the southernmost island of the Philippines. Both in Goodenough and Biak, we had the only general hospital in the combat area of the war. We experienced a few bombings by the Japanese, however they were directed at the airport. None of the bombs hit our hospital area. The most military excitement any of us had was experienced by our chief of surgery, Dr. Preston “Pep” Wade. He and Dr. Bird were exploring outside of our area and happened upon a fully armed Japanese soldier who was sleeping in the woods. The soldier promptly yielded to capture and then submitted his rifle to Dr. Wade who led him into the back of the truck. Dr. Bird drove while Dr. Wade sat with the prisoner in the back of the truck. Dr. Wade was trying to manipulate the safety lever on the captured gun when he dropped the bullets all over the bed of the truck. A bit alarmed, he watched as the prisoner picked up all of the bullets and handed them to him. They drove the prisoner to the Army headquarters in Biak and turned him in. Pep Wade insisted on and received a receipt. The rest of us never stopped kidding him about the failure of his surgical education to teach him how to unload a gun.

In Biak, we got our 1000-bed hospital up and running. The Americans had just rescued some prisoners of war who had been captured three years before during Japan’s invasion of the Philippines. The prisoners had been held near the capital in Cabanatuan and Bilibid prisons. Most of the freed prisoners were flown to our hospital in Biak. It was evident that many among them suffered powerful effects, not only on their bodies but on their mental states as well. Dr. Herb Ripley, who had joined us as chief of psychiatry, and I were so struck by the contrasts among soldiers in their behavior while under capture that we decided to perform a systematic study of their experiences and responses to those experiences, as well as examine changes in their attitudes and personalities upon release from prison.

Our report was formally presented in 1947 (Wolf and Ripley, 1947). We had achieved the cooperation of 35 individuals: 34 men and one woman. There were 14 U.S. soldiers, nine officers, two sailors, two Marines, one Army



nurse; and there were also one Dutch and six British servicemen. Our research uncovered two contrasting patterns of behavior that characterized those who had survived: psychopathic personalities and highly adjustable personalities.

Psychopathic-type behavior was exhibited by prisoners who consciously or unconsciously suppressed anxiety, depression, feelings of pain and so forth. In some instances, a loss of physical function was evident; for example, a prisoner would “go blind” in order to avoid physically seeing torture, or would “turn off pain” in order to withstand the beatings.

Highly adjustable personality behavior was demonstrated by prisoners who actively kept themselves busy and productive and consciously “made the best of” the situation by obeying captors or reporting on fellow prisoners. One prisoner kept himself intellectually occupied by solving puzzles and problems so as to avoid discouraging thoughts, while another forced himself to eat as much as he could get so that he would not die of starvation.

Both forms of behavior represented mechanisms by which prisoners of war adapted to harsh conditions in order to survive. Among those we were able to evaluate after their return home following the end of the war, we found evidence of lasting effects on their personality and behavior. Even the best-integrated individuals experienced adjustment difficulties, although some were able to function adequately in a productive capacity. It was found that the prisoners who had exhibited the most severe forms of psychopathic behavior also had the most difficult time adjusting back into society.

Strange as life is, on the ship that brought me back to the U.S. I met the chief Army legal authority for the South Asian theater. When I mentioned my name, he reeled off a long outline of legal problems that had been brought to his attention during the war. He said that he was committed to testifying before Congress about the quality of military justice in the Southwest Pacific Theater. He then opened his briefcase and pulled out the cases in which I had been the defense attorney, including the one in which I had been reprimanded by the presiding judge. He said he would offer the case of the officer with a sick pregnant wife as an example of inappropriate exercise of military authority and responsibility. I later learned that he had been successful in his testimony before Congress, and the consequences of the judgment against the soldier with the sick wife had been reversed and removed.

Once back in the U.S., I was put on a train to Newark, and when I arrived I found Virginia standing alone on the walkway, waiting for me. It was a wonderfully gratifying moment. She took me to the home of a general stationed there who was a family friend. Great relief and get-togethers followed, and soon we were back home in New York, in a very small apartment across the street from New York Hospital.

## **Chapter 7: Cornell After the War and Medicine A (1945-1952)**

During the war, Tom Little and I kept in touch by exchanging letters now and then. I had arranged for another resident, Dr. Thomas Almay, to continue some of the research projects with Tom and his stomach while I was away. On my return from the war, Tom and I picked up where we had left off.

Shortly after Virginia and I had resettled ourselves in New York, Dr. Barr called me to his office and explained that the Commonwealth Foundation was going to support two new programs, one at Cornell and one at the University of Cincinnati. The foundation's objective was to educate academic internists in recognizing and dealing with the psychological forces and individual characteristics that are relevant to disease and are therefore important to medical education and practice. The grant would support half a dozen fellowships each year at both institutions. Dr. Barr asked me to organize and direct the program for Cornell.

I agreed to take on the responsibility, but only under the aegis of Harold Wolff. While I was responsible for recruiting fellows and directing the program, Dr. Wolff gave invaluable advice for organizing the program with emphasis on clinical experience for the fellows, as well as their participation in research.

My first step was to persuade Herb Ripley to join me in organizing and directing the program. We built our program around a special medical clinic facility that we called Medicine A. Since the aim was for the fellows to develop a comprehensive understanding of their patients, we requested that patients with a variety of medical disorders be referred to our Medicine A clinic. We hoped that each fellow, in addition to caring for the patients, would be stimulated enough by the experience so that he would develop an attitude of inquiry that could lead him to useful clinical research.

The plan worked well. The fellows were enthusiastic, and each one became involved in clinical research. Tom Holmes, who came to us from Washington University in Seattle, collaborated with Harold Wolff's research assistant, Helen Goodell, and me on nasopharyngeal research, allergic and other topics. We were assigned a room equipped in such a way that we could control the atmosphere, gently circulating either pure air or air which contained small particles of pollens and other irritants. Several publications distributed at meetings and a book, *The Nose*, emerged from Holmes' research.

Two other fellows, Ian Stevenson and Charles Duncan, focused their work on the cardiovascular system. Together they investigated the heartbeat and blood pressure. To assist them, we set up appropriate equipment in the lab, such as the sophisticated ballistocardiograph, a medical instrument that measures the mechanical force of heart contractions and the amount of blood passing through the heart during a specified period. After several short publications, the work of the fellows was reported in toto in a book called, *Life Stress and Essential Hypertension*.

Each of the investigators participated in the authorship (Wolf et al., 1955).

One of the fellows focused his interest on skin disorders, especially hives. He found that the cutaneous manifestations of hives could be induced by bringing up an emotionally sensitive topic in a discussion with the patient. We called such very productive research strategies “stress interviews” and resorted to them frequently, with remarkable success in recognizing the relevant factors that had contributed to the patient’s illness.

Indeed, our goals for Medicine A were being met. Along with caring for patients, the fellows were extending their inquiries to include the broader aspects of illness and disease -- such as the underlying conditions responsible for disorders -- and thereby contributing a great deal to clinical research.

On Tuesday morning each week, we had a roundtable conference with Harold Wolff in which each member of the group would describe his work and findings for general discussion. Often, visiting doctors participated as well. One of the most helpful and important was Dr. Johannes J. Groen, professor of medicine at the University of Jerusalem. Before the war, he had been professor of medicine at the University of Amsterdam. The influence of Germany, however, caused him to lose his post. He was captured by the Germans and was made the doctor in a concentration camp for the remainder of the war. Harold Wolff and I bonded very closely with J. J. Groen. He worked with us for over a year, until he was appointed to his leadership post at the University of Jerusalem. I was able to visit him there on two subsequent occasions.

A major contributor to Harold Wolff’s enormous success, as well as the success of Medicine A, was Wolff’s research associate, Helen Goodell. She had worked with him since his arrival at the newly built New York Hospital in the mid-1930s. She was a tireless worker, full of ideas and enormously generous to all of us who worked with Harold Wolff. She was invaluable to the work of Medicine A. We became deeply devoted friends, and she often visited Virginia and me in the years to come at our country home in Pennsylvania. After Harold Wolff’s death from a stroke, we invited Helen to join us at a laboratory that we had established in Pennsylvania. There we worked together for 15 years until her death from Parkinson’s disease. She and I constructed an updated edition of Harold Wolff’s famous book, *Stress and Disease*, and we collaborated on several research reports and four books.

A woman who had been extremely helpful to me during the latter years at Cornell and even thereafter was Mrs. de Perez, a volunteer at New York Hospital. We met when she was doing secretarial work for a neurologist who was working on epilepsy in a laboratory next to my office. One day when I walked past his lab, I saw Mrs. de Perez bent forward over the typewriter, in tears. Hoping to help, I suggested going for a cup of coffee. Over the coffee, she explained that the doctor she was helping would not let her smoke while she was working for him. I assured her that I would try to persuade him to cancel his smoking ban. I tried, but failed, so Mrs. de Perez elected to do her volunteer



Helen Goddell

work for the Medicine A doctors. She did so well she became indispensable to us.

From what I could gather, Mrs. de Perez, who wore expensive jewelry, had been born to a wealthy family, married a wealthy South American and then was ultimately divorced. I later found out from the director of the volunteer program at the hospital that Mrs. de Perez had very meager financial resources and lived in a modest apartment not far from the hospital. Since I was secretary-treasurer at one of the medical societies at that time, I arranged for her to take on work and receive compensation from that organization. She refused the offer until I agreed that she could also maintain her volunteer status with Medicine A as well. It meant long hours of work, but that was the type of person she was.

While Herb Ripley and I were working hard at Medicine A, we were asked by one of the administrative staff at West Point, Colonel F. M. Greene, to visit and evaluate the military academy's programs for the first-year cadets. Colonel Greene, whose title was "Master of the Sword," selected Herb and me because of the work we had done with the prisoners of war in the South Pacific. The problem West Point had was that some of the applicants who had been considered the most likely to succeed as leaders had resigned during their first year. The abrupt resignation of some of the most promising cadets had become a seriously troubling problem. West Point was concerned about its cadet retention rates, and we were asked to make an assessment of the problem and offer suggestions about its solution.

Herb and I spent several days watching and listening to the process of welcoming and acclimating new cadets to West Point. We observed that at meals, they were required to sit at the end of a long table with their backs held straight and were not allowed to speak unless spoken to by a superior. Between meals, they were hazed in a variety of ways and were prohibited from initiating any activity with one another.

The West Point training and education system did not appear to be the problem, but the West Point social culture was demoralizing, humiliating and discouraging to the new recruits. The more seasoned cadets seemed to think they needed to protect their own seniority, and they did this at the expense of the new recruits. Instead of an environment of encouragement, the new cadets faced an environment of disapproval and reprisal. This is what Herb and I felt needed to change.

The Master of the Sword, Colonel Greene, was very supportive of our inquiry and agreed with our judgment that manifestations of initiative and leadership among new cadets should be encouraged and cultivated instead of being barred. Our final report was warmly received by Colonel Greene, but according to him, was ignored by the commanding general.

Herb Ripley and I put together a model for an interview to be used in dealing with applicants to the academy. We were then asked to send a copy of that recommendation to Lt. Commander Philip Phillips in the Department of Neuropsychiatry at the Naval Air Station in Pensacola, Florida. His reply was as follows:

IN REPLY REFER TO  
NO. PER/dt

U. S. NAVAL AIR STATION  
PENSACOLA, FLORIDA



Department of Neuropsychiatry  
School of Aviation Medicine  
U. S. Naval Air Station  
Pensacola, Florida  
11 May 1949

Dr. Stewart Wolf  
The New York Hospital  
525 East 68th Street  
New York 21, New York

Dear Dr. Wolf:

I want to thank you for your kindness in providing me with the excellent material on proposed special interviews with West Point cadets with a view toward assessment of their aptitude for successful leadership.

Problems resulting from faulty recruiting are daily encountered by us in the Regular Service, and views and recommendations on this subject such as those of Dr. Ripley and yourself are greatly appreciated.

Thank you again for your courtesy in writing me, and for the material enclosed with your letter.

Respectfully,

A handwritten signature in cursive script that reads "Philip B. Phillips".

PHILIP B. PHILLIPS,  
Lt. Commander, MC, USN.



After the fellows in Medicine A were well established in their research projects, Dr. Barr invited me again to his office, this time to announce that he had recommended me to fill the vacant chairmanship of medicine at McGill University in Montreal. A few days later, I received a letter from their dean, inviting me to visit.

I took a train from New York to Montreal where the dean met me and began taking me to visit several of the department chairmen, two of whom I had already met. For the next two days, I was a lunch and dinner guest. The main topic of conversation was my work with Tom and his stomach. It was a cordial, friendly experience during which I drank more alcohol than I should have. The last visit was in a living room with members of the board of trustees. Apart from quizzing me about how I would run the department of medicine if I were appointed chairman, they asked me to assess their needs and advise them how to proceed in filling the post.

My judgment was that they already had on their faculty an outstanding professor who was by far more educated and scientifically productive than I. His name was J. S. L. Browne. I was acquainted with him, and in my judgment, his intellectual quality, research contributions and ability as a teacher were outstanding, but it was apparent that the board members were looking for another person as department chairman. I left Montreal without further discussion. I learned later that a British physician had been appointed to the job. I was relieved because, although I hoped to lead a medical school department of medicine some day, I did not yet want to give up the study of Tom. Furthermore, I was happy with my new duties at Cornell, and Virginia and I were happy in New York.

Not long after returning home from the war in the Pacific, I was invited to give lectures in South America about our studies of Tom and his stomach. I think the invitation stemmed from a suggestion by a friend, Adolf Berle, who had served as Ambassador to Brazil under President Truman. Berle, who had been a member of Franklin Roosevelt's brain trust, and his physician-wife, Beatrice, were friends of Harold Wolff. They soon became friends of Virginia and me. Both of them had learned to speak Portuguese during Adolf's years as Ambassador. I had planned to give the lectures in French, because most educated South Americans are familiar with French. They urged me to present at least one of my lectures in Portuguese. Adolf Berle arranged for a Brazilian newspaper reporter in New York to translate one of my lectures into Portuguese. When the tape arrived, I began to memorize the text and practice the pronunciation.

Shortly thereafter, Virginia and I flew to Rio de Janeiro where we were royally entertained because of their high regard for Adolf Berle. There was one social pattern that distressed both Virginia and me. During hors d'oeuvres at the home of a wealthy banker, we noted that while we reflexively acknowledged the serving maid with a nod and a thank-you with each passage of hors d'oeuvres, the host and his wife were blank faced and made no acknowledgment to the servants. We just assumed that it was a cultural custom of the country.

When the time came for the first lecture, the auditorium was crowded with doctors, the first row being occupied by some professors whom we had met. Just before I was called to the podium, five ladies whom we had met walked in. The front row was immediately cleared for them by the professors, and those professors stood on the aisle throughout the lecture, which I delivered in Portuguese. I then handled the comments and questions in French. At the end of the session, one of the ladies, smiling at me, said in English, “It was a fascinating talk. I understood your every word, but I must tell you that you have a distracting Italian accent.” I laughed, because I don’t even speak Italian.

We went on to Buenos Aires for the next visit, where the lectures were delivered in French. The local psychiatric society put on a large dinner dance. The men were very attentive to Virginia. I found myself dancing with a pretty female psychiatrist who loaded me with questions and suggestions on how to interpret our observations during the study of Tom. She insisted that the opening into Tom’s stomach must be considered psychologically as a vagina. As I tried politely to counter her suggestion, she replied in a patronizing tone that I should, of course, be forgiven for my error because I had not been analyzed.

After Argentina, Virginia and I flew across the mountains to speak in Chile and then Peru. We met the American ambassadors to both countries and observed that, unlike Adolf Berle, neither of them had learned the local language. We were a bit ashamed. It seemed to me that international diplomacy should not be hampered by language differences.

One of my most intriguing patients during this time was the son of Charles Rector, owner of the famous Rector’s Restaurant on Broadway near Times Square. Apart from being an outstanding eatery, Rector’s was a place where the elite gathered in the early years of the 20th century. Included among the elite was “Diamond Jim” Brady whose invention of hot boxes, the devices used universally for oiling the axles of railroad cars, won him a huge fortune. Together with other philanthropists, he had endowed the department of urology at Johns Hopkins after Dr. Hugh Young performed a successful operation on him for a benign enlargement of the prostate. Brady also gave a comparable endowment to the department of urology at Cornell’s New York Hospital.

Brady had once been a frequent patron of Rector’s, but after a few years his visits became rare. He replied to a query from the owner, Rector Sr., that because of his fondness for Marguery sauce, he had been going to Paris to eat at the famed Marguery Restaurant. Marguery sauce was made from a reduced mixture of white wine and fish stock, blended with egg yolks and butter. It had been developed in the late 1800s and was served most often with a mild fish, such as sole. To Rector Sr., the loss of Brady as a regular customer was a situation that needed to be addressed. Rector’s did not serve Marguery sauce, but that situation would change, just for the sake of pleasing this

one special patron.

To save the bacon, Rector sent his son, George, to Paris to seek a job at the Marguery, in hopes of learning how to make the sauce. The great restaurant declined George's application on the basis of his youth and lack of experience. He then obtained an assistantship in another Paris restaurant for a few months until he could qualify for a job at the Marguery. After George became fully qualified in making Marguery sauce, he was called back to New York by his father who, with Brady, had arranged a welcoming group to march him from the arrival dock to Rector's Restaurant.

Diamond Jim took a seat at a table while George disappeared into the kitchen. Rector Sr. sat quietly across the table from Brady until George emerged from the kitchen with the meal in hand. Diamond Jim ate the repast without saying a word until he had finished. He then looked across the table and blurted out to Rector, "With this sauce made by your son, I would gladly have eaten it on a Turkish towel." It was quite clear that the limited patronage problem had been solved. Diamond Jim Brady became again a valued fan of Rector's.

The details above were told to me by George Rector as he was recovering from the attack of angina pectoris that had been responsible for his entering New York Hospital. Virginia, who had been fascinated by the story, invited George to dinner at our small apartment. He seemed to enjoy the dinner, but said very little about the meal. Later, before being discharged from the hospital, George presented his already well-known recipe book to Virginia with a written message on the flyleaf: "With greetings, from one good cook to another."

Virginia became pregnant in 1950 and during that summer, she delivered our first child, Stewart George Wolf III. Our pediatrician, who had served with me in the 9th General Hospital during the war, insisted that Virginia and I move out of our tiny apartment, complaining that it would not meet hygienic standards for a family. Fortunately, a Johns Hopkins classmate and his wife, both of whom were ophthalmologists, were moving out of their apartment on the 14th floor of an apartment house on 52nd Street, close to the East River, so we took over their lease.

A major deficiency of New York for couples with children was its short supply of trees and green places, so Virginia and I, trying to produce a family, began scanning the newspapers for country properties. The price of everything north of the city was sky high -- too much for my \$6000 a year salary from Cornell where I had been ranked as an assistant professor of medicine. Properties directly south and west of New York City were New Jersey estates. But west of New York, beyond New Jersey, we found a dairy farm in Pennsylvania that was available at a reasonable price, so we contacted the realtor, Mr. George Plush, to make the purchase. The farm was situated in a beautiful setting just below the ridge upon which part of the Appalachian Trail extends. The price was low because the owners, Mr. and Mrs. Eichein, were divorced and were eager to move away. Their grown children had

already left home. The farm had been established and the house built in the 19th century by a German family named Eilenberger. We found some of their memorabilia in the attic.

We bought the farm with a loan from the local bank plus a small inheritance from my mother's sister, who had died the previous year. Soon we were going out to the farm every weekend with our colleagues at Cornell, most of whom had shared the 9th General Hospital experience with me during the war. They helped us fix up the house and grounds, generously doing an enormous amount of work. As I described it, Virginia did the cooking, I made the martinis, and they did the work.

As anyone with a patch of grass knows, grass grows. Owning acreage and working full time in the city meant taking many trips back and forth between the farm and the hospital. My weekends were full, and soon I found the upkeep on the farm to be a little overwhelming.

One weekend, I went into a shop in Mt. Bethel near the farm to look into buying a device for cutting the grass, as the grass was growing and we had a lot of it. A nice looking fellow walked in and we started talking about cutting devices. He told me that the device I had been admiring was no good, that there were better devices available. We talked more, and he told me his name was Mike Bach and that he sold eggs and other types of produce in New York. He drove the truck for the owners and lived with the owners. He had grown up in an orphanage and liked discipline and hard work.

Mike Bach and I became close friends. While I was away from the farm, especially when I moved to Oklahoma and was only able to go to the farm during the summers, Mike oversaw the upkeep of the farm and helped build the laboratory that I had established. Eventually, Mike suffered a stroke and died, but I will always be grateful for his friendship and his help.

During the first summer after the war, I received a telephone call from the medical editor for Time magazine asking me if I would consult for his weekly column. It required me to join him at his office in the Time Building at Rockefeller Center in New York every Sunday at 3:00 p.m. I enjoyed the job immensely, and it gave me a good feeling when I was able to keep hazy medical developments from being published prematurely and to explain and encourage the publication of important contributions. A month or two later, I was asked to serve as consultant to the medical and science editor of Life magazine as well. Thus, our time at the farm became more and more important to Virginia and me.

One weekend when Virginia and I went out to the farm alone, and before we had advanced to the point of buying furniture, we were sitting on orange crates when we heard a knock at the door. I got up and opened the door to see a man standing there waving a dollar bill in his hand. He quickly explained that he represented the Columbia

Natural Gas Company and that they wanted to buy an easement to bring their oil pipe, the “Big Inch,” from Texas to New York, through our property, a distance of nearly a mile. He said they would pay \$1200 for the privilege and that the dollar bill was the agreement-closing symbol. We, of course, could envision a way to pay for some living room furniture, but the amount seemed measly for a right to dig up and have a permanent right of way through our property for a mile. Nevertheless, having few choices, we agreed.

## **Chapter 8: Moving West to Oklahoma (1952-1966)**

In November 1951, I was invited by the dean to visit the University of Oklahoma School of Medicine in Oklahoma City as a candidate for the chair of the department of medicine. This would constitute the first full-time clinical chairmanship at that institution. Previously, the clinical faculty had been selected from the prominent practicing physicians and surgeons in the community.

The dean, Dr. Mark Everett, was planning to establish full-time clinical leadership for each of the clinical departments, starting with internal medicine. He had identified three preferred candidates, two from Harvard and one from the University of Florida. Each one had already visited as a candidate. I knew each of them personally and had high regard for them as teachers and as medical researchers.

I was immensely impressed by Dr. Everett. Although very genial and kindly, he was clearly determined to build a strong, new, full-time clinical faculty. He himself was well educated and had been recruited from the department of biochemistry at Harvard. I was impressed also with the practicing doctors whom I met, especially with Dr. William W. Rucks, the chairman of the selection committee and a first-class clinician, comparable to the best at Hopkins and Cornell.

Before leaving, I met again with Dr. Everett and explained to him that I was in the midst of a research program that involved Tom and his stomach. He said that he was quite aware of the work with Tom and that he and President George Cross had already arranged with a charitable organization, the Noble Foundation, to support the research if it could be moved to Oklahoma. I also explained to Dr. Everett that in order to organize the department of medicine, supervise the teaching and recruit interns and residents, I would need to bring with me another senior professor, preferably Dr. Robert Bird, a close colleague at Cornell, along with two chief residents for the first two years to organize the house staff program.

Three weeks after returning to New York I received a phone call from Dr. Everett offering me the post. He agreed to my requests concerning Tom, Dr. Robert Bird and the residents, and furthermore offered me a membership with a laboratory in the newly formed Oklahoma Medical Research Foundation that was located across the street from University Hospital. I thought long and hard about whether or not to accept the challenge at Oklahoma, and I talked a good deal with Harold Wolff. I also mentioned to the editors of Time and Life the possibility of my leaving New York. Both of them assured me that we could do our communications over the phone and by mail, but the plan did not seem feasible to me, so I persuaded them to select one of my successors at Cornell.

The possibility of organizing my own department and helping recruit a full-time faculty was very tempting to me. Dr. Wolff was very helpful and supportive, but it was evident that he did not want me to leave Cornell. He



declared that if I left, the Medicine A program would collapse. I was reluctant to leave Harold Wolff and Medicine A. Dr. Wolff and I were very close, had worked together for more than ten years, and we had deep respect for one another. As for the Medicine A program, we had already lost some of our key people. Herb Ripley had moved to Seattle to become the chairman of psychiatry at the University of Washington, and Tom Holmes had gone with him as an assistant professor. It was a loss for Cornell, but as I looked at it, it also fulfilled the objective of the Commonwealth Foundation to produce internists who were competent to deal with the psychological aspects of medical problems.

I had hoped that Harold Wolff would succeed Eugene DuBois. Although I was a little dissatisfied with Dr. Barr's leadership, I loved the friendly working environment of Cornell and I loved working with Harold Wolff. Moreover, Virginia and I were happy in our apartment on 52nd Street. Although automobiles were scarce so soon after the war, we were able to buy a small Crosley car -- made by the company that had first introduced disk brakes. I drove it back and forth to the hospital every day, and it was our transportation to the farm every weekend.

I very much wanted to seize the opportunity given to me to lead Oklahoma's school of medicine. So I finally told Harold Wolff that I was going to accept the Oklahoma post and would leave early in April with Robert Bird as my vice chairman. I had also recruited one of the residents, Clinton Weiman, as chief resident for the first year in Oklahoma, and James Colville for that post in the second year, as I felt that none of the house staff at Oklahoma was able to take on the responsibilities of chief resident at that time.

On September 29, 1952, Virginia delivered our second child, a girl, named Angeline Griffing Wolf for her grandmother. Unfortunately, we could not bring her home to our apartment right away because she had been born prematurely and was found to have retrolental fibroplasia, a retinal disorder attributed to premature exposure to excess oxygen. Retrolental fibroplasias were the first known "free radical" disease, caused by excess liberation of oxygen free radicals.

Our baby daughter was still under treatment for her eye disease, so Virginia was not able to join me on the trip to Oklahoma. Nevertheless, the plans went forward and Bob Bird and I moved to Oklahoma City. We were warmly welcomed by Dr. Everett and the practicing physicians who had been doing the clinical teaching. Our first-year chief resident, Clinton Weiman, arrived shortly thereafter. Bob and I had also hired a secretary from New York. She followed us and promptly found an apartment in Oklahoma City.

Virginia and the children would be joining us, so I needed to find a new home. One of the internists in practice offered me his car and I began to explore a fashionable area, called Nichols Hills, in the northwest part of town. The houses were large and opulent, some even gaudy. It struck me that the most urgent desire of the owners

was to have a handsome, perfectly clipped front lawn that could put their neighbors' lawns to shame.

Instead, I found a lovely home just one block from University Hospital. The neighborhood contained large, historical homes, but they were in no way pretentious. Our home had been owned by the president of the board of the Oklahoma City Orchestra, who was planning to move to Nichols Hills. Virginia, our children and I lived happily in that house in Oklahoma City for the next 14 years.

I still very much wanted to continue my studies of Tom and his stomach, so I proceeded to make arrangements for funding. Meanwhile, Tom had agreed to join me and bring his wife, daughter and son-in-law. In the end, however, the plan fell through because Tom's son-in-law, a chief engineer on a tugboat in the New York Harbor, discovered that ships do not dock in Oklahoma City. He therefore withdrew, and so did Tom.

The Dean and the President of the University of Oklahoma, George L. Cross, agreed to let me take off during the summers and continue the study of Tom in New York. Cornell agreed to keep my laboratory open for me during the summers. It worked out very well. Virginia stayed at the farm as I worked with Tom during the week, and I would spend the weekend with her on the farm. Beyond that, for several weeks at a time, Tom would come to Oklahoma City and stay in the research ward of the Oklahoma Medical Research Institute while we carried on the research.

Dean Everett relied on me not only to organize the department of medicine, but to play a major role in recruiting chairmen for the other clinical departments, such as surgery and pediatrics, and also to develop a collaborative teaching program with Veteran's Hospital which was located across the street.

The first recruit was John Schilling, M.D., an associate professor of surgery at the University of Rochester. That institution was funded by the Rockefeller Foundation at the turn of the century and was considered the first "clone" of Johns Hopkins. John and I bonded very readily. For the first several weeks, in the fashion of Hopkins training, John and I made rounds together on both the medical and surgical wards. Dr. Schilling managed to develop an outstanding department of surgery by recruiting and training individuals who would become leaders in their fields.

The medical residency program proceeded well under the leadership of Clinton Weiman and Jim Colville. Over the next 10 years, we appointed 17 chief residents to lead a cooperative residency program that linked the clinical experience at the University Hospital with that of the Oklahoma City Veteran's Hospital, which was moved to the campus.

Bob Bird accepted the leadership of the teaching program. He fashioned the teaching program much like his own training under Dr. DuBois and established and developed the school's first research laboratory, close to the wards. There patients themselves became, in effect, co-investigators as they cooperated and, in essence,

participated in the work. Working with the students in this fashion developed strong personal bonds between Dr. Bird, his students, interns and residents. Many of them accompanied him on vacation fishing and hunting outings, thereby sealing a life-long mutual relationship.

Bob Bird was certainly the most gifted and effective faculty member. When I finally left Oklahoma for Galveston, Texas, in 1966, he was appointed to the deanship of the University of Oklahoma Medical School. He had served with great success for two years until he was recruited by the director of the National Library of Medicine, Martin Cummings, to serve as deputy director. At the National Library of Medicine his performance was, again, outstanding.

Bob Bird spent many holidays with Virginia and me at the farm in Pennsylvania. On his last visit, he was going to spend Christmas week with my family and me, but on arriving at the Easton Airport, he suffered a myocardial infarction with rapidly fatal cardiac arrhythmia. He died despite attempts at resuscitation. This was a tragic and unexpected loss of a close friend and colleague.

Later, the University of Oklahoma, with the aid of the Robert Montgomery Bird Society, established a large fund in his name to support the health sciences center. The existing library was named in his honor as the Robert Montgomery Bird Library.

Virginia and I settled in nicely in Oklahoma City. Our third child, Thomas Danforth Wolf, was born on March 7, 1954. Although I was busy with the medical school and research, and Virginia was busy with the family, we immersed ourselves into Oklahoma society.

Virginia and I attended St. Paul's Episcopal Cathedral in Oklahoma City, and we were both very active in serving the church. Virginia joined the women's altar guild and later became its chairwoman; I served on the vestry with three other church members under Bishop Powell. At one time, the cathedral needed to engage a new dean. Several priests were recommended, some of whom were invited to visit Oklahoma and preach on Sunday at our church. The first two were thought by the vestry to be more sanctimonious than endowed with leadership capability. The third candidate to be discussed by the vestry was the Reverend John Van Dyke who had a small church not far from our home in Pennsylvania. I was asked to report to the vestry as to whether or not he should be invited to visit. When Virginia and I went to our farm for the Christmas holidays, we attended his Christmas Eve service. After the service, we met with him and his wife in his home. We were both immensely impressed with him, but both his foreign accent and the fact that he had been divorced suggested that he might not be readily accepted by the vestry at Oklahoma.

At the next meeting of the vestry, I had reported that we had learned that Dr. Van Dyke was born in Holland,

became a chemist, and worked for a liquor company, he became an alcoholic, which led to divorce. He was treated by the founder of Alcoholics Anonymous, and had been in recovery for 20 years. Fortunately, the Bishop and the vestry approved of him, and he eventually became one of the most valuable citizens in Oklahoma City.



Fishing trip: L to R: The Right Reverend Chilton Powell, Bishop of Oklahoma, The Very Reverend John Christian Van Dyk, Dean of St. Paul's Cathedral, Marigene Van Dyk and Betty Powell, February 3, 1962

Oklahoma City had a very good symphony orchestra, under the direction of Guy Frasier Harrison. The president of the Oklahoma Symphony at that time was John Kirkpatrick, head of a small oil company, whose principal interest was philanthropy of a very enlightened sort. He had created an excellent art gallery, donated a beautifully equipped zoo that is now considered one of the finest zoos in America, and created a large institute which combined art, technology and science and provided creative opportunities for children and young people. He was very modest, however, and he particularly disliked being in the limelight or making speeches. Therefore, since we had become friends, he insisted that I make all the announcements and messages from the stage of the symphony during his two years as president.

I followed him in that post and served as president of the symphony for five years. The greatest difficulty was the annual fund-raising chore. There were several quite wealthy families in Oklahoma who had no interest in symphonic music. But the audiences at the concerts were always quite large and, in general, support for the orchestra was very good. Its excellent director, Guy Frasier Harrison, was highly regarded. I think Virginia and I attended every performance. In deference to what we considered a community jewel, we always dressed for the concert -- she



Mr. and Mrs. Guy Grasier Harrison with Stewart and Virginia Wolf

in a handsome gown and I in black tie.

Gradually, I became more and more involved in community activities, including organizing a program called “Frontiers in Science,” which featured lectures for high school students by well-established scientists from all over the country. The various civic activities required me to meet frequently with community leaders, some of whom were businessmen or philanthropists. Outstanding among them was John Kirkpatrick.

Some leaders, however, were neither very helpful nor generous in their civic duties. Many of the civic activities were organized by a very able man named Stanley Draper, who had been imported from North Carolina. I worked with him a good deal. I complained to him once that some of the community leaders were hopelessly selfish and should be superseded. He replied, “I know, Stewart. I agree with you. Now, will you name the people who can take over for them?” Draper’s wise comment was reminiscent of the practical words of Dr. Everett. When I had urged some drastic action to correct a problem in the medical teaching program, Dr. Everett heard me out, then said, “I understand, Stewart. Do you want to make a brave showing, or do you want to get something accomplished?”

Before leaving Cornell for Oklahoma, I passed along my post as the secretary-treasurer of the medical society to my successor at Medicine A, so that Mrs. de Perez, the volunteer I had met at Cornell, could continue to receive income from her work at the society. After I moved to Oklahoma, I often visited with Mrs. de Perez during my frequent trips to New York. While I was in Oklahoma, I had learned that Mrs. de Perez had received a large legacy

from one of her cousins who had worked as a producer for a motion picture company in California. With money in hand, Mrs. de Perez moved out to Oklahoma to “retire,” although she continued her volunteerism, this time at the University of Oklahoma School of Medicine. I found her a nice house nearby, and she enjoyed not only working at the school but also entertaining many of the medical dignitaries who visited from time to time.

During the late 1950s and early 1960s, I was consulted by a patient named Barbara Griffin who suffered from severe migraine. Having worked a great deal on migrainous patients with Harold Wolff, I was eager to do a good job with her. Barbara was from the northeastern part of Oklahoma and had a very long drive to reach my office. After about five years of frequent visits, her headaches subsided, by which that time we had become good friends. When an opening arose, I suggested that she work as a secretary for Dr. Jim Hampton, an excellent resident and fellow who had become chairman of hematology at the medical school and the research laboratory at the Oklahoma Medical Research Foundation.

Barbara moved to Oklahoma City with her husband and two daughters and did very well. Her older daughter, Cathy, was a talented flautist. At that time, our daughter, Angeline, was attending an outstanding art and music school, Interlochen Arts Academy in Michigan, so I encouraged Barbara to enter Cathy there, and Cathy did attend Interlochen for one semester.

Cathy developed serious diabetes that was complicated by severe kidney failure. She required a kidney transplant. Barbara had already shown herself to be very generous with Dr. Hampton’s patients, but showed profound love and generosity of spirit when she gave her right kidney to Cathy. After the painful and exhausting transfer operation, Cathy improved enough to get a job of her own. Barbara was an excellent and devoted mother. Later, after Virginia and I had settled in Pennsylvania, Barbara and her husband, Jim, often visited us.

Mark Everett had originally suggested the establishment of the Oklahoma Medical Research Foundation and had recruited community backing. He wanted its work to be closely linked and collaboratively related to the research activities in the medical school. But the director who had been selected to lead the foundation kept it fairly well isolated from the activities of the school. I worked at both places and tried to forward Dr. Everett’s policies.

Dr. Everett and his financial officer helped me establish a small independent foundation based on the idea that I had put to work when I was at Cornell. Occasionally, pharmaceutical companies and other organizations would request a service and pay for it. For instance, drug companies would pay us to perform a clinical investigation. During my years at Cornell, I had collected the money from these sources and kept it in the institutional business office for unexpected and unbudgeted needs for our department. I had advised my successor in the Medicine A post to save the fund I had amassed for future needs. Unfortunately, he spent the whole fund during the first year after I



left, thus leaving no funds available for contingencies for necessary future needs. At the University of Oklahoma, with the help of Dr. Everett and his financial advisor, we used money from these sources to establish the Stewart Wolf Medical Research Fund.

Dr. Everett, with a small group of doctors, had been able to launch the Oklahoma Medical Research Foundation, but that organization suddenly found itself in financial difficulty because the philanthropist who had pledged to cover the cost of constructing the building died suddenly, and his heirs refused to make the payment. The foundation was also short of money to pay the year's salary for two of its scientists. The Stewart Wolf Fund made its first expenditures to cover those needs.

The executive director of the Oklahoma Medical Research Foundation, Hugh Payne, urgently needed long-term financial support for the Foundation. During a period of deep thought about how to achieve that objective, he turned to me and asked, "Isn't there a telephone line across the Atlantic Ocean to England?" I assured him that there was. He then came forth with the idea to phone Sir Alexander Fleming, (the discoverer of penicillin) thinking that he might be willing to visit Oklahoma and help with fund-raising for the Foundation. He managed to get the number of Fleming's laboratory and dialed the number. He asked me to listen in and help him, if necessary.

Sir Alexander himself answered the phone, and after a single sentence from Hugh Payne, he said in a charming British accent, "Aklaheuma! I should be delighted!" Thereupon, the two of them settled on a timetable within six weeks.

Sir Alexander made a great hit in Oklahoma City. He met many of the community leaders and made a few television appearances. He was equally warmly received during his trip around the state with Hugh Payne, and he raised substantial financial support for the Oklahoma Medical Research Foundation.

Before returning to England, Sir Alexander confided to Hugh Payne that a major post-war hardship in England resulted from a ban on the local sale of whiskey. The ban was designed to reduce spending at a time of currency shortage and to enhance foreign exports. In gratitude, Hugh Payne shipped to Sir Alexander a case of Scotch whiskey every few months (the whiskey was purchased outside of Oklahoma, which still had Prohibition at the time). Dr. Fleming made several additional visits to Oklahoma during the next few years until the Foundation was well funded to expand substantially into the future.

Virginia and I became friends with another very conspicuously famous person, Bud Wilkinson, the University of Oklahoma's football coach. Wilkinson's team had the distinction of having won 47 football games in succession. It took an outstanding team, Notre Dame, to end Oklahoma's winning streak. He was a man of extraordinary moral quality, generosity of spirit and dedication to the young men on his team. He was equally

dedicated to his gracious, intelligent and highly supportive wife, Mary. Bud asked me to join him on some of his periodic television appearances to discuss some of the physiological strains of football. On one occasion, we demonstrated, using a balloon, how athletes consume less oxygen than the average person at rest, and vastly less than the anxious patient.



Bud Wilkinson and Stewart Wolf

Before I arrived in Oklahoma, the members of the full-time basic sciences faculty had formed their own social organization. Since, upon my arrival, there were not yet any full-time faculty members in the clinical departments, they declined to accept Robert Bird and me, or any other clinical professor, to their membership despite the persuasive efforts of Dr. Everett.

One of these basic sciences chairmen, Dr. Ernest Lachman, agreed with Dean Everett that the organization should cover the entire faculty. Dr. Lachman was a distinguished professor of anatomy when Dr. Everett discovered him in Germany. When his professorship was been taken away by the Nazis, Dr. Everett brought him to Oklahoma as chairman of anatomy. He and his wife became valuable assets to the medical faculty and to the Oklahoma City community. Of course, they were also very enthusiastic supporters of the Oklahoma City Symphony Orchestra.

Within the next two years, a beautiful house which was a replica of George Washington's Mount Vernon came up for sale. It was just a block from my house. With Dr. Everett's support, it was bought by the Stewart

Wolf Fund and became a site for a faculty club that embraced everyone in the faculty. Dr. and Mrs. Lachman were enthusiastic and helped a great deal with the planning. Our aim was to have the building owned by a faculty organization and not by the university. The Stewart Wolf Fund had paid \$60,000 to buy the building from its owner, Dr. George Reeves, who had lived there with his wife and 13 children for several years.

Happily, the Faculty House is still functioning as an asset to the medical school and to the community. It has served as a resource for post-graduate education, where visiting faculty can stay and where small groups can meet. Several civic and charitable organizations in Oklahoma City have used the Faculty House for meetings and sessions of various sorts. It has also served to bring together all members of the faculty, both full- and part-time, into a friendly and informal association.

Beginning in the early years at Oklahoma, I was asked to participate in several national projects. For the National Institutes of Health, I served on three study sections that handled preliminary reviews of research proposals from scientists all over the country. I also served as chairman of the Cardiovascular Program Grant Directors and also on two National Advisory Councils, Heart and Environmental Health. The councils make the final decisions about research awards. At that time, the National Institutes of Health was a model federal institution dedicated to supporting first-class medical research.

The chairman of the Heart Council was Dr. Ralph Knutti. He was one of the 17 public health officials who initiated the program for the support of original research. Dr. Knutti was still in charge of the National Advisory Heart Council during my tenure as a member. Later on, he accompanied an NIH review committee visitation to evaluate a request for support of a research project of the lab that I established in Pennsylvania when the lab was just beginning. Ralph Knutti was typical of the enlightened public health officers who guided the NIH during the pre-bureaucracy days.

I was later given other advisory responsibilities by government and other organizations and institutions, including serving on the Board of Regents of the National Library of Medicine and becoming its chairman from 1965 to 1969. In 1968 and 1969, I also served on the Advisory Committee for Space Medicine and Behavioral Science at NASA.

By the early 1960s, the research program at the Oklahoma Medical Research Foundation was thoroughly established. Two of its scientists, Per Björntorp and Herbert Helander, were young Swedish doctors who had been sent to Oklahoma by Dr. Lars Werkö, the professor of medicine at the University of Göteborg. I had met Dr. Werkö during his several visits to Harold Wolff's laboratory at Cornell. Both of his young doctors did extremely well at Oklahoma and later became chairmen of medicine in Swedish medical schools -- Herb Helander in Lund and Per

Björntorp succeeding Dr. Werkö at Göteborg.

In 1963, a letter from Dr. Werkö announced that I was to be awarded an honorary degree from the University of Göteborg. Virginia and I flew to Sweden for the ceremony and took the opportunity to visit with other Swedish medical friends including Björn Folkow, Göteborg's chairman of physiology and Gunnar Björk, professor of medicine at Stockholm. As with the others from Sweden, we became fast friends and associates.

Dr. Lennart Levi became another good friend from Sweden with whom I spent a good deal of time. He conducted an annual conference on stress and sent his son, Ragnar, to work with me at my lab in Pennsylvania during the summer. Later, Dr. Werkö sent one of his young faculty members who was studying gastroenterology, Gerhard Dotevall, to work with me for a year at Totts Gap and in Oklahoma. He did extremely well. He then spent another year at the University of California, San Francisco, after which he was appointed chairman of gastroenterology at Göteborg. Since then, Gerhard and his wife, Stina, continue to be close friends.

In 1963, while I was serving as a member of the National Advisory Heart Council for the NIH, I was asked by Dr. Charles Kidd, the director of NIH's Office of International Research, to spend a year in Paris as an agent of his office to visit the research laboratories in Europe that were supported by the NIH under the Marshall Plan. My task was to report back an assessment of the work being done. I was also asked to meet with American research fellows who had been working in European laboratories and to interview young European scientists who were seeking research fellowships in the U.S.

Our plan was to take the whole family so that the children could have the same opportunity that I had had to go to school in France. We also thought that it would be a wonderful experience for Mrs. de Perez to join us. She had spent a good deal of time in Paris during her youth. It was a great opportunity to see the world again. I was to be headquartered in the American Embassy in Paris, from whence I would travel to the locations where the NIH was supporting research.

The Oxford University Press, publisher of my book with Harold Wolff, *Human Gastric Function*, had requested a second edition. Since I had already begun the revision, I thought that I might be able to complete it during the year in Paris. But I worried about where to find a secretary until I suddenly remembered that a splendid secretary, Miss Mary Steichen, was working in Europe. Miss Steichen had been a devoted secretary to me during my early years in Oklahoma. Two years before my trip to Paris, Miss Steichen had been offered a position to work with the U.S. Army in Germany. She had expressed some concern about leaving me, but I told her that it was a wonderful opportunity and that she would be crazy to turn it down. Two years later, when I contacted Miss Steichen in Germany regarding my trip to Paris, she seemed delighted to hear from me and agreed to help me with the revision of the

book.

During our first week in Paris we stayed at a pension. It was by no means lonely. The first day, another American doctor entered the same pension with his wife and two children. We became friends and had a close friendship throughout the rest of our stay in France. On the second day, I received a phone call from a doctor, Professor Comptè, who knew about my stomach study. He invited us to his house for dinner and thereafter, we enjoyed in a lifelong friendship with him and his family.



Stewart Wolf and Family in Paris

Shortly after our arrival in France, I had to leave for a two-week visit to Russia. Unfortunately, this meant leaving Virginia and the children in Paris, none of whom spoke French. I realized that it was a cruel arrangement. Before I took off for Moscow, however, we were able to arrange for a very nice place to live just outside of Paris, and enrolled the children in school there. Virginia handled the difficult situation beautifully. The schooling went well for the two older children, George and Ange, but Tom had a teacher who behaved much like my English teacher had when I was at the *École Alsacienne* when she shouted “The Little American can’t speak English.”

My sojourn in Russia went well. We had a good many interesting encounters in Moscow and St. Petersburg (Petrograd), including visiting with Nikolai Anichkov, professor of pathology, who had published the first claim that eating a high cholesterol diet was the cause of coronary atherosclerosis. Anichkov had worked in Germany with



Aschoff, the discoverer of cholesterol. The lead that he had followed emerged in 1909 during the war between Russia and Japan. The Russian Army's chief of staff got news of a strange and fatal disorder that had recently occurred in certain battalions, with several mysterious deaths. Dr. Ignatowski, the chief military doctor, was sent to solve the problem. The commanding officer could not offer much help, but did mention that not long before, his unit had received a shipment of meat that had gone bad. Ignatowski fed the meat to a group of rabbits and compared that group with a control group who received no meat. In post-mortem examinations, the abdomens of the test group rabbits were full of greasy deposits which were also found in several vessels, including the lining of the coronary arteries. None of the animals died from eating the meat, however. When Ignatowski later reported his findings at a meeting in Moscow, Anichkov published a paper in a Russian journal claiming that cholesterol was the probable cause of atherosclerosis in humans.

Anichkov's reports were not taken seriously by cardiologists in the rest of the world until his experimental findings were confirmed by Timothy Leary, a Harvard pathologist. After the presence of cholesterol in coronary, carotid, vertebral and other arteries was found in other species in similar experiments, a dogma quickly emerged that declared cholesterol to be the cause of atherosclerosis. This belief was soon vigorously promoted by the American Heart Association.

I took a skeptical view of that dogma for various reasons, not the least of which was my earlier experiments with urea. It appeared from clinical inquiry that cholesterol deposits occurred characteristically on inflamed surfaces in the body (as opposed to just random deposits one would have thought might occur after eating cholesterol-laden foods), as with mastoid infections, pleuritis, the intima of arteries and with an overgrowth of inflammatory muscle cells. There have been a few subsequent developments that have found coronary artery deposition of cholesterol following intimal damage by infarction. So high cholesterol isn't necessarily a problem, only when cholesterol is combined with inflamed surfaces in the body does cholesterol seem significant. The cholesterol carrier, LDL, probably plays a more important role in atherosclerotic plaque formation than does cholesterol. We have probably been looking at the wrong thing all along.

Among other experiences during our visit to Russia was a visit to Ivan Pavlov's laboratory and to the Russian Circus. One of the most intriguing experiences was a conversation with a Russian woman whom we met. She was very pleased with and dependent upon the social structures and rules of communism. She said she felt sorry for Americans. To illustrate her feelings, she said that she understood that there is sometimes violence during political elections in America, even occasionally a murder. I agreed that she was correct, but that such an event was not frequent. She replied that there is never any antagonism or violence in Russian voting. "You simply register your



vote, yes or no, with no fear. I understand that in America, some people work so much that they never get a vacation.” I had to admit that that was true. She then explained that in Russia, everyone is required to have a vacation and that the government decides the time and place, makes all of the arrangements and pays for the event. We dropped our conversation there.

Back in Paris, I started to make the required visits to the laboratories. I visited 35 scientists in six countries who were currently under NIH support, and I interviewed 37 research fellows from seven countries who had requested support to work in the U.S. In the meantime, I also periodically flew back to the States to report to the NIH and to attend various National Advisory Heart Council meetings.

My contact with European researchers was not limited to my visits to laboratories. Other European medical scientists wrote me requesting an opportunity to meet with me in Paris. Mrs. de Perez agreed to hold the meetings in her apartment quarters, and she was a charming and gracious hostess. She held court in a very grand manner.

Since we were so near many countries, I decided to take the family on a long trip so that I could give the children the kind of intellectual treat that Mother had given us when my siblings and I were little. Virginia, the children and I traveled to Italy, Sicily, Greece, Jordan, Egypt and Jerusalem. The trip worked out beautifully and got us back to France in time for my commitments at the Office of International Research.

Unfortunately, on our return, I learned that Mrs. de Perez had been ill with abdominal pain for the past three or four days. I got in touch with Bill Hood, a previous student of mine who was directing the department of medicine at American Hospital in Paris. He suspected pancreatitis and felt that she should go back to University Hospital in Oklahoma City. I took her back by plane and waited until her condition stabilized before I returned to Paris.

Shortly thereafter, the school year terminated and we all flew back together to Oklahoma, including Mary Steichen, who had finished typing the revision of *The Stomach* and was ready to work with me again in Oklahoma.

In 1962, I wrote and published a report of my ten years of service as head of medicine at the University of Oklahoma. I then resigned the post and spent much of my time in my laboratory at the Oklahoma Medical Research Foundation. Dr. James Hammersten, who had been guiding the pulmonary program, succeeded me as chairman of medicine and distinguished himself as an inspiration to the students for the next ten years.

Eventually, the dean and faculty at the University of Oklahoma School of Medicine established a Stewart Wolf Society made up of previous, present and future residents and faculty members. In 1966, shortly after I left Oklahoma for Galveston, Texas, the Stewart Wolf Society established an annual Stewart Wolf Lecture. The first lecture was presented in 1967 by Dr. Jim Hardy, with whom I had done research on cold pain during my residency at Cornell. The list of subsequent annual lecturers included several old friends, colleagues and distinguished academics.

My laboratory at the Oklahoma Medical Research Foundation had initially been focused on the chemical and physiological significance of the membranous lining of the stomach. For collaborators, I was able to recruit two outstanding Argentinean biochemists, Ranwell and Raoul Trucco, to join our research group. We studied the nature and functions of important molecules produced in the stomach lining. Among the contributions of the group was the discovery and crystallization of a previously unknown enzyme, gastricsin, by one of our graduate students, Jordan Tang.

The discovery of gastricsin also designated by the enzyme commission as (EC3.4.23.3) is commonly known as Pepsin C. Pepsin was a general name for several enzymes of the gastric juice that catalyzed the hydrolysis of proteins to form polypeptides which are broken down to amino acids. Pepsin A is secreted by the gastric mucosa in the form of pepsinogen and has an optimum pH of 1.5 to 2. It is present in the stomach of virtually every animal and most fish. It digests bones and other tough substances, but the strength of its acidity is not necessary for humans. Gastricsin has an optimum pH of 4, which is adequate for humans. We began to suspect that gastricsin may have developed in the course of evolution to function in a less acidic optimum pH, appropriate for the diets of humans.

We examined gastric juice from all the animals we could access. They all contained Pepsin A, and none contained gastricsin. Gastricsin was found only in humans. The discovery seemed strange, since Gastricsin is known to be highly active with hemoglobin as substrate, one would suspect its presence in lower mammals, particularly carnivores. (See Research on Gastricsin).

## **Chapter 9: Totts Gap Medical Research Laboratory (1958-Present)**

In the late 1940s and early 1950s, I built a laboratory near my farm in Bangor, Pennsylvania, so that I could continue my studies of Tom and his stomach. Eventually, financial support of what became Totts Gap Medical Research Laboratories emerged from the Stewart Wolf Fund that was established during my early years at Oklahoma. The institute was to perform as an adjunct to the University of Oklahoma School of Medicine, with a focus on developing “thinking” doctors and innovative researchers.

In 1968, the Stewart Wolf Fund was absorbed by a 501(c)(3) charitable corporation, Totts Gap Medical Research Laboratories, Inc., which was incorporated by my brother’s law firm in Baltimore, Maryland. Totts Gap still has a close link with Oklahoma and the University of Oklahoma School of Medicine, as well as Cornell Medical School in New York and Johns Hopkins Medical School in Baltimore. Collaborators and professors from all three places continue to visit and work at Totts Gap every year. In 1969, it was re-registered as Totts Gap Medical Research Institute, and its structure became more organized with a constitution, bylaws and a board of directors.

While Marty Cummings, the director of the National Library of Medicine, was serving as chairman of infectious diseases at Oklahoma, he took a vacation to Jamaica where he met Dr. Robert Page, a retired medical director for Standard Oil Company. Dr. Page expressed a deep interest in human ecology, so Marty suggested that he get in touch with me. One of the topics on which we focused on at Totts Gap was the relationship between the social environment and human health, hence human ecology. Dr. Page felt so supportive of our ideas that he contributed \$100,000 to Totts Gap and volunteered to become chairman of the board of directors of the laboratory.

When Tom Little died of dehydration and an old kidney infection (pyelonephritis) in 1958, I had to decide what to do during the summer months. Having worked with so many young Oklahoma aspirants to careers in medicine, I realized that young people in the Midwest are just as capable and smart as their counterparts in the East. Their only handicap was their distance from the medical power centers. This little piece of enlightenment suggested the idea of creating a summer program at the Totts Gap Laboratory and inviting a few young doctors still in training at Oklahoma to spend a summer doing research in Pennsylvania.

Beginning in the summer of 1958, young doctors at University Hospital in Oklahoma -- residents, fellows and post-docs -- joined me in the laboratory to participate in research. The program went very well and aroused interest from several old colleagues of mine at Hopkins, Harvard, Cornell and other eastern schools. I invited several of these friends to visit Totts Gap and spend a few days with the young people, examining, critiquing, and encouraging them in their work.

Totts Gap continued as a summer laboratory with eventual participation by young scientists from other parts

of the U.S. and foreign countries, including Italy, Australia, New Zealand, China and Canada. Throughout, the purpose was to teach, encourage and advance medical science.



Totts Gap Board Members: L to R: Robert Page, Eliot Stellar, Robert Bird, Helen Godell, Beatrice Berle, Stewart Wolf, Nick Werthessen, Mark Altschule, Oscar Swarth, Joseph White, John Bruhn, Ed Pellegrino and Andre Cournand.

A big advantage for the young people was their exposure to medical research. Their acquaintances with professors from around the country increased their opportunities for fellowships or faculty appointments. The students were performing innovative research and were working side-by-side with some of the most well known researchers in the country.

During one of our summers of research, Totts Gap welcomed a brilliant young physician-scientist named Brett Gooden. He and his wife, Leslie, added a great deal to the Totts Gap environment. My son, Tom, who was a gifted photographer, wrote plays for the Goodens to act and recorded them on a movie camera. The Goodens were delightful visitors for the summer.

Brett had been interested in reports of our work at Oklahoma on the oxygen-conserving dive reflex. In the dive reflex, heart rate and limb blood flow decrease. The decreased heart rate does not reduce metabolism or the

oxygen demands of the body's vital organs, and the lowered heart rate and occasional abnormal heart rhythms resulting from the dive reflex may contribute to blackout underwater. It appears that the purpose of the dive reflex in humans is to reduce heat loss in the limbs.

In aquatic mammals, this reflex is protective in nature. It plays a large role in helping the animal to conserve oxygen while submerged beneath the surface. In some animals, this reflex can allow them to remain underwater for up to several hours before needing to resurface to take a breath. The term "oxygen-conserving reflex" is applied because these changes allow survival under water for a longer period than the supply of oxygen would warrant under ordinary circumstances.

Humans however, do not gain an oxygen-conserving benefit from this reflex. In fact, in cold water, oxygen consumption will actually rise as we attempt to produce more heat. Our bodies will burn more of its fuel, and we will get an increase in metabolism. This process requires an increased supply of oxygen. The dive reflex may be related to mechanisms of sudden death in angina pectoris, myocardial infarction and certain other conditions.

Brett Gooden, working with Robert Elsner, professor of marine science at the University of Alaska, was a pioneer in the investigation of the dive reflex, and he made a very substantial contribution to the work on the dive reflex at Totts Gap.

We conducted experiments together in the swimming pool while recording the subject's electrocardiogram. The greatest depth in the pool was nine feet in the middle. The subject to be studied was equipped with a scuba mask and was required to walk into the pool to recover a 50-cent piece that was hidden on the floor of the pool in the deep section. Periodically, after the subject had immersed himself into the pool, a "spy" in scuba gear would quietly walk down the steps to the water and make his way to the subject. On arrival, he would suddenly reach toward the subject and knock off his scuba mask. The ECG, of course, recorded a bradycardia that corresponded the moment of fright or alarm of the subject. The lowest heart rate recorded was 40 beats per minute.

Perhaps the most important lesson learned from the study of the dive reflex was the recognition of its trigger, the ophthalmic branch of the trigeminal nerve. Its afferent fibers are found throughout the naso-pharynx, the trachea and its surroundings, the pleura and the surface of the heart, including the coronary arteries. Our studies suggested that the arousal of the trigeminal nerve by stimulation of such sites may induce sudden death by ventricular arrhythmia. (See Research on Dive Reflex).

While Virginia and I were at the farm during the summer of 1962, I was asked to make a presentation at a meeting of the county medical society. After the talk, one of the doctors, Dr. Benjamin Falcone, took me to a tavern for a beer and conversation. He told me that he had been practicing medicine for 17 years in the vicinity of three

neighboring towns: Bangor, originally settled by Welsh slate miners, Nazareth, settled by a German Protestant sect, and Roseto, settled by Italian immigrants nearly a century ago. Dr. Falcone had noted that there was a strikingly low death rate from heart disease in Roseto compared to the rate in the two other towns. He said that a myocardial infarction in Roseto was hardly ever encountered in patients under 75 years of age. “You should study Roseto,” he said.

I told my colleagues in Oklahoma about Dr. Falcone’s observation. Although initially skeptical, we decided to gather mortality data on half a dozen towns in the area and compare each one to the national statistics. With the help of the Pennsylvania Department of Health, we were able to gather the required data. We learned that over a period of six years, the death rate from myocardial infarction in Roseto was less than half that of not only the surrounding towns, but also of the participants in the Los Angeles study and of white Americans nationally.

On the strength of this preliminary information, we planned a thorough study of the inhabitants of Roseto and of two control communities, Bangor and Nazareth. With the help of the National Institutes of Health and two private foundations, we were able to accomplish the study. The study thoroughly confirmed Roseto’s relative immunity from coronary disease despite a larger consumption of cholesterol-laden foods among Rosetans than among the inhabitants of the control communities. On the other hand, we found a vast and important difference in the sociological structure of Roseto as compared to that of the other communities.

Roseto was established in northern Pennsylvania in 1912. The immigrants came from an Italian hill town, Roseto Val Fortore, in the province of Foggia in southern Italy. On arrival, most of the men found jobs in the slate quarries of nearby Bangor for the starvation wage of \$1.00 per day. Not surprisingly, their early years in Roseto were somewhat chaotic. They needed a Roman Catholic Church, but could not persuade Archbishop Ryan, the local Catholic authority, to assign them one. Accordingly, the Rosetans spotted a Lombard Waldensian priest, Emmanuel Tealdo, who was willing to establish a Protestant church. Later on, Archbishop Ryan realized that he had made a slight mistake and promptly managed to recruit an Italian priest, Father Pasquale de Nisco, from a parish in London, to establish the Catholic Church of Our Lady of Mount Carmel. Father de Nisco also took over the task of properly organizing Roseto.

The community of Roseto was characterized by a strikingly cohesive family structure. Virtually all of the Rosetans lived in three-generation homes. The elderly were not sent to nursing homes, rather they were cherished at home and were given the esteem of a justice of the Supreme Court. We found no poverty in cohesive Roseto, no petty crime, and no hardship. People helped each other and families took care of their own.

In 1969, Dr. John Bruhn and I wrote and published *The Roseto Story: An Anatomy of Health*, the first book



on our study of the Italian community of Roseto, Pennsylvania. It reported not only the thorough history, physical examination, and laboratory data on each individual, but also an account of eating habits documented by our nutritionist who recorded the participants' meals at home. Because the life habits (smoking, high-fat foods, etc.) of the Rosetans were contrary to good health, we concluded that the only other factor that could be responsible for the Rosetans' relative immunity from heart disease was the social structure in Roseto.

We continued to follow the inhabitants of Roseto and their social changes for the next 20 years, and then we repeated the examination of the citizens in 1982. Though the healthy characteristics were still very striking, what was even more so was that those who had moved away from the community and its social structure exhibited health characteristics more like the national average. That is to say, those who had moved away had higher incidences of heart disease than those who had stayed.

Accordingly, we published a second book in 1993 titled, *The Power of Clan*. The results of our study were publicized throughout the country and several documentaries were recorded by worldwide sources: the British Broadcasting Company, the Canadian Broadcasting Company, a Swedish affiliate and U.S. sources. Most outstanding was a newspaper series by the Chicago Tribune.

It is tempting to speculate that the oft-proposed relationship of self-esteem, self-confidence and optimism to health has a sound scientific basis. In any case it seems appropriate to supplement our consideration of emotional stress with attention to forces that counteract stress and sustain the person. Among these may be numbered strong and confident religious beliefs, family solidarity and all manner of love relationships as well as the satisfactions of achievement, a sense of purpose in activities together with a host of uniquely human experiences.

Recent years have seen major social changes in clubs and other social organizations, including decreases in new and even long-time members. The lack of cohesion among the membership of clubs, school and college alumni, charitable and other traditional gatherings, has introduced counterproductive ways of adapting to our world. This social emptiness was discussed in the following piece I wrote for the Journal of the South Carolina Medical Association, February 1976:

#### Protective Social Forces that Counterbalance Stress

Ogden Nash once wrote, "There is only one way to happiness on this terrestrial ball -- that is to have a clear conscience or no conscience at all." The implication is that to be fulfilled one must approve of himself, must find himself in harmony with his own system of values. We express a uniquely human trait as we continually elect, consciously or unconsciously, among various alternatives a certain course to pursue. We thereby attempt to satisfy the needs of the spirit quite apart from those for personal

survival, food, and sexual gratification.

Being a social animal, man finds that many of the requirements for adaptation and for satisfying his needs stem from his relationships with his fellows. Unlike the ants and the bees, humans do not have a rigidly preordained role in society, but must continually select among a vast array of options that offer abstract as well as concrete rewards and punishments. Man must adapt to his social surroundings where relationships are largely based on verbal and other symbols. He must achieve nourishment of the spirit and satisfaction from activities while realizing his potential for love and for creativity.

Human beings are threatened by those very forces upon which they are dependent for nourishment, life and happiness. They must be part of the tribe, and yet they are driven to give expression to their own proclivities; because of their sensitive organization they are often pulled two ways at the same time. Events having to do with their place in their society take on major significance, and they often function best when their own needs are totally subordinate to the common end, the “team approach” in modern parlance. Inversely, when frustrated in such efforts, or rejected by his group, the individual may get sick or even die. He is jeopardized not only by those forces that threaten survival of self and kin and opportunities for procreation, but also he is endangered when, through the actions of other people, his growth, development and expression of individual proclivities are blocked, and often when his esthetic needs and creative potential are not fulfilled. Further, man’s lively appetite for challenge, exploration and adventure, by driving him into situations fraught with difficulty and hardship, may yield frustration and enhanced vulnerability.

The ability to hope, to trust in those about one, the ability to have faith in one’s destiny and to realize one’s personal identity are the elements of emotional security that can sustain an individual through all manner of hazards and hardships.

The expectations of those about us, the standards of our culture and the demands of one’s particular social milieu are powerful forces, now driving, now restraining, that may either threaten or sustain a man.

As a tribal creature with a long history of development man depends for his very existence on the aid, support and the real and symbolic encouragement of other humans. He lives his life so much in contact with others and he is so deeply concerned about their expectations of him, that perhaps his greatest need is approval and acceptance.

Thus a strong sense of group identity, a feeling of being needed and valued, is an important

requirement of individuals in a healthy society. The town of Roseto in eastern Pennsylvania was found to be remarkably healthy and comparatively free of the major scourges in America, cardiovascular and mental illness. The death rate from myocardial infarction in Roseto was found to be less than half that of surrounding towns. This almost exclusively Italian town of 1700 inhabitants originally settled in 1882 by immigrants from Roseto Val Fortore in the province of Foggia in Italy, has been the subject of careful study for the past 16 years. The conventional risk factors for myocardial infarction were by no means absent among Rosetans. We found that a diet high in animal fat, cigarette smoking, relatively sedentary occupation and obesity, are at least as prevalent in Roseto as elsewhere in the northeastern part of the U.S. Neither could the comparatively salubrious state of Rosetans be attributed to genetic or ethnic factors. A study of their relatives, many born in Roseto who now lived in towns and cities in New York, New Jersey and Pennsylvania areas, revealed stigmata of coronary artery disease by history and electrocardiogram comparable to other Americans. Moreover, their families had suffered the usual number of deaths from myocardial infarction among men in the fourth and fifth decades. In Roseto, on the other hand, over a sixteen-year period, only one individual died of myocardial infarction under the age of fifty-five. The striking feature of Roseto was its social structure. Because the mainly Anglo-Saxon inhabitants of the region shunned Italians, their natural cohesiveness was actually accentuated. Not only were the family units extremely close and mutually supportive, but so was the community as a whole, so that there was essentially no poverty and virtually no crime. The male-female relationships in Roseto were those of "old-country" with the man the undisputed head of the household. Moreover, the elderly were respected and listened to. Both men and women lived to old age, and indeed the death rate among women was slightly greater than that among men, leading to the unusual presence in the community of a few more widowers than widows. In addition to their relative immunity to death from myocardial infarction in the younger age groups, Bruhn has reported among the people of Roseto a remarkably low incidence of mental illness, especially senile dementia. Roseto illustrates that social stability and mobility are not necessarily antithetical. Like a ship underway, the community is stable with respect to certain buffetings and yet moves forwards. Thus, Roseto has been economically prosperous in comparison to its neighbors and innovative with respect to community projects. An unusually high percentage of high school entrants go on to graduation and an unusually high percentage of them complete a four-year college course.

It may be possible to test the hypothesis that the relative immunity to coronary deaths among

Rosetans is related to their culture, since the pattern of “old country” cohesiveness has begun to weaken. The younger people are not identifying themselves with the community activities to the extent they formerly did. They are even joining country clubs and attending church outside of Roseto. Their attitudes are becoming more typical of the culture that prevails in the communities around them. It may be significant that there has been a slight upturn in death from myocardial infarction during the last 4 years, but it is too early to make a judgment.

Dr. Sula Benet, a professor of anthropology at Hunter College, New York, tells of the remarkable health and longevity of the Abkhasians of Georgia in the U.S.S.R. She emphasizes similar peculiarities of that culture, “the high degree of integration in their lives, the sense of group identity that gives each individual an unshaken feeling of personal security and continuity and permits the Abkhasians as a people to adapt themselves -- yet preserve themselves -- to the changing conditions imposed by the larger society in which they live.” The resemblance to the prevailing philosophy of Roseto is evident.

Also in common with Roseto, and in contrast to most American communities, the place of the elderly in the community of Abkhasians is very special. Dr. Benet writes that as “a life-loving, optimistic people, [they are] unlike so many very old ‘dependent’ people in the U.S. who feel they are a burden to themselves and their families -- they enjoy the prospect of continued life.... In a culture which so highly values continuity in its traditions, the old are indispensable in their transmission. The elders preside at important ceremonial occasions, they mediate disputes and their knowledge of farming is sought. They feel needed because...they are.” The similarity to the situation of the elderly in Roseto is striking.

The challenge for modern society is to preserve insofar as possible the salubrious influence of established patterns in the face of inevitable and increasingly rapid change. Another important requirement of individuals in a healthy society is their constructive interdependence. Interdependence is a very fundamental principle among living things. The realization of this truth may have been somewhat obscured by Darwin’s emphasis on competition, the survival of the fit. It is true; nevertheless, that interdependence is demonstrable in the very simplest of unicellular organisms. The top millimeter of the sea, for example, is occupied by a variety of microscopic forms, each separate and freely moving, but the product of one is essential to the life of another so that these unconnected cells are nevertheless very closely interrelated. Such interdependent aggregations must be the forerunners

of tissues. It appears, therefore, that the process of nature has been differentiation, specialization, combination and then differentiation again. There may be a great lesson for us in this story of interdependence. Perhaps cities are the tissue of human society. The mass of humanity on the face of the earth may be comparable to the organisms in the top millimeter of the sea. The inter-relatedness of all life and hence the identity of life above and apart from individual identity is expressed by Teilhard de Chardin in this concept of the biosphere. In describing it he emphasizes that it is ever changing and evolving.

The ability of individuals to achieve healthy relationships and to accommodate to change depends on what has been called the plasticity of the nervous system; that is, the ability to alter functional connections among association neurons and to select among alternate behavioral pathways.

A recent experience in Brunei, Borneo, may be illustrative. In a preliminary observation of medical anthropology we studied rural tribes dwelling in jungle communities. Since WWII in the wake of affluence from important offshore oil and gas discoveries the country has been undergoing extraordinarily rapid social change. Formerly accessible only by riverboat and jungle tracking, the villages are visited frequently by helicopter bringing free medical services and supplies. A network of new roads is rapidly invading the jungle and schools are springing up in nearly every neighborhood among formerly illiterate tribal peoples. Finally, the state is encouraging everyone to adopt the religion of Islam. In the face of these multifaceted social pressures, the rural people have adapted remarkably easily, at the same time holding tenaciously to their extremely cohesive family structure and their traditional animistic religious beliefs that go back thousands of years.

There appears to be at present an effective equilibrium and, associated with this, an essentially healthy state among the inhabitants of the villages. We found no evidence of systemic hypertension, myocardial infarction, rheumatoid arthritis, peptic ulcer or ulcerative colitis.

Tentative conclusions from this brief study are suggested by the previous experience with the Italian community of Roseto, PA, whose salubrious state of health appears to have lasted only as long as Old World attitudes and traditions were maintained while adapting to American economic and political patterns. A prediction is therefore ventured, that as the newly educated youth of rural Brunei grow up in a world alien to their unschooled parents, and as the anxiety-relieving powers of old traditions and practices eroded, the chronic diseases of western society may make their appearance.

## Chapter 10: The Marine Biomedical Institute, Galveston, Texas (1969-1977)

Dr. Joe White, professor of anesthesia and assistant dean at Oklahoma was recruited to the University of Texas Medical Branch in Galveston to serve as dean under Dr. Truman Blocker, a famous plastic surgeon and director of the Medical Branch. Dr. Blocker had recently established a new institute on the campus with the aim of taking advantage of Galveston's location on the Gulf of Mexico and making use of the environment for biomedical research. While it would be difficult to match the fine work of the famous marine research centers at Woods Hole Biomedical and Oceanographic Institutes, Dr. Blocker felt that since the cold weather on the northeast coast limited the length of time during the year that marine organisms could be used for study, the Gulf of Mexico would be ideal in that it afforded a longer period for investigation.



Stewart Wolf, Lady Bird Johnson and Truman Blocker

Joe White visited me in Oklahoma City to persuade me to become the Director of the soon-to-be established Marine Biomedical Institute in Galveston and to organize a medical research program there. Joe said that whether or not I was willing to move to Galveston, Dr. Blocker wanted me to give the Goldheaded Cane Address at the graduation ceremony of their medical school. I was glad to give the talk, but I wasn't sure I wanted to leave Oklahoma. I did, however, think that Dr. Blocker had a splendid plan for establishing a biomedical research institute.

My talk at the graduation ceremony in Galveston was followed by a cocktail party, where I met the chairman



of the board of regents of the University of Texas at Austin, Frank Erwin. He was well known as a powerful administrator. He was a strong backer of Lyndon Johnson and had created the opportunity for him to run for the presidency. Mr. Erwin looked like a forceful man, but I found him candid and friendly. He complimented me on the lecture and said, "I don't want you to feel under pressure to accept the directorship of Truman Blocker's institute. In fact, I want the best thing for you, so you should do what pleases you. I will only add that we won't take no for an answer."

I took the offer seriously, but before I actually accepted the post, I learned that Truman Blocker had already set things in motion by recruiting Colonel Robert Martindale, the adjunct officer of the medical unit of the Naval headquarters at San Antonio, to be administrative director of the Institute. My title was to be scientific director. Truman had also recruited an expert marine diver named Dennis Bowman, who had been a member of the crew that attended to the early spacecraft after splashdown in the ocean.

The National Institute of Oceanic and Environmental Sciences had begun recruiting people to live on the ocean floor near the Virgin Islands in order to study marine organisms and the ground atmosphere on the ocean floor. Because the project required medical advice and coverage, Truman Blocker agreed to take on the medical and supervisory tasks, but was told that the National Oceanic and Atmospheric Association could not supply the financial support for the medical coverage. I suggested that the National Science Foundation might be able to support the project, so Bob Martindale and I took off for Washington. We visited the National Science Foundation and were able to gather the support we needed.

After Bob and I secured the funding for the project, it was time to think about the post that had been offered to me. I took Bob to the Cosmos Club for a collaborative martini. Through the first cocktail we talked pleasantly about Galveston, Truman Blocker and the Institute. Then, as Bob took the first sip of his second martini, I said to him, "Bob, I can't accept the post in Galveston. It is not possible to run an institute with two heads, one controlling the money and administration and the other directing the research." Bob immediately took another sip, put his glass down and said, "Stewart, I fully agree with you. All we have to do is tell Truman that we would like him to make you the director and me the associate director for administration. That way, I could help you achieve what you want and need." We shook hands and downed the rest of our martinis, with a toast to Truman. When we returned to Galveston, he agreed with

our plan, and I accepted the directorship.

Virginia and I moved to Galveston in June of 1968 and found a lovely house on a small bay not far from the medical school. All three children were away at school -- George in college at Columbia in New York, Ange studying at Interlochen Academy of Arts in Michigan, and Tom at Blair Academy in New Jersey. We joined the Episcopal Church in Galveston, where Bob Martindale, his wife Adeline, Virginia and I sang in the choir, and where Virginia again became very active in the women's activities, as she had been at the Cathedral in Oklahoma City.

Truman Blocker was the ideal president for an institution for medical education. Not only did he envision the Marine Biomedical Institute, but he handled his entire medical school faculty with understanding, concern, inspiration and strong leadership. Quite often in the morning, he would walk around the campus with a cup of coffee in his hand, visiting each department. He wanted to be brought up to date about progress, and he wanted to learn about present activities and plans. If there was an operational problem, he wanted to hear about it. The same held true for discoveries or imaginative ideas.

Later on, he would often have lunch with a local philanthropist, an official from the main campus of the university or with a member of the legislature. He would tell them about his visits to faculty members and would arouse their interest in the progress being made on his campus. These lunches often opened opportunities for the Institution in the form of financial support, academic opportunities or legislative action.

An opportunity to meet with Truman Blocker in his office was not usually achieved by seeking an appointment through his secretary, but by simply visiting his office. If he happened to be there, his door was usually open. He would simply call to you and invite you in. Dr. Blocker was a leader in every sense of the word.

For help in building and organizing the Marine Biomedical Institute, I visited Dr. Per Scholander at the Scripps Institute of Oceanography in La Jolla, California. He had been trained as a physiologist at Harvard and had continued his studies at Woods Hole Oceanographic Institute. My visit to Scripps was very profitable. Dr. Scholander was studying the oxygen-conserving dive reflex in sea lions. I was intrigued by his findings that the slowing of the heart rate was much more pronounced when he immersed the animal in water than when the sea lions dived in voluntarily. I suspected that the accentuated bradycardia was due to fright in response to being dunked, much like what I had found during my dive reflex experiments at Totts Gap.

Bob Martindale and I had been working on a plan to establish a marine biology section in the Institute in Galveston, but neither of us was very familiar with the field. We needed very badly to acquire a first-rate marine biologist. I received an inquiry from a Dr. William Hulet, a faculty member of the Marine Biological Institute in Miami, Florida. Bill Hulet had done postgraduate work with Dr. Homer Smith at his laboratory in Maine, where,

through fish studies, certain functions of the human kidney were discovered. I offered Bill the post of director of marine biology at the Institute in Galveston, and he accepted. Bill Hulet, with his graduate student, Roger Hanlon, had organized a first-class marine biology section in Florida, where they bred marine creatures important to the study of human physiology.

In addition to fortifying the Institute with top-rate marine biologists, I was also looking for leadership in oceanography. I knew of a man by reputation, Maurice Ewing, who was director of the Oceanographic Institute at Columbia University in New York. I asked Truman Blocker to approach Frank Erwin about our desire to recruit Maurice Ewing. Just a few days later, I was in an airplane with Truman and Mr. Erwin, headed for New York City. We met with Dr. Ewing at a law office affiliated with the granting foundation that supported Dr. Ewing's research. We greeted the lawyer and then became quiet. Only Frank Erwin spoke with the lawyer. Dr. Ewing said very little, but it was obvious that he and his associates were fed up with Columbia and the bureaucracy of its administration. Within a half hour, it was decided that Dr. Ewing would leave Columbia and join the Marine Biomedical Institute in 1970 as head of an associated Institute of Oceanography.

When we arrived back in Galveston, we soon got word that Mr. Cecil Green, a philanthropist who established Green College, Oxford University, had given us a research boat. Mr. Green announced that he would get a laboratory facility for Dr. Ewing. Everything worked well. Dr. Ewing and his wife were happy to join our organization and proved to be gracious and lifelong friends.

On one occasion, I invited Dr. Ewing and his wife to our farm in Pennsylvania. They were delightful guests. Dr. Ewing was eager to see and explore Totts Gap, a declivity on part of the Appalachian Trail that overlooked our farm. About a mile west was the Delaware Water Gap, through which the Delaware River flowed. I drove him up the mountain and parked about 100 yards from the edge of the gap. Dr. Ewing got out of the car, walked over to the gap and stood in the center of it where there was a huge, perfectly round stone. The gap was dry. After examining Totts Gap for about 10 minutes, Dr. Ewing walked back to the car and said, "I knew it! I was correct!" I asked him what he was referring to, and he replied, "I knew the river had previously gone through Totts Gap." I asked him how he knew, and he looked at me much as my brother had when I did so badly trying to learn bridge. "I'll show you," he said, so we walked together to the gap. "There," he said, pointing to the round stone. I remained silent. "You don't know the Bible," he added. Then it hit me, and I thought of David slaying Goliath, using his slingshot and the round stones he selected from the river that flowed through the valley that separated the Israelite and the Philistine camps. Dr. Ewing explained that he had stubbornly advocated that interpretation of the course of the Delaware River against his colleagues, who had insisted that he was wrong, and that he had been handicapped by not having the convincing

evidence. The smooth rock proved that the river had, at one time, flowed through Totts Gap.

Not long after we moved to Galveston, I was informed by my old friend, John Schilling, that I had been invited to visit the University of Washington at Seattle to present the Jessie and John Danz lectures. Those who had previously served as Danz lecturers include George Boar, Francis Crick, Joshua Lederberg, Carl Sagan and René DuBois.

This seemed to me like pretty rich company. I didn't think my message would match that of any of them, but I realized that it would be an excellent opportunity to present my findings about the powerful effects of social environment upon human health, so I agreed to visit for two weeks to present three lectures and to speak in conferences at the medical school. Virginia and I enjoyed every minute of the visit. We met with many of the faculty leaders throughout the university. We were very impressed with the standard of scholarship there.

After I returned to Galveston, I received a request from the University of Washington to submit a manuscript based on my lectures. The book was published under the title, *Social Environment and Health*. The book, like my lectures, supported the proposition that an effective social adjustment -- one that yields personal satisfaction and fulfillment -- is conducive to optimal health, and the allied proposition that social failure, frustration, dissatisfaction, deprivation and disapproval enhance vulnerability to disease. Although it is clear that man, as a tribal creature, depends on his fellows for recognition, support and understanding, most biomedical scientific thought fails to acknowledge that the quality of social adjustment is relevant to the development of brain, body and health.

During my stay in Galveston, I kept in touch with the scientists at Scripps Institute of Oceanography in La Jolla, California. In June of 1975, I received a letter from them regarding a project they were planning which would take place in Borneo during the summer months. Since they would need a physician in the party, they asked if I would accompany them. I thought that it sounded like a unique opportunity for me to conduct my own research project as well, so I agreed to go. I suggested the idea to my son, Tom, and asked him if he was interested in going to Borneo with me. He agreed with enthusiasm.

We boarded an airplane in mid-July and headed for Borneo. We were not entirely clear as to where the Alpha Helix, the Scripps research ship, was docked, so when we landed at Brunei we had to search for it. We located the ship in a small cove where the dock had at one time been a private site for the Queen of England's vessel. Our Scripps friends warmly welcomed us.

During our research, Tom and I had discovered that the social structure in Borneo bore a remarkable similarity to that in Roseto. The natives' living quarters, which were long houses in the forest, contained multiple generations of the family. In addition, the relationship between disease and social dynamics in Borneo was very

similar to our findings in Roseto.

While we were in Borneo, we met a woman named Barbara Harrisson, who was doing research on Chinese and other pottery. Barbara was a scholar who was fluent in the local language, and she was gracious enough to help us visit and study the villages. She became an immensely helpful colleague and a lifelong friend. She accompanied us on our journey back to the U.S. and to the farm, as she was working on her dissertation for a Ph.D. at the University of Pennsylvania. I loaned her one of the houses that belonged to Totts Gap Institute, where she worked alone for the remainder of the year until she earned her degree.



Dr. Wolf (right) restin in Borneo long house

An end to my happy days in Texas followed a tragic event that emerged from an unfortunate circumstance in the department of surgery. The professor of surgery disciplined a surgical resident who had refused to carry out his commitment. The resident complained to his uncle, a state senator, who insisted that the chairman of surgery be fired. When Truman and the dean refused, the senator appealed to Mr. Erwin, the chairman of the board of regents. Mr. Erwin asked Truman to retire immediately, despite the fact that earlier Mr. Erwin had suggested that Truman keep his post until the age of 75.

Truman's successor had little interest in the Marine Biomedical Institute and was especially opposed to my taking young doctors to Totts Gap during the summer for research experience. Beyond that, he called me to his office to congratulate me on having recruited several very valuable faculty members. He said, "Stewart, you have done a great job for the university, but you have become too important. We need to develop a strong cancer institute, and your organization stands in the way." I demurred a bit and reminded him that the largest cancer institute in America belonged to the University of Texas at Houston, only 45 miles north of Galveston. That observation did not go over

well, and I knew he wanted me to disappear.

The actions of Truman's successor continued to change the cooperative atmosphere among faculty leaders, and several people, including Bill Hulet and Bob Martindale, resigned and left Galveston. By coincidence, I had been approached by the president of St. Luke's Hospital in Bethlehem, Pennsylvania, not far from the farm and Totts Gap. He wanted me for the post of vice president of medical affairs. In light of the events happening at the Marine Biomedical Institute in Galveston, I decided to accept the post at St. Luke's. Virginia and I sold our house in Galveston and moved back to the farm.



## Chapter 11: Decades of Change (1977-Present)

I was appointed to a professorship of medicine at Temple University, in addition to being the vice president for medical affairs at St. Luke's, as St. Luke's accepted residents for training from Temple Medical School. I also joined the College of Physicians of Philadelphia and became chairman of their medical history program.

During the next few years, Virginia and I had an opportunity to join my brother, Van, and his wife, Alice, on trips to the South Pacific and South Africa, organized by the Yale Alumni Association. We also had several visits from the children, all of whom had finished college and were living in New York.

The Totts Gap Laboratory was very busy. I was continuing research on the dive reflex. I worked a great deal with Helen Goodell and Beatrice Berle, and wrote and published a book, *The Limits of Medicine: The Doctor's Job in the Coming Era*. The book was based on a Totts Gap colloquium in which Beatrice's second husband, André Cournand, who had received a Nobel Prize for introducing cardiac catheterization, played a major role.

Three colleagues, Nicholas Werthesson, Mark Altschule and Richard Veech, became indispensable to the work of Totts Gap. Nick Werthesson was director of physiological research for the U.S. Office of Naval Research, an organization that supported research at Totts Gap and elsewhere in the eastern U.S. A Harvard graduate, Nick was an outstanding scientist whose rich experience and wise judgement contributed a great deal to our work. Nick also served on the board of directors of Totts Gap. Before he died in 1981, he directed his laboratory assistant to send his laboratory records, resources and other materials to me at Totts Gap.

Nick had been a close friend of Mark Altschule who, at that time, was chairman of the board of directors of Totts Gap. Mark had been a widely respected and inspiring teacher at the Harvard Medical School for years. During his latter years, he had served as an archivist at the Francis A. Countway Library, and just before he died in 1988 he completed an important book, *The Rise and Decline of Bedside Medicine*. In this book, Altschule inaugurated a new way of looking at the history of medicine. He offered a synthesis of the writings and behavior of influential physicians that reached over 400 years. He traced a remarkable fluctuation of interest among physicians in what they can learn about medicine from their patients. Altschule focused on the excessive use of the laboratory in medicine that has impaired clinical practice by attenuating the doctor-patient relationship.

The decline of clinical medicine is thus not the fault of science or even too much science but in the forfeiture to technology of the most important element in medical practice, a thorough understanding of the patient. In Altschule's words, "Medical practice that derogates, or interferes with doctor-patient relations, is medicine deformed."

Richard “Bud” Veech was a close friend of both Mark Altschule and Nick Werthesson. After graduating from Harvard Medical School summa cum laude, he took a medical residency at Cornell, after which he earned a Ph.D. in biochemistry under Sir Hans Krebs at Oxford. Afterwards, he accepted a job at the National Institutes of Health doing research on alcoholism. I had an opportunity to work with Bud while I was at St. Luke’s Hospital. I studied patients in the alcoholic ward of an affiliated hospital in Bethlehem, Pennsylvania, and sent the data and blood work of each patient to Bud’s laboratory in Bethesda, Maryland. The research led to Bud’s discovery of the presence of 2,3-butanediol in chronic alcoholics and the control of alcohol metabolism by differences in the redox state. The presence of D,L-2,3-butanediol in patients with alcoholic cirrhosis and its absence in control subjects suggests that this compound may be a marker of some forms for alcoholism.

At one time when I was serving on the advisory committee for Bud’s research in Bethesda, I had breakfast with Hans Krebs, who was chairman of the committee. He mentioned that he had tried to persuade Bud to remain with him at Oxford after he had completed his Ph.D. Dr. Krebs added that Veech was the best graduate student he had ever had. In view of the likelihood of his (Krebs’) resigning his post as chairman of biochemistry, he thought Oxford might select Bud as his successor. Bud declined, however, because his wife was very eager to get back to the U.S. Bud began serving on the board of directors at Totts Gap in 1993.

During the early years of my study of Tom and his stomach, I learned that a great French physiologist, Charles Richet, had published studies of a 15 year-old boy, named Marcellin. Like Tom, Marcellin had a gastric fistula, although Marcellin’s resulted from the surgical treatment of a malignant growth in his stomach rather than esophageal trauma. Richet studied the sensory mechanisms in the young man’s stomach and made the project the topic of his medical school graduation thesis. He continued his research by studying gastric acid in fish.

As I learned more about Richet’s work in neurophysiology, I was so impressed with his versatility that I decided to write his biography under the guidance of the distinguished medical historian, Larry Holmes, director of history of medicine at Yale. Richet’s grandson, Gabriel and his wife, Claude were of enormously generous assistance to me in preparing and writing the biography. Gabriel was professor of nephrology at the University of Paris. I was also privileged to talk several times with Richet’s son, Charles fils, who had also become a medical teacher.

During World War II, Charles fils, was too old to serve in the army, but was active in the Resistance and sheltered Allied pilots who were shot down over France. Eventually the Germans caught him, and he was imprisoned in Paris for seven months and then transferred to Buchenwald for the remaining 16 months of the war. Upon his liberation from the concentration camp, he wrote to General Charles de Gaulle urging him to make sure that German prisoners were properly treated according to the Geneva Convention.

Charles fils was appointed professor of nutrition in the Faculté de Médecine after the war. In his first lecture to the students, he mentioned that seven members of the Faculté had been imprisoned in concentration camps and that of that group, only he survived. He kept in touch with as many of his fellow survivors of Buchenwald as he could find, and he noticed that there was an extraordinarily high incidence of cancer among the survivors. He himself suffered a cancer of the larynx. In 1957 he published a monograph, *La Pathologie de Misère*, which dwelt on what he felt were the consequences of life in the concentration camps and other experiences of human deprivation and degradation.

Charles fils gave me a copy of his essay and urged me to get in touch with the American authorities, suggesting a stronger emphasis on pacifism and avoidance of war. I wrote to the Secretary of State and received a polite reply.

Gabriel Richet, the son of Charles fils had a distinguished career as chairman of medicine and chief of nephrology in the Faculté de Médecine in Paris. He generously gave me access to those of his grandfather's documents that were in his possession. At Charles' death, his library and personal effects were pretty well dispersed. He left his collection of theses to the Société de Biologie and his physiology books to the Laboratoire de Physiologie at the Faculté de Médecine in Paris. Other books, including those on social and physical science, he willed to the Institut Marey located in the Bois de Boulogne. His remaining books and personal effects were supposed to have been divided among his children. Gabriel tried to collect or obtain photocopies of his grandfather's documents from the other family members, but he found that many had been lost or destroyed. Sadly, he was unable to find any trace of the notebooks that contained original records of his grandfather's work.

In August of 1986, Gabriel and his wife, Claude, generously welcomed me into their summer home in the hills of Provence. For nearly a week, they allowed me to study and photograph the materials they had on hand. Particularly helpful was a five-volume, 1500-page memoir written by Charles Richet during World War I. With the title, *Mémoires sur Moi et les Autres*, it was intended for his children and grandchildren so that, as he put it, "they would know the full truth of my life and my accomplishments. I can't tell everything. Any man who does, is lying." By the time I had completed my research on Richet, I had enough material to write and publish in 1993 the book, *Brain, Mind and Medicine: A Biography of Charles Richet*. (Wolf, 1993).

During the summer of 1986, shortly after Virginia and I returned to the farm after our trip to France, I resumed my research at the Totts Gap Laboratory. I was working with my favorite technologist, an Oklahoman named Jake Ebey, on a study of the control of cardiac arrhythmias. That same year, I received a letter from Shanghai, China, signed by a young doctor named Huang Ming-He. He was an advanced student, resident or fellow who had

read some of my publications, and he was interested in working with me at Totts Gap in neurocardiology.

In my reply, I complimented him on his aspirations and explained that although we were interested in neurocardiology, Totts Gap was a small organization. I informed him that there were larger groups elsewhere in the U.S. that could offer him stronger training experience. Within two weeks, I received another letter from him. It was one of the most polite and gracious letters I had ever received.

It began with deep gratitude for my recommendations of other institutions and concluded with a statement that he would prefer to work with me. He also mentioned the names of two of his faculty members from whom I could obtain references. I wrote them both a letter of inquiry. They both gave rave recommendations in response to my inquiry and added that the young man had such a command of the English language that they used him as an interpreter in conferences attended by English-speaking visitors.

I then wrote Huang Ming-He a letter of welcome in the fall of 1987 and suggested that he fly into JFK airport in New York, assuring him that I would meet his plane if he would inform me of the time of arrival. He sent me a photo of him standing with his wife. His wife was an electrocardiograph technician at an army hospital, so she was unable to leave the country at that moment. She and their son planned to join him at a later date.

On the appointed day, Jake Ebey accompanied me to the airport to meet our Chinese visitor. He was arriving on a Chinese carrier, and there was a huge crowd at the gate. With his photo in our hands, we scrutinized every face that passed through the gate. Finally, I saw a young man who appeared to be about the right size and age, so I shouted to him, "Are you Huang Ming-He?" "No," he shouted back, "I am Huang Ming Chow." Shortly afterward, another young man about the same appearance came through, and this time we had the right one, so we loaded our car with him and his luggage and drove out to Totts Gap.

Since the Chinese write the man's last name first, followed by the first name, we asked if we could call him "Ming Huang," leaving out the He (pronounced, "Hew"). He agreed, and that is what I call him to this day.

Research at Totts Gap was moving along at a fast pace. Ming, Jake and I did several studies on the influence of the brain on the heart. During the same period, I also helped Bud Veech with studies of brain damage from alcoholism, and I began serving as chairman of the scientific advisory committee of the Muscular Dystrophy Association.

In early March, 1987, Virginia began to experience mid-chest pain that was characteristic of heartburn. On esophagoscopy, a carcinoma of the esophagus was discovered. After obtaining advice from several colleagues, we consulted a surgeon at the University of Michigan Hospital who had developed an operation in which lesions could be removed and a portion of the esophagus could be replaced by extending the stomach upward towards the pharynx.

The operation was conducted and was followed by radiation. After we came home, Virginia was given intravenous feeding at St. Luke's Hospital, but she was otherwise doing fairly well. After a few weeks, I was allowed to care for her at home under orders from her physician at St. Luke's Hospital. Her condition continued to improve to the point where she could eat without the need for a feeding tube.

At that time, a couple of dear friends from Oklahoma, Barbara and Jim Griffin, came to help me in the care of Virginia. I was unable to spend much time with Ming. Jake continued working with him, but I felt that in view of Virginia's condition, we should send Ming to a larger physiological laboratory.

I arranged for Ming to go to Oklahoma and work with a splendid scientist, Dr. Robert Foreman, who had spent four years with me at the Marine Biomedical Institute in Galveston and was now chairman of physiology at the University of Oklahoma. Ming had a very productive time during his two years in Oklahoma City. Since it would be necessary for Ming to leave the U.S. after three years because of the U.S. immigration laws, I phoned Dr. Walter Randall, a distinguished physiologist at Loyola University in Illinois, asking him to recommend a laboratory in Canada where Ming could work. He recommended

Dalhousie University in Halifax, where Andrew Armour, one of his star students, was professor of physiology. Ming was accepted there and had a superb experience in Halifax, and he, Dr. Armour and I performed and published some collaborative work. In addition, Ming earned a Ph.D. in physiology under Dr. Armour.

Ming, his wife Hong, and their son, Yeng-Yeng, visited us several times on holidays and other occasions. Following his gratifying experience in Halifax, Ming earned a fellowship in cardiology at Harvard, where he made a notable discovery about secretory mechanisms in the heart wall and their relationship to heart disease. Next, Ming decided to seek clinical training and applied for a dual program at the University of Buffalo that included both clinical and research activity. My relationship with Ming and his family has continued to be close and mutually dedicated.

By the end of September 1987, Virginia began to suffer pain in her neck, chest, shoulders and groin and had developed clear evidence of metastasis. I tried to keep her as comfortable as possible, but although she wished to stay home, her condition worsened, and I had to take her back to the hospital, where she died on October 9, 1987. Her funeral was attended by our children, family members from Baltimore and elsewhere, and many of our friends in the Bangor area.

I continued living at the farm. My daughter, Ange, was living in New York, and performing with a modern dance company as the première danseuse. My son, George, had married and was living in New Orleans, where he was teaching French and linguistics at the University of New Orleans. My son, Tom, also married and had a son named Nicolas. He was working for a computer company. I tried to take care of the household affairs, the needs of Virginia's mother, who had outlived her daughter, and our financial accounts. As soon as we were able to fund it, we established in her memory the Virginia Wolf Scholarship at the local high school.

In February of 1989, I was invited to make a research report at Montreux, Switzerland, by Dr. Paul Rosch, who had worked for several years with Hans Selye in Montreal, Canada, and with him had organized the American Institute of Stress. Dr. Rosch had been a professor in several medical schools and university hospitals. He had an extraordinary gift for integrative thinking in medicine, backed by an impressive intellectual cultivation and a vast knowledge of human biology and clinical medicine.

Dr. Rosch had established the annual meeting of the International Congress of Stress in Montreux. The Montreux meetings had a remarkable quality that reflected Paul Rosch's broad interests and experience. The programs featured lectures by leaders in medicine and biomedical science from around the world, and each year there is a selected honoree to whom Paul Rosch presented the Hans Selye award. At the first Congress, I was the recipient of the Hans Selye award. I regularly attended the annual meetings, which always took place in Montreux



during the last days of February and the first of March.

Later in 1989, Barbara and Jim Griffin made another visit to the farm at the height of the fall tree colors. At dinner one evening, I was talking about the resignation of one of the Totts Gap secretaries and how I was planning to reorganize that job and appoint a comptroller to handle the Totts Gap and my finances which Virginia always managed. Barbara said in a rather joking manner, "May I apply for the job?" At that time, Jim had retired from his position with the Oklahoma Department of Education, and Barbara was the office manager for the department of neurosurgery at the University of Oklahoma. I asked her if she would be willing to move, and she indicated that she and Jim were ready to leave Oklahoma. They moved to Pennsylvania in January of 1990 and took up residence in the house across the road from the lab, where Helen Goodell had lived. Barbara took over the post of comptroller and Jim helped with the maintenance of the grounds.

Shortly after the arrival of the Griffins, I was appointed editor of the Pavlovian Society's journal, which had acquired a new name and new publisher. The journal's name had been changed from The Pavlovian Journal of Biological Sciences to Integrative Physiological and Behavioral Science. Transaction Publishers had bought the rights to the journal from Lippincott. In addition to her duties as comptroller, Barbara took over the job of editorial assistant as well.

For a long time, Jim Griffin had suffered from diabetes mellitus, but was otherwise in good health. We arranged for the three of us to have all our dinners and some of our lunches at my house, with Barbara doing the cooking. Gradually, Barbara's responsibilities increased to hosting all the social events for Totts Gap and for me personally. The three of us also had several opportunities to travel together. Barbara and Jim joined me on trips to France, Germany and England.

In early spring of 1996, six years after the arrival of the Griffins, Jim became ill with a lung disorder that had evaded diagnosis for several months. The doctors at St. Luke's Hospital who were caring for him finally established the diagnosis of Waldenstrom's macroglobinemia. Despite skillful efforts and close attention, Jim died on May 1, 1997. After a local funeral with Pennsylvania family and friends, Barbara planned a funeral and burial service with friends and family in Oklahoma.

In October of 1997, Barbara and I took a Yale Alumni trip through the rivers of southern France, where we visited many of the important châteaux and wineries. It was a fascinating experience that greatly enhanced our ability to recognize, savor and distinguish the various wines.

When we were on a train traveling along the side of a mountain over the famous Châteaux Neuf-du-Pap, the train stopped so that we could get out and admire the view from a nearby stone fence. At that moment, I proposed

marriage to Barbara. She accepted, and we had a woman who was standing next to us take our picture.



Engagement of Stewart Wolf and Barbara Griffin in France

We began to plan our wedding for the next Valentine's Day. We later talked plans over with family members and several friends. We finally settled on the Century Association in New York, which has a reciprocal relationship with the Cosmos Club in Washington, D.C., where I am a member. In a search for a minister to perform the marriage rite, we inquired at the Central Presbyterian Church in New York where Virginia and I had been married. The pastor of the church had christened all three of our children and had officiated Virginia's mother's funeral.

The church put us in touch with a substitute minister whom they had often used, Dr. Charles Robison. With him and the manager of the Century Club, we were able to plan a program that would satisfy our needs and would accommodate a dance orchestra and 100 guests. We supplemented the plan with a preliminary gathering at a small club nearby, for family members and close friends. The whole process went off extremely well and at the end, we both felt not only married, but ready to start our new life together.

Instead of going away on a wedding trip, Barbara and I felt the desire to set up our ménage, so we went back to the farm and began to decorate the house with the almost countless lovely gifts we had received.



Wedding Day of Stewart and Barbara Wolf



The Griffin and Wolf Family on the Wedding Day of Stewart and Barbara Wolf

## **Afterward: A Renaissance in Medicine**

By the late 1980s, I had become seriously concerned about the quality of medical education and practice in the U.S. Opportunities to serve medical schools and hospitals as a visiting professor had become rare, and when I did have an opportunity to make rounds with doctors-in-training, the young people seemed more focused on the tests and the use of technology than they were on communicating with and understanding the patient. I soon began to see patients in consultation once a week for the Bureau of Disability. Often, the reports of the referring physicians seemed cursory -- with little evidence of serious analysis. Hospitals had begun to advertise, and it was clear that HMOs had begun to control medical practice.

Dr. Austin Kutscher at Columbia University in New York was also concerned about medical standards and invited me to participate in some of his conferences. In 1988, I joined him and two of his colleagues in writing the book, *The Responsible Physician*, which was dedicated to the memory of Virginia Danforth Wolf.

Beginning in the summer of 1995, as a small step in the direction of reforming medical education, research and practice, Totts Gap welcomed some young people headed for a medical career -- students in their third and fourth years of high school from the Oklahoma School of Science and Mathematics in Oklahoma City, Oklahoma.

The summer sessions with the high school students have been both satisfying and stimulating. Half a dozen medical colleagues whom I had known and admired over the years volunteered to serve as visiting professors to teach the students and supervise their research projects. In addition, tutorial sessions and laboratory experiences were punctuated by recreational, social and aesthetic opportunities during the weekends. At the conclusion of the program every summer, each student formally reports on his or her work and each one presents his or her findings.

Critical to the summer sessions is the accompanying emphasis on quality medical care and physiological inquiry. The students are given a history of medical care, and they discuss present-day issues and medical ethics. I encourage them to use critical thinking and to always ask questions, of both themselves and what they are learning. I believe that working with students before they enter medical education will give them the tools they need to make the most out of medical education.

I also wanted to focus on the realm of medicine beyond just medical education, so I began to compose a historical perspective and broad assessment of the current state of medical education, practice and research. Very obvious was a decline in the tradition of teaching students at the bedside, which was a valuable technique that had been initiated approximately 100 years ago by Giovanni Bathota da Monte in Padua, Italy. Today, bedside teaching is suffering neglect. William Osler, in the early days of Johns Hopkins, emphasized not only bedside teaching, but

also the need for intellectual cultivation of young doctors in order to understand patients and their illnesses with the penetrating insight of Sherlock Holmes.

My assessment resulted in the publishing of my book, *Educating Doctors: Crisis in Medical Education, Research and Practice*. My book was well accepted and many volumes were sold, but for me it was just the first step toward improving the quality of medical service. It was becoming increasingly obvious that medical care by hospitals, academic centers, group practices and among individual physicians was in the hands of medical insurance companies, and the popular term, “health care delivery,” implied the public’s need for a product of some sort. I felt then, and still feel, that health care shouldn’t be a commodity, or an object that could be bought or sold.

Thus, the second step toward improving medicine was to achieve a “renaissance in medicine.” I tried to interest many present-day medical leaders to work together and plan an educational formula that could powerfully influence the upcoming crop of medical doctors. Nearly every person I spoke to was sympathetic in their reply, but most were not optimistic enough to work for a reformation or change in medicine.

Accordingly, I prepared a short essay that detailed the need to recreate medical education with an emphasis on intellectual cultivation and personal commitment to patients’ needs and the comprehensive inquiry essential to understanding and meeting those needs. I distributed the essay to many distinguished medical academics and colleagues, asking them to attend and participate in a colloquium aimed at creating a renaissance in medical education and practice. There was an outstanding response, and in December of 1999, Totts Gap Medical Research Laboratories organized the first colloquium dedicated to a Renaissance in Medicine, held in Celebration City, Florida. Approximately 27 prominent medical academics attended and participated vigorously. The purpose of the colloquium was to discuss issues relevant to medical education, research and practice in order to determine a model for a new and revolutionary medical school and hospital capable of initiating the Renaissance in Medicine educational and medical practice in America.



The following is reprinted from a chapter I wrote in the book, *Medical Education and Practice: Relationships and Responsibilities in a Changing Society*, Association of American Medical Colleges, 1965:

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### The Needs and Expectations of Society for Medical Care

Medical educators and their parent universities share with the practicing profession the responsibility for the future of American Medicine, and the responsibility for guiding man and institutions toward meeting the health needs of today and tomorrow. This means bringing the best of medical and health care ever closer to the people in a changing society. If the desired haven is to be reached, both town and gown must be sensitive, as river pilots are to the special characteristics of the channel, to the currents of history and the needs of the people. Individually and collectively, medical practitioners and academicians must examine their values and objectives, assessing the significance of and justification for conflicts, where they exist, because ultimately the goal of the whole medical establishment is a common one.

We think of the medical establishment as including physicians, teachers, researchers, a broad spectrum of hospital personnel, and those concerned with health agencies. Some of the problems facing these groups came under discussion at the 1962 Institute of the Association of American Medical Colleges (AAMC), which was devoted to educator-practitioner relationships. The deliberations at that national conclave have prompted the development of this report. The book attempts to place American medicine in context with respect to the characteristics and problems of the individuals and of the institutions that must provide medical and health care. A recurring theme, more or less in evidence throughout all the chapters, is the selection and cultivation of appropriate talents in medical people. This first chapter looks briefly at the needs and expectations of the American people for medical and health care.

### Perspective

For centuries, in order to maintain their military, political, and economic strength, nations have concerned themselves with the health of their people. Such justifications are still cogent today, but modern philosophy places an equal emphasis on individual fulfillment and well-being, an emphasis that is likely to become stronger over the next few decades.

The course of history has changed as man, always striving to satisfy his needs, has perceived them differently from time to time. There has also been a cumulative effect over the years so that he has

progressively demanded more and more of his environment. This trend, and the fact that man himself has contributed mightily to changes in his environment, have helped to bring about increasing interdependence among people, an interdependence that stretches across gender and greater distances. Thus a concern for the welfare of other individuals and groups, and even more or less remote nations, is no longer purely a matter of altruism; this concern contributes very directly to one's own safety and welfare, as brought out very clearly by Berle in his recent book. Perhaps increasing interdependence, as an aspect of the evolution of man, might be called a natural law of society.

The evolution of society has owed much to man's continual curiosity, his relentless inquiry into the laws of nature, and particularly the laws that govern man himself. Increasing knowledge of these has enabled him to define more clearly his basic needs. Where he used to see food and shelter as essential elements, he now expects comfort and security, and it is likely that his expectations along this line will continue to increase.

Among future expectations many will surely relate to health and medical care. It is therefore pertinent to ask what may reasonably be required of the health profession over the coming years. The naïve and thoughtless may ask for freedom from illness and indefinitely postponed death, conditions we can confidently omit from any realistic anticipation. Death, after all, is a part of life, a necessary condition to biological or even social evolution. A greater number of people may live long, as the scourges of youth and middle age are mitigated, but there is little likelihood that more than the occasional hearty human will come near to spanning a century. Individual illnesses may be conquered but, as Rene Dubos showed so beautifully in his *Mirage of Health*, as we tamper with our environment new patterns of disease appear to challenge the ingenuity of the medical scientists.

The American public has been bombarded with spectacular stories of scientific advances and with propaganda of all sorts conquering medical and health care, but nevertheless it remains naïve concerning the fundamental issues and the real potential of the medical establishment. Today the primary concern of most laymen with respect to their health needs is availability of physicians. Their second concern is a method of payment. Most Americans, especially in rural and semi-rural areas, want reasonable access to a physician, and preferably a choice of physicians. The standards usually quoted for the proper distribution of physicians per population density -- one physician for every 1,000 patients -- are based on the transportation and communication systems that prevailed at the turn of the century.

One county in Oklahoma is illustrative of a situation which exists over most of the rural United

States. The county has 1,034 square miles and a population of 5,956. It has only three physicians, all general practitioners. If half a dozen patients were in urgent need of a doctor at one time, especially if they were spread out geographically, the three physicians could hardly cope with the situation except for the fact that in a town 30 miles from the center of the county, and about as many minutes over a good road, there is a group clinic comprising seven doctors. One of them is on duty in the clinic at all times, surrounded by the usually essential diagnostic equipment. A patient rushed there by automobile could be evaluated in many instances in a fraction of the time required for one of the local general practitioners to be reached, much less study the problem and arrive at a definitive answer. Moreover, the clinic has three surgeons on the staff to perform emergency operations. More involved problems can be handled at several large general hospitals in the major cities or in the University Medical Center, within approximately 200 miles of any corner of the state. Here almost any type of high-grade advice or skill is available more or less constantly. Such a pattern for medical practice is only one of a number that can be adapted to the geographical relationships typical of the United States.

Despite problems of geographical distribution, health needs are certainly being provided for more effectively now than in the past. The concept of preventive medicine has transcended the elimination or neutralization of microbes and other noxious agents, to encompass the host and his adaptive capacities. There has developed a focus on genetic proclivities, the equipment and characteristics that people bring into the world. A thorough understanding of genetic traits may ultimately lead to the modification of some of them. Developmental studies too are proceeding on a broad front. Pediatricians and psychiatrists have been studying formative years from birth through adolescence for clues to the possibility of shaping the individual into a more adaptable, healthier adult. As the physician becomes increasingly effective in dealing with the broad spectrum of his responsibilities, the public will become increasingly aware of its needs and its due. In a world where we are continually creating new hazards to health, the medical establishment will be expected to provide for the health needs of everyone at a price everyone can afford. It follows that new measures must be devised to bring the best of medical and health care within reach. More and not less interest in expanding medical and related health personnel will be indicated, and more and not less interest in health plans.

No plan, of course, and no organization for distribution of services will of itself insure proper quality, because this must depend on the personal characteristics and education of physicians and

other health personnel. Much more is involved than technical proficiency and a familiarity with recent discoveries.

### The challenge

The age of automation has indulged us all in a surfeit of labor-saving and lavish comfort. In our part of the world, at least, we have been made relatively secure from hunger and homelessness. The epidemics that once decimated whole communities have largely been conquered and yet man is not happy, not fulfilled. Neither is he particularly healthy. From a vast number of experiences, man has been shown -- but has not altogether learned -- that his health and well-being depend not only on his capacity to adapt to the tangible environment, but also to the prevailing attitudes and values in his society and to his own goals and aspirations. Repeatedly over the course of recorded history, man's preoccupation with material comforts and conveniences has, like an unbalanced diet, somehow sickened him.

There are at last indications that the man of Western civilization is becoming aware of his state of spiritual and emotional starvation. As he does, more and more will be required of the physician. Not only will he need to be a capable diagnostician who knows his limitations and operates within them, but a counselor of some intellectual quality, wisdom, and experience as well. He will have to supplement a broad knowledge, analytical judgement, and experience with disease with an understanding of people and the forces, tangible and symbolic, with which they must deal. He will apply his knowledge that the bodily organs and tissues are subject to a complex system of controls, a hierarchy in which precedence is taken by impulses from the highest levels of the brain, those areas concerned with the interpretation of experience. He will possess an interest in people as individuals and a respect for their individuality. In short, the modern physician will effectively serve the people by offering them informed, comprehensive and continuing care.

Within the past few decades physicians have had at hand for the first time specific means of preventing, reversing, or altering significantly the natural course of disease. The importance of the medical profession to society, however, was no less during the preceding hundreds of years. The inescapable inference is that physicians have always had something powerful and valuable to offer their fellow man other than specific remedies. There now exists abundant experimental evidence of the curative value of a host of nonspecific factors -- the patient's state of mind, the emotional climate, placebo effects, etc., all of which relate themselves intimately to the quality of the communication

between patient and physician. Any reorganization of medical services will offer little unless it allows for this vital component of the healing art. It must also give cognizance to the changes taking place in the composition of the population, in our way of life, and in the prevalence of various kinds of illnesses. In any case, the appropriate hope for the future would be some measure of vigor and comfort in old age and competent and readily available assistance at manageable prices for those whose health fails.

### Problems of the educators

In a day when our urgent need is for diversity and rapid movement toward new achievements in health care we find ourselves held back by our own important progress of more than a generation ago. At that time the mediocrity in United States medical education was changed to excellence by the establishment of high standards as a result of the Flexner survey. In the more than half a century that has followed, our preoccupation with standards has intensified and has subtly led us to standardization. Flexner insisted that the responsibility for medical education be assumed by the universities. Today medical education is not really controlled by the universities. The universities find themselves hemmed in on all sides by standards imposed from without and by authoritarian bodies whose requirements must be satisfied.

If the reasonable expectations of society are to be met, the universities must be free to innovate and experiment in the development of a new generation of physicians capable of a broad understanding of human ecology, as well as of highly refined specialized skills, capable of being lifelong students of the progress of medical science, and capable of coordinating an effective health program for individuals with a host of paramedical agencies.

Among other problems of the educators not the least is financing. Society spends several times what the student himself pays to finance his medical education, whatever his means. Nevertheless, society has no way of controlling, or indeed accessing, the quality of the medical and health care it receives. While the public is demanding a workable system of financing medical care, it is expressing little or no concern about quality control. There is a widespread assumption that a physician's competence is assured by the M.D. degree, the state license, or a specialty board's certification. None of these devices does more than declare a degree of competence at a particular moment in time. None of them attests to the quality of the individual's motivation, his dedication, compassion, or concern for his patient's welfare. They provide no assurance of his desire to remain a student for the rest of his life, to

stay in command of his subject, and to keep his skills at a high level.

It seems to me that this is a problem the licensing authorities and specialty boards have not solved. Perhaps it cannot be solved completely, but any attempts at effective solution will require careful thought and collaborative action among the various institutions concerned with medical and health care. We in the medical profession must look beyond our personal concerns and jealousies, so clearly indicated in the survey by Dr. Patricia L. Kendall, reported in Chapter 5. We must pool our resources in an effort to meet the reasonable expectation of the public for comprehensive medical service in a suitable fashion. The medical profession must coordinate its efforts with those of related personnel to provide service in an economically realistic way. Unless we can do this, regimentation of some sort will be imposed.

A sharp focus on the objective of service on the part of the schools of medicine should lead them to realize that their first responsibility is to replenish and continually strengthen the profession, and should make plain the need for the public and the medical profession to learn to understand each other and work together. It should establish the obligation of practicing physicians, both individually and through their county societies, to back the schools of medicine in their efforts to gain adequate financial support for their teaching programs. It will certainly be necessary to shore up the sagging financial structure of the medical schools. Further growth of existing schools will be required, as well as the establishment of new schools. Both must proceed with sympathetic understanding on the part of local practitioners with respect to the financial burdens involved. Adequate financing must come from one or more of the four possible sources: private endowment, state appropriations, federal aid, or income from the care of patients. Any tendency to stifle one of these sources will simply limit the available alternatives and force the exploitation of another. Competitive attitudes among practitioners and educators distort the balance and operate to the detriment of all.

In addition to cooperative attitudes, a great deal of ingenuity is going to be required to meet all the real needs of the future. New emphases must be developed without neglecting the important old ones, and much of the initiative here rests with medical education.

Thus far it has been difficult for medical educators to deal with the rapid developments in biological sciences and the increasing relevance to medicine of mathematics and the physical sciences and social sciences. Often, despite continual reminders that medicine must concern itself with the whole man, the student has observed among his teachers a lessening of emphasis on development of



clinical skills and analysis of the individual patient.

It has been recognized that exposure to and participation in research is of great value in helping the student cultivate his ability to elicit and evaluate evidence and to analyze problems clearly, whether they be at the bedside or in the laboratory. The place of research in the educational process has been difficult to establish dispassionately, however, because of the wide discrepancy in the amount of financial support available for research on the one hand and for teaching on the other. Perhaps because of these pressures and the burgeoning of knowledge in the basic sciences, the clinical departments of many medical schools are becoming increasingly committed to research at the molecular level without emphasis on clinical excellence. Indeed some medical educators have actually advocated that the future teacher be disassociated from the future practitioner in the undergraduate years.

In my view such a distinction would interfere with the accomplishment of the main objective of the undergraduate years in medical school, namely to help the student learn how to elicit and evaluate evidence. The same approach and the same intellectual quality are required of the clinician as of the investigator. Dr. William Castle made a cogent remark concerning this issue:

In each discipline, the quality and experience of the mind, whether guiding the pencil or between the ear pieces of the stethoscope seems to me the pertinent and consequently basic consideration; and for this reason I suggest that what is termed basic research should be judged not in proportion to the complexity of the technique involved or inversely as the size of the object investigated, but by the relevance of the matter of the inquiry to the competence of the organ of curiosity of the particular investigator. With such a distinction, that admits of no hierarchy among the practitioners of science, we should more readily achieve the democracy of thought inherent in science and applicable to all its disciplines. Indeed, we should then regard the study of the patient, including all aspects of his disease and of its relation to his physical and cultural environment, as the basic research area appropriate for the physician.

The often unconscious downgrading of clinical skills by faculties of medicine is illustrated quite dramatically in Chapter 5. It is sufficient to say here that the situation arouses among practitioners and among students headed for practice. Thereby is provided another area of misunderstanding in an already too costly lack of communication between academician and practitioner.

One wonders whether there has not occurred an undesirable fragmentation in clinical

departments that tends to imbue the students and younger faculty members with the idea that relatively narrow specialization, with a “know-nothing” attitude toward other areas, is acceptable. Such a trend would result in fewer and fewer competent diagnosticians on the full-time faculties of the clinical departments. In many departments the most productive investigators are working on purely biochemical problems that require no relationship to the bedside. Such individuals often consider medical service a load and teaching a load. The tendency toward minimal training and concern for clinical medicine may be further accentuated by the fact that the students who are preparing for academic careers in clinical departments see the kudos go to the laboratory man. Medicine cannot be taught as a craft, either at the bedside or in the laboratory. When it is, it attracts intellectual pedestrians whose interests are more technological than scholarly. Medicine properly is a science. As such, it is capable of providing the student not only the means for intellectual growth and a discipline of thought to use in his exacting profession, but a value system and a basis for behavior as well

The late Harold Wolff outlined very clearly the moral values a good scientific discipline can teach.

...It can certainly teach honesty, restraint, application, desire and need for hard work, patience, tolerance of frustration, and avoidance of deceit. It can teach the value of curiosity, observance, experiment, and the need for formulating testable hypotheses.... It can teach...a basis for operating in the next day's adventure with nature.... It can teach the recognition that the perceiving of an order in nature has in itself a moralizing effect.... It can emphasize tolerance and willingness to consider the inferences of others, and it can weight or give weight to the aim of leaving one's specific scientific discipline better than one found it.

These considerations imply very clearly the need for the selection and cultivation of superior people in medicine -- superior in dedication and commitment to service as well as possessing superiority in hardihood and intellect. Here the objectives of the educator must not be the replication of a model -- more and more physicians and other health personnel created in our own image -- but an even better, wiser, and more effective breed. A further clear indication for the educators is to resist any temptation toward self-satisfaction or aloofness, but to be in touch with their professional colleagues in practice and to share with them the broad problems of creating a better medical world..

I think that what I have been trying to say is that we in medical practice and medical education

must raise our sights as we consider the magnitude of the problem of the health and well-being of our society. With the 1962 AAMC Institute as a prime resource and inspiration, the contributors to this book have attempted to document and interpret some of the means whereby we and all our confreres can take better aim at the target. Assuredly, the considerable progress that has been made beckons us to a broader and inviting challenge. It is not likely to be met with maximum effectiveness without a real partnership between medical educator and medical practitioner.

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There comes a time in life when one must face and consider the challenge of aging. Perhaps, at the age of 87, my process of growing up might be thought to be complete. Unless growing up may turn out to be concluded by sudden death, I will likely be faced, for a few more years, by the challenge of aging and will continue to be influenced, and to some extent, shaped by continuing associations and experiences.

Continuing influences on an elderly person may be conveyed largely by the prevailing character of the social environment, including forces relating to experiences with family, friends and associates. Such prevailing social forces may even, in part, determine his or her time to die.

Perhaps the most difficult challenge of aging is the adaptation to change. As Hippocrates put it, "Those things that one has been accustomed to for a long time usually give less disturbance than those things one is not accustomed to."

Commonly encountered scourges of the elderly are Alzheimer's and Parkinson's diseases. A welcome and reassuring event has occurred near the end of the 20th century. It is a medical discovery made by Dr. Richard Veech, a distinguished physician and biochemist -- and a long-time friend of mine -- who is working with a Japanese colleague, Yoshihiro Kashiwaya. They have discovered in both Alzheimer's and Parkinson's diseases a potentially fatal chemical inhibitor that blocks the proper functions of the brain cells and thereby causes death. These scientists then identified an effective antidote to the inhibitor, thereby opening the door toward the prevention and cure of the two fatal diseases that affect aging human beings (Kashiwaya, et al., 2000). Another important discovery of a substance, memapsin, which blocks the chemical process that creates Alzheimer's disease, was made by Jordan Tang, a scientist at the Oklahoma Medical Research Foundation. He, too, was a long time friend with whom I had worked in the past (Lin, et al., 2000).

We seem to be learning that aging itself is not fatal, but that death results from our failure to adapt to changes, both environmental and internal. The ability to extend the gift of life then carries with it the responsibility to enhance the quality of life.

What of the future? Whatever was decided by the early inhabitants of our world would have a powerful influence on society as it evolved over subsequent centuries. What can we recommend to those who will inhabit the world in the coming century? Could we suggest a social point of view that would encourage an attitude that could bless, teach, and influence the next millennium? Perhaps.

The fundamental, enriching stimuli for those who will be growing up must come from enlightened parents, teachers and friends. Those who will be growing up in the new century could benefit from some of the same kind of “effect of person” that I, among many others, was exposed to over the past years. My parents, who set an example with strong morals and a huge sense of personal responsibility and with high standards, were strongly supportive of me and fostered my efforts wherever they were directed. Many of the teachers whom I encountered took an interest in me, as well as in my work. This was true of Dr. Jarcho, Dr. MacCallum, and Dr. Hamman at Johns Hopkins, and Dr. Harold Wolff and others at Cornell. Early on in the teacher-student relationship, there developed between us a mutual respect that turned toward friendship and finally mutual affection and emotional support. Throughout these and other human relationships, people must, in essence, love one another.

In France during the 17th century, at a time that was marked by hostile competition, Jean de LaFontaine made powerful statements in his famous fables in which he described an encounter between a donkey and a dog, L’ane et le Chien. He stated the required social behavior in these words: “Il se faut entraider. C’est la loi de nature.” “It is necessary to help one another. That is the law of nature.” If LaFontaine’s principle is taken to heart by us and our successors, growing up in such a social environment will not only enrich and protect our intracranial neurons, but will sustain our spirits long into the coming decades and, hopefully, through coming centuries. Perhaps we can conclude that proper adaptation to the world means contributing to it.

## THE BRIDGE BUILDER

By Miss Will Allen Dromgoole

An old man, going a lone highway  
Came to the evening, cold and gray  
To a chasm , vast and deep and wide.  
Through which was flowing a sullen tide,  
The old man crossed, in the twilight dim,  
The sullen stream held no fears for him.  
But he turned, when he reached the other side,  
And built a bridge to span the tide.

“Old Man,” said a fellow pilgrim near,  
“You are wasting your strength in building here.  
Your journey will end with the ending day;  
You never again must pass this way.  
You have crossed the chasm, deep and wide  
Why build you the bridge at the eventide?”

The builder lifted his old gray head.  
“Good friend, in the path I have come,” he said  
“There followeth after me today  
A youth whose feet must pass this way  
This chasm that has been naught to me  
To that fair haired youth may a pitfall be  
He, too, must cross in the twilight dim;  
Good friend, I am building this bridge for him.”

## **Essays and Commentaries**

### **Education in the United States**

Since adapting to the world depends heavily on a person's learning and experience, it seems appropriate to examine available education. There is a widespread concern about the education of young people in the United States. Neither government authorities, parents, nor students appear to be satisfied.

#### **Intellectual Cultivation**

Tests of all sorts, including those for medical specialty boards, are based on the accumulation of knowledge and information, although adequate education requires intellectual cultivation that begins in childhood when the five-year-old boy or girl asks mother to identify and explain a place or an event encountered on a walk or a trip. Mother must not discard the query. On the contrary, if she cannot explain it, she needs to get help from a friend who can, because intellectual cultivation begins with curiosity. Curiosity should never be dismissed.

Unfortunately, there are relatively few Americans whose minds have been developed to their full potential. Teachers in every grade should teach intellectual cultivation. When this is the aim of teaching rather than memorizing and regurgitating facts, learning becomes firm for the student. The teacher's attitude toward teaching directly influences the student's attitude towards learning. Any conversation with the teacher or a librarian can be a starting point for intellectual growth. And, of course, there are plenty of other things that can help. A love of books and of reading can stimulate the mind and give the young student the tools with which to teach himself. Travel with the family can broaden the young person's perspective by exposing him to people, languages, and cultures different from his own.

While important for anyone, intellectual cultivation is especially important in the life of the physician. By causing the mind to grasp elusive connections among bits of information, by nurturing the curiosity which is expressed so spontaneously in the young, we encourage mental habits that are of great value in diagnosing and treating illness, and researching its causes and cure. By exposing future physicians to intellectual achievements in the arts and humanities, we make it easier to resist the narrowing of perspective that can accompany specialization. By giving future physicians an appreciation of other cultures, we give them a deeper knowledge of mankind. The intellectually cultivated physician is better equipped to understand the patient, and achieving that understanding is an essential foundation for all the physician's other efforts.

There seems to be more emphasis on recalling facts than on understanding the underlying principals. Perhaps the problem is the public's conception of education. The Scholastic Assessment Test (SAT) has become the criterion



for admission to college. It requires correct answers to a broad list of questions that have become fairly standard to the point that certain stores can sell a student a document to be studied that can “prepare” the student with the right answers. Instead of testing a student’s intellectual cultivation, many colleges depend on examination exercises at intervals during the four years in order to assess the student’s recollection of facts earlier presented. The intellectual quality of the student is not probed when “correct answers” do not reflect a student’s grasp of a topic or issue.

Rather than a test, an essay focused on the need for intellectual capacity can be very useful. The SAT tests required for college entrance demand only that the student collect and recall specific information that unfortunately consists of the accumulation of facts. Evidence of thought, understanding, and a taste for learning are not called for.

Most Americans will agree that it is high time to reexamine and perfect the education process in our schools. The appetite for learning should begin in the early years of life. Therefore there must be early attention to the brain, without which learning is impossible. The best way to test achievements of students is to know them as individuals and show sincere interest in their progress and development.

The word education derives from the Latin *educare*, meaning, “to bring out.” The word implies that there is something in the person that can be brought out, thereby endowing the person with an ability to learn, to understand and to act in an intelligent way. The brain is responsible for bringing together the major elements of education. The brain performs in response to a request from its owner and is responsive to stimuli of all sorts including subtle messages transferred from what has been called “the effect of person,” a phenomenon deeply studied by Horsley Gantt whose power as a teacher has played a major role in education.

The best way for a student to learn is to have a teacher who is committed to the student as a person and who has the skill of exercising what is called “the effect of person.” Such a person was Horsley Gantt.

W. Horsley Gantt was born in Wingina, Virginia. He received his B.S. in 1917 from the University of North Carolina and his M.D. in 1920 from the University of Virginia. Gantt went to Russia in the 1920s with the American Relief Administration, and while there became a student of Ivan Pavlov. Having spent time in the laboratory of Ivan Pavlov shortly after the end of World War I where he studied what he called “the effect of person,” Gantt started his career at Johns Hopkins where he ultimately became professor of physiology. He came to Johns Hopkins in 1929 and founded the Pavlovian Laboratory at the Johns Hopkins University School of Medicine. Gantt devoted his scientific career to furthering an understanding of the connections between physiological functions, attitudes, and behavior. He wrote over 400 scientific articles and several books. He also translated many of Pavlov’s works into English.

Dr. Horsley Gantt, during his years as a Johns Hopkins psychologist, contributed a great deal to the study of personal adaptation to challenges and opportunities during the process of growing up.

Horsley Gantt explored further his “effect of person,” observing the powerful effect of some outstanding teachers and mentors on their students, both in the classroom and in other social settings. He came to the conclusion that “effect of person,” like the law of gravity, is an ineluctable phenomenon of nature. Although the effect of person has not been fully understood, it is nevertheless, dependable and its power cannot be denied. The lifting effect of person enhances confidence and capability.

The mechanism whereby the effect of person is transferred from one individual to another perhaps in a subtle message from the presence and demeanor of one person that stimulates and motivates the other. The interpersonal psychophysiological process can take place any time people are together and sometimes even at a distance. Horsley Gantt lived in Roland Park in Baltimore directly behind my house. He admired my parents and he invited me to visit with him at his home many evenings. I thought that it was an extraordinary opportunity and my parents encouraged it. He talked mostly about how the effect of person resembles the phenomenon of gravity. His career as a teacher and later in biomedical research was stellar and has been a boon for medical scholars.

During a lifetime the “effect of person” begins with the bonding of mother and newborn infant and continues with subtle influences from parents, teachers, friends and other contacts, some of which may have powerful influences throughout a lifetime.

Such subtle influences that can powerfully affect a person’s adaptation to the world with his or her beliefs, aspirations and behavior, have often been communicated by poets, painters or musicians. We are constantly susceptible to such subtle messages and stimuli and the feelings and beliefs that they generate in us.

### Learning and Creative Thinking

Leadership and learning are indispensable to each other.

Arthur M. Schlesinger, Jr.

Learning is more than just the assimilation of information. It requires applying to the information one’s critical power of observation toward the formulation of creative judgments, the making of carefully reasoned choices. A smart chimpanzee can learn a variety of skills and a parrot can learn to remember and repeat information, but neither is capable of advancing our knowledge. It is the power to discriminate and the ability to evaluate evidence that sets man apart from the apes. Such disciplined thinking may be dangerous, however. Very few important intellectual advances have failed to arouse suspicion, hostility, or disapproval. The efforts and contributions of many creative people have been stymied, such as Galileo Galilei.

Sadly, those with creative imagination are not always equally endowed with courage. It takes a hardy soul to

withstand the pressure of disapproval. Instead, many will cultivate habits of thinking, which, as they strive to achieve acceptance, lack freshness and originality.

Those who withstand the pressure of disapproval tend to upset people -- especially educators. Often such disciplined thinking may provoke a kind of retaliation which, at times, has even led to the innovator being put to death. As a result they are at risk of becoming governed by dogmas that prevail at the time. Every aspect of life can be affected by such tacitly imposed belief systems.

### The Seductive Power of Dogma

Success in any field is dependent upon unfettered spontaneity, not upon the possession of passports, stamped by an approving authority. Freedom is such a simple word and so often uttered that we may not realize the profound underlying principle.

Progress toward explaining human biology, although considerable, has often been blocked by the periodic emergence of popular dogmas that have long been unchallenged. One of the most tenacious of the dogmas, borrowed from mathematical physics, teaches that reality can be found only in material objects and that the intangible does not exist. Its strict application would insist that while substantial and measurable tears can be elicited with a puff of irritant gas, they cannot be caused by the recollection of a dead relative. Today we already witness many instances of tangible, material results of intangible stimuli and experiences. For example, the production of tears by a sad memory, the oft-reported heart attack during emotional stress and countless other well documented experiences and experiments have served to challenge the dogmas of materialism. Nevertheless, crippling dogmas often persist as comfort and reassurance to skeptics.

Despite this absurd denial and a vast number of other examples of clearly valid instances of tangible biological effects emerging from intangible stimuli, the dogma persists as a tenaciously held scientific principle. Another troublesome dogma holds that a discovery is invalid until it can be repeated. Claude Bernard's demonstration that glycosuria is produced in animals by stimulation in the fourth ventricle was a successful defiance of the dogma. He had repeated the experiment several times without success, but it evolved later on that his discovery was correct. As he wrote, "One cannot deny a fact."

Within the space of 100 years, the average person in America, once largely self-reliant and responsible for his or her own welfare and that of his or her family and, to some extent, their community, has progressively and ineluctably become managed. In fact, management has become the touchstone. Its power has been felt in the trade unions and in the government, starting with the post-World War I income tax.

The power of management has been felt in corporations, and now more in schools, colleges, and universities.

The latter has been suffering an alarming proliferation of administrators that has produced a costly scourge of managers engulfing and suppressing what was once the *raison d'être* of the institution of intellectual leadership.

As we have thus far failed to learn from the collapse of the Soviet Union, leadership cannot exist under management. It must be the other way around. Managers must serve the mission as it is envisioned by the leaders. Medical service, the education of doctors, medical research, and the practice of medicine are, because of the incursions of managers, hobbled and stultified by bureaucrats and bureaucratic thinking.

During the 1980s, a major proportion of United States citizens suffered serious difficulties when insurance companies began to take over and ultimately control medical service.

Robert Putnam, in his book, *Bowling Alone* (Putnam, 2000), has made a strong case for adapting to the world in a positive fashion. He also recognized a kind of lonely complacency among friends who used to be interested and active in doing things with others. He saw a major change in that direction among Americans since World War II.

Putnam's major message is the importance of involvement with other people in some activity that is useful to the community. He calls it "Social Capital." We Americans must learn from our social structure that it isn't "the economy, Stupid." It is social, emotional and intellectual fulfillment. It is through human relations, adapting to the world by way of interactions with other people around us, that will enhance our way of life.

For the most part, adaptation to the world is adapting to the people who inhabit it. Overall, this adaptation reflects our own peculiarities and beliefs, interests, attitudes, perceptibility, morals, aspirations, our desires and our sense of responsibility. Behavior, on the other hand, depends on subtle influences that we may experience from interaction with other people. Human interaction, then, becomes the process of adapting to the world. Beyond greetings and an exchange of names, human interaction, even when casual, may contain considerable significance, encouragement or disappointment.

Such interpersonal messages commonly delivered by parents, teachers, employers, friends or others, may have powerful consequences, favorable or otherwise.

### Social Behavior

During the early days of America, social intimacy was not considered proper. The Victorian social mores continued to influence social behavior well beyond the time of World War I. As memories of the Civil War were still vivid, the effects of interpersonal communications might have been widely disparate.

Fortunately, some of our predecessors, philosophers, and other thinkers have explored such human intercommunications and have come forth with helpful ways to deal with them. Outstanding among these philosophers was then-distinguished British authority on human relations, John Locke, an Oxford graduate as both

lawyer and physician. His best identification is his famous essay “Concerning Human Understanding,” first published in 1689 (Locke, 1981). Locke’s thinking was immensely influential, not only in Great Britain but elsewhere in the world. He was a friend of Isaac Newton and of the Princess of Orange who later became Queen Mary. He wrote the enlightening and influential essay on human understanding and another on toleration, in which he urged not only tolerance, but cooperation among religious and other beliefs. He also wrote a good deal in which he recommended a civil government. He was the most active member of the British Board of Trade until his death in 1704.

John Locke, from his rich experience with Englishmen of various social stature, education and achievement, has provided us with wise counsel concerning understanding and dealing with other people.

His understanding of interpersonal forces was stimulated by 17th century French philosopher-scientist, Pierre Gassendi, who held the view that the brain’s cognitive, emotional and reasoning capability are dependent upon subtle sensory input to tangible and intangible familiar receptors -- eyes and ears, as well as the skin and even internal structures (Gassendi, 1658). Such potentially powerful messages may be conveyed by the mere presence of a certain person, and thereby may be capable of transmitting emotional messages without spoken words, gestures or posture.

As an American, whose life almost spans the 20th century, I have had many human encounters that have shaped my understanding, feelings, beliefs and activities. I have profited from the inspiring effect of person, from Horsely Gantt himself and from other teachers, friends and family, including my two German-Swiss nurses, Tanta and Helena, who were hired by my mother to care for all three of her children during their early years.

Mine has been a rich and fulfilling life, one of continual growth, challenge, learning and change, influenced deeply by others -- by those both great and humble, in ways both large and small. Every relationship can be an opportunity for learning if one is open to the experience. Every person is both teacher and student throughout life, if he is aware of the possibilities and responsibilities.

It has been said, “Education makes a people easy to lead, but difficult to drive; easy to govern, but impossible to enslave.” This kind of education comes only with the ability to reason and deduce, and is hampered by focusing on the mere memorization of facts. I will be forever grateful for the freedom of thought, the development of logic, and the support of my curiosity that was encouraged and nurtured throughout my life. It is with great thankfulness that I approach my ninth decade of living. I continue to relish that freedom and the limitless opportunities for increased understanding that we, as humans, share and experience in the process of adapting to our world.

## **Our Dependable Brain -- As An Adapter**

The brain was in place and may have been usable by primitive human beings many million years ago. According to Charles Darwin, the human species had acquired a functional brain by two million years ago (Darwin, 1859). He discovered that what eventually became a brain during natural selection began with the fish whose “brains” contained bones. He added that when the human brain first appeared, it had fewer bones than did the fish. Nevertheless, during the past two million years, the human brain has doubled in size and function. Even the infant’s brain demands a great deal of the infant’s inquisitive energy. Unfortunately, too many of our modern country’s children and adults have not made sufficient demands on their brains. Such neglect is harmful to the brain.

Since the brain has not been a prominent focus of study in the teaching of high school or college physiology, this study is intended for those students and their teachers, as well as others concerned. Its purpose is to remind the reader that their most valuable asset is the brain whose activity provides consciousness, comprehension, deduction, critical thought, reasoning, speech, compact with the environment (internal and external), vital function, and motor control.

The brain is a regulatory organ that is highly developed at birth, which contains a collection of billions of neurons that gather together in specific areas of the brain where it can carry out specific functions. As Susan Greenfield asserted in her book, *The Human Brain*, “The brain is made up of anatomically distinct regions, but these regions are not autonomous minibrains. Rather, they constitute a cohesive and integrated system organized for the most part in a mysterious way. Therefore, it will be almost impossible to learn how the brain works by studying just one particular region of the brain at a time.” (Greenfield, 1997).

Every human brain is supplied with a vast number of stem cells, cells that are capable of dividing and forming neurons that do the signaling of the brain. Neurons are specialized cells, but they contain the same structures that are found in most other cells and, like other cells, they have capabilities to alter, activate and attach to other cells. Their specific function is to allow our brains to learn, reason, and remember. The survival of neurons and special functions require the availability of sugar (mainly glucose) that the neurons break down to pyruvate and, with the help of ATP, produce the oxygen for the energy of the neurons.

Like all cells, neurons are surrounded by a cell membrane, and contain a nucleus, containing genes, and organelles that carry out basic cellular functions such as energy of production. Neurons are also important for communicating sensory information and controlling body functions such as muscle activity. Glial cells (neuroglia) serve as the brain’s support system. They provide nourishment and protection.

The healthy brain is a tireless communicator. Perhaps the worst damage to the brain is to not use it, because



activity of the oxygen by neurons is what keeps the brain alive. The brain also needs to be exercised by doing just about anything such as reading, writing, meditation, or traveling. The mature brain contains 100 billion neurons and many more glial cells that are evolved from precursor cells. After their birth, the precursor cells disappear, leaving more glial-supporting cells than neurons in the brain.

While its neurons and other intracranial cells do the work of the brain, the neuroglia act to manage the complex chemical functions of the brain to care for and expedite the work of the neurons. They also participate in repair and regeneration of intracranial structures and are also involved in the pathological processes of certain brain diseases, etc. (Kettermann and Ransom, 1995).

### Neurons on the Job

The work of the brain itself is carried out by its huge supply of neurons (also known as nerve cells). Messages and requests of all sorts are picked up by neurons where they work in the brain. Their ability to travel, enables the neurons to carry fellow neurons with them throughout the nervous system, enables them to get their work done that usually requires delivering their message to another neuron that can complete the job or pass it on to an appropriate location where the job can be accomplished. Of special importance are the interactions of the immensely complex chemical interactions that take place within the brain. To a considerable degree, the brain oversees and controls its actions.

The receptor neurons of the brain can receive and deliver all sorts of messages, however subtle, including hints or desires that are delivered without words. This capability of subtle communication is true even to the extent of a death spell. When I was a consultant for a native general hospital in New Guinea during World War II, I had an opportunity to study a native man who had been the victim of a death spell that was called *pouri-pouri*. From my examination of the patient when he appeared at the native hospital, there were no symptoms or signs of an abnormality, so I took him to our Army hospital for a work-up. Our hospital was a Cornell-affiliated institution made up of Cornell professors, technicians, and nurses from Cornell University Hospital in New York. No significant abnormality was found. I continued to follow the patient at the native hospital for the next few days. He was very cooperative, even genial, but he was convinced that he would die soon because of the “death spell” and that there was nothing that could counteract it. He died later that week.

I, of course, wanted a postmortem examination, but I learned that the New Guinea laws do not allow autopsies. With the backing of our military headquarters, I got permission to talk to the officials and got a special permission for this one circumstance. The autopsy was done by our pathologists who could find no abnormality that could have caused the death.

This whole experience, as rarely as we encounter it, has a long background in several groups and countries around the world. The ancient Greeks were probably the first. When they wanted to finish a citizen who had failed to adhere to certain restrictions they merely wrote the person's name on a stone and threw it into the sea, with consequent sudden death of the culprit. This type of sociological punishment was eventually adopted by other groups who had developed other modes of death by disapproval. Numerous tribes in North, Central, and South America have similar ways of eliminating undesirable members of the tribe.

The mechanism involved in accomplishing a fatality from a "death spell" appears to be akin to the power of placebos to control bodily mechanisms and the subtle effects one person can wish on another.

A "death spell" may require words that are said to have magic powers. The consequences of learning that such a "death spell" without any words or contact of any kind has been made against a person usually causes the victim to feel defeated, without a chance to avoid the intended consequences.

Since the ability of the psychological forces by way of the brain are known to be capable of causing fatal cardiac arrhythmia or cardiac arrest, it is likely that sudden cardiac arrest was the cause death to my New Guinea patient. This very well illustrates the power of suggestion.

Not only adverse, but also supportive messages may be conveyed from brain to brain. A clear example is the supportive effect of person (Gantt 1972). The positive phenomenon is also evident among closely linked couples, friends, and families.

The brain is sensitive and responds to one's entire life experience from birth to death. Many experienced events and circumstances are stored in long-term memory. Other such experiences may promptly arouse responses -- intellectual, emotional, esthetic, physical, or otherwise, including the death spell message described above.

The information stored is usable in memory and may be recalled any time, or may affect the subject's thoughts, emotions, or behavior at any subsequent time that a similar circumstance may be experienced.

Among the many personal services made by the dependable brain is its willingness to guide the person toward intellectual cultivation. Here the mind is concerned with familiarity with other people and understanding the world they live in, its characteristics and its achievements.

### Intellectual Cultivation

Intellectual cultivation, understanding about the world and its people, must be sought during one's formative years and must emerge from social and other experiences, including travel and wide reading. Parents can encourage intellectual cultivation in their small children by reading classical books to them and by traveling with them.

Learning is better achieved by experiences with teachers and other people rather than by lectures. Especially

powerful is the attitude, behavior, and personal influence of the teacher, especially when teaching in small groups or individually. The brain deals with responses of words more than with memories. Personal influence outweighs the student's recollection of information taught in school.

In view of the powerful resources of the brain and their easy availability to the person, the young person's curiosity must be encouraged and put to work. Without curiosity, Archimedes would never have pioneered the study of science with his well-known discovery in his bathtub. (He discovered that density in a gold pan outweighed a larger silver pan.) Unfortunately, modern education does not make optimal use of a young person's curiosity. Instead, modern education is based on the student's recall of selected information rather than his understanding of the underlying principals. Unfortunately, the student's reply must depend more on his or her memory rather than the depth and breadth of their grasp of the subject, which is the proper goal of schooling.

The goal of the teacher should be to help the student achieve intellectual cultivation by nurturing understanding rather than merely seeking the recall of information. The evaluation of the student's performance should come from the teacher, not from a test or an examination. If the teacher does not understand the student and his or her work, the assessment and evaluation may be inaccurate. As the physician aims to understand his patient, the teacher should strive to understand the student.

Each neuron in the brain may have thousands of branches that connect it to other neurons. These branches are called dendrites or axons. Dendrites carry messages toward the cell body, axons carry messages away from the cell body to another neuron.

This capability to travel is dependent on the axon growth cone that was discovered early in the 20th century by the Spanish physiologist, Santiago Ramón y Cahal. Ramón y Cahal was awarded the Nobel Prize in physiology and medicine in 1906, along with Camillo Golgi, an Italian who had discovered a stain that allowed neurons to be seen through the microscope. Ramón y Cahal explained how neurons would gather together in large groups in various sites in the brain and explained how he had discovered that each neuron was equipped with an axon growth cone that attached to the neuron's axon, enabling the neuron to be pulled throughout the brain and nervous system and to be attached to dendrites of other neurons throughout the body.

When Ramón y Cahal and Golgi met with the officers of the Nobel Prize, they agreed with each other that neurons gathered together in large groups, but Golgi insisted that the neurons could not move from place to place. But the Nobel Prize officers acknowledged that they could be pulled all over the brain and nervous system, as Ramón y Cahal had discovered.

## Injury to the Brain

There is very little in human life experience that is not dealt with, interpreted, critiqued, or otherwise evaluated by the human brain. Very little happens in the life of a person without involvement with his or her brain.

Babies are subject to head injury during birth if there has been forceful pressure on the head during birth, which may cause damage to the underlying brain. Repair and recovery usually occur within a short time unless the damage is quite severe.

Damage to the skull and brain from trauma, as in an auto accident, may require much longer periods for healing, but with careful care there may be almost a full recovery within a few weeks or months. On the other hand, strokes caused by an intracranial bleed or infarct cause more lasting damage. With careful rehabilitation, the brain eventually will make a full recovery, or nearly full recovery.

Brain injury may also occur from a variety of degenerative disorders and infectious diseases, some of which, like syphilis, are destructive to all bodily systems. So also are fungi and parasites.

The various functions of the brain depend not only on the message system but also on the location in the brain where the delivery is made to the target dendrites on a neuron geared for a specific function, such as seeing, smelling, hearing, motion, sensation, mentation, etc. It is thus that the dendrites in myriad locations in the brain can expedite the wide variety of human functions.

The number of intracranial stem cells and neurons increases to many billions as an individual grows during his lifetime. New neurons for special jobs are constantly being made, and they gather together in various areas of the brain where certain bodily functions, such as smelling, speech, balance, and memory, are regulated. The neurons are constantly receiving messages and orders. Their amazing capacity is their ability to deliver messages and instructions to other neurons, not only in the brain but also throughout the nervous system in the body.

A major function of the brain is to receive from the receptor neurons information, requests, demands, sensations, questions, and its nourishment in the form of the sugars which break down to provide oxygen. The brain thereby keeps itself and us alive and to do so, requires a continuous supply of oxygen.

The physiological duties of the brain include responsibilities of inactive placebos and other subtle influences. It is clear that the success of placebos depends on the brain's response to personal communication, subtle or otherwise, between doctor and patient. The communication may be either direct or subtle, with or without words or reflecting only feelings. A successful effect may include also persuasion.

## The Brain and the Person

It is of great importance, but not generally understood, that the consequence of an experience may not derive

from the nature of the event but rather from the meaning of the event to the one who experienced it.

By considering the power of the keys of a piano, one might understand that neither the power nor pattern of the music could explain its consequences. Indeed, the effect on the person who heard the music might derive from simply the time when it was played or the meaning of the music to that individual at that time.

Paracelsus, an early 16th century physician and natural philosopher, suggested that the brain, a complex biological structure, is like a violin, trumpet, flute or guitar, a living instrument that, when played in response to inspiration and will, is capable of giving rise to thoughts, emotions, aspirations, and behavior (Paracelsus, 1891). In this view, the brain is an organ of immense aptitude and versatility, capable of storing, organizing and mediating thoughts, feelings, attitudes, beliefs, and intentions, and can direct most visceral functions and social behavior, but is not itself a source of feelings, attitudes, beliefs and intentions.

As Paracelsus suggested, the brain does indeed resemble a complex instrument, perhaps a piano. Neither the music of the piano nor its spiritual or emotional power is contained in the instrument's expressive metal and ivory equipment, but emerges from the way in which the equipment is activated. The qualities of the music are intangible, but potentially powerful in influencing people and events. The same is true with intangible forces emerging from the brain's neural interactions. Like the writings of a pen, they may also be "more powerful than the sword."

What might such intangible forces be? Included among them are many kinds of influence that one person may exert on another, like the salubrious effect the presence of a concerned physician may have on his patient, for example. Charles Darwin described the effect of his physician-father's presence on a patient with irregular heartbeat, which "invariably became regular as soon as my father entered the room." Horsley Gantt made extensive studies of this phenomenon and called it the "effect of person" (Gantt, 1972). The clinical significance of the effect of person has been explored by Dr. James Lynch noted for his book, *The Broken Heart*, was able to show that loneliness and lack of human companionship contributed significantly to the hazard of fatal cardiac arrhythmia or myocardial infarction (Lynch, 1977).

Many biologists and medical scientists are reluctant to recognize and deal with the powerful and important intangibles of mind and spirit. They seem to be hampered by a long-standing dogma that restricts the domain of science to the objective and measurable. Unlike the modern biologists who turn a blind eye to intangible evidence, the philosophers, from whom all science originated, had no difficulty accepting meaning and significance as legitimate matters for study as readily as they accepted objective, observable phenomena.

In the early 18th century, the famous philosopher and mathematician Christian von Wolf proposed the existence of an intangible physical force at work in human interactions. Wolf, who, according to research done by

my Aunt Bessie at Goucher College in 1889, was an ancestor of mine, had approached psychology with the concepts and methods of physics. He suggested that, as the laws of motion reflect physical phenomena, social forces are also capable of producing a somatic or visceral change, reflecting the individual's perception of his or her experience, especially in relation to human interactions (Blackwell, 1961).

As Claude Bernard put it: "The vital force directs phenomena that it does not produce; the physical agents produce phenomena they do not direct" (Bernard, 1839). Bernard used the term "vital" to distinguish living organisms from inanimate, not to lend itself to reductionistic analysis. Although irreducible, it is nevertheless comprehensible as a powerful and universal intangible.

### Freeing the Full Capacity of the Human Intellect

After wresting from Sweden the Baltic port that became St. Petersburg, Peter the Great, and later his widow, Catherine I, who succeeded him as czarina after his death in 1725, clearly had a mission: to bring science and learning in Russia to the level of that in the most enlightened countries of Europe. Peter decided to begin with the creation of the Academy of Science in St. Petersburg. He assigned the job of selecting the faculty not to a committee but to the famous German mathematician-philosopher, Christian von Wolf. Wolf, or Wolff as he was sometimes identified, enjoyed a free hand and strong support from the czar. The faculty he selected consisted mainly of German and French scientists. Among those given professorships were the French astronomer Joseph N. Delisle, the German mathematician Jakob Herrmann, the German philosopher Georg Bernhard Bilfinger, and the German lexicographer and orientalist Theophilus Siegfried Bayer. Associate appointments were given to the German mathematician Leonard Euler, the German geographer-historian Gerhard Friedrich Müller, the Danish artist and architect Christof Marselius, the Swiss painter Georg Gsell, and the German sculptor Conrad Osner. The work of the faculty got under way in 1725. By 1733, the first Russian, V. E. Adoduron, was appointed to the academy. Thereafter the prestige of the academy grew apace, a triumph of untrammelled initiative (Lipski, 1953).

Another example of the practical good sense of planning with a single architect, free to exercise his perspicacity and wisdom, occurred in the United States near the end of the 19th century when the philanthropist Johns Hopkins undertook to establish a new medical school and hospital. Daniel Coit Gilman, president of the new university, assigned the job of selecting the initial faculty to the pathologist William H. Welsh, who, with a largely free hand, built an institution without peer in the United States.

Only 15 years after Welsh's arrival, President Charles W. Eliot of Harvard wrote to Hopkins' President



Gilman as follows:

I congratulate you, sir, on the prodigious advancement of medical teaching, which has resulted from the labors of the Johns Hopkins faculty of medicine...[T]he whole university organization of our country has changed; but among all the changes there is none greater than that wrought in the development of medical teaching and research; and these men whom you, sir, summoned here have led the way” (Harvey, et al. 1989).

Another example of rapid progress toward excellence achieved by uninhibited human inspiration and effort was the extraordinary impetus to biomedical research throughout the world provided by a wise, perceptive, and sensitive man, Alan Gregg. Gregg represented the Bureau of Medicine at the Rockefeller Foundation and visited hundreds of laboratories for a firsthand look at the work being done.

His exemplary way of getting things done without red tape was emulated during the early days of the National Institutes of Health after World War I. Farseeing, wise, and dedicated public servants, such as Cassius J. Van Slyke, Franklin Yeager, Ralph Knutti, and several others were placed in charge of the support of NIH research. Their stated precept was “This is the scientists’ program. Our job is to expedite their work.”

### The Awakening of Financial Support for Medical Research in the USA

Within a single decade the NIH was not only supporting the work of more than half of the future Nobel prize winners in medicine or physiology, but was creating opportunities for thousands of bright new investigators at home and abroad. As the management staff of NIH grew larger during the subsequent decades, however, investigator-initiated research gave way to staff-initiated “targeted” projects and to costly “center” grants and special projects planned by the officials of the institutes themselves. Even a dogma for medical treatments is now being forged in committee by consensus rather than in the critical arena of hypothesis and debate.

Some of the early architects of NIH policy, who consciously avoided creating a regimented and bureaucratic identity for NIH, are still alive. An ear toward the advice of some of them might help direct the bulk of the congressional appropriation from management toward mission. If so, there might be much broader support for diversity in investigator-initiated research, including brilliant but unconventional initiatives that might emerge from uncensored thinking.

## Using Our Brains

Il se faut entraider. C'est la Loi de Nature.

Jean de la Fontaine

“We must help one another. That is the Law of Nature.” These were the words of Jean de la Fontaine (1621-1695), a French poet and critic of the French society of his era and of human behavior in general. Like Aesop, he used animals to convey his moral messages. The fables of la Fontaine were beautifully translated by an English poet, Marianne Moore (Moore, 1954).

Although all living creatures depend on others to sustain health and life, the law of nature has been heeded more by animals than by man. The tiny organisms that inhabit the top few millimeters on the surface of the ocean maintain their needs for nourishment, energy, reproduction, and population balance by cross exchange of secretion with other species.

At higher levels on the phylogenetic scale, dependence on other creatures becomes more varied and complex, ranging from killing animals and growing plants for food to nourishing the mind and spirit through social and emotional interdependence. Although humans have high-grade equipment to sense their environment and their needs, their efforts to satisfy them have been halting, to say the least. The self-preservation strategies of humans have been seriously faulted since the time of the first homosapiens. The problem seems to be that it took a very long time for primitive man to learn how to use his “sapiens.” Instead of engaging in mutual help with his fellows, he tried to compete with or eliminate them. Eventually, according to anthropologist Jack Harris, he learned that cooperation was a more rewarding strategy.

In order to maintain the species and provide proper care for children, it was necessary for men to learn not to kill one another in breeding rites. Other mammals -- deer, for example -- had been programmed to indulge only in mock battles for the females. The breakthrough for man occurred with the establishment of families and clans. Later, as pride of place emerged with the discovery of agriculture, interdependence increased and man learned to use domestic animals and vehicles for land and water transport. A steady stream of other technologies followed.

Presumably, the high development of the mammalian nervous system has been responsible for the continued presence of our class in the world. The dinosaurs had far more formidable weapons of attack and defense than have mammals, and yet they became extinct at about the time the mammalian design was developed in the course of evolution. Mammals are generally more vulnerable than reptiles, but they are also more adaptable. The integrative activity of their brains provides for maintaining the temperature of the blood more or less constant in the face of

variations of 100 degrees or more in the surrounding atmosphere. Also, mammals are able to adapt to wetness and dryness, to altitude, and to the wily predatory maneuvers of their enemies. It would appear, therefore, that the purpose of the brain may be, not only to maintain the constancy of the internal environment, but rather permit effective adaptations to changes in the external environment.

Neural integration is a complex system involving receptor and effector activity and something connecting the two. The connection may be direct, as in a simple reflex arc, or roundabout through interposed neural circuits concerned with interpretation, association with learned experiences, and other stored information either on a conscious or unconscious level. Thus neural integrative activity refers to what takes place between the delivery of an afferent impulse to the central nervous system and the formation of an efferent pattern of response. It may occur at several levels of the nervous system. When language or other types of symbolism are involved, the process must include the highest integrative level, the cerebral cortex. Thus, the ultimate effector pattern may often depend upon the peculiar meaning or significance of a circumstance or event to the particular individual concerned. Paul D. MacLean, senior research scientist at NIH who, in 1952, published the Visceral Brain and coined the term limbic system, has suggested that all afferent information may be available to the hippocampus, an area considered important to affective and visceral behavior.

An influx of afferent impulses does not necessarily imply conscious sensation. The viscera provide a profusion of afferent impulses that are not felt but that can be recognized through action potentials picked up from various subcortical sites.

The emotional interactions of human beings may be pathogenic on the one hand or beneficial to one's health on the other, depending on the circumstances. Some of the most damaging human relationships have their origin in the faulty raising of children and in the human fallacy of confusing leadership with power.

Such pathogenic relationships contradict LaFontaine's wise perception stated at the beginning of this essay. They include not only faulty infant care, but also what the church has identified as the seven deadly sins: gluttony, envy, greed, lust, stealing, lying (bearing false witness) and covetousness. They should also include racism, gender bias, and failure to provide social support, dishonesty, and lack of respect. Salubrious interactions, on the other hand, include emotional and social support, encouragement, recognition, admiration, love, forgiveness, respect, teaching, and generosity of spirit.

The greater the range of human desires, the more numerous are the emotional impediments to wise judgments. One has only to contemplate the consequences of biblical Solomon's greed and search for power or of what two world wars accomplished for the Germans, the initiators of both wars. Their leaders had confused

leadership with power and, as a consequence, had nearly ruined their nations and failed to extend their power. Leadership implies service to others, helping, teaching, and building cooperation and morale. Any athletic coach, successful educator or orchestra maestro is aware of this law of nature.

The brain mechanisms involved in regulating the bodily economy have been probed through measurements of behavior and various other techniques including electroencephalography, ultrasonography, radiography, MRI and PET scanning, but knowledge of the mechanisms whereby the brain stores information and evaluates experience continues to be fragmentary. The evidence of the storage of experiences in the brain came from the work of Wilder Penfield, a world famous brain surgeon who founded the Montreal Neurological Institute in 1934, and Theodore Rasmussen, who succeeded Dr. Penfield in 1962. These two men studied patients with temporal lobe epilepsy and found that sights, sounds and happenings long past in their lives could, by appropriately applied electrical stimulation to the brain, be vividly re-experienced (Penfield & Rasmussen 1950). Current technical refinements have made it possible to explore, stimulate, and record from fairly precisely identified structures in the brain. From such studies it has become evident that, while the basic neuronal structures and their distribution in the brain is species-specific, and to some extent specific to the individual, their fine dendritic development is epigenetic and is largely determined by experience (Buell and Coleman, 1979).

### Neuronal Plasticity

Arnold Scheibel, director of the Brain Research Institute at UCLA, whose research interest was in brainstem substrates of consciousness, and his colleagues made post mortem analyses of pyramidal neurons in various cortical receptive zones in the brains of individuals with differing levels of education and types of occupation. They revealed that the richness and patterns of dendritic development corresponded roughly to cortical localization of the body parts most involved in their daily activities (Scheibel and Wechsler, 1990). Scheibel recalled observations of Oskar and Cécile Vogt made in 1954. The Vogt's were neuroscientists who crusaded for a brain institute. Finally the Kaiser Wilhelm Institute was created.

The Vogt's noted that in autopsy specimens they observed had an unusual thickness of the primary auditory receptive cortex of a violinist who in life had had perfect pitch. They had also observed enhancement of the primary visual cortex in an artist with extraordinary eidetic powers and comparable developments in the cortices of other highly talented individuals. (Scheibel and Wechsler, 1990). Although such findings do not distinguish between genetic and developmental changes, David Hubel and Torsten Wiesel, co-recipients of the Nobel Prize for Physiology or Medicine for their discoveries concerning information processing in the visual region of the brain, have shown that visual experience is essential

to the development of the visual cortex and, furthermore, that such sensory exposure must occur during a critical time period in infancy (1959,1963). Although the techniques of measuring and tracing dendritic branching need a great deal more development, refinement and precision before physiological consequences and explanatory power can be stated, they nevertheless offer a hopeful step toward understanding the role of dendritic interactions in cognitive, emotional, and behavioral development.

Scheibel emphasized that inferences from such observations must be made from well-studied individuals rather than from combined data on groups: “Brain tissue is so sensitive a reflector of inheritance, moods, activities, skills, and challenges of the individual that it is impossible to have too fine-grained a history of the subject if satisfactory correlations are to be attempted. In a sense, the neurostructure and neurochemical milieu are at once the cause and effect of the history of the individual...an organic autobiography” (Scheibel and Wechsler, 1990).

Harold Pinsker, associate professor in the department of physiology and biophysics at the University of Texas Medical Branch, and William Willis, director of the Marine Biomedical Institute in Galveston, Texas, published the proceedings of an interdisciplinary conference that attempted a synthesis of separate and sometimes disparate findings of neurobiologists, psychologists, mathematician-engineers, clinicians, and philosophers concerning the workings of the nervous system and its implications for understanding human behavior (Pinkser & Willis, 1980). This rich resource provides links between levels of neural organization from molecular to behavioral. The book deals with the increased complexity of organization that allows an organism to perform more abstract and less precisely definable functions such as characteristics of individual human personalities and that which endows the individual with qualities such as courage, honesty, loyalty, generosity and creative imagination.

The excessive secretion of cortisol during depression provides a vivid example of the physical effects of emotionally stressful life experiences, especially those involving human relationships. The pattern is essentially Hans Selye’s stress reaction that results in a depression of glycolytic energy metabolism. Hans Selye was the pioneer in research into stress in the 1930s. The consequences are somewhat akin to Cushing’s syndrome and may include visceral adiposity, decreased muscle mass, osteoporosis, hyperglycemia, and impaired immune functions due to the suppression of the functions of leukocytes, of cytokine production, interleukin 6 and beta 1 and suppression of type 1 helper T lymphocytes. Prevention of this distinctive process clearly lies in constructive and pleasing human relationships, the application of the law of nature expressed in the fable of the donkey and the dog.

There is much a good physician can do by achieving an understanding of each patient as a person. Understanding a patient’s message, as practiced by Dr. Mark Altschule who was a professor of medicine at Harvard Medical School and Director of the Francis A. Countway Library of Medicine, is the first step in treating the

syndrome of defeat, dejection and despair, so often leading to arrhythmic death. (Altschule 1988).

There is much a good physician can do by achieving an understanding of each patient as a person. Understanding a patient's message, as practiced by Dr. Mark Altschule who was a professor of medicine at Harvard Medical School and Director of the Francis A. Countway Library of Medicine, is the first step in treating the syndrome of defeat, dejection and despair, so often leading to arrhythmic death. (Altschule 1988).

The key to characterizing an individual is to ascertain his or her Weltanschauung, one's way of looking at life. Such information may be available in a skillfully conducted dialogue but is less accessible from uniform pre-designed paper and pencil tests, which cannot detect subtleties that distinguish us from one another. Neither can contrived, presumably stressful, stimuli be expected to impose a standardized impact on an experimental subject. Mental arithmetic, a relatively stable favorite, though onerous or even frightening to some, is fun for others. Further progress will require new questions framed to conform to the determinative nature of experience, the central processing of which produces individual, subjective interpretations that shape behavior. The potentially powerful force of words, gestures, music, art, or an idea on a person must, to be effective, encounter a receptor. Just as a tree falling in the forest makes noise only if the airwaves it creates encounter a suitable detector, so the force of personal influence, felicitous or destructive, has reality only if it engages in a special way the evaluative neuronal circuitry in the brain of one or more other human beings. Thus, the effect depends on how the event is processed in the neural circuitry peculiar to the recipient or recipients.

### The Brain, Ultimate Regulator of the Person and His or Her Well-being

The regulatory capability of the brain may be activated by a wide range of everyday life experiences, emotional, sensory, and anticipatory, in all of which responses by the brain's neuronal mechanisms play the leading role. Myriad other activations of neuronal functions in the brain will depend on the capability and hence the well being of the intracranial neurons.

Specific messages may be delivered to the dendrites of another neuron by an axon growth cone. To achieve a regulatory function, axons must be activated to travel to dendrites of appropriate neurons in response to stimulus and while sensing the welcome of appropriate receptor cells.

As noted, such every day functions of the neurons require that it be in normal condition with mitochondrions and well supplied with oxygen from glycolysis. On the other hand, if the resources for glycolysis by intracranial neurons are lacking, the neurons die and, ultimately, so does the person.



Thus, aging individuals may be at serious risk because continuing glycolysis in neurons requires that the neuron be stimulated to work by some activity of the person, emotional, intellectual, physical or otherwise. Because of this requirement, aging humans who retire may be at risk of premature death. Beyond this, as shown by Richard Veech, senior scientist at NIH and his colleague Yoshihiro Kashiwaya (1995), the neurocellular damage of Parkinson's or Alzheimer's disease, neuronal glycolysis is inhibited. Fortunately, these investigators have discovered that the damage of Parkinson's or Alzheimer's can be prevented by the introduction of ketone bodies. Unfortunately, also as shown by Veech, insulin does not induce glucose transport in the brain, while ketone bodies do. Again, ketone bodies are required.

The individual neurons share most of the contents that exist in other cells of the human body and also share some of their functions, including acting as receptors, modifiers, and expeditors. Indeed, a special feature of neurons is their proclivity to respond to stimuli and messages of all sorts.

All manner of life experiences can arouse responses from neurons in any appropriate site in the brain. The neurons may be activated by sights, sounds, and odors as well as by emotionally or intellectually significant events. All of these and other neuronal responses require energy, and thus the energy of oxygen must be available by mitochondrial glycolysis within each of the participating neurons.

The various parts of the brain, the right and left cerebra, are rich in receptors that, with the help of the growth cone, can deliver the message to the intended recipient in the brain or the sprawling nervous system.

Fortunately, although the brain is very reliable, it won't protect the person unless some activity -- exercise, thinking, inquiring, game playing, traveling and learning -- call upon it regularly. Achieving intellectual cultivation is the best activity for the brain as it works to keep us alive, in health and protect us. Moreover, learning about what the brain is and how it works is pretty simple. It is essentially the organ system that defines us as human beings and we take it for granted until it doesn't work as it should.

### The Location of the Brain's Major Functions

Remembering is one of our most important tasks. Remembering must begin with an experience that is recorded by either side of the frontal lobes.

The brain appears as three connected parts, the cerebrum, which forms the bulk of the brain, may be divided into two parts: the right and left cerebral hemispheres. The two sides of the brain are joined at the bottom by the corpus callosum. This connects the two halves of the brain and delivers messages from one half of the brain to the other. The cerebrum contains billions of neurons and glia that together form the cerebral cortex; the cerebellum fine tunes our motor activity or movement. It helps us maintain our posture and sense of balance; and the brain stem

which is located in front of the cerebellum. It serves as a relay station, passing messages back and forth between various parts of the body and cerebral cortex. Many areas of the cerebral cortex (surface) correspond to specific functions, such as vision, hearing, speech, emotions, thinking, and remembering.

There are two other major parts. The thalamus serves as a relay station for almost all information that comes and goes to the cortex. It plays a role in pain sensation, attention and alertness. The hypothalamus contains nerve connections that send messages to the pituitary gland. It plays a role in controlling our behavior such as eating, sleeping, regulating body temperature, emotions, secretion of hormones and movement. Most high-level brain functions take place in the cerebrum. Its two large hemispheres are divided into four lobes: the frontal, the area that produces movement of parts of the body; the parietal, interprets sensory signals received from other areas of the brain such as our vision, hearing, motor, sensory and memory; the temporal, which helps us hear sounds and gives sounds their meaning, such as the ringing of a bell; and the occipital, which contributes to our visual field or how our eyes see the world.

### The Dynamics of Interpreting Experience and Learning to Cope

It has become customary to substitute the terms “input” and “output” for the classical designations “stimulus” and “response.” Input information reaches the highest integrative levels of the nervous system by a variety of routes, including the nerves and the blood. The signals may be electrical, mechanical, or chemical, each affecting a specialized type of receptor. If the resulting neural impulse reaches consciousness, it becomes a sensation. Whether or not sensory information reaches consciousness, however, does not necessarily determine the nature or extent of the reaction, or output, except as will, desire, or motivation may add to the picture. Moreover, emotional responses may be aroused, such as fear, anxiety, or resentment, with or without awareness of the original input. Also, with or without awareness, and with or without an emotion or feeling-state, responses may be formulated in terms of striving, destroying, avoiding, and so forth. Thus, frustration of aims and misfortunes may lead (and are perhaps essential) to the growth and strengthening of a person as well as to maladaptive reactions. The degree to which energy fed into the organism through afferent channels is essential to his or her well-being has not as yet been established. It is certain that it is, that a challenge to adapt can promote welfare and productivity. Hans Vaihinger, German philosopher who wrote *The Philosophy of As If*, stated, “Man owes his mental development more to his enemies (adversities) than to his friends” (Vaihinger, 1949). The oyster produces the pearl in response to a stress stimulus.

## Forebrain Involvement in Visceral and Behavioral Responses

As W. Grey Walter, respected neurophysiologist, wrote, “Facts accumulate at a far higher rate than does the understanding of them” (Walter, 1953). Dr. Walter worked extensively on the electroencephalogram (EEG) and discovered theta and delta waves in the EEG (the human waves associated with light and deep sleep. So it has been with facts relating the functions of the brain to disease. Vast knowledge has accumulated concerning the behavior of neurons, neurotransmitters, receptors, and in the chemistry and physics of neuronal communication in the brain. However, explanatory information from studies of neurovisceral control continues to be more or less restricted to the activities of autonomic nerves. It has taken a long time for American physicians and physiologists to move “north” of the brain stem in their inquiries into neural mechanisms of disease. Their focus has favored the hindbrain where the autonomic nerves originate and function mainly as conduits for messages from higher centers in the forebrain where afferent information from within the body and from the environment is perceived, evaluated and acted upon.

While English-speaking neurophysiologists are now vigorously exploring the forebrain, they are only beginning to formulate their findings regarding intercommunications and interactions in the forebrain in psychological terms. Conversely, as the neuroscientists have uncovered facts relating the functions of the brain to those of the rest of the body, they have had relatively little effect on the thinking of most psychiatrists. Neither have the findings of the neurophysiologists been incorporated into the thinking of most physicians and clinical investigators whose special fields embrace the internal organs, such as the cardiovascular system, the lungs, the kidneys, and so forth.

The Russians are a good deal farther along than we are in understanding the relation of the nervous system to disease, thanks to the influence of a contemporary of William Osler named Sergei Botkin who, as a teacher and close associate of Pavlov, emphasized the importance of the cerebral cortex to clinical medicine (Wolf, 1994). He evolved a theory of disease based on the work of his compatriot Ivan Sechenov and called it “nervism.” In it he proposed that most, if not all, bodily processes are subject to some sort of regulation by cortical mechanisms -- or, in our terms, neural integrative activity. Sechenov was known as the father of Russian experimental physiology. He introduced electrophysiology into laboratories and also into teaching.

Sechenov, who had worked under Botkin and Claude Bernard, was impressed not so much by Bernard’s constancy of the milieu interieur as by his capacity to adapt, presumably under nervous control, to changes in the milieu exterieur, and thus protect the organism. Sechenov was later influenced by Charles Richet’s publication on

the Defense of the Organism (1900). Walter Cannon credited Richet's work for his concept of Homeostasis (Cannon, 1926). Charles Richet was awarded the Nobel Prize in 1913 for his research on anaphylaxis. Sechenov had expressed his ideas in a book called Reflexes of the Brain, originally published in 1863 and later translated (Sechenov, 1952), which aroused severe criticism from orthodox official czarist Russia, and became identified with the growth of the philosophy of dialectic materialism and the resultant political changes. In the scientific world, however, Sechenov and his book inspired Pavlov's experimental work and his discovery of the conditional reflex. Since the death of Pavlov, his pupil, Konstantin Bykov, with a great number of collaborators, accumulated an enormous body of evidence relating efferent and afferent connections of the cerebral cortex to a wide variety of visceral and psychological functions, including tissue metabolism (Bykov, 1957).

### Learning the Functions of the Brain

Despite a persisting general awareness of the role of the brain in initiating and patterning bodily reactions of all sorts, experimental access to the machinery of the brain seemed for centuries unattainable. As late as the 19th century, the distinguished Swedish scientist, Jöns Berzelius in an 1813 publication, declared that no progress was possible in understanding the brain (Berzelius, 1813). Over half a century later, Joseph Hyrtl, the great anatomist of Vienna predicted, "The anatomy inside the brain is, and will probably always remain, a book closed with seven seals and written in hieroglyphics in addition" (Hyrtl, 1846). They, of course, had not allowed for the extraordinary technical advances that were to subsequently occur.

### Intangible Forces and Functions

An intriguing view of the functions of the brain beyond maintaining life, health, and vigor is found in the writings of Paracelsus (Theophrastus Bombastus Von Hohenheim), an early 16th century physician and natural philosopher, who considered the brain to be an expressive instrument or device, not a cause of intellectual or emotional behavior. From his *De Veribus Morborum*, his biographer, Hartman quotes: "Wisdom, reason and thought are not contained in the brain, but thus belong to the invisible universal spirit which feels through the heart and thinks by means of the brain. All these powers...become manifest through material organs.... (Paracelsus, 1891).

Paracelsus seemed to be suggesting that the brain, like a violin, trumpet, flute, or guitar, is an instrument, albeit a living instrument, that is capable of giving rise to thoughts, emotions, aspirations, and behavior. As the nature and quality of music depend in part on the characteristics of the instrument, so the nature and quality of the products of a brain depend on its characteristics and the afferent data fed into it. Recent studies of senile dementia of the Alzheimer type have reawakened an old concern with the significance of sensory input to the maintenance

of intellectual functioning. The idea that sensory information contributes in a major way to shaping the structure of the brain and is a fundamental requirement for mental activity took root in the 17th century with Pierre Gassendi, an English philosopher who occupied himself with the rehabilitation of the Epicurus, and John Locke, an English philosopher educated at Oxford principally in medicine and science. Locke is noted for his *Essay Concerning Human Understanding* (1690). Later, in France, Pierre Jean George Cabanis, professor of medicine in the Faculté de Medecine in Paris, began to evolve a unified concept of the mind-body relationship based on physiology (Cabanis, 1981). He propounded the idea that not only thought and emotions, but also general, somatic, and visceral behavior are individually shaped by life experiences perceived through the senses and influenced by stored information from earlier experiences, as well as by the structure and capability of each individual brain.

During a woman's pregnancy, the structural and other physiological and chemical requirements for the baby are being provided to the new infant. Also during the brief period of parturition the more subtle needs of the baby, especially complex structural, chemical and other sequences are provided, thereby avoiding the most serious disease, cerebral palsy.

### Activating the Brain by Initiative or by Paying Attention

There has been a great deal of attention to the nature and significance of intentionally. This question has not carried us very far in understanding what governs human behavior.

Intellectual cultivation is an understanding of the world and its people and their function. The first requirement is curiosity and a bent toward analysis. Helpful personal characteristics include having an appetite for traveling, and experience with all sources of people. The important message here is that intellectual cultivation requires curiosity, the need to understand, not just the accumulation of information. (See appendix on a perspective written by my paternal grandfather, Marcus Wolf given to me by my Aunt Bessie).

As dependable as the brain is, the person in which the brain lives must be equally dependable in serving it. The person must bear in mind that the brain must be fed and must have work to do in order to survive. Special caution must be practiced by the person who has relaxed. Total inactivity is bad for the brain and dangerous for the person. If there is no personal awareness or activity, the neurons die and so does the person.

A major function of the brain is to teach the organism to adapt by using its integrative capabilities. Curiosity about the brain and mind began with the ancient Greeks who had a great deal of curiosity about the world and its

people. They developed an intense interest in mathematics and thought of the natural phenomena according to the rules of mathematics. They knew that the brain was inside the head, but they did not know what it did. It was, therefore, eventually assumed to be the location of the soul.

Pythagoras advanced the primitive ideas about the use of numbers to develop geometry. Plato eventually followed the ideas and conclusions of Pythagoras. Later he concluded that the brain was involved in human reproduction. He thought that the brain produced semen that flowed down through the spine to the phallus that impregnated the woman's ovum.

One might visualize a single early homosapiens stretched out on a grassy field on the earth about four million years ago. What would he be thinking if he spotted another person stretched out on the grass several yards away? What would he do if the other human was holding a sort of weed in his hand and was taking bites of it with a comfortable smile on his face? Should the first man ask him for a bite or should he just grab the plant from him and eat it, or should the man with the weed offer him a bite, or perhaps go and pick another plant for him? Or should he punch in the nose the invader of his space and run away from him? Whatever behavior pattern emerged from this ancient human encounter would surely have influenced subsequent social encounters, and affected subsequent human relationships as they evolved over ensuing days, years, and centuries.

There is sufficient evidence to suggest that early human behavior would have been initiated by coveting and fulfilled by competition. In fact, coveting seems to have been the most powerful incentive for individuals, groups or nations as they eventually settled in the world. Most of them promptly engaged in conquest or competition aimed at vanquishing or destroying any opposition. Even today vicious competition governs national efforts to achieve prosperity and worldly importance.

### The Beginnings of Society

An ancient society leading toward the study of medicine, Mesopotamia, (meaning the rivers -- the Tigris and Euphrates) was located in the site we now call Iraq. From many perspectives, Mesopotamia could be credited as the cradle of civilization starting about 5000 BC when the early inhabitants began to gather in communities. The early Assyrians occupied what became like city states. There following the famous Dynasty of Ur, that was followed by several Empires that succeeded it, including the Assyrians and ultimately belonging to the Roman Empire.

### Mesopotamian Medicine: The Sources

Most of the information available to modern scholars come from cuneiform tablets as there are no useful pictorial representations in ancient Mesopotamian art that have survived. Neither has a significant amount of skeletal

material yet been analyzed. Unfortunately, while an abundance of these cuneiform tablets from ancient Mesopotamia have survived, relatively few are concerned with medical issues. Many of the tablets that do mention medical practices have survived in the library of Asshurbanipal, the last great king of Assyria. It was housed in the king's palace at Nineveh, and when the palace was burned by invaders around 20,000 BC clay tablets were baked (and thereby preserved) by the great fire.

In the early 1920s, the 660 medical tablets from the library of Asshurbanipal were published by Campbell Thompson. Other medical texts have been published more recently. For example, Franz Kocher has published a series of volumes called *Die Babylonisch-Assyrische Medizin*. The first four of these volumes contain 420 tablets found from sites other than Asshurbanipal's library, including the library of a medical practitioner (an asipu) from Neo-Assyrian Assur, as well as in Middle Assyrian and Middle Babylonian texts. The remaining two volumes of Kocher's work augment Campbell Thompson's treatise, providing new joints of broken fragments and much material uncovered in the British Museum. At least one more volume of the Nineveh texts has been announced. In addition, the series *Späte Babylonische Texte aus Uruk* contains some thirty medical texts not included in Kocher's work. The vast majority of these tablets are prescriptions, but there are a few series of tablets that contained entries that were directly related to one another, and these have been labeled "treatises."

The largest surviving such medical treatise from ancient Mesopotamia is known as "Treatise of Medical Diagnosis and Prognoses." The text of these treatises consists of 40 tablets collected and studied by the French scholar R. Labat. Although the oldest surviving copy of this treatise dates to around 1600 BC, the information contained is an amalgamation of several centuries of Mesopotamian medical knowledge. The diagnostic treatise is organized in head-to-toe order with separate subsections covering convulsive disorders, gynecology and pediatrics. (Wolf, 1999).

The intellectual development of these ancient citizens was clearly outstanding. Doubtless, the more remote primitive hominids, during the early days when our Earth was first inhabited, were faced with many environmental challenges, among them the heat and cold, rain and snow, and the need for nourishment. But it is likely that their most important challenges came from interactions with the people whom they encountered.

Thanks to the ingenuity and ambition of a few men in past centuries, there are available today many nourishing adaptations, both biological and psychological, that most richly serve the world's inhabitants with emotional and intellectual rewards, including its beauties and intellectual stimulation. Also available is a wide range of friendships with other humans and there is the opportunity to appreciate and even create art of all sorts, opportunities to appreciate its wonders and also to learn from them. Most inhabitants of the world don't realize how fortunate they are.



## APPENDIX

A few years after my study of Tom Little, I had an opportunity to examine the relationship between emotionally significant events to the control of bodily systems. The following essay was presented in Ryazan, Russia on September 28, 1994, at the I.V. Pavlovian Readings at the request of the Russian Academy of Medical Sciences, and was published in the Spring 1997 issue of the journal, Integrative Physiological and Behavioral Science.

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### Neural Regulation of Viscera Elicited by Individual Interpretations of Life Experiences

The idea that one's perception of a life experience, or even one's state of mind, may participate in determining the health and behavior of bodily structures was popular among ancient philosophers. Even ordinary people in ancient civilizations were aware that certain odors can induce nausea and that frightening news can inhibit salivary flow or can cause diarrhea. Only recently, however, have the underlying neural mechanisms in the cognitive areas of the brain come to light, thus confirming a 350-year-old theory of Pierre Gassendi and John Locke, which held that all thought, beliefs and behavior, general and visceral, are actuated and governed by sensation (or experience). They believed that the processing of the sensations by the brain is shaped by stored memories, impressions, and learning as well as by messages from an immediate experience itself. Their idea took hold among 18th- and 19th-century philosophers and scientists and influenced the research of Ivan Pavlov, that was initially undertaken while he was studying with Sergei Petrovich Botkin, Professor of Medicine at the Military Academy of Medicine in St. Petersburg. His work on the gastric glands, which won him the Nobel Prize, was begun in Botkin's laboratory and so was some of his early work on conditional reflex. At that time there was no way to directly access the structures of the brain, but Pavlov devised an indirect method that allowed him to draw inferences concerning the function of the central neural circuits from his experiments on dogs as they responded to tangible and intangible forces in the environment, including socially significant events.

Subsequent experimental investigations in humans have documented and measured the powerful influence of life experiences on the secretion of the salivary glands, the motility of the esophagus, the motility and secretion of the stomach and the motility of the bile ducts, small intestine and colon. Within the past few years the structures and pathways of the brain responsible for transducing

emotionally significant experiences into salutary or dysfunctional bodily behaviors have been partially identified. We now have clear evidence that the central processing of information from afferent neurons by a vast network of intercommunicating circuitry may, through autonomic effectors, direct and govern metabolic and thermodynamic functions, thereby altering the distribution of receptors, the synthesis of messenger molecules and even gene expression in peripheral tissues.

This complex mechanism, long suspected to operate in daily life, is, through interdisciplinary efforts of neuroscientists, becoming described and characterized in increasing detail at an astonishing rate of speed.

Although there is a great deal still to be learned concerning operational details, the fact is pretty well established that afferent signals entering the brain by way of various sensory pathways may activate an extensive array of interactive neuronal circuits. From these are recruited, coded, and stored information from past experience in the form of memories, learning, beliefs, prejudices, vulnerabilities, and aspirations. The interactions involve groups of neurons in the thalamus; hippocampus; reticular activating system; identified areas of the temporal, occipital and frontal cortex; and other areas of the brain through excitatory and inhibitory influences of millions of neurons. Thus, individual interpretation of the original sensory message is shaped and modified. Through this complex interchange there evolves, with amazing speed, an assessment of the experience, with or without consciously felt emotions, and a response in the form of altered overt behavior and/or visceral adjustments. Such responses may be transitory and well tolerated or, if they persist, may lead to discomfort or disease.

Since genetic proclivities, development, and life experience vary widely among individuals, the consequences of central processing of afferent signals will vary from person to person and from time to time. Hence the neural mechanisms that control the gastrointestinal system or, indeed, any visceral system are not linear. For example, we have demonstrated that the same dose of atropine to be administered to the same individual on two different occasions will inhibit gastric secretion and motility on one occasion and will have no effect on another. Similarly, ipecac administered blindly through a stomach tube to a pregnant woman, with no symptoms at the time, produced nausea with characteristic changes being recorded from her stomach and duodenum. On another occasion, while experiencing the nausea of morning sickness and its gastrointestinal manifestations, the same dose of ipecac administered to the same individual eliminated the nausea and the accompanying GI changes when she was told that a powerful anti-nausea drug was being administered. In another experiment

a placebo was administered to 12 healthy young men on two occasions by two different physicians. Those who received the placebo from Dr. A reacted with an increase in gastric HCL secretion, while a decrease in HCL secretion followed the administration of a placebo by Dr. B.

These and other similar data emphasize the individual nature of visceral responses to life experiences. Thus, while careful observations and experiments can yield reliable data on individuals, they cannot be generalized to the population.

Similarly, the experimental application of standardized stresses to individual subjects cannot be assumed to be generally stressful. Mental arithmetic, horror movies, and the like may be frightening to some but fun for others. The fact that a stimulus is “aversive” does not establish its relevance to the individual’s way of evaluating and dealing with problems and challenges in his or her own life. Even efforts to measure the intensity of a stimulus fall short of the mark. A harsh word can be measured in decibels or a sight in lamberts, lumens, or photons, but the meaning of the sight or sound, the significance for a particular individual, eludes such measurement. It is possible, for example, to call an individual a coward in a precisely modulated tone so that the decibels can be accurately measured. Moreover, the amount of energy generated and transmitted through the ear drum and the middle ear to the organ of Corti can be as nicely determined as any stimulus in biological research. Such pains, however, would not reward the investigator with a uniformity of response from person to person or even from time to time in the same person. Although each of us is equipped with much the same machinery in the brain, the way it creates patterns of response is an individual matter. The energy fed by way of receptors into the nervous system actuates neural mechanisms that interpret events as threatening, neutral, or pleasurable, both in kind and degree. Responses, then, are uniquely personal according to the stored biases, individual proclivities, and past experiences of the individual. Therefore, in human beings, the search for the standard is such a search for the will-o’-the-wisp.

Responses of invertebrates that are low on the evolutionary scale to stimuli, noxious and otherwise, are more accurately predictable and characteristic of the species because the neural connection between their afferent and effector neurons is more or less direct and allows for fewer contingencies between input and output. Thus, optical responses in such organisms are uncommon. In mammals, on the other hand, afferent information is processed through relatively complex circuitry before the formulation of a response. Still the reactions of mice and rats are more predictable than are those of humans. Even dogs fall readily into habit patterns, the very predictability of which greatly

expedited the brilliant research of Pavlov, but Pavlov also recognized major differences in response among different breeds of dog. The much more widely variable ways in which humans interpret experiences makes their visceral, as well as social, responses far less predictable than those of cats, dogs, or even monkeys.

Therefore, to study human beings physicians and investigators alike must mobilize their sensitivity, perceptiveness, and descriptive skills to understand and interpret the correlates of physiological disturbances. To establish the relevance of a stressful experience to a particular individual, the investigative strategy must take into account the relevance of a presumable stressful circumstance to the past life experiences, attitudes, and vulnerabilities of the particular patient in question. From such a thorough inquiry into a patient's past one can devise a remarkably precise topic for discussion in a stress interview. This technique proved to be highly informative in the hands of Bela Mittleman and Harold Wolff in 1940 and was used to great advantage in our studies of Tom and his gastric fistula carried out from 1941 to 1958 and from 1941 to 1958 in subsequent investigations of a variety of other bodily systems as well.

Gradually we are becoming aware of a fact that is not new but, to a large extent, is being ignored, namely, that the cortical influence on gastrointestinal responses is integrated with the neuro-regulatory mechanism of other visceral systems, notably the heart and vessels. At the onset of a severe myocardial infarction, for example, the first symptoms may be "indigestion," anorexia and nausea, or even diarrhea or fecal incontinence. The associated epigastric or abdominal distress is, however, usually interpreted as angina pectoris despite the fact that the heart is supplied by the lower cervical and upper thoracic segments, and the innervation of the stomach and intestines comes from the lower thoracic segments.

To understand the integrative and interactive regulatory systems that control physiology and behavior and provide mechanisms of health and disease, we must refocus on the organism and not try to compartmentalize the study of human physiology and pathology into specialties. To understand the mechanisms of patterned adaptive responses across systems, it is necessary to work with the whole integrated organism as Pavlov himself did so brilliantly.

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This essay written by my paternal grandfather, Marcus Wolf, was given to me by my Aunt Bessie. She attended Goucher College in Baltimore and had the best record of having learned mathematics at a high level -- a

record that was never matched by subsequent students for more than 25 years. Aunt Bessie liked to do research, including her study of the Wolf family members who had attended Goucher College.

It is evident from this contribution that the mind is not a place in the brain but is an important function of the brain that must be activated by the person.

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## An Essay: Ideas, nor Mind, Innate

by Marcus Wolf

### Preface

The few pages herein offered to the public, are the result of ruminatings on a subject, which, the writer of “this” believes, has for ages, by a majority of man, been perverted.

Many men of high standing and eminent literary abilities, have ardently and laboriously dived deep into the science of metaphysics; written volume upon volume thereon; yet few, if any, have approached the point here advanced. And should the author of “this” succeed in removing “the error” to any extent, by his attempt, he will deem himself highly remunerated for performing the task. But as preliminaries are tiresome, the reader is referred to the matter under consideration.

### Essay: Ideas, nor Mind, Innate

Mind is the most wonderful treasure in the possession of man. It originates and gives form and character to all the mental and physical pursuits of life, and controls, as it were, the exercise of all those faculties, springing from and necessary to its existence; whether the intention be good or evil. Or the act contemplated be virtuous or vicious, the mind must resort, through its faculty of memory, to the store of ideas, accumulated by its experience for light and guidance.

The mind erects empires, governs nations, and directs all individual as well as collective pursuits; and while it has, unfortunately, in many instances, enslaved man, it has, happily, in many others, prostrated tyrants. It is to mind that the body politic owes its constitution and character; and every family composing it, its destiny; and to it every individual of mature age owes his knowledge and understanding; and each is molded by relations and causes altogether beyond the control of any individual human will.

When reviewing the vast multitude of the human race, we discover very great differences in the mental character of individuals; and in sentiments, morals, religion, politics, manners, and habits; these differences, resulting, as they do, from causes beyond individual control, must strike the observer with

astonishment. Even that inward monitor, conscience, which directs man to right and wrong, and checks or permits the act as consistent or inconsistent with morality, virtue and propriety, or, on the other hand, sanctions deviations from virtue and the commission of crime, exhibits the same wide range of diversity. Well may exclaim with the Poet -

Had I been born on some Pagan shore,  
I might detest truths I now adore.

Nay, it is scarcely necessary to satisfy ourselves of that diversity to go to other hemispheres or nations. Is it not true, that these differences are exhibited as much by the individuals of a single community, town, or city, as by those of different nations?

The members of the same family often differ, and honestly, too, upon all the principles and matters by which they may be respectively affected; thus showing, in that simplest form of social existence, the lights and shadows of a mental landscape.

Now, why this vast and multiplied variety? Man has made this a theme of thought for ages, and the designing have laboriously endeavored to establish mind as an innate power, united with our physical being; the mass of mankind have been led, by deep-rooted prejudice, and without enquiry, to adopt that belief. Few, indeed, have been bold enough to controvert this popular dogma, although many have been satisfied by searching investigation that nothing but accumulated ideas constitutes the mind. And let us ask whether any candid inquirer can reach a different conclusion?

Mark the close relationship of mind and its faculties. Is it not evident that they are one and the same thing; that they cannot be separated; that each manifests itself in the other, and that all constitute what we call mind.

It must be admitted by all who are willing to give the subject a philosophical examination, that ideas set the faculties on motion, which in conjunction with the faculties, constitute the intellect and give it a character, derived by observation, reflection and conception from the surrounding circumstances and conditions of the individual existence. Let us inquire, for argument sake, into what are termed the faculties, and see if it cannot be demonstrated that they are originated with what is called mind, and so strengthened by use and growth as to constitute intellect. For illustration, let us take the most prominent ones -- reasoning, imagination, judgment and memory. As to the first, let us ask if it could ever arise in a physical body without ideas from which to select, compare, and deduct conclusions? Nay, the word reasoning, would not be known in the vocabulary of language, and there is

no one who can assert that the ideas thus necessary to the faculty of reason are not derived or conceived directly or indirectly through the channels of perception and reflection.

2. How could imagination take its flight into the regions of fancy and fanciful conjecture, and thus inspire the mind with motives, unless fed and stimulated by the store of ideas gathered up in the experiences of time? Each age draws to itself the ruling ideas of the past, and in its turn adds its own accumulation of thought to the mental wealth of the future. Imagination, dealing with ideas upon which it springs into action, carries back to the storehouse of thought its own conception of new truths and new beauties. Motives necessarily originate in the exercise of reason or imagination, and these in turn depend for their action upon the stock of ideas with which the mind is stored. Without ideas these faculties would have no existence.

3. Can a sedate judgment at all times be invoked to decide upon matters presented by reason and imagination, ungoverned by considerations and ideas of the past? Or can any one say that the decisions of judgment are not given in substance similar to the determinations of others made or reached under like knowledge and conditions? It is evident, then, that the guide to the exercise of this faculty of judgment must have been planted in, and derived from, the faculties of perception and reflection, and, like them, made to constitute an element of the mind.

4. What is memory? It is the retaining of something which has been imparted to a body organized with sensation. But will any one contend that there is anything recorded in man of which he has not had a conception? It would not be too extravagant to say, that, without ideas, this faculty would have been unknown; indeed, this faculty could not exist without ideas, as will be shown by appropriate citation in the further progress of this argument.

So much for the faculties; and we may further add, that if all the agencies affecting the condition of man be properly considered, and their causes and effects duly appreciated, the diversity found in the character of different minds will no longer be regarded as wonderful or mysterious.

It is true that metaphysicians have generally admitted the influence of the perceptive faculty on the character of the mind; but most of them have contended, and some of them with great force, that a consciousness of right and wrong, as well as the idea of a Creator, is inherent in the mind. This notion, however, seems to be absurd, when we find that the ideas and consequent opinions and practices of men are as different and as little understood by them, unless made uniform by education, as their notions and opinions differ in regard to the meaning of words as they are pronounced and used by persons



educated in the languages of various countries. Mention the name of any thing to a person, in his mother tongue, and the same, or a similar thing, will immediately present itself to his mind; but when the same thing is spoken in another language, no such impression on the mind is produced. Conscience must act consistently with the idea of the mind held to be true, and the idea of a Creator must accord with the representation given by the system of theology, accepted by the mind as true. When the Christian God is spoken of to heathen for the first time, he finds no symbol for such a being in his mind, and he therefore obtains no idea of such a being -- a consequence similar to that above mentioned in regard to the use of an unfamiliar language.

When man reflects on the infinite number of ideas in his possession, and acquaints himself how and by what means they were accumulated, or, when properly understood, how manifold they are; the additions and multiplications they receive from ideas previously acquired, and increased by comparison; then it will not be considered surprising that the author of this essay boldly asserts that ideas generate and form mind, and not mind ideas! It has often been said that the variety of differently constituted minds, is a matter of a wonderfully mysterious character; and instead of endeavoring to solve this mystery, and to understand the true design of a creation so wonderful, fancy takes the place of investigation. Each sect, community and nation, from generation to generation, adopts and adheres to the belief of its ancestors, and thus takes it for granted that this wonderful agent, mind, has been called into existence by some superior ruling power. The philosophic observer should not, however, stop in his course of enquiry upon this subject, out of deference to any existing popular faith; but, like Newton, when he saw the falling apple, press his investigations to the farthest limit of human reason. By so doing, it will be found that the mind is the result of natural causes, and in some sense as much a property of organized matter as is the principle or property of attraction and consequently gravitation. When once rightly understood, this proposition will compel universal acceptance and belief; and it will be appreciated as a truth founded in reason so strong as to remove it altogether from the field of caviling disputation.

For the purpose of determining the origin of what is called the mind, it will be necessary to resort to facts -- the fountain head to sound reasoning.

Take for instance the infant being, man, at his birth, and trace him to his maturity, and comparing him with other animated beings, see whether there are not sufficient causes for endowing him with the power or mental property of mind; a property or power superior to that possessed by

any other portion of animated nature? It will be admitted that every plant in the vegetable kingdom, although animated with a life peculiar to itself, never gains possession of ideas or knowledge, and consequently never becomes possessed of mind. This is not surprising, for the plain reason that no object or existence in the vegetable kingdom is in possession of organs of sensation, through which alone ideas can be acquired; and yet we perceive as great a variety in that kingdom in regard to construction, size, strength and beauty, as we find in the animal; differences produced by causes and conditions obviously sufficient to account for their great diversity.

Every plant of these divisions of nature displays itself in accordance with the conditions, properties, and principles of its organization, and therefore exists from necessity, and could not otherwise exist or be.

It will also be conceded that where there are no manifestations of thought there can be no mind; and if the intellect of man appears to be superior to any manifestations made by animals of the lower species, that superiority is clearly attributable to the superiority of his physical organization.

The powers of perception, retention and comparison of ideas, are greatest and more perfect in man; and if so, there is no reason for making his intellectual superiority a matter of wonder. Is it not true that every species of animal possesses some quality or power in which it excels all others; and if so, will it be contended that man is in all things superior to all animals because superior to them in an intellectual power? What is there in man's ability to astonish; and why concede so much of superiority to him when that superiority is in every respect the simple result and creature of circumstances beyond his control.

Man is brought into the world, so far as time and place are concerned, by agencies that he cannot resist; and of necessity made to acquire a cast of mind corresponding with surrounding objects. The language and pervading morals, in which he must be educated from infancy to maturity, fixes the character of his mind; a fact easily and naturally shown by the differences in the minds of persons born and educated in different countries. In illustration of this natural truth, let us suppose the case of an individual deprived from infancy of one or more of the senses; would it be possible for that person to have the same knowledge as one possessed of all the senses?

Can a blind man have an idea of color? Can one born deaf distinguish one sound from another? These queries must be answered in the negative, and for the reason that the organs through which such ideas or impressions are acquired and conveyed are altogether wanting. In those particular respects

there could be no definite idea or impression, and to that extent no mind. Reason depends upon ideas, and as ideas depend for their existence on the organs of sensation, there would without those organs be no reasoning power. A man natural in size and in all respects like his fellows, so far as appearances go, yet deprived of all his senses, but that of touch or feeling, could never acquire the ideas or knowledge derivable in their nature and by other organs of sensation, and consequently could acquire but a part of what constitutes a whole mind.

To show that a person may thus be shorn of a part of his intellectual being, we refer to the case of an inmate of the Deaf and Dumb Asylum in the State of Massachusetts. Her history would be too lengthy for this essay; but it is well known that until received in that institution at the age of eight years, she was in the condition of a being without intelligence. Her progress in knowledge after that time through the sense of touch, was almost incredible, and but for the statement of those who were conversant with her in the course of her education, would not have been believed. And so shall we always find it. Those deprived of one or more senses; acquire ideas though, which they discover their inferiority to those who are possessed of all their senses. This discovery stimulates them in the exercise of such senses as they possess; to the end that they may meet their fellows upon an equality; and hence we find that the person deprived of one sense, outstrips in its exercise and consequent development, his fellows who are fortunate enough to possess all the senses in perfection. In such a case necessity requires and compels a greater exercise of the faculties possessed, for it is through those faculties alone that ideas and knowledge can be acquired; and compared with the person whose faculties are all perfect, the amount of knowledge required will be found proportionally much larger in the case of the person who is destitute of some one or more of the senses. He who possesses all the senses has a larger number of channels through which to gain ideas or knowledge, and in the consciousness of that full possession is proportionally careless and indifferent to the special exercise of those faculties.

A person born deaf can never have a definite idea of sound; and the like results necessarily follow in the absence of any other of the senses.

Persons destitute of the power to speak words as we do, are not necessarily destitute of the faculty of speech; but do not speak, for the reason only, being deaf and unable to hear words spoken by others, he cannot or doth not speak, because he hears no sound to imitate. The faculty of hearing, as it is termed, like the other faculties, exists in and with the animated body; and the reception of impressions, and perception of ideas, only show the faculties to be conditions of the animated body.

Every animated organization, possessed of the power of perception, begins at its birth to acquire ideas, and continues to do so throughout the period of life; and when life closes, there can no longer be perception, conception, reflection, nor manifestation of ideas.

This law is general, applying not only to man, but to every class of the animal kingdom. Each class is impressed and receives notions of the external world according to the capacity of its physical organization, and during life uses or is guided by such instinct or ideas as it has acquired, and when life ceases, becomes nothing more than inanimate, inert matter.

Whenever metaphysicians attempt to prove mind innate, they ought to show that man possesses knowledge or ideas not acquired through the faculties or powers of perception and reflection -- a task in which they have never yet succeeded, and in which they must ever fail; indeed, it is impossible for them to conceive of a mind in a body, animate or inanimate, which manifests no knowledge or intelligence.

Let us here enquire whether mind, or anything beyond instinct, can be found in man at the time of his birth? Mind originates in the accumulation of ideas, and it is the animated body only, that, through the powers of sensation, acquires ideas; and these powers of sensation exist simply as conditions of a living body; a living body possessing capacity to receive impressions, and retain ideas of them -- which capacity grows and strengthens with the child. The mind, by treasuring up ideas in memory, becomes able to compare them, to reason and draw inferences from them; and in this we are enabled to conclude that the mind, then, exists in the individual as a mere condition of his physical being, and not as an independent self-existing agent or power.

Whether this power locates itself in any particular part of the physical being, we will not discuss; the object intended is to show that mind is originated and exhibited by a living body, as a necessary result of the peculiar organization of the physical being; which being, by its powers of sensation, originates what we call mind, thro' and by impressions received from surrounding things, habits and customs.

The child thus, necessarily, takes his character from surroundings over which it has no control, and in reference to which he is entirely passive; and the character it may exhibit at maturity, correspond in all respects with the molding influences of those surroundings upon his powers of sensation, and through them upon his conceptions of the material world in which he lives.

Perceptions from sensation are more various and vast than is generally supposed; the

conclusions from comparison of those retained by memory, however, largely increase the original stock of ideas derived alone through the medium of sensation.

It is manifest, from these considerations, that there must be great differences in minds, and these differences must increase and vary as the individuals pass through life, just as their ideas, acquired by comparison and reasoning, vary.

Imagination, when darting forth for objects to contemplate upon, is bound to grasp them with that degree of information possessed in the fountain from whence it starts; and in returning, must necessarily dissect, elucidate and yield decision to such preponderating influences as were imbibed previous to the said flight.

And when the observer reflects upon the almost momentary flights, and, as it were, the electric returns; and the speedy conclusions drawn by comparing; his pen will scarcely enable him to keep pace with adding and multiplying, for to record the various and numerous ideas so received, conceived, and treasured by memory.

We often hear the remark, that, in case two persons, reared together in one family; nurtured by one nurse; watched by the same parents; instructed in one school; and associating from infancy unto maturity; that they still differ widely in sentiments, ideas, opinions, and character; and that these differences justify the inference that they were so designed by some superior power.

But is not such a conclusion drawn too hastily, when, as has already been shown in regard to the vast number and contrariety of ideas presented, that, even in the case of the two persons in question, observation through sensation may vary by thousands in the space of one day. Then, what must this dissimilarity be, after either of those compares, reflects and decides, as they necessarily must thereon, in accordance with their former acquired and retained ideas. Thousands might not suffice in that short space of time. Then, how countless that disparity must be when scores of years are taken into consideration.

Now let us, for a moment, imagine the unavoidable disparity that must ensue on part of persons reared in the several countries -- the one daily perceiving the manners, customs, habits and worships of his countrymen -- while the other sees and hears those of his. Does history not furnish sufficient evidence that the parts thereon, in regard to opinions and beliefs, are in most instances as opposite as the climes of the torrid and frigid zones. Viewing things, then, in a true light, we need no longer stare or wonder at that extraordinary disparity.

Nay, proper inquiry will satisfy any rational being that these results will follow from as plain demonstrations of cause and effect, as will the mathematical problem which proves that two and two are four.

There is a phenomenon existing which shows that two human beings may be so situated that similarity of perception, to a great extent, must ensue; and from that a similarity of conception and ideas; and hence, a very near approach to the same cast of mind; and we so really find it on part of the two beings referred to. To prove this the author of this essay has it from personal conversation with the Siamese twins, when they were exhibited in Baltimore, about the year 1836 or 1837, that conversation was scarcely ever entered into between them. The question propounded by me was, whether they ever conversed with one another? When the one then addressed answered by saying, “We can do so, but neither my brother nor I have any answer to give which the other does not possess, and it would be therefore useless, and have been therefore not accustomed to do so.” I would here remark, that when one at that time conversed with any one, the other would, during the time, notice his brother and the third person, and answer no questions until the dialogue was over. Now can anything be clearer than that the similarity of knowledge on their part resulting from their connection, compulsory occupying the same position all the time, thereby compelled to perceive objects alike, and hence ideas alike; all, so existing on part of those two extraordinary and interesting beings, the answer to me, alluded to above, was entirely correct.

Take any other two persons, separated from each other, and as they must be exposed to a variety of sights, sounds and things, it is evident that their ideas will differ, and their minds must vary accordingly. This difference is in contrast with the sameness of manifestation by the “Siamese” only, because of the different circumstances and conditions under which the ideas of the former were conceived.

As another illustration to prove the above, let us ask why it is, when, the greater the intercourse, intimacy, and frequent association of any two persons, thereby quite likely a considerable amount of similar sentiment is formed, yet more interchange of ideas should take place between them? A fact witnessed daily, and is of common occurrence. Many other cases of this character might be cited, showing that perception, reflection, and comparing of ideas, mould the several minds, as it were, by necessity. And when all these causes are properly viewed, and so honestly acknowledged, as rational beings should do, the wonder about the great variety of minds, and from whence the production

thereof, will cease; and we will no longer imagine the necessity of a designer for so constituting the minds of intelligent beings.

In glancing over the universe, and observing the operations of nature, we need not be amazed at finding variety in every thing; and this for the reason that there are no precisely like causes acting under like conditions at the same time; and of course there can be no two effects precisely like in character. True, we may often discern great similarity in these effects, but still discover, by close observation, assisting the eye with magnifying glasses, or any thing pertaining to the other senses with some useful instrument so far as science has produced thereon, that the closest similarity still stops short of actual and perfect similitude, and we are at last compelled to admit that no two things precisely alike can be found in the whole kingdom of nature. Let us examine whether there is not a sufficient diversity in the causes to account for these dissimilarities in the things constituting the world around us.

Can vegetation of the same species, from the several seeds, (and by close scrutiny it will be seen they vary some,) germinate precisely alike? The soil in a garden spot, similar, to the eye, will vary almost incredibly when analyzed. All the plants, whether near or far apart, will, therefore, be differently situated. The one seed may be softly imbedded, while the other is compressed by pebbles; young sprouts, when shooting above the ground, must already differ some; during growth, while moisture is received by the one, it is quite often withheld from the other; sun-beams striking on that, at one time, while, on account of some obstruction, not so on the other; so, with currents of air, and thousands of other causes operating, showing, that all those effects are produced by fixed principles of necessity, and could not be otherwise than we find them. These phenomenon and differences are unquestionably caused by the operation of natural laws, fixed in themselves, but constantly operating under dissimilar conditions. The investigation of this department of our subject ought to satisfy any mind, willing to reason candidly upon these facts, that in all the various phases of nature, including those appearing in the constitution of the human mind, they are produced by the operation of laws inherent in and governing the physical world.

By examining the action and movement of any piece of mechanism, we find that it does nothing other or beyond what it was designed to do; and if imperfectly constructed, the imperfection will be apparent in its operation.

Each wheel, pinion, crank and lever acts in its place, time and turn, according to design; and, from necessity, cannot act otherwise.



Again, why is it that the same person cannot precisely repeat any former performance?

It is said that the most skillful artist cannot produce two portraits of the same person exactly alike. The best engraver, with all his ingenuity, cannot replace a lost plate of his own workmanship, so that the new and the old cannot be distinguished.

Instances of this character can be multiplied indefinitely, and they all show the fact that the differences result altogether from the differences of the conditions operating at the time, from mental, physical, and external influences; and the individuals are therefore compelled, involuntarily, and, as it were, by necessity, to conform to those preponderating influences as are acting upon them at the time when the efforts were made to repeat or copy any previous act or work.

The same characteristics may be observed in the material world.

The column of sand, composed of its infinite number of particles, when moved by the whirlwind, is compelled to take the form and shape imparted by the propelling current then prevailing, and each grain and particle finds its place in the moving body according to the laws of force. In truth, when we reflect upon this subject, we find it almost impossible to conceive of causes exactly alike, when we observe the different results produced by the same apparent cause.

And when we find that these various manifestations of nature could not have been otherwise, and that each in its place results, of necessity, from the operation of laws governing the physical world, the mind reposes in the conviction that its own origin is attributable to the same laws.

Thus philosophy checks the wild flights of imaginations, and demonstrates the fact that mind exists in virtue of physical laws, and not as an independent creation of an unknown power.

Now, whether viewing all these phenomenon in man, morally, mentally or physically; distinctions in animals of the same or the several species; variety in the vegetable kingdom, from the smallest blade of grass to the largest tree in the forest; the soils, rocks, pebbles, crystals, and everything belonging to the mineral kingdom; it will be found that by tracing things to their proper source, all exist, as they do, by necessity, and could not be otherwise than as we found them; hence, also, incontestably proves that the mind is created and formed by the acquisition of ideas through the channels of sensation alone; and previous to perception and conception, mind could not have existed any more than we can say that there should have been a town or village on any site previous to the building of a house or houses thereon.

There is another error in the opinion of most men, that ought to be corrected; and that is in

reference to the instinctive powers of the various animals. It is generally held that man only possesses reasoning faculties, and that all other animals are guided by instinct alone.

Now, what is the meaning of the word “instinct?” The best lexicographers tell us that it is the power of acting without power or reason. This is unquestionably a correct definition of the term, showing, as it does, that it relates only to pure animal wants and desires.

We find, however, by comparing man with the other animals, that in this particular they approximate each other; an observation that ought to be sufficient to remove the error to which we have eluded. But, further, of what avail is it to boast that certain propensities in man can be and are controlled by his reason? Is it not equally true of other animals, especially those domesticated by man and made to serve his will? Man teaches them, to some extent, as may be witnessed by their performance under showmen, and otherwise; and they, in obedience to his teaching, control their instinctive wants and desires. The term instinct should be applied to man as well as the lower animals, and should be understood as a measure of intelligence upon which either may act, controlled or uncontrolled, by the precepts of more fully developed reasoning powers. But whenever we perceive a manifestation of ideas from an animated body, is it not self-evident that it must emanate from what has been acquired and retained. We hear the bird sing as he has been taught; the horse directing his course as guided by the rein; and the ox turning to the right or left according to the command of his driver; all of which shows that each practices according to instruction, attainable only through the power of sensation, and that each, so far as instructed by their sensations to that extent, of mind. True, not to the same extent as that of man, but which we have to attribute to the different quality, and peculiar organization, of matter, of which the several bodies are composed.

Man is unfortunately so vain and presumptive, that he arrogates all power to himself, and whether he discovers manifestations of intelligence in animals or man, his vanity leads him to pronounce what he sees in the animal to be instinct, and what he sees in man to be mind or reason; and this, too, when he knows that the common source of intelligence in both, is the power of sensation, common to both. Memory in both retains the impressions received by the organs of sensation, and the manifestation of these impressions is, in reality, the primary evidence that mind exists, and that without such impressions there could be neither manifestation of mind nor mental existence.

# **Pemphigus Vulgaris: Failure of Treatment with Riboflavin and Smallpox Vaccine**

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## PEMPHIGUS VULGARIS: FAILURE OF TREATMENT WITH RIBOFLAVIN AND SMALLPOX VACCINE

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An encouraging report of the treatment of pemphigus vulgaris was recently made by Topping and Knoefel.<sup>1</sup> They administered to their patient orally a flavin concentrate containing 970 Sherman-Bourquin units, or approximately 2.5 mg. of riboflavin daily. This patient had previously been treated by them with neoarsphenamine and sulfanilamide without success. After the administration of riboflavin had been started, however, the lesions cleared up and the patient remained well for several weeks. Later, after treatment was discontinued, the patient suffered a recurrence.<sup>2</sup> When the drug was resumed, this time in the dose of 5 mg. daily, the lesions cleared up again, and the patient has been apparently well since, nearly fourteen months after the institution of riboflavin therapy.<sup>2</sup>

On the strength of this favorable report, and since pemphigus is still considered a fatal disease, a patient in the New York Hospital suffering from pemphigus was treated for eleven days with 100 mg. of riboflavin (Merck) by mouth daily, forty times the dose used by Topping and Knoefel. In contradistinction to their patient, who showed improvement at once and suffered no new lesions after the start of treatment, our patient showed no perceptible benefit from the drug and continued to have new lesions. He finally contracted bronchopneumonia and died.

Another therapeutic measure which deserves some comment was tried on our patient. As we were working on the assumption that Grace's<sup>3</sup> demonstration of a virus being etiologically concerned with pemphigus was correct, it seemed rational to try nonspecific vaccine therapy in this case. The therapeutic

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1. Topping, M. C., and Knoefel, A. F.: Use of Vitamin G in Pemphigus: Report of a Case of Pemphigus Vulgaris Treated Successfully with Riboflavin, *J. A. M. A.* **114**: 2102 (May 25) 1940.

2. Topping, M. C.: Personal communication to the authors.

3. Grace, A. W., and Suskind, F. H.: Etiology of Pemphigus Vulgaris: Isolation of a Transmissible Agent in a Fourth Case, *J. Invest. Dermat.* **2**: 1 (Feb.) 1939.

value of smallpox vaccine in the treatment of recurrent herpes simplex is well known.<sup>4</sup> Accordingly the patient was given five injections of 0.1 cc. of ordinary smallpox vaccine subcutaneously and five injections of 0.1 cc. of Rivers' vaccine<sup>5</sup> intradermally, without noticeable effect.

#### REPORT OF CASE

*History.*—An Austrian Jew aged 53, a bookkeeper, living in the United States for only nine months when he was admitted to the New York Hospital, June 14, 1940, complained chiefly of progressive involvement of the skin with bullae for eight months. His past and his family history were not contributory. The present illness began in October 1939. At that time bullae first appeared in small numbers on apparently normal skin of the trunk and extremities. They came in crops, leaving crusted raw areas which healed poorly. Similar lesions appeared in the mouth and throat. They made for a great deal of discomfort in eating and frequently bled a little. Later the left eye and eyelid became involved in a similar process. Meanwhile the lesions over the trunk and extremities were becoming more numerous. The patient had lost 35 pounds (15.9 Kg.) since the onset of the disease.

*Examination.*—Physical examination on admission showed him to be emaciated, acutely ill and uncomfortable. His whole body was virtually covered with rounded, denuded, crusted and often secondarily infected lesions. There were a few fresh bullae in areas of apparently normal skin. These varied in size from 1 to 6 cm. in diameter. The Nikolsky sign was present. Touching the open lesions caused a great deal of pain, and they bled easily. The nasal mucosa, as well as the buccal cavity and most of the pharynx, showed bullae and desquamation. The lungs were clear, apart from a few scattered rhonchi. The remainder of the physical examination was not remarkable.

*Laboratory Data.*—The urine showed occasional traces of albumin but no other pathologic conditions. The hemoglobin content of the blood was 13 Gm.; the red blood cells numbered 5.2 million and the white blood cells 8,300 with 25 adult polymorphonuclear cells, 45 immature cells, 18 lymphocytes, 3 monocytes and 9 eosinophils. During the patient's stay in the hospital the proportion of red blood cells and hemoglobin fell slightly while the white blood cell count rose, showing an increase in the proportion of immature polymorphonuclear cells. A count six days before death revealed the hemoglobin content to be 10.5 Gm., the red blood cells 4.6 million and the white blood cells 19,700; the differential count showed 30 adult poly-

4. Foster, P. D., and Abshier, A. B.: Smallpox Vaccine in the Treatment of Herpes Simplex, *Arch. Dermat. & Syph.* **36**: 294 (Aug.) 1937.

5. Rivers, T. M., and Ward, S. M.: Jennerian Prophylaxis by Means of Intradermal Injections of Culture Vaccine Virus, *J. Exper. Med.* **62**: 549 (Oct.) 1935.



morphonuclear cells, 52 immature cells, 12 lymphocytes, 2 monocytes, 3 eosinophils and 1 basophil. The blood Kline reaction was negative; the blood urea nitrogen level was 11 mg. per hundred cubic centimeters and the fasting level of blood sugar was 103 mg. per hundred cubic centimeters on admission.

*Course.*—The course in the hospital was progressively downhill. New crops of bullae continued to appear. Apart from the administration of riboflavin and smallpox vaccine, as mentioned previously, the patient was given a tub bath every day in tepid water containing 1 Gm. of potassium permanganate. His entire body was sprayed twice a day with a 1 per cent aqueous solution of gentian violet and his mouth cleaned with stäogen oil.<sup>5a</sup> Bronchopneumonia developed and sulfapyridine (0.1 Gm. every four hours) was without apparent effect. On the thirtieth day after admission his temperature went above 38 C. (100.4 F.) and remained elevated, rising as high as 41 C. (105.8 F.) on the day of his death one week later.

*Autopsy.*—An autopsy was performed, and a minute study was made of the organs, including the brain and spinal cord. The anatomic diagnoses were pemphigus with excoriation of a large proportion of the cutaneous surface, an acute splenic tumor with focal areas of necrosis, fatty degeneration of the liver and of the heart, bronchopneumonia with consolidation throughout the lower lobes of the left lung, acute bronchitis and hydrothorax.

Other abnormalities noted were slight arteriosclerosis of the aorta and the right coronary and pulmonary arteries, slight calcification of the renal tubules, cholelithiasis, a calcified nodule in the lower lobe of the right lung, thrombosis of the inferior hemorrhoidal veins in the lower portion of the rectum and of the pancreatic veins, focal necrosis of the pancreas with lymphocytic infiltration, a cyst of the pars anterior of the hypophysis and edentia.

It is interesting that pathologic changes in the central nervous system described by other observers<sup>6</sup> were not present in our patient. Lesions have been found in the spinal cord, especially about the dorsal root, which have led several observers to regard pemphigus as primarily a disease of the central nervous system showing, like herpes zoster, cutaneous bullae as the most obvious external sign. Dr. Louis D. Stevenson examined carefully the brain and spinal cord of this patient, and he was able to find no significant lesions in either.

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5a. A proprietary preparation said to be "an ozonide of olive oil in olive oil."

6. Poirrier, L.: *Pathogénie nerveuse des pemphigus chroniques*, Thesis, Paris, no. 169, 1904. Covey, G. W.: Pemphigus Vulgaris, with Findings in the Spinal Cord Suggesting the Etiology of the Skin Lesions, *Arch. Dermat. & Syph.* 6: 303 (March) 1924.

Furthermore, lesions in the adrenal glands,<sup>7</sup> described as having a probable etiologic connection with pemphigus vulgaris, were not seen in this case.<sup>8</sup>

#### COMMENT

This case is reported because it illustrates the failure of a therapeutic measure in pemphigus which has been recommended as efficacious. In addition, a new method of therapy was undertaken, namely vaccination, which was based on the assumption that pemphigus is a virus-borne disease. This measure also met with failure. Pathologic studies in this case failed to reveal the presence of lesions in the central nervous system or in the adrenal glands, sites considered by other investigators to have special significance in pemphigus.

#### SUMMARY

In the case of pemphigus here reported treatment with riboflavin and smallpox vaccine was tried. The patient died while under treatment. An autopsy failed to reveal lesions in the spinal cord or in the adrenal glands, sites described as characteristic by other investigators.

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7. Talbott, J. H., and Coombs, F. S.: Pemphigus: Experimental Studies on Thirty-Four Patients, *Arch. Dermat. & Syph.* **41**: 359 (Feb.) 1940.

8. Since this paper was submitted for publication, a patient with acute pemphigus has been treated in this hospital with riboflavin without salutary effect from the drug. She was a 58 year old Irish woman, sick for only six weeks before admission. The rash had been present only two days. On admission her skin and mucous membranes were covered with characteristic bullae. She died in four days despite the administration of 50 mg. of riboflavin twice a day for three days. The diagnosis was confirmed by postmortem examination. The case will be reported in detail later.



## OLD TERMS AND MODERN CONCEPTS IN MEDICINE

**B**ECAUSE TERMS reflect concepts, there is a danger that the persistence of obsolete terms in our language may perpetuate outworn concepts. Among such terms are some that imply a categorical distinction no longer considered valid, as for example, "functional etiology" versus "organic etiology," "functional process" versus "organic process," or "functional disease" versus "organic disease."

According to older concepts, a disease is organic, anatomic, or structural, if a gross or microscopic "lesion" can be identified by visual methods of examination. Today there is a general awareness that most anatomic lesions depend upon a series of functional changes. The diphtheritic membrane, for example, which chokes its victim, is composed chiefly of the victim's own fibrin. The consolidation in the lungs of the patient with pneumonia comes from his own body's reactions to the invading microbe, which include vasodilation, exudation, and the mobilization and concentration of leukocytes. These changes do not represent the depredations of the pneumococcus so much as they reflect functional adaptations by the host. Similarly, the manifestations of many other diseases stem from the patient's own adaptive processes. Hence the terms functional and structural are descriptive of different phases in a process and do not imply that the bodily disorders are categorically different.

Such phrases as "the effect of the mind on the body" and "emotional origin" are similarly inexact and misleading, since not only intangible stresses but many of the tangible ones produce their bodily effects or diseases through the mediation of the highest levels of the central nervous system. Thus the nausea that follows a whiff of rotten egg vapor must be brought about through pathways in the forebrain. This would not be referred to as "the effect of the mind on the body." It is rather the effect of the rotten egg on the body. Since bodily mechanisms that require the presence of the cerebral cortex are functions integrated at the highest neural levels, the phrase "highly integrated response" may be more useful and is certainly more meaningful than the oft heard "psychogenic reaction."

One may thus think of highly integrated functions in the same biologic terms with which one considers more localized reactions and responses on a segmental reflex level. Recent studies have emphasized the fact that a variety of stressful experiences may be damaging to the human organism, some of the noxious stimuli acting more or less directly, others largely indirectly. When stressful qualities of an experience depend upon its significance to the individual, the reaction is mediated through the highest (cortical) level. Such a process of work by the neurons in the brain is certainly as physical as the manufacture of urine by the kidneys.

Recent work suggests that certain bodily disorders and diseases may include in their mechanism the interpretive function of the brain. Study of such highly integrated patterns of reaction in man requires a comprehensive view of the human organism and its aims and goals. This type of study has not been popular; recently, in fact, it has been considered in some quarters to be unscientific. To call this unscientific would be the same as saying that a study of water and its properties would be less scientific than a study of the constituents, hydrogen and oxygen. To such early physiologists as Claude Bernard, it was scientific and highly desirable, and Bernard found it possible to focus his interest on a study of the behavior and habits of highly differentiated man. Shortly thereafter, the discoveries of Louis Pasteur at once widened and narrowed the horizon of investigators. Bernard predicted that the best brains in medicine would become diverted to the study of the behavior and habits of the not very highly differentiated bacteria. This trend took place and was followed in the history of medicine by the work of such great German physiologists as Karl Ludwig on the functions of isolated organs. Even in the recent past an experimental study was considered most highly satisfactory if the organ in question could be isolated almost completely from the influence of the organism's highest integrative activity. One might as well approach the study of water by isolating and scrutinizing hydrogen. Consistent progress in medicine today depends, as always, on changing methods and concepts, and clarity of thinking requires that worn out concepts be discarded together with the clichés that serve them. The breadth of view necessary to progress in medicine involves not only the consideration of the whole patient but the development of the "whole doctor."

STEWART WOLF

THE MEASUREMENT AND RECORDING OF GASTRODUODENAL  
BLOOD FLOW IN MAN BY MEANS OF A  
THERMAL GRADIENTOMETER

By CHARLES H. RICHARDS, STEWART WOLF, AND HAROLD G. WOLFF

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September, 1942

## THE MEASUREMENT AND RECORDING OF GASTRODUODENAL BLOOD FLOW IN MAN BY MEANS OF A THERMAL GRADIENTOMETER<sup>1</sup>

By CHARLES H. RICHARDS, STEWART WOLF,<sup>2</sup> AND HAROLD G. WOLFF

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(Received for publication March 16, 1942)

Measurement of blood flow in the intact human gut is desirable, not only because of its significance in physiological and pharmacological problems, but also because circulatory changes may be implicated in the mechanism of peptic ulceration. Studies on intestinal blood flow involving extensive surgical procedures with cannulation of arteries and veins have been carried out on animals (1 to 6), but the observations for the most part are contradictory, and, at best, deductions derived from them cannot be applied directly to human conditions. In other studies, inferences about the intestinal blood flow have been drawn from direct inspection of changes in calibre of the serosal vessels (7) and changes in color of the mucosa (8, 9).

### METHOD PREVIOUSLY DESCRIBED\*

Recently, we reported a method of measuring and recording mucosal blood flow in man. This required of the subject only that he swallow a duodenal tube with a small balloon attached (10). On the surface of this balloon was mounted the measuring element consisting of a silver button with a heating coil and a thermocouple. The button was applied to the mucosa by inflating the balloon with air to a pressure of about 15 to 20 mm. Hg, and the reference couple was maintained at body temperature. When in place, the button was heated about 2° C. above body temperature by connecting the heating coil to a source of constant current. Under these conditions, the actual temperature of the button varied according to the amount of heat lost by conduction to the blood flowing past it.

Two possible sources of error in the use of this apparatus were: (1) A change in area of the button actually in contact with the mucosa; and (2) movement of the button to a new position on the mucosa. In the first instance, the area of contact would affect the temperature

of the button, and no method was available to distinguish between this effect and a change in blood flow. The second possibility of error was due to the fact that the temperature of the button was above that of the body and hence the tissue directly beneath it was warmer than the surrounding area. Therefore, any shift to an unheated area would cool the button until equilibrium was reestablished. This effect was impossible to distinguish from a change in contact area or a change in blood flow.

### PRESENT METHOD

After trying several methods of circumventing these difficulties, the silver button was finally discarded in favor of the arrangement here described (Figure 1). A balloon, about 8 cm. in length and 2.5 cm. in its greatest diameter, has moulded into its wall 6 constantan-copper thermocouples equally spaced around its greatest circumference. The duodenal tube passes through the center of the balloon and on this tube is wound the heating coil with the reference thermocouples beneath it. The temperature of the heater is raised about 10° C. above that of the body and heat is radiated to the whole surface of the balloon. Consequently, all the tissue in contact with it is warmed slightly above body temperature.

With this instrument, the errors previously encountered are minimized: (1) Since measurement is made at 6 points on the surface of the balloon and the couples are in series, the average temperature gradient between the heater and the balloon wall is recorded and the area of contact is less important; (2) since a much greater area of tissue is warmed than is actually used, considerable movement along the mucosa is possible without disturbing equilibrium at the points from which measurement is being made.

The apparatus was used with the subject in a fasting state to minimize the cooling effect which might be produced by the flow of intestinal contents past the balloon. To determine whether this factor could account for any of the observed results, a special balloon was constructed which was provided with a by-pass. Since experiments with this balloon gave identical results, it was assumed that this possible source of error was negligible.

It is important to note that this device measures the flow of blood past the balloon and not the amount of blood in the tissues. A decreased flow would be registered from a mucosa engorged with blood, if stasis and congestion were present.

<sup>1</sup> This investigation has been aided by a grant from the Josiah Macy, Jr. Foundation.

<sup>2</sup> National Research Council Fellow in the Medical Sciences.



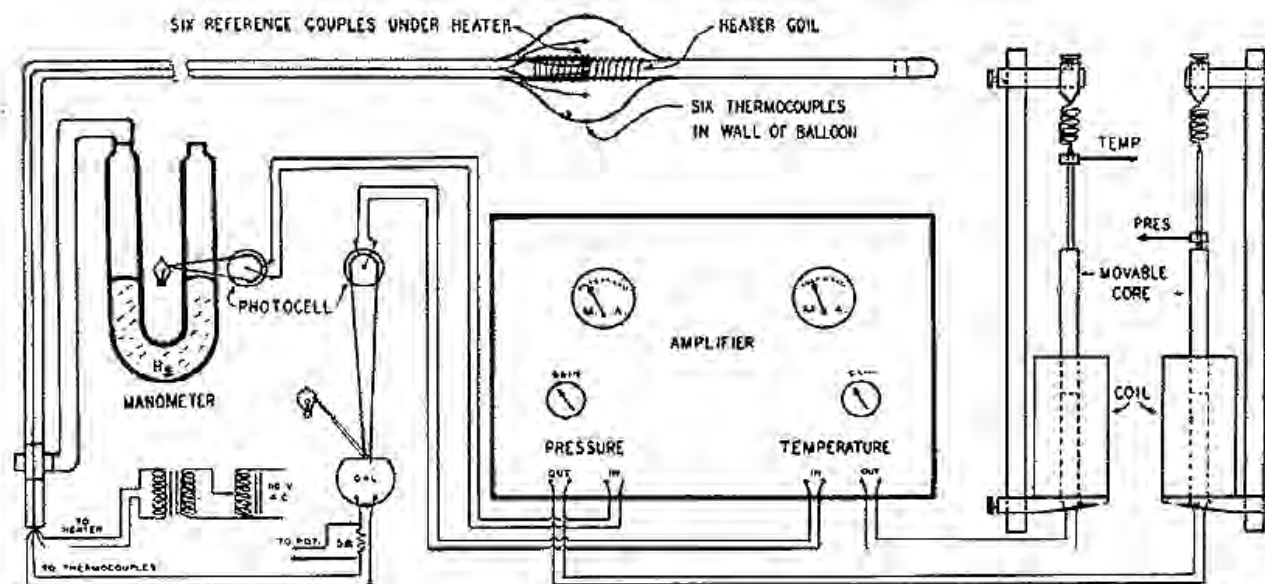


FIG. 1. NEW APPARATUS COMPLETE

#### RECORDING

Leads from the heater winding (which is about 100 ohms) are brought out through the tube and connected to a 10:1 stepdown transformer whose primary is operated from the 110 volt line through a variable autotransformer. The thermocouple leads are connected to the galvanometer through an attenuator (omitted from Figure 1) and with a 5 ohm resistor in series for the potentiometer (circuit shown in Figure 2). This is necessary because the output of the thermopile without this balancing device is too great for the galvanometer. The light from the galvanometer mirror is focussed on a phototube so that

changes in temperature of the thermocouples vary the illumination of the phototube. The current through the tube is then amplified and fed into the solenoid whose movable core carries the writing point. The amplifier circuit is shown in Figure 3.

An identical amplifier and recording device is used to record contractions by connecting the tube from the balloon to a Hg manometer, one side of which is placed between a light source and a phototube so that variations in the Hg column vary the illumination of this phototube.

Thus there is obtained a continuous record of temperature changes (corresponding to changes in blood flow) and of pressure changes (*i.e.*, contractions of the gut).

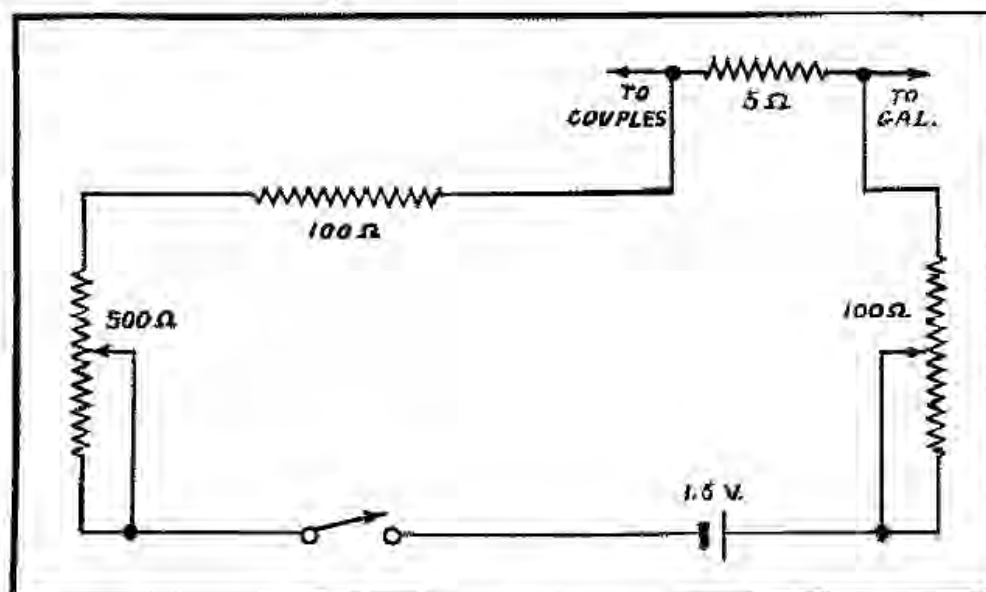


FIG. 2. DETAIL OF POTENTIOMETER CIRCUIT

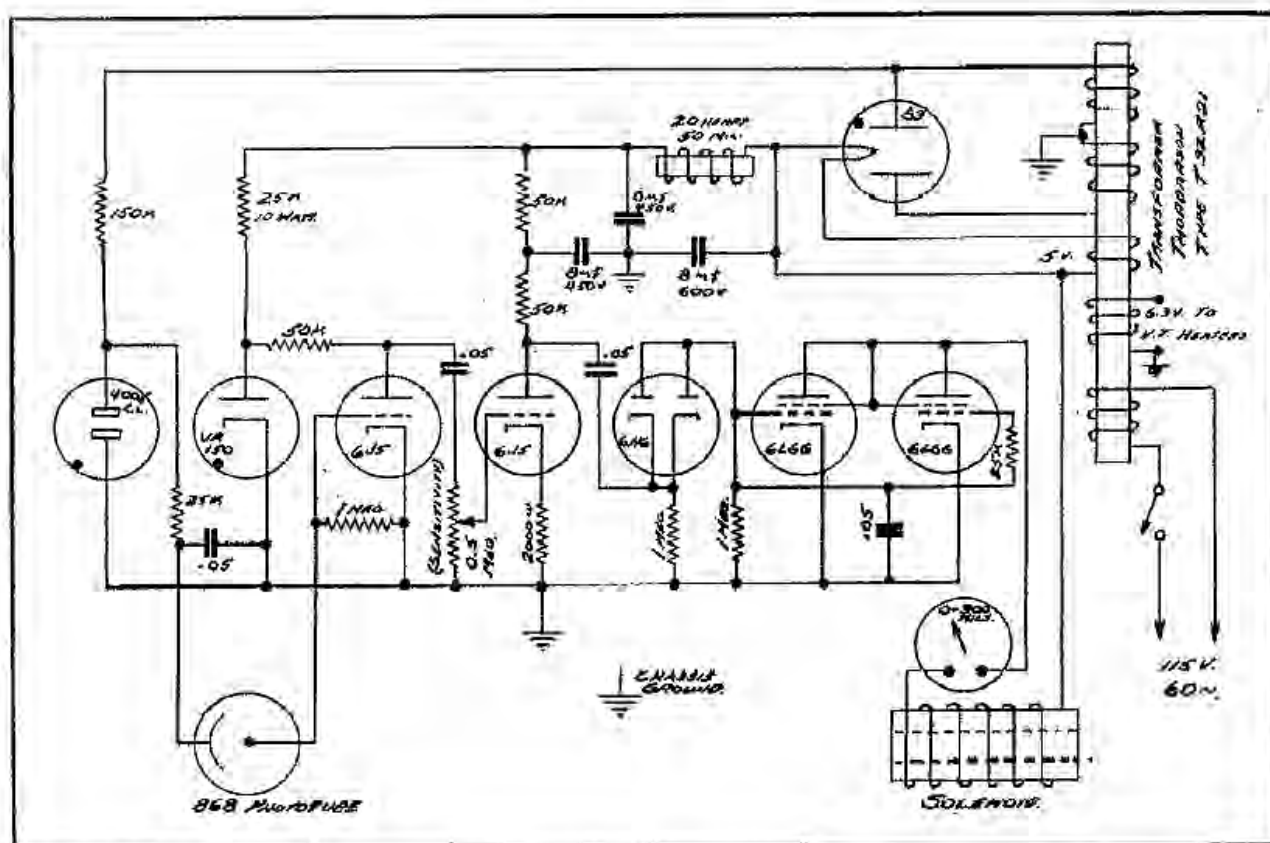


FIG. 3. DETAIL OF AMPLIFIER CIRCUIT (designed by Wm. A. Geohegan, M.D., Dept. of Anatomy, Cornell University Medical College)

Illumination of the photocell applies negative half-wave 60 cycle voltage to the grid of the first 6J5. After amplification, this is rectified and applied as a negative bias on the grids of the two 6L6G's, decreasing the current through the recording solenoid. Records published here show a rather large variation of recorder position with line voltage, manifested particularly by large spikes produced by line voltage surges. This was due largely to the fact that the phototube is operated on a steep portion of its characteristic, and the difficulty has been overcome by regulating the applied phototube voltage as shown above, with the 4005 CI. neon lamp and its associated filter.

#### OBSERVATIONS ON THE STOMACH

1. *Correlation of recorded blood flow with direct observation of color changes.* With the balloon in place in the stomach observations were made on a subject with a large gastric fistula, whose gastric mucosa was readily accessible to view (9). While the blood flow was recorded, simultaneous observations of color changes in the mucosa were made. These changes were compared with a color scale ranging from 20 to 100, the higher reading indicating increased redness (9). As shown in Figure 4, a spontaneous increase in recorded blood flow was associated with an obvious reddening of the mucosa and decreased flow with paling.

2. *Effect of motility on blood flow.* With each contraction of the stomach, there was a transitory

acceleration of recorded blood flow and a coincident blushing of the gastric mucosa. Strong sustained contractions or cramps of the stomach were found to be associated with an initial increase of blood flow, followed by prolonged decrease. This decrease was accompanied by cyanosis and was therefore probably due to stasis and congestion.

3. *Influence of histamine on blood flow* (Figure 5). The intramuscular injection of 0.5 mgm. of histamine phosphate was followed within 15 minutes by a significant rise in blood flow which continued to increase up to 45 minutes after injection. With each gastric contraction, there was a further transitory wave-like acceleration of blood flow. One hour after injection the blood flow began to decrease and within 2 hours it had returned to its original base line. These changes



FIG. 4. SPONTANEOUS CHANGES IN RECORDED BLOOD FLOW IN THE STOMACH CORRELATED WITH CHANGES IN THE COLOR OF THE MUCOUS MEMBRANE NOTED ON DIRECT INSPECTION

The scale on the ordinate shows in centimeters the actual excursion of the recording needle from the base line with increase in blood flow.

in recorded blood flow following histamine paralleled the color changes of the gastric mucosa as ascertained by direct observation.

4. *Effect of amyl nitrite and nitroglycerin on blood flow.* Amyl nitrite inhalation (1 cc.) and 0.6 mgm. of nitroglycerin placed under the tongue were followed by a variety of circulatory changes. Usually within 1 to 2 minutes after administration of these agents the gastric mucosa had become more red and engorged. At such times a simultaneous increase in blood flow occurred. At other times, especially with larger amounts of the nitrites and a fall in blood pressure, the mucosa became slightly cyanotic and the recorded blood flow either remained unchanged or was diminished.

#### OBSERVATIONS OF THE DUODENUM

1. *Effect of motility on blood flow.* As in the stomach, each short contraction of the duodenum was accompanied by a transitory acceleration of recorded blood flow. This effect is illustrated

in Figure 6. During phases of frequent contractions, the base line is significantly higher than during quiescent phases.

2. *Response to appetizing stimuli.* The sight and smell of food in a hungry patient produced the effect on blood flow and motility which is shown in Figure 7. With a steady base line in both tracings, food was presented at the arrow. Within less than a half a minute strong contractions started and within one and a half minutes the blood flow began to increase. The latter effect lasted about 6 minutes, although the motility was altered for a longer period. Food which was not appetizing, on the other hand, evoked no such effects. Indeed, when actual distaste was encountered, a decrease in blood flow occurred. Figure 8 shows a sharp increase in blood flow and motility which occurred following a mere discussion of appetizing foods.

3. *Changes associated with anxiety, tension and resentment.* Feelings of anxiety, tension and re-



# GASTRODUODENAL BLOOD FLOW IN MAN

sentiment were evoked in one subject during an interview which focussed upon experiences with a business partner, who had in the subject's opinion betrayed and deceived him. A detailed per-

sonality study of this patient is presented elsewhere (11). In Figure 9, an increase in blood flow is shown to be associated with this distressing emotional state. This graph was made by plot-

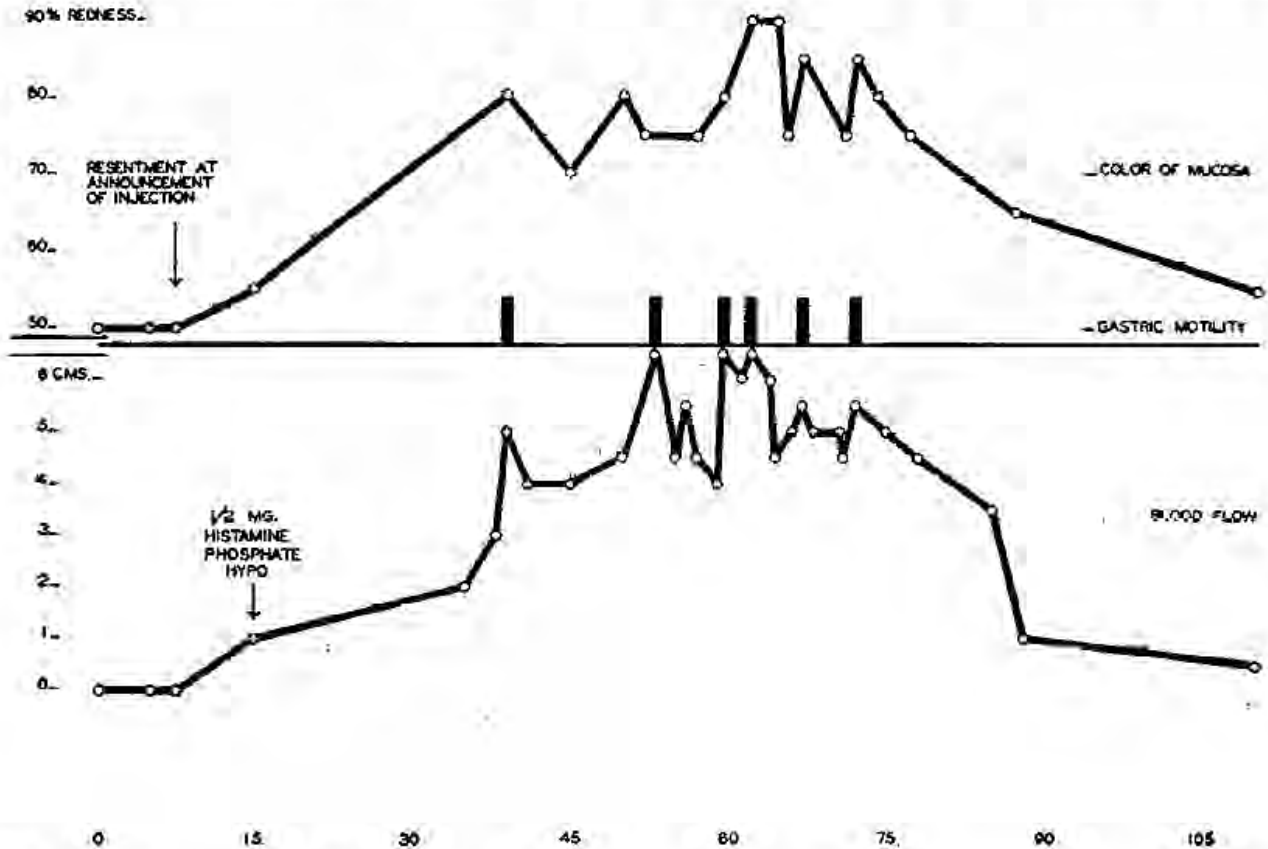


FIG. 5. CORRELATION OF COLOR CHANGES AND CHANGES IN RECORDED BLOOD FLOW IN THE GASTRIC MUCOSA AFTER HISTAMINE

Note transitory blushing and increased blood flow accompanying each major contraction. The contractions are indicated diagrammatically as solid columns. The record of blood flow is represented diagrammatically. The scale on the ordinate shows in centimeters the actual excursion of the recording needle from the base line with increase in blood flow.

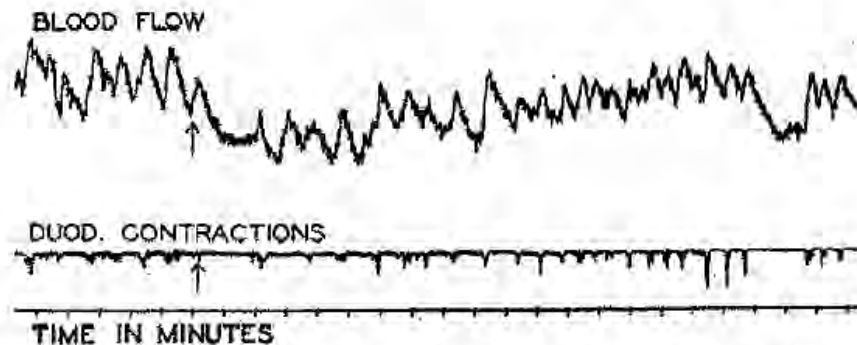


FIG. 6. CORRELATION OF BLOOD FLOW WITH CONTRACTIONS OF THE WALL OF THE DUODENUM

The tracings of blood flow and motility are synchronous.

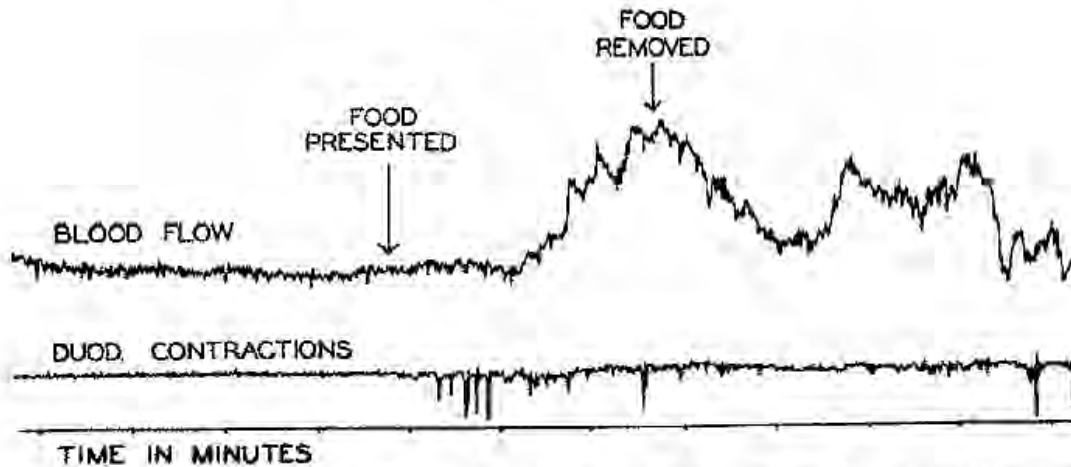


FIG. 7. CHANGES IN BLOOD FLOW AND MOTILITY ASSOCIATED WITH THE SIGHT AND SMELL OF APPETIZING FOOD

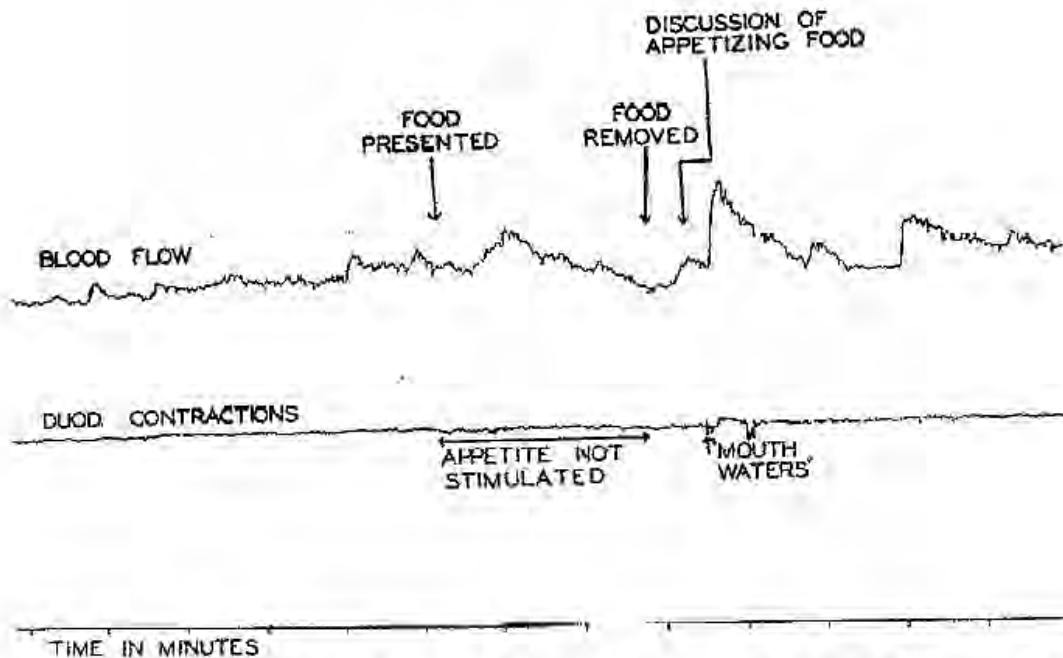


FIG. 8. CHANGES IN BLOOD FLOW AND MOTILITY ASSOCIATED WITH THE DISCUSSION OF APPETIZING FOOD

Note the absence of changes with the sight and smell of unappetizing food.

ting readings obtained directly from the galvanometer and manometer at 5 second intervals.

#### DISCUSSION

Changes in blood flow in the gastric and duodenal mucosae are here shown to occur under particular circumstances.

The transient increase in blood flow accompanying contractions of the stomach or duodenum is

probably due to the mechanical effect of squeezing the blood out of the muscularis into the mucosa. If the contractions occur frequently enough, they may cause a sustained increase in flow. However, this factor alone cannot account for the large changes in flow shown in Figures 5, 7, 8, 9. It is probable for example that the increase with histamine is due to increased metabolic activity associated with hypersecretion, and the effect of the

# GASTRODUODENAL BLOOD FLOW IN MAN

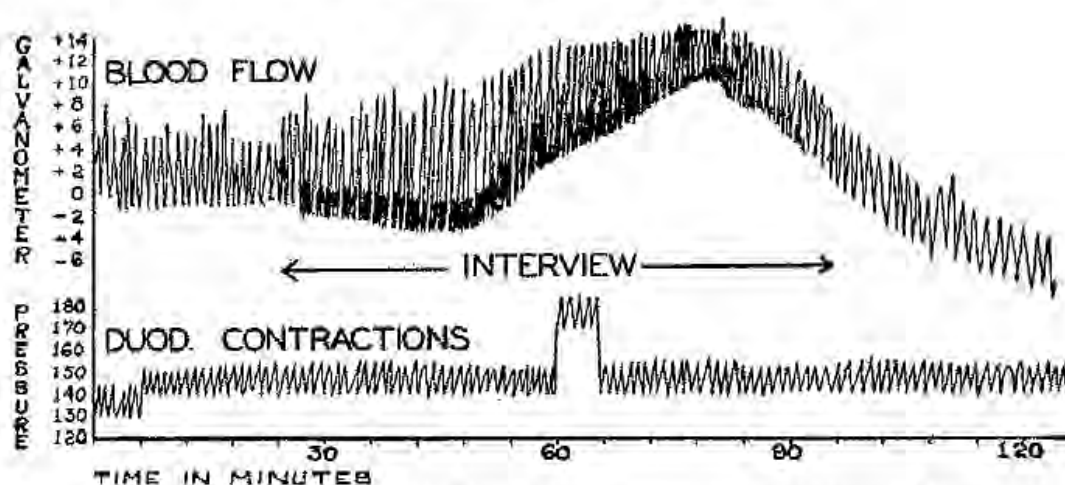


FIG. 9. INCREASE IN DUODENAL BLOOD FLOW ACCOMPANYING ANXIETY, TENSION AND RESENTMENT

The pressure is calibrated in mm. of water.

contractions is seen to be merely superimposed. Results of these studies on blood flow and motility will be correlated with secretory activity in another publication (9).

Anxiety, resentment and tension were seen to be associated with an increase in blood flow of the gastroduodenal mucosa. In the same subject, however, other emotional states such as fear, dejection and depression have been shown to be accompanied by a pale gastric mucosa and a decrease in secretion and motility (9).

The inference may be drawn that the blood flow of the gastroduodenal mucosa is determined by the interplay of three factors: (1), gastroduodenal motor activity, (2) the calibre of the blood vessels in the mucosa, and (3) the systemic arterial blood pressure.

## SUMMARY

1. There has been described an improved instrument for measuring blood flow in the intact gastrointestinal tract of man, which requires of the subject merely that he swallow a small balloon attached to a stomach tube. Interpretation of the findings has been simplified and given added significance by correlation with direct observation of the color changes of the gastric mucosa in a patient with a large gastric fistula.

2. Contractions of the wall of the stomach and duodenum were accompanied by a transitory acceleration of blood flow.

3. Histamine induced a prolonged acceleration of blood flow in the gastric mucosa.

4. The contemplation, or even the mere discussion, of appetizing food was accompanied by an accelerated blood flow.

5. Anxiety, tension, and resentment were associated with accelerated blood flow.

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# THE RELATION OF GASTRIC FUNCTION TO NAUSEA IN MAN

By STEWART WOLF

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877-882, November, 1943

## THE RELATION OF GASTRIC FUNCTION TO NAUSEA IN MAN

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Medical College, New York)

(Received for publication July 1, 1943)

In this communication are set forth the results of an experimental inquiry into the nature and significance of alterations in gastric function which accompany nausea in man.

Observations were made on the author, on 2 other normal subjects, and on a subject with a large gastric fistula, previously described in connection with other investigations (1). The fistula which had been surgically produced 48 years before because of a benign stricture of the oesophagus, was 3.5 cm. in diameter. The introduction of a lighted anoscope through the stoma afforded a convenient method of examining the gastric mucosa. Moreover, folds of mucosa could be forced out through the stoma and made to lie exposed on the abdominal wall when the subject increased his intra-abdominal pressure. Thus, vascular changes in the mucosa could be quickly recognized and closely followed. These, with other simultaneously recorded gastric functions, were studied for their relationship to the experience of nausea.

### METHOD

The subjects rested supine on a bed, with a thin elastic balloon, inflated to a pressure of 12 cm. of water, in place in the stomach. Continuous tracings of pressure changes in the balloon were recorded on a moving drum. At the same time, continuous aspiration of gastric juice was effected through an ordinary tube. A record of sweating on the forehead was made by taking readings of skin resistance every minute by means of an ordinary Wheatstone bridge resistance-measuring device,<sup>2</sup> and finally, observations were made of changes in the subject's pulse rate and in the color of his face.

In the fistulous subject, in addition to these determinations, vascular changes in the mucosa were observed by comparing color changes to a standard color scale. It has been shown in another publication that these changes

in color actually parallel changes in blood flow (2). Salivary accretion was also estimated by emptying the blind upper end of the oesophagus before observations were begun, and measuring the accumulation of saliva at appropriate intervals.

### OBSERVATIONS

Ten experiments were carried out after the manner described, in addition to 15 others in which only measurements of gastric motor activity were recorded. Nausea was induced by caloric vestibular stimulation, swinging, rotation of the head, and by situations involving a reaction of fear and withdrawal. The stimuli were applied at intervals, from 1 to 15 hours after feeding. After a suitable control period, 1 external auditory canal was irrigated with cold water. Note was made of the onset of nystagmus, as well as of the occurrence of vertigo, nausea, or other sensations. The degree of discomfort experienced by the subjects during irrigation varied roughly with the temperature of the water and the duration of the stimulus. The longer the period of irrigation and the colder the water, the greater was the intensity of discomfort. The following protocols illustrate the gastric and other bodily changes which occurred during vestibular stimulation.

Protocol 1. Near the beginning of a phase of spontaneously accelerated gastric activity, the left canal was irrigated with water at 5° C. Within 1 minute, nystagmus and vertigo appeared. At this point, the gastric contractions decreased in amplitude. No other changes were noted as yet, however. Skin resistance on the forehead remained unchanged until 5 minutes later when the first vague feelings of nausea appeared. Coincident with this, a sharp fall in skin resistance from 1,000,000 ohms occurred, reaching 90,000 ohms within 1 minute. A minute after that, perspiration appeared clearly on the forehead. Moderate tachycardia and facial pallor accompanied these changes. No gastric contractions occurred during the period of nausea. There was frequent coughing but no actual vomiting (Figure 1). Unfortunately, in this experiment, no record of duodenal contractions was obtained. Ingelfinger (3) has shown, however, that the

<sup>1</sup> Captain M. C., A. U. S.

<sup>2</sup> In making the measurements of skin resistance, the help of Dr. Charles Berry of the Department of Anatomy, Cornell University Medical School, is gratefully acknowledged.



STEWART WOLF

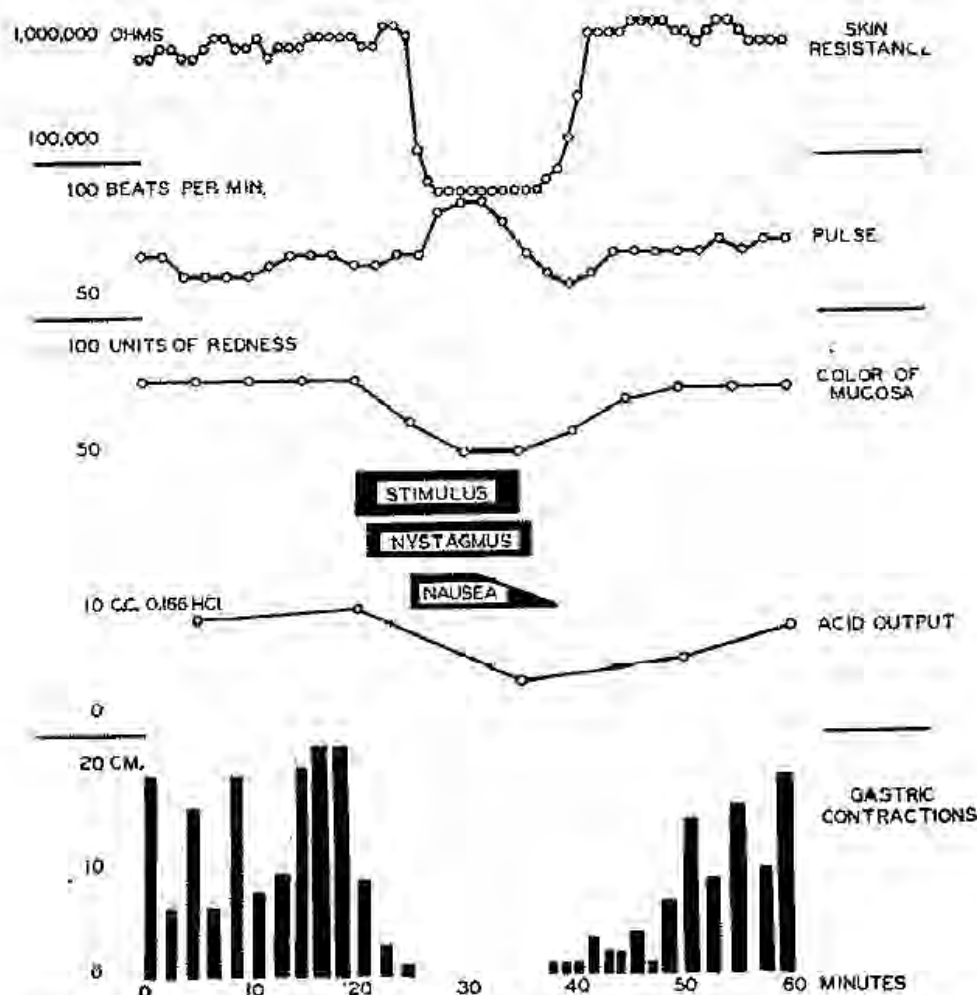


FIG. 1. GASTRIC AND OTHER BODILY CHANGES, ASSOCIATED WITH NAUSEA, INDUCED BY CALORIC VESTIBULAR STIMULATION

contractile state of the duodenum increases as that of the stomach decreases, so that eventually, by the difference in pressure gradient, the duodenal balloon is forced back into the stomach.

*Comment.* The striking finding in this experiment was the early inhibition of gastric motor activity and the much later onset of the other bodily changes. It would be of interest to know how many of these latter would follow such a stimulus if actual nausea did not occur. The opportunity to make this differentiation became available in other experiments in which lesser degrees of discomfort occurred.

**Protocol 2.** Using water at 8° C., 3 minutes after vestibular stimulation was undertaken, there occurred slight vertigo and nystagmus, as well as a distinctly uncomfortable "sinking" feeling without actual nausea. Concomitant with this feeling of discomfort, there occurred a sharp drop in skin resistance on the forehead

from 1,900,000 ohms to 100,000 ohms within a minute and a half. With the disappearance of the uncomfortable sensations, the skin resistance quickly rose to its former level. Apart from the usual reduction in the amplitude of gastric contractions which occurred within 1 minute, no measurable changes occurred in the stomach and there were no changes in the output of saliva.

*Comment.* In this experiment, reduction in the amplitude of gastric contractions antedated the onset of nystagmus and it was the only change which was noted in the stomach. Lowering of skin resistance on the forehead came on later and was transitory, corresponding in point of time to a feeling of slight abdominal discomfort.

**Protocol 3.** When slightly warmer water at 12° C. was used, the onset of nystagmus was delayed until 5 minutes after the start of vestibular stimulation. It was not marked and vertigo was not troublesome. No nausea occurred. In the stomach, contractions which were of

# RELATION OF GASTRIC FUNCTION TO NAUSEA IN MAN

considerable amplitude when stimulation was started decreased markedly 1 minute after the stimulus was applied. The mucous membrane of the stomach became slightly less red but no change in the rate of acid secretion, output of gastric mucus, or saliva could be detected. Neither did there occur any change in the appearance of the face or in the pulse rate. In this experiment, and in others in which the subject recognized little or no discomfort, there occurred no significant change in skin resistance on the forehead. The findings are shown graphically in Figure 2.

*Comment.* This experiment has shown that when the stimulus failed to induce significant discomfort, the only bodily change observed was a sharp decrease in the vigor of gastric contractions.

Protocol 4. In another subject, 2 minutes after the commencement of irrigation, the same sort of discomfort described in the previous protocol occurred. It was associated with vigorous nystagmus and vertigo. Skin resistance fell suddenly from 180,000 ohms to 90,000 ohms. The palms became moist and the pulse rate rose from 65

to 90 beats per minute. A minute later, when the fleeting distress had passed away, the skin resistance and pulse rate returned to their former level. Nystagmus and vertigo, however, continued.

Protocol 5. In a third subject, the effects described above were evident 2 minutes after the start of vestibular stimulation. The skin resistance on the forehead fell from 650,000 ohms to 210,000 ohms and 2 minutes later had returned to 670,000 ohms, despite the persistence of nystagmus and vertigo.

*Comment.* These observations indicate that peripheral autonomic manifestations were not necessarily an accompaniment of vertigo but rather were associated with the feeling of abdominal discomfort and mild apprehension. As shown in the first protocol, with the greater discomfort of actual nausea, these autonomic effects were even more marked.

*Swing sickness.* A swing, consisting of a chair suspended by cables from a bar 18 feet above the

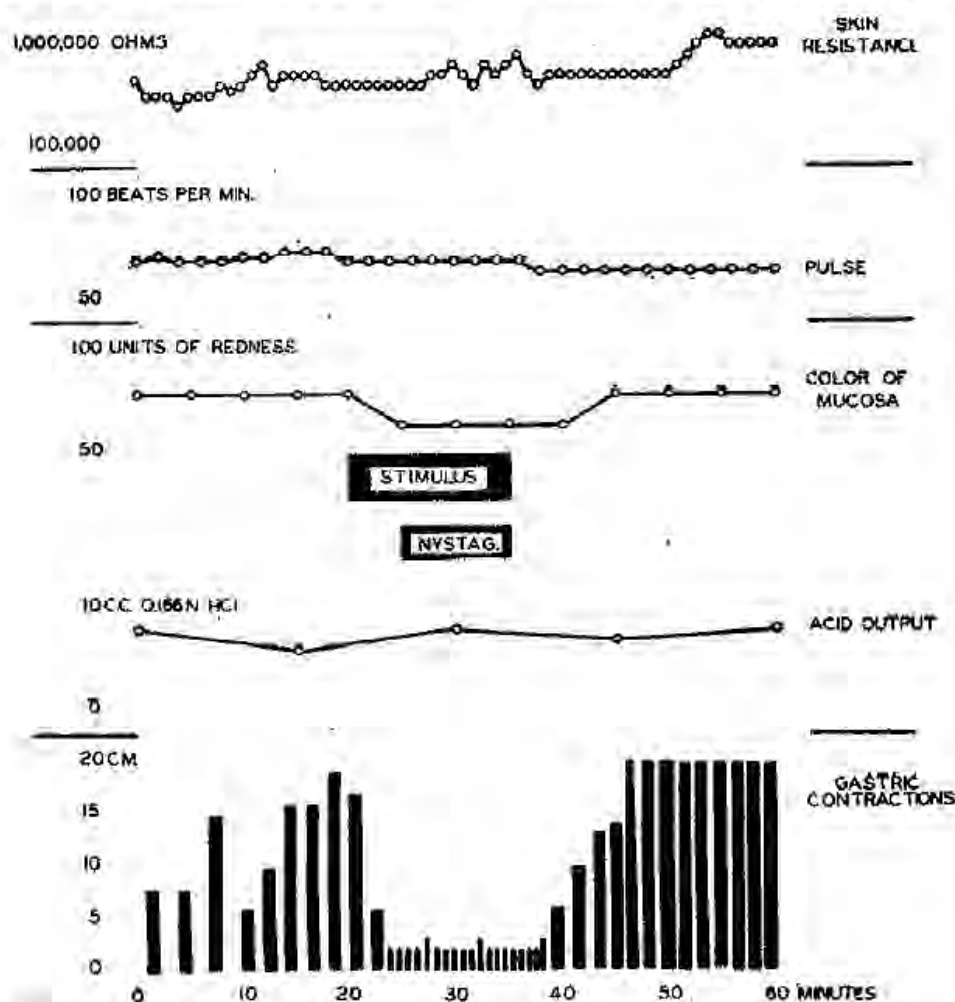


FIG. 2. GASTRIC AND OTHER BODILY CHANGES FOLLOWING CALORIC VESTIBULAR STIMULATION WHICH FAILED TO INDUCE NAUSEA

seat, was used. The subject was placed in the chair and swung through an arc of 90°, at the rate of approximately 15 complete swings a minute.

Protocol 6. Swinging was undertaken during a phase of vigorous gastric contractions. After 3 minutes, the contractions decreased sharply in amplitude and started up again 5 minutes after the swinging was stopped. There occurred no nystagmus, vertigo, nausea, or other discomforts of any sort. No change in the rate of acid or mucus secretion was noted. Salivary flow was not altered and no pallor, tachycardia, or sweating occurred.

Protocol 7. An earlier swing experiment was attended with considerably more discomfort than the one described in the previous protocol. Swinging was carried out under similar circumstances but after 20 minutes of swinging, the subject felt "weak in the knees," "light-headed," and slightly nauseated. The stomach had become pale. The vigorous contractions had disappeared and acid production had decreased. The results are shown in Figure 3.

*Comment.* These experiments show that the same bodily changes were induced by swinging as by caloric vestibular stimulation. Decreased gastric motility was a constant occurrence but further gastric changes and the more widespread autonomic effects occurred only when nausea or discomfort was induced.

*Nausea accompanying fear.* Several opportunities have been available to observe the changes in the function of our fistulous subject's stomach during alarm fear, and a reaction of withdrawal. They have been commented upon at length in another publication (4) but may be reviewed briefly here.

During a period of relatively accelerated gastric functioning, while the mucosa was under observation and the gastric juice was being collected, a

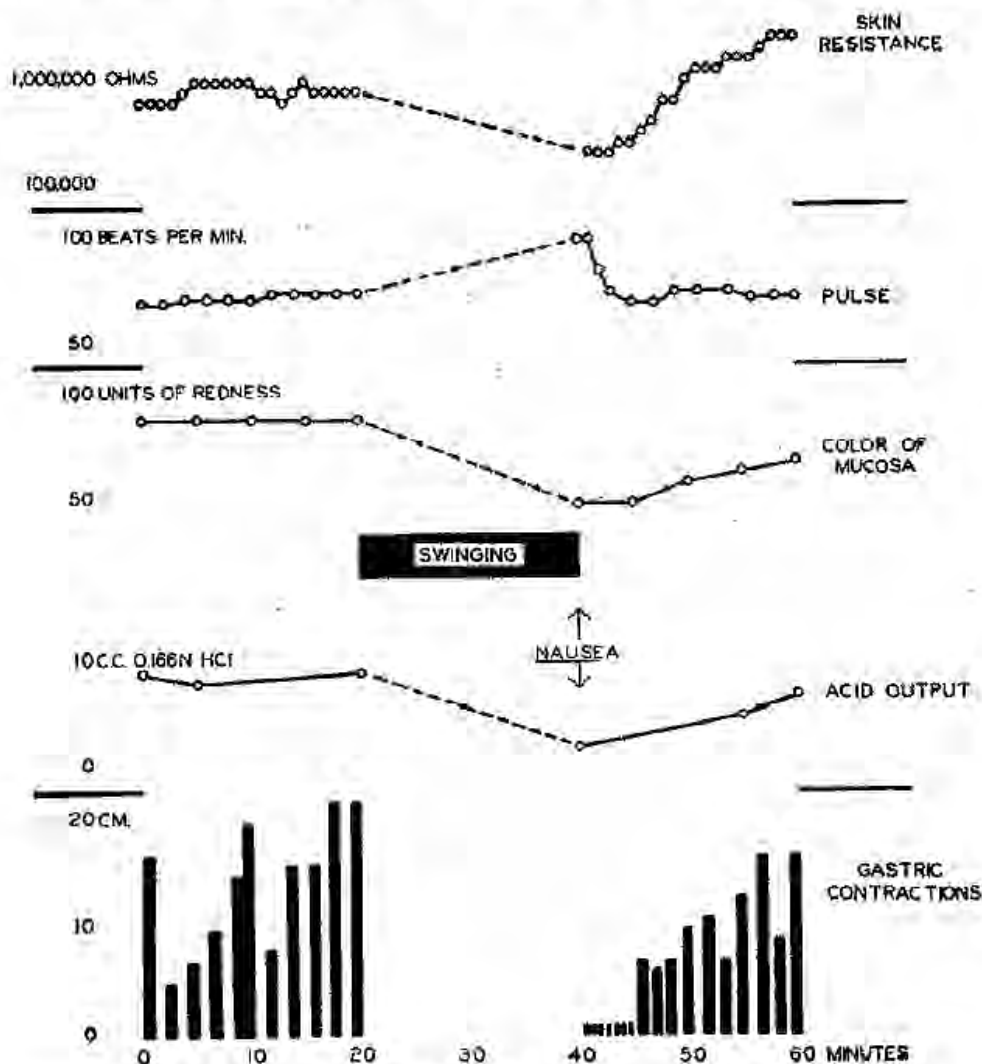


FIG. 3. GASTRIC AND OTHER BODILY CHANGES ASSOCIATED WITH NAUSEA INDUCED BY SWINGING.

# RELATION OF GASTRIC FUNCTION TO NAUSEA IN MAN

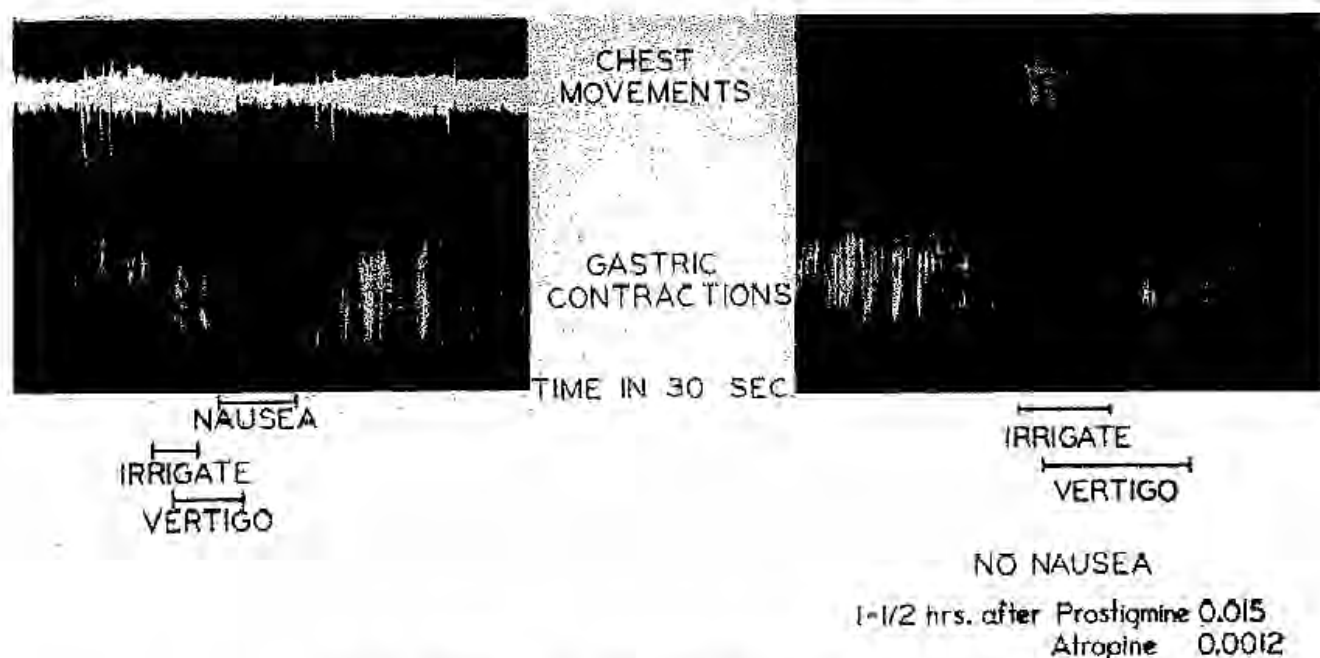


FIG. 4. KYMOGRAPHIC TRACINGS OF GASTRIC CONTRACTIONS

On the left is illustrated the usual sudden cessation of gastric contractions, decrease in gastric tone, and the occurrence of nausea, following irrigation of the auditory canal with cold water.

The tracing on the right was made from the same subject, one and one-half hours after prostigmine and atropine. Despite irrigation with water of the same temperature as the control (2° C.) for a period twice as long, no interruption of gastric motor activity occurred, and no nausea was experienced.

member of the staff entered the room and began searching impatiently for certain protocols to which he attached particular importance. As he searched, he muttered imprecations. Our subject, who tidied up the laboratory the previous night, had mislaid them. He was fearful of detection and of losing his job. He lay motionless on the table. His face became pale, as did his gastric mucosa, and acid output decreased temporarily until the doctor located his papers. On numerous other occasions, it was noted that the subject suffered depression of gastric function associated with pallor and sweating in situations involving fear and a feeling of withdrawal. Frequently nausea occurred in such a setting.

*Nausea following other stimuli.* Nausea was induced in the subjects by 2 other methods, namely, by rotating the head rhythmically while the eyes fixed some object on the ceiling and by administering a mixture of 5 cm. of powdered mustard in 100 cc. of water. In each case, the changes in gastric behavior already described occurred, the earliest and most striking alteration being the prompt cessation of gastric contractions, with a decrease in tone of the stomach wall.

## *The relation of gastric motor activity to the sensation of nausea*

It is clear that the changes in motor activity which occurred in these experiments did not result from nausea since they antedated the onset of the sensation and occurred with stimuli of insufficient intensity to cause nausea. These data do not determine, however, whether or not the altered gastric motility is essential to the occurrence of nausea. In order to settle this question, an attempt was made to prevent by drugs the inhibition of gastric contractions which followed nauseating stimuli. Veach (5) and his associates found that a combination of prostigmine and atropine, administered hypodermically, uniformly induced vigorous contractile activity in the atonic stomach of man. In the following experiments, a combination of these drugs given by mouth was tried out as a prophylactic against nausea.

*Action of a combination of prostigmine and atropine on the gastric motor mechanism.* In 6 experiments on 3 subjects, prostigmine hydrobromide, 0.015 gram, and atropine sulphate, 0.0012 gram, were administered while recordings of gas-



tric contractions were being made. In each case, vigorous contractile activity began within 10 to 30 minutes, if it was not already in progress, and the contractions continued for more than 2 hours. At intervals of half an hour and one and one-half hours, irrigation of the auditory canal was carried out for 5 minutes with water at 2° C. In no case was there any interruption of the motor activity and, despite vigorous nystagmus and vertigo, no nausea occurred. Similarly rhythmic rotation of the subject's head while the eyes fixed a spot on the ceiling failed to induce nausea or to alter the pattern of gastric motility. Gagging was then induced by stimulating the posterior pharynx with a tongue blade. Still gastric contractions continued and no nausea was felt. Figure 4 illustrates the contrast in motor function of the stomach during vestibular stimulation, with and without the administration of prostigmine and atropine. No detectable side reactions attended the administration of this combination of drugs.

*Effects of prostigmine and atropine alone.* When either of these drugs was administered alone in the dosage stated, no predictable effect on gastric motility was induced. Prostigmine was usually followed by the appearance of vigorous gastric contractions, but often the intestinal cramps which also occurred resulted in nausea and, with the nausea, there occurred inhibition of gastric contractions. The administration of atropine alone was also associated with undesirable side effects, such as dryness of the mouth (1). No detectable side reactions attended the administration of both drugs in the combination noted above.

*Comment.* The fact that nausea may be prevented, despite strong nauseating stimuli, by controlling with drugs the pattern of gastric motility indicates that gastric relaxation and hypomotility are essential to the occurrence of nausea. They do not, however, allow any conclusions regarding the mechanism of nausea or the mode of mediation of that sensation.

#### SUMMARY

Changes in gastric function during nausea have been explored and correlated with other more widespread changes in bodily function. Several nauseating stimuli were applied. The changes as-

sociated with the nausea resulting from each were clear-cut and uniform.

Following stimuli of intensity insufficient to cause nausea, there occurred interruption of gastric contractions and decreased muscular tone of the stomach wall. Stronger stimuli, which caused actual nausea, induced further changes in the stomach, characterized by pallor, decrease in the output of hydrochloric acid, and acceleration of the production of mucus. More widespread bodily changes were also noted, including salivation, sweating, and tachycardia followed by bradycardia.

Nausea occurred only during phases of inhibition of gastric motor activity. When, by the use of a combination of prostigmine and atropine, gastric contractions were made to continue despite strong vestibular stimulation, nausea failed to occur. The fact that gastric motor inhibition could be blocked by drugs, thereby preventing nausea, suggests their possible prophylactic use against seasickness.

#### CONCLUSIONS

1. Nausea induced by several stimuli was found to be accompanied by definite and uniform changes in gastric function.
2. While it cannot be said what connection these changes have with its mechanism, nausea occurred only during gastric relaxation and hypomotility.
3. By controlling pharmacologically the gastric motor mechanism before the application of stimuli, it was possible to prevent the occurrence of nausea.

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## PRESIDENTIAL ADDRESS

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### On Building Walls\*

By Stewart Wolf

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*Something there is that doesn't love a wall  
That sends the frozen groundswell under it*

AMERICA'S BELOVED POET, Robert Frost, was questioning an old tradition that held that "Good fences make good neighbors." Why do they make good neighbors? asks Frost.

It is a good question. What are we fencing in or out? Walls and fences are like categories and points of view that have crystallized. They come along naturally in the course of man's utilization of the riches of nature, but eventually they seem to develop an importance and significance of their own. Why? asks Frost. What is accomplished by this ritual of building walls?

Over the past 50 years in Medical America we have been building walls at an alarming rate. The rate has accelerated since the war. Some of the walls are hurdles; for example, the specialty boards. These hurdles were erected to help maintain high standards of training for practicing specialists. As such they serve man's original purpose for walls—protection. When boards are introduced as criteria for a university faculty, however, they become standards of intellectual conformity. The job of the university is not only communication but the search for knowledge. The paths that lead there cannot be prescribed by a board.

As for the young scientist himself, his search for approval is likely to result in a flight from originality. Ironically, just before he is examined the candidate is spoken of as qualified. After his acceptance of the stamp of approval he is said to be certified, like a bottle of Grade A milk—as sterile as is compatible with good taste.

Insecure human beings have huddled together for centuries in societies which prescribed initiation rituals for various stages of a

young man's development. This gave some assurance that potentially creative young men would conform to established standards of erudition and achievement. Are we not a bit young to have gone the full cycle of Arnold Toynbee, from creativity to self satisfaction?

A century ago Claude Bernard warned experimental medicine against exaggerating the importance of erudition. More recently Alan Gregg, in speaking to the dignified Assembly of the American College of Physicians referred to the specialty board examinations in words to this effect: You are not finding out what the young men can do. You are not even finding out what they know. You are merely finding out whether or not they know the same things you know.

Other walls are categories which we erect to separate one group of workers from another. So-and-so is working in cardiovascular disease, or he is a metabolite or blood man. Doesn't the blood go everywhere, don't the blood vessels? Must hypertension in the peripheral arterial system be the sacred province of the cardiologist, and must hypertension in an equally legitimate vascular system, the portal veins, be the bailiwick of the gastroenterologist? It is ironic again that in cardiovascular research a most exciting recent development was contributed by a blood man. Well, why not? The blood runs in the vessels. Fuller Albright recognized how shaky were the boundary walls of disease categories when he wrote in Cecil's textbook:—"Once some division of endocrinology such as diabetes is put on a firm footing, it is removed from the section on endocrinology to the section on metabolic diseases." We are often inclined to forget that categories are man-made and we carelessly endow them with some intrinsic significance

\* Read before the National Meeting of the American Federation for Clinical Research, Atlantic City, New Jersey, May 2, 1951.



## PRESIDENTIAL ADDRESS

despite the warning of Nietzsche that "tradition finally becomes holy and inspires awe."

Other walls we erect for purposes of exclusion. This applies to membership in learned societies. Most societies organize on the basis of the human impulse for kindred minds to gather in groups to exchange ideas. Stage two is the search for members of the new society. The focus at this time is on communication and progress. If the society is productive, its efforts are crowned with glory and prestige. Next comes the stage of exclusion—the human impulse to protect one's front seat. It was such wall-building that prompted Dr. Christian to propose the organization of this society. He suggested that we adopt the constitution of another association which had got to the wall building stage but whose original constitution had defined eligibility for membership as follows:

Any practicing physician residing in the United States or Canada who has accomplished a meritorious original investigation in the clinical or allied sciences of medicine, and who enjoys an unimpeachable moral standing in the medical profession, is eligible to membership.

After this society had been functioning for fifteen years, however, the wall of exclusion was raised and the active membership was limited to two hundred.

The wall building of exclusion crops up in all sorts of ways. Recently a highly respected investigator came out in favor of eliminating reports of research based on multiple authorship. If he had got away with that it would have made a sorry shambles of our program today.

A wise physician in Oklahoma City recently compared the young medical worker to a squirrel, "once free to garner the best from the topmost boughs of the boundless forest, who when committed to the annulling tread of conformity within the confines of his miserable cage cracks only the nuts supplied by his keeper."

Emerson in these words saw the business of cracking only nuts supplied by one's keeper:

Men grind and grind in the mill of truism and nothing comes out but what was put in. But the

moment they desert the tradition for a spontaneous thought, then poetry, wit, hope, virtue, learning, anecdote all flock to their aid.

Unfortunately those with creative imagination are not necessarily equally endowed with courage. It takes a hardy soul to withstand the pressure of disapproval and continue running on the topmost bough. Too many of us walk voluntarily into the cage of conformity. Thus we cultivate habits of thinking which, in their effort to achieve acceptance, lack freshness and originality.

Success in scientific research, as in other creative fields, is dependent upon unfettered spontaneity. Oliver Cromwell once said, "No one rises so high as he who knows not whither he is going."

I believe that our Federation stands for this freedom to explore the unknown without the need for passports stamped by an approving authority. After sound basic training Henry Christian left his men to work out their own destiny. "Work along at anything you wish," he used to say. "Eventually you will get an idea."

Freedom is such a simple word that having uttered it we may not realize how much has been said.



The figure above is not a wall, although it looks a little like one. It is a horse collar. Some of you may remember having seen one. Within

#### CLINICAL RESEARCH PROCEEDINGS

its perimeter one hundred years ago lay much of man's concept of transportation. If at that time standards of training for students of transportation had been confined within this yoke, it would have taken all of us much longer to reach this meeting on one edge of our continent.

The last bit of wall building I want to describe to you is that which sets a limit on man's capacity to approach the truth. Before the days of Friedrich Wöhler it was held that while inorganic compounds could be synthesized, such would not be possible with organic compounds because they contained a special kind of vital ingredient which was beyond man's reach. Wöhler's synthesis of urea changed all that.

Even Pasteur, a really free mind in medicine, undertook some wall-building when he spoke to the French Academy at the time of his election to that body which had earlier scorned him. Pasteur, as he entered the Academy's high walls of prestige and acceptance, threw up this wall of his own. He said that scientific method is not applicable to problems involving emotions. Within a very few years of this pronouncement Pavlov and later Walter Cannon were chipping away at Pasteur's wall which would limit man's capacity to approach the truth.

Robert Frost had the answer: "Something there is that doesn't love a wall, that wants it down."



## Talking With the Patient\*

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The basis of any medical practice is communication. The art of communication is something we cultivate, build on, and develop throughout our whole lives in medicine. Oddly, it is not something that great emphasis is placed on in medical schools and it is not something that the patient in your office recognizes as a particularly valuable commodity. He is likely to be more impressed with a gadget or by a recording of some sort. But I think if you will review your own experiences as a consultant you will all agree that on the occasions when the Lord has smiled and allowed you to make the diagnosis which the physician who asked you to see the patient hadn't already made, in a very, very high percentage of instances the right answer was suggested by something that turned up in talking with the patient.

Also, in treatment as well as in diagnosis, communication, of which talking is one modality, communication between patient and physician is of enormous importance. Many therapeutic situations depend almost entirely on such communication, not only as practiced by the psychiatrist, but by general practitioners and physicians in almost any kind of specialty. The privilege of the physician to help cure occasionally, and to relieve very commonly, but always to comfort, is therapy. The communication between pa-

*The highest manifestation of any physician's skill is talking with the patient, and this talking with the patient is by no means always verbal.*

tient and physician, even in the hospital room of the patient dying of cancer or some other fatal illness, is an instance of the dependence of therapy on communication, of which talking is a very important element. The value of the interchange between patient and physician depends very heavily upon the qualities of the physician, as well as the capacities of the patient. It depends upon how freely the patient feels he can talk with the physician; how much he is willing and able to say.

### THE PHYSICIAN'S QUALITIES

What are the requisite qualities of the physician? Well, I suppose we can all draw a vision of a perfect physician, but certainly one of the things that he would have to have would be a liking for and an interest in patients. He must also have a faith in their potential and a faith in his own mission vis-a-vis that patient. This is something that sounds very simple but I don't think that everyone comes by this kind of interest and commitment automatically.

The physician must also have patience. Patience to worry along with a situation that is not progressing very rapidly. He has to have patience to face, not only the patient's failures, but his own. This is a very,

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\*Prepared from a taped transcript of the address and only slightly edited.



very important aspect of communicating with the patient, I think, and it has to do very often with a willingness to accept hostility from the patient. If you have an individual with a terminal cancer, you are very unlikely to say, "Well, I'm sorry. There is nothing I can do for you. There is no use for you to come back to see me, or there is no use for me to come back to see you." No, you stick with that patient and however cantankerous he may be, you are gracious and attentive and seriously interested in the person until the end. If you are taking care of an individual with meningitis and you have on a new white coat or, worse yet, a brand new Sunday suit, and as you roll the patient over in bed he vomits all over your clothes, you don't turn to the patient and say, "Well, that's a fine way to treat a man who has done so much for you, who has stayed up late at night, come to see you, worried about your situation, and who has put his very best into trying to help you." Nevertheless the physician is often reluctant to tolerate other equally legitimate symptoms of illness, namely covert signs of hostility in his patient such as being late for appointments, complaining about the physician's perspicacity, smiling at the physician and saying, "You know, I'm not one least bit better despite the fact that I'm \$200 poorer and have been coming to you for such and such a length of time." We've all had experiences of this type, and how often we've been tempted to turn and say exactly what you wouldn't say to the patient that had vomited on you. "This is a fine way to treat someone who is working so hard in your behalf." And yet these symptoms of hostility worked out against the physician are, of course, just vicarious expressions of the patient's symptoms of hostility toward other, more important people in his life, on whom he dare not thrust these feelings. So this becomes a very important aspect of the physician, his patience and his willingness to be patient with little progress in any kind of a disease and to stick with, and not reject, the patient.

The physician has to have restraint—restraint in expressing disapproval of the pa-

tient, restraint in forcing the patient into a course of action which may seem very obvious and sensible to the physician and yet is something beyond the power, at the moment, of the patient. The physician must be very careful not to work out his own insecurities in dominating the patient and pressing on him in any way whatever.

Now, if we begin with this ideal physician that none of us achieves but all of us aspire to, much of the effectiveness of his interview, his communication with the patient, has to do with the laying of the ground work to begin with, the setting of the scenery, and the first impression that the physician makes on the patient. Very often a patient's communication is curtailed because he feels that the physician is too busy, or he feels that the physician is preoccupied with troubles of his own, or he feels that the physician is not interested, or perhaps not sympathetic.

We used to have a very interesting experience when I was at Cornell. We followed patients who had had sympathectomies for hypertension, and, for the convenience of the patient, we arranged for the visits at the same time that the neurosurgeons saw the patient. He would go to the neurosurgical clinic, and after he had been seen and duly recorded we would follow him from our angle. Time and time again, patients who were asked "How do you feel?" would say, "Well, doctor, I just can't do what I used to do. I feel terrible," and then go on to a long list of familiar post-sympathectomy, and sometimes unrelated, symptoms. Recorded in his chart, however, a few minutes earlier in neurosurgery clinic would be the words "Patient doing very well. No complaints. Blood pressure so and so. And perhaps a cold pressor test." Knowing the neurosurgeon as a personal friend, and knowing him to be a man of great integrity, intellectually, and of great interest in his patients we often said, "Why didn't you tell Dr. So and So what you're telling me? It says here on the chart that you had no complaints and I'm sure that was the situation." The patient would an-

swer, "Well, Dr. So and So is such a lovely man and he has worked so hard and done so much that I just hate to disappoint him." So there are many aspects, there are many wrinkles, there are many angles to the shrewd and accurate communication with the patient, by talking. I think many of us fool ourselves much more often than we realize.

#### GETTING THE MESSAGE ACROSS

I went to medical school at Hopkins and when we learned about the signs of peptic ulcer we had some very accommodating patients coming to the clinic who were delighted to say that yes, their pain was mid-epigastric, very localized, and that it came on two hours after meals and was relieved by taking food and soda, if that would help this young doctor out in any way. Glad to do it. But seriously, for setting the stage for talking with the patient, I think the whole thing can be summed up in getting across three messages. Now these messages can't be gotten across in words because if they were the patient wouldn't believe them. If you are told extravagant claims you just automatically don't believe them. But they must be gotten across by the manner and demeanor, attitude, and by the inner light from the physician. Those messages are: "No matter what you say or do in my presence, there is no hazard of censure, ridicule, or betrayal."

Of course, we all feel that way in our relationships with patients, but I don't think we always get it across. When we do, then we create a situation which will allow for the best kind of communication, and this is as important as any aspect of examining the patient. Just as one can't listen adequately to the heart if some one has a coat and shirt on or if the noise of busses going by on the street isn't muffled out and so forth, so one can't communicate, talk to the patient effectively for diagnosis and treatment unless the ground work is properly laid.

#### SOURCES OF INFORMATION

Now the next point is the sources of information. What sources of information are available to the physician? A great many.

First and most obvious, of course, are the direct words of the patient. What he says to you; but much more than that are implications in what he says. Unconscious revelations by context, slips of the tongue, contradictions, and things about the individual's behavior that are very telling. I refer to these things as the pre-systolic rumbles of the interview, and actually this is a very good simile because in all respects these indicators in conversation resemble pre-systolic rumbles. In the first place, they are heard with the ear. In the second place they can only be heard by a skilled person, someone who is practiced, interested, and expert in listening. I am sure you remember when you were second year students and I am sure all of you who teach physical diagnosis in medical school will agree with me that a very high percentage of second year students, after their first few sessions in listening to the heart with a stethoscope, go home to their wives, mothers, or others and say, "Boy, you've got to have a lot of imagination to be a successful doctor. You listen through those stethoscopes and you read something into it." How many times have the second year students said to their instructors, "Well, seems to me you're reading this into it." And yet, these same boys, three or four years later when they are interns and residents—nothing to it. They are able to hear presystolic rumbles without any difficulty at all and they wouldn't doubt for a minute the validity of this auditory stimulus. But it requires training and experience.

The second way in which my presystolic rumbles resemble those from the heart valves is that they allow you to draw inferences from very indirect evidence and they allow you to draw inferences that are very, very safe. You can't see the heart valves, you can't touch them. All you can do is hear the disturbances of the eddy currents that are set up when the blood goes by them. And it's the same way with the type of evidence you get from listening to the slip of the tongue, the non sequitur, or the gratuitous remark of a patient. And yet, the experienced



person can draw very firm conclusions from listening either to the heart or to the person.

Now, what are some of these presystolic rumbles in conversation and how do you get at them? Well, some things have to do with a statement which is inappropriate. Not long ago I had a physician's wife who had diarrhea and I felt that this diarrhea was somehow connected with her adjustment to her father who had died, and tremendous guilt about him. But, I couldn't for the life of me get her to say anything about her father except that he was the most wonderful man in the world and that she was immensely devoted to him, and he to her, and that there couldn't be anything more idyllic than their relationship. Finally I asked her to describe him. I said, "What was there about your father that is so outstanding?" Without a slip she answered immediately, "He was a walking encyclopedia. There was nothing — no subject on which he could not discourse intelligently." Well, somebody who wasn't used to listening to presystolic rumbles might pass that one up, but actually, if you think about it a moment, it is a non sequitur. She had damned him with faint praise, to be blunt about it. She had described him in terms that were out of keeping with what she had implied about what a wonderful person he was. She didn't say how generous, kind, or understanding he was, how he was a person you could always approach, who always stood behind you and so forth. No, she said he was a walking encyclopedia.

Often in the individual's behavior one gets presystolic rumbles. Not long ago a woman sat down before me and was talking about herself. In trying to size up where in the social structure of the life of the city she fitted, I came to a tentative conclusion, and suddenly she told me she was the wife of a fireman. Well, she didn't dress, she didn't talk, she didn't act the part that she was cast in, in life. Sometimes this is a very subtle business and when you come from the East and live in the West a while, you have to be careful about drawing conclusions too rapidly from this kind of thing. But if you have the picture it's a very balanced

kind of evidence. It's important to have a knowledge of life in general and of the general background of individuals in order to get at some of these presystolic rumbles.

I think this is a pretty good argument for what the Deans of all medical schools argue for anyway; and that is, a pretty general life experience and a pretty liberal education before a person comes into medical school. Let me give you an example.

In New York, a young woman, a 26 year old Italian girl, was complaining of nausea and vomiting, so troublesome and incapacitating that she couldn't work. As the story unfolded, it developed that this woman wasn't married. Now immediately, because of familiarity with the cultural patterns of first generation Italians in New York, in contrast with some of the other displaced European cultures, you would immediately realize that this was incongruous, a girl 26, pretty but unmarried and not dedicated to any other line, such as a religious order. If she had been a fifth generation American who had gone to college at Wellesley this fact would have no importance at all. But, it was a short cut, and it was right, and that was her problem. In the Italian culture in New York, however, it is customary to shield a girl most vigorously up until the time she is 18, and practically keep her from all contacts with men, and then as soon as she is 18 to wonder why she isn't married yet. And most of these girls are likely to get married very early, well before the age of 26. So, a knowledge of the social pressures and the cultural background, the *modus vivendi*, the way in which the people live, is enormously helpful to the physician in cutting through to the potentially important conflicts in their lives, in getting to these presystolic rumbles.

#### METHODS OF QUESTIONING

In asking questions of the patient in the history, it's very important to avoid questions that are going to bring misinformation. I think all of us do that kind of thing often without realizing it. We'll say, for example, "Did your father punish you very much when



you were a child?" The answer to that is, "No" automatically, because 'I'm not going to say anything disloyal about my father. I'm not ready to say anything like that.' It's an automatic reply. But if you asked an individual what sort of things he punished you for when you were a child, you are much more likely to get information. Everybody was punished for something, and the bases for parental punishment reflect parental values. They immediately set the stage for the kind of atmosphere your patient has grown up in.

So, you as the physician can begin to see this person's life experiences through his eyes and not through your own, it is very important to avoid what I call the "fine, thanks, how are you" type of question. If you are walking down the street having eaten too much shrimp the night before and you have a little nausea and queasy feeling and maybe a headache or something, and one of your friends sees you in the street and says, "Hi, Charlie, how are you?" you don't say, "Well, I'll tell you, Joe. I've got this epigastric sensation here which is uncomfortable and a little headache, and so on." You don't do that. You say, "Fine, thanks. How are you?" Now our patients are going to make 'fine, thanks, how are you,' socially acceptable type of responses to questions because it's automatic for them. It's natural for them. We practice doing that all our lives, being a good sport, keeping information from ourselves and from others. So, it is necessary to create an atmosphere in which the patient is not going to talk in the 'fine, thanks, how are you' vein.

Let me give you an example of an experiment that was done a couple of years ago on a patient, a 42-year-old dentist who had a peptic ulcer and migraine headaches. He went to a very good internist who was very alert to the importance of life experiences in reference to peptic ulcer and migraine. The physician took his "routine history," did a physical examination, and after this was completed sat down with the patient and said, "As you probably know, a good many physicians connect ulcers and migraine with emotional problems, so I think it would be

well if we reviewed the situation together a little bit. Of course, you realize that anything you say is entirely confidential." The patient said, "Yes, I know that, doctor. I've given this thing considerable thought myself. I thought there might be some nervousness or emotional trouble but for the life of me I can't find a thing. I have a fine wife, two lovely children, an excellent practice and a house of my own. We have no in-law troubles and I should be the happiest man in the world." The doctor said, "Well, I'm not satisfied with this." He was a careful man. He said, "Well, tell me some of the details. Are there any disturbances at home? Do the children get on your nerves?" This line and others were pursued with negative results. Finally, the physician asked, "What about the office? Is there anything at the office that isn't going just right? The landlord, your secretary, the place itself. Are you making as much in practice as you hoped you would?" The patient looked at him blandly and sincerely and openly and he said, "Really, doctor, I'm doing better than I ever expected. I can't complain of my practice in any respect. It is as good as any dentist I know."

Now, this physician was approaching the problem in an earnest and systematic way, but he was getting nowhere, for several reasons. First of all, he put too much emphasis on the fact that 'now I've explored your medical difficulties and we're going to launch into a discussion of your personal life.' Anybody becomes defensive in this situation. It wouldn't be natural not to. In the second place, the questions were too leading. They implied possible points of conflict which might have worried the physician instead of trying to look at the problem through the eyes of the patient. Now you may say this physician didn't have much time and with more time more could have been gotten out. So, in this experiment great pains were taken to have another interview by another physician lasting the same length of time. It wasn't a question of how much mining was done, but where.

The second interview went something like this. The doctor said, "Are you doing with

your life what you want to do?" The patient made a long pause, a presystolic murmur. "I can't be definite about that, doctor. I believe I am. I think I'm content." The doctor said, "What kind of practice did you plan for yourself when you first started out?" The patient said, "Well, that might be a source of discontent to myself. I have a fairly busy practice, but I don't think — well, perhaps the quality isn't there, and that might be a source of discontent in my own mind." The doctor said, "Do you mean it's too routine?" The patient said, "Well, I think perhaps I'm seeing too many patients and can't be as selective in my work; the quality is perhaps not as good as I would like it to be. Now, I may be theorizing there." The doctor simply said, "Well, go ahead."

Instead of going from a conception in his own mind — he had a conception in his own mind — this doctor was using the same type shortcut that I referred to you before and he was going on the basis of his knowledge that a very substantial percentage of dentists are frustrated physicians, and that many of them have applied for and were turned down by medical schools, and had underlying desires to be physicians. That's not true of all dentists, but it's true of a high enough proportion so that when a problem like this comes up, it's a good thing to have in the back of your mind as a possibility. But he avoided taking off on an abstraction of his own and simply said, "Go ahead." The patient then said, "Those are possibilities that loom in my mind. I have a busy practice, but perhaps it isn't a happy practice, though, in my mind." And the doctor said, "Suppose all stops were out — what would you like to be doing?" The patient said, "Just what you're doing now. I've often thought I'd like to be affiliated with the University." Now the doctor mistakenly guessed that he had been correct all along; he thought the dentist wanted to be a physician, but he didn't say anything. The dentist went on to clarify. He said, "I enjoyed my internship and my residency immensely. I stayed on for about five years and I got a

big bang out of that. I was happy there." He told how he graduated and where he had interned and so forth, and the doctor said, "Did you think at the time of continuing in full-time work, teaching?" The patient said, "Well, I opened an office not far from the hospital so I could retain my position at the institution."

"Do you still do that?"

"No, I gave it up. I guess somehow or other I just got into a routine. We get ourselves married and we get into that swing, as it were." What he had done, of course — the dental school was in a very poor section of town, he had moved his wife out into the country and was driving into town from there. "The need for better income?" said the doctor.

"I imagine so," said the patient.

And here is this man, then, who had been perfectly honest with the previous physician — had been perfectly honest up to this time — here his manner was grim, dejected, and it was evident that an important conflict had been discovered. The discussion moved logically to the question of the wife's financial demands and her social ambitions. Soon the story of being caught in a treadmill had come out — trying to supply the demands of an avid, ambitious wife. He wept during much of this discussion. I think the point of the story is to attempt in questioning not to propose possible sources of conflict that might be sources of conflict to you but to induce the patient to be reflective and to turn up sources of his own.

#### USING THE INFORMATION SECURED

Now, once the information is obtained, what's to be done with it? What is the therapeutic potential of the doctor-patient relationship? It is enormous. There is a great deal of potential in the doctor-patient relationship which doesn't require any shrewd knowledge of the patient as a person but does



require a good communication. I'd like, just briefly, to outline an example of this for you.

In 1930 the surgeons of the nation were congratulating themselves at the meeting of the American Surgical Society for having found a cure for duodenal ulcer. This meeting was attended by Frank Lahey, by W. J. Mayo, Lord Moynihan of England was over here — and a paper was presented by a Dr. Douglas. A very careful, five-year follow-up of duodenal ulcer — 68 cases followed for five years with symptoms and X-rays and so forth — in which he recorded an 81 per cent five-year cure of duodenal ulcer by a surgical procedure which today, if used alone, would be considered malpractice, namely, gastroenterostomy. Now, this was a feverish moment in surgery and those of you who were practicing surgery at that time will remember it. It was a time when the European surgeons had abandoned gastroenterostomy and had come out for gastric resection, and at this very meeting Dr. W. J. Mayo stood up and said, "How, how can a surgeon remove an innocent organ with no pathology for a neighboring lesion, when we have in gastroenterostomy such a uniformly successful procedure? I would never let a gastric resection be performed on a member of my family."

Dr. Lahey spoke and said, "Finally, we have a procedure for the treatment of duodenal ulcer which cuts at the very core of the pathological physiology of the disorder."

So then I read on with a great deal of interest because I thought perhaps it had been recorded and then subsequently forgotten. But, "Namely," he said, "the failure of the alkaline duodenal juices to regurgitate into the stomach and neutralize the acid there."

Well, as I say, I think the intensity of feeling was an important aspect in this thing. Douglas reported his carefully studied cases and he had an incidence of marginal ulcer of 1.6 per cent — 68 cases followed for five

years. In the same issue of the journal in which this paper appeared, Dr. A. A. Berg, another great surgeon in the United States, but one who had been contaminated by the European point of view and who had abandoned gastroenterostomy in favor of gastrectomy, reported his latest series of gastroenterostomies with a 33 per cent incidence of marginal ulcer. Now the statistical significance of the difference between 1.6 and 33 is undoubted. It is also undoubted that the difference in these figures did not depend on the technical difference of the procedure. I submit that it depended on the intensity of feeling that the loyal gastroenterostomy supporters felt, and the powerful placebo effects of the personalities of these great men.

This same thing has happened with many surgical procedures, and, of course, it happens with drug administrations. Dr. Shapiro, here in your city, has done a good deal of important work along that line, but it illustrates the terrific power of a good communication between patient and physician, even without any real knowledge on the part of the physician of what makes the patient tick. But with that knowledge, with a shrewd understanding of the patient in the person, the therapeutic possibilities are greatly, greatly enhanced and certainly don't lie merely in the province of the psychiatrists.

#### PROGNOSTIC SIGNS

Now, what about the prognosis? What aspects of a patient indicate a favorable prognosis in management in which talking with the patient is an important element? Well, I don't know the answer to that question. We've studied patients whom we've seen and attempted to analyze their charts and records and I think I can come up with only two things that are of great importance in the physician's appraisal of how much effort to put on this patient and I begin by saying that we are continually fooled.

The recent onset of illness is of some importance, but not very great. The age of the

patient may be of some importance, but not very great. The two things that seem to be of the most telling importance are: (1) the past history of the patient's ability to derive satisfaction from his activities. Whatever it was he used to do, whatever his activities were in school or in a lodge or in his business, or what not. If he was able to derive satisfaction, let me say — spiritual nourishment — from this activity, then that's a good prognostic sign. (2) The other favorable sign is his past history of being able to develop constructive, love relationships with people. In proportion to the number and the depth in which he was able to share human experiences with others is the degree of favorableness of his prognosis. Neither of those rules is absolute at all but I think that they do have an important application.

#### RESULTS OF THERAPY

Now what about the results of therapy? Here, I think, is the weakest part of our story. There haven't been well studied and well documented results of comparative therapeutic measures. Rather, people who have been interested in psychotherapy have been more concerned with decrying the rival brand and shouting for the home team. We have to be very careful in appraising the results of psychotherapy not to fall into the same trap that one falls into in appraising the results of surgery and of drug therapy. Merely because a major improvement follows the use of an operation, or the drug, or of the discovery by the patient of some incestuous attitude toward the parent does not mean that the operation, drug, or discovery was the responsible agent. We must remember that the common denominator in all therapeutic maneuvers is a constructive relationship between patient and physician. The capacity of the physician in this relationship to help the patient restore his faith in himself may often be the key to restoring him to health.

I would like to conclude by pointing out ways in which the physician protects himself

against communicating with the patient. We've dwelt upon ways in which the patient naturally protects himself from communicating with the physician, but too often the physician, too, protects himself. For example, as the attending man and his resident are walking out of a patient's room the attending man often says, "Isn't Mrs. So-and-So a wonderful sport? This stuff just rolls off her like water off a duck's back. Marvelous!" And sixteen steps behind, Mrs. So-and-So is weeping bitterly because she feels she can't talk to Dr. So-and-So. Making light of the situation so that it is impossible for the patient to talk to the doctor, to approach him, is perhaps the commonest way in which the physician protects himself against the very important communication with a patient.

Let us end our discussion in the room of the patient who is going to die, because everyone is, ultimately. If we keep our patient we'll be in this role with him some day. The strength and ability of the patient to meet this phase in life — because, after all, death is an aspect of life — depend on a great many things that strengthen his courage and faith. The doctor, I think, plays a small role in comparison to his church, for example, but a very important and evident role and I think that so often rather than keeping the patient at arms length, rather than making light, rather than fooling himself that the patient is so extraordinarily stoical, that sharing this experience in a very dignified way is often a tremendous help.

I think we can say that talking with the patient is a very important thing to do, and to do skillfully, and that in view of the demonstrated relevance of life experience to so many important diseases of today, it is something in which every physician should acquire great skill.

800 Northeast Thirteenth St.  
Oklahoma City, Okla.

# An invitation to danger\*

Stewart Wolf, M.D., Oklahoma City, Oklahoma

*Presented to a senior medical class,  
this stimulating address stresses that  
ability to learn and a pioneering spirit  
are the essentials to a rewarding  
medical career.*

MY TITLE IS TAKEN from a movie scenario written by Dylan Thomas. It is about Rock, the Professor of Anatomy in a medieval medical school. In those days they had difficulty getting bodies to dissect. The politicians and the clerics passed laws prohibiting the true study of human anatomy. They thought their doctors could learn all they needed by poring over the books of Galen and perpetuating the errors and misinformation contained therein. Rock, the Professor of Anatomy, like most of his colleagues, was working with human bodies exhumed illegally by ghouls who earned their living by grave robbing. Unfortunately one of the men working for Rock became overzealous and began to provide bodies who had skipped the formality of natural death and burial. This man was caught killing off the denizens of skid row and selling them to Rock. Of course, it was Rock, who had known nothing of these crimes, who suffered for them when they were found out. He lost his job at the university. The movie scenario picks him up as he is giving his last lecture to his class. Let me quote from the author.

"As the camera moves over the heads of the class toward the front of the lecture hall, the

figure of Rock fills the screen and he is saying: 'To think, then, is to enter into a perilous country, colder of welcome than the polar wastes, darker than a Scottish Sunday, where the hand of the unthinker is always raised against you, where the wild animals, who go by such names as Envy, Hypocrisy, and Tradition, are notoriously carnivorous, and where the parasites rule.

"To think is dangerous. The majority of men have found it easier to writhe their way into the parasitical bureaucracy, or to droop into the slack ranks of the ruled. I beg you all to devote your lives to danger; I pledge you to adventure; I command you to experiment. Remember the practice of Anatomy is absolutely vital to the progress of medicine. Remember that the progress of medicine is vital to the progress of mankind. And mankind is worth fighting for: killing and lying and dying for. Forget what you like. Forget all I have ever told you. But remember that."

## *Utilization and evaluation of facts*

An educated man is, of course, not just an informed man but one who has learned to learn. Learning, furthermore, does not stop with the assimilation of information. Learning implies the use of information and of powers of observation in the formulation of creative judgments, the making of discriminations and choices. A smart chimpanzee can learn a variety of skills and a parrot can learn to remember and repeat information but neither is capable of advancing our knowledge. It is the power to discriminate and the ability to evaluate evidence that sets man apart from the apes. These are dangerous weapons, however. They upset people—especially educators. They often provoke a kind of retaliation which at times has even led to the innovator's being put to death. Very few important intellectual advances have failed to arouse suspicion, hostility or disapproval.

\*This address was given on June 6, 1957, at the senior class convocation of the University of Colorado School of Medicine by the Professor and Head of the Department of Medicine, University of Oklahoma School of Medicine.



### *Ability to learn vital*

May I say a word to the educators, my colleagues who are charged with the responsibility of evaluating performance and giving out diplomas? There is a trap which it is easy for us to fall into, a situation in which we look to our students mainly for how well they have absorbed our teachings. We should rather be concerned with how capable they are of inquiry, of evaluating fresh evidence and of making new judgments. The vitality of the educated man stems from his ability to inquire on his own. As educators we must avoid the position in which Dr. Alan Gregg once found the Specialty Board of Internal Medicine. Dr. Gregg told an august gathering of the American College of Physicians something to this effect: "You are fooling yourselves, gentlemen. You are not finding out what these young men can do. You are not even finding out what they know. You are only finding out whether or not they know the same things you know."

We educators must be prepared to learn from each succeeding generation that many of the thoughts and concepts which we dearly held to be true are incorrect—that many of our most precious doctrines are invalid. In my relatively short medical life it has come to pass that what we were taught with reference to the mechanisms of diabetes and congestive heart failure in the midthirties is no longer true in the midfifties. Information with which we could have gotten an honor grade in an examination is now misinformation. Similarly some of the best practices then are today malpractice. Let me give you an example. In 1930 the surgeons of the nation had gathered together to congratulate themselves for having found "an operation based on sound physiologic principles which cuts into the very core of the pathogenesis of peptic ulcer, namely, the failure of the pylorus to relax and allow for admixture of the bile and pancreatic secretion with the gastric juices." These words of Frank Lahey were spoken in the heat of the battle between the surgeons who advocated gastroenterostomy and those who recommended gastric resection for duodenal ulcer. At a symposium of the American Surgical Society, John Douglas reported 80 per cent five-year

cures in sixty-eight patients with duodenal ulcer who had been treated with gastroenterostomy. This is interesting in view of the fact that today gastroenterostomy for duodenal ulcer would be considered malpractice. The powerful placebo effect of the operation is inherent in the fact that Douglas found only 1.6 per cent marginal ulcers among his patients while A. A. Berg, a man who did not believe in the value of the operations, was reporting a 33½ per cent incidence of marginal ulcer. Among powerful placebo personalities who had done well in treating duodenal ulcer by gastroenterostomy was Crile and Lord Moynihan and W. J. Mayo. Perhaps in the perspective of a few more years we will be in a better position to evaluate such currently controversial surgical procedures as thoracolumbar sympathectomy in the treatment of hypertension. With new insights we must continually evaluate and re-evaluate even the most hallowed and accepted evidence.

### *Diplomas not final objective*

Your rich educational experience here at Colorado is climaxed by a piece of paper bearing the stamp of approval of your betters—a diploma. Shortly you will be given your diplomas. What will they mean to you? Will they represent a comfort or a challenge, a resting place with the mark of approval, or a milestone to be quickly left behind on the road of progress—and invitation to danger?

Diplomas and certificates unfortunately get to be things to shoot for in themselves. Thus our sights are often actually guided to a target instead of being free to shoot at what seems most promising. Progress requires courage and creativity, new approaches. A wise Oklahoma City man once compared the modern scholar to a squirrel—"He should be free to garner the best from the topmost boughs of the boundless forest. Committed to the annuling tread of conformity within the confines of a miserable cage, however, he cracks only the nuts supplied by his keeper." Emerson in these words saw the business of cracking only nuts supplied by a keeper—"Men grind and grind in the mill of truism and nothing comes out but what was put in. But the moment they desert the tradition for a spontaneous thought,



then poetry, wit, hope, virtue, learning, anecdote all flock to their aid." Unfortunately those with creative imagination are not always equally endowed with courage. It takes a hardy soul to withstand the pressure of disapproval and continue running on the top-most bough. Too many of us walk voluntarily in the cage of conformity. Thus we cultivate habits of thinking which in their efforts to achieve acceptance lack freshness and originality. Success in any field is dependent upon unfettered spontaneity, not upon the possession of passports stamped by an approving authority. Freedom is such a simple word that having uttered it we may not realize how much has been said. None of us is independent of the social pressures about us. Our thinking is often geared to prevailing values that are so pervasive that we hardly recognize their existence, not to mention the existence of alternate points of view. This, of course, is why our politicians have such difficulty in understanding and dealing with people who grew up under an entirely different set of prevailing pressures—like the Chinese and Russians. We take for granted the values of our society as we do the air we breathe and we consider them just as vital. We could use some fresh thinking in our world affairs and some thinking in perspective and a broad frame of reference.

#### *Pioneer spirit*

Many people dedicate their lives to the effort to be liked, to be well thought of by

their fellows. Man, being a tribal animal, must live with his peers, of course, and he must periodically prove himself—to a certain extent gain acceptance. But as the sole goal of living, such conformity leads nowhere.

We will have to depend on some of you hardy souls to get us out of this minuet that we are doing with each other, bowing to this one and that according to a cadence which can't be broken for risk of disapproval. What is a pioneer? Is he someone who is willing to live under primitive conditions or is he someone who wants to lead us somewhere?

Let's not allow these diplomas to be mere symbols of acceptance. Too often we carelessly think of education as training. Training according to Webster means "to direct the growth of" or "to form by bending." Thus, although training implies growth, it may be guided into the beautiful symmetry of the espalier tree—uniform, fitting and pleasing to the eye but bearing little fruit. The opposite extreme might be found in the altogether uncultivated and undisciplined tree which grows to bushy, leafy branches but also produces little fruit. The richest yield of fruit comes from the tree in the well kept orchard, tended and disciplined but growing free and not necessarily identical with his neighbor. We should ask ourselves where we want to go in life, otherwise we'll simply go where everyone else has been.

Let me congratulate you all on your current achievement and wish you Godspeed in your future ones. Good luck and thank you. •

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# THE FINAL STUDIES OF TOM

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By STEWART WOLF, M.D.

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## THE FINAL STUDIES OF TOM

By STEWART WOLF, M.D.

OKLAHOMA CITY, OKLAHOMA

Tom was born in 1886 in Staten Island, the country borough of New York City, six years after the death of William Beaumont's famous subject, Alexis St. Martin. That year in Germany Frankel was belaboring Friedlander, as Dr. Austrian has told us. It was also the year when Austin Flint wrote the remarkable predictions of Medicine in the Future, which his fellow Buffalonian, our esteemed president, told us about so engagingly in his address. Tom grew up to be a small, wiry man, with a quick temper and a quick smile. Figure 1 shows a picture of Tom taken at about the age of 20, and one made the year of his death.

In 1895, at the age of 9, Tom suffered a complete occlusion of the esophagus because of accidentally swallowing scalding hot clam chowder. The surgeons at the New York Hospital performed one of the first gastrostomies done in this country. Tom fed himself through that defect in his abdominal wall for the remaining 65 years of his life. It was not until he was 56 years old, however, that he came under study, in 1941, at Cornell-New York Hospital. Thereafter, except for the period of World War II, Tom was more or less continuously under study until his death.

Among the bits of new information turned up through the study of Tom were the following: 1. The slimy lining mucous barrier of the stomach was so effective in insulating the delicate columnar cells of the mucous membrane that the stomach wall was less vulnerable to irritation from chemical agents, including condiments, food and drugs, than was the skin of the fore-arm. 2. Increased secretion of acid or increased motor activity on the part of the stomach was accompanied by hyperemia and engorgement of the mucosa. On the other hand, the hyposcreting stomach was pale and flat. Such changes, observed grossly in terms of redness and turgidity of the rugal folds were seen through the dissecting microscope as widening and narrowing of the venous lakes which surround the branched glands of the mucosa. See Figure 2. 3. Life situations interpreted as overwhelming by Tom were associated with pallor of the mucosa, hypomotility and hyposecretion of acid as earlier observed by Canon in his animals under stress. See Figure 2. 4. Life situations which he interpreted as challenging, on the other hand, were associated with gastric hyper-function, including hyperemia and engorgement of the mucosa, hyper-secretion of acid, and hypermotility, similar to that which accompanied the anticipation of food. See Figure 2. 5. Sustained hyperemia and engorgement of the gastric mucosa



FIG. 1. Tom as a young man and a few months before his death.

was associated with a lowering of pain threshold and a striking increase in fragility of the membrane so that small erosions and bleeding points appeared in response to the most minor traumata or apparently without trauma. 6. Except for the protection afforded by the transparent investment of tenacious mucous, the gastric juice contained in the stomach was found capable of digesting the mucosa itself. In fact, a peptic ulcer was induced in the mucosa of Tom by keeping the membrane in contact with his own gastric juice for a 3-day period while the protective mucous was sucked away at frequent intervals through a small glass pipette. First there was a rapid accumulation of mucous which welled up from the surface and precipitated as an opaque membrane under the constant drip of Tom's acid gastric juice. The protective mucous formed almost as rapidly as it was sucked away. Finally, the mucosa became locally hyperemic, and a small hemorrhagic spot appeared which broke down and ulcerated, ending in a round, sharply-demarcated, punched-out lesion, with a granular base. The ulcer was covered with a petrolatum dressing for four days, and thereafter no trace of it could be seen even through the dissecting microscope. It is interesting to note that less formidable erosions which were seen to appear, apparently spontaneously from time to time under circumstances of sustained mucosal engorgement and hyperemia, healed with great rapidity and were rarely discernible the following day.<sup>1</sup>

Although Tom's life as an experimental subject was spent mainly in the attempt to clarify some of the problems of peptic ulceration, he paradoxically ultimately developed a carcinoma of the stomach which arose



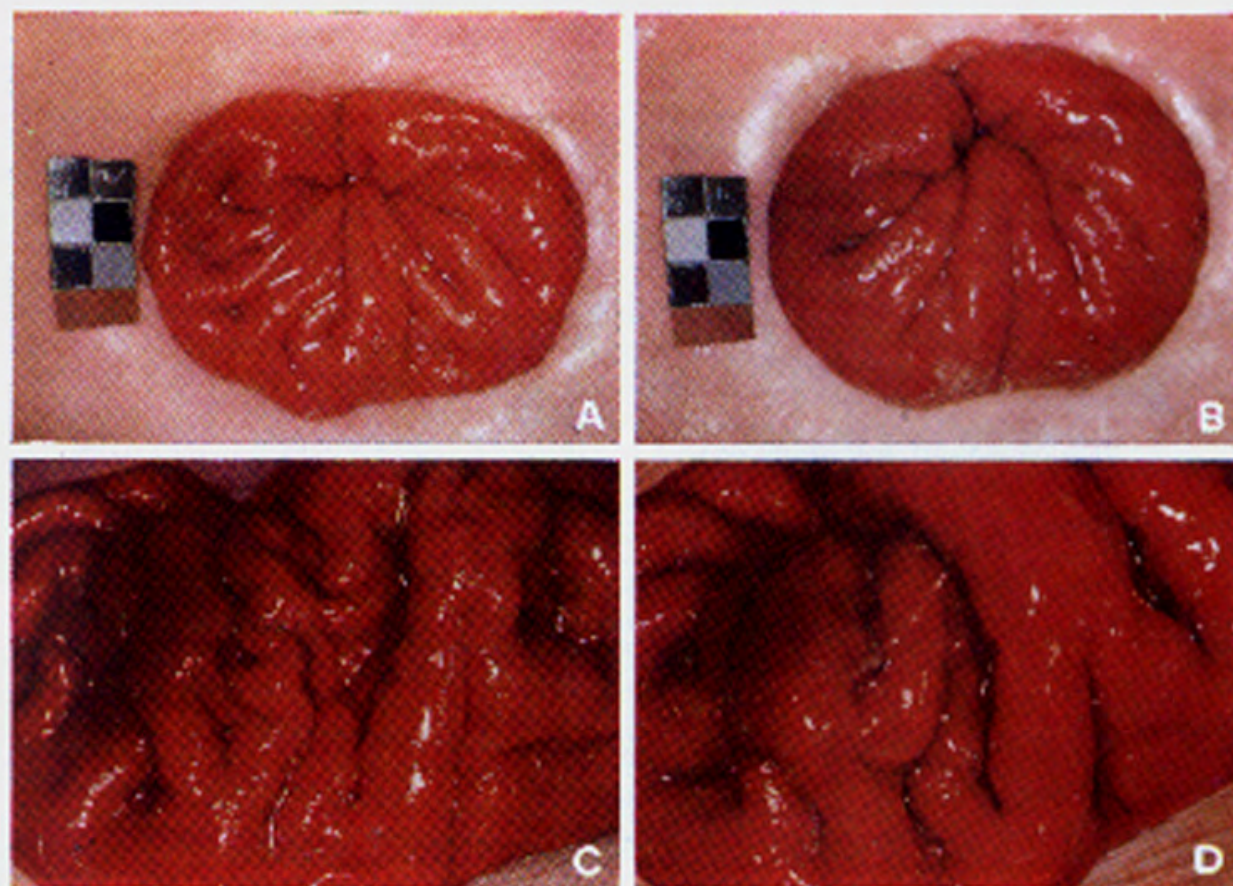


FIG. 2. A. Tom's gastric mucosa under average circumstances.

B. The hyperemic engorged mucosa associated with gastric hyperfunction. Note hemorrhagic spots indicating increased fragility of the turgid membrane. The checker pattern and sample red color indicate uniformity of photographic technic.

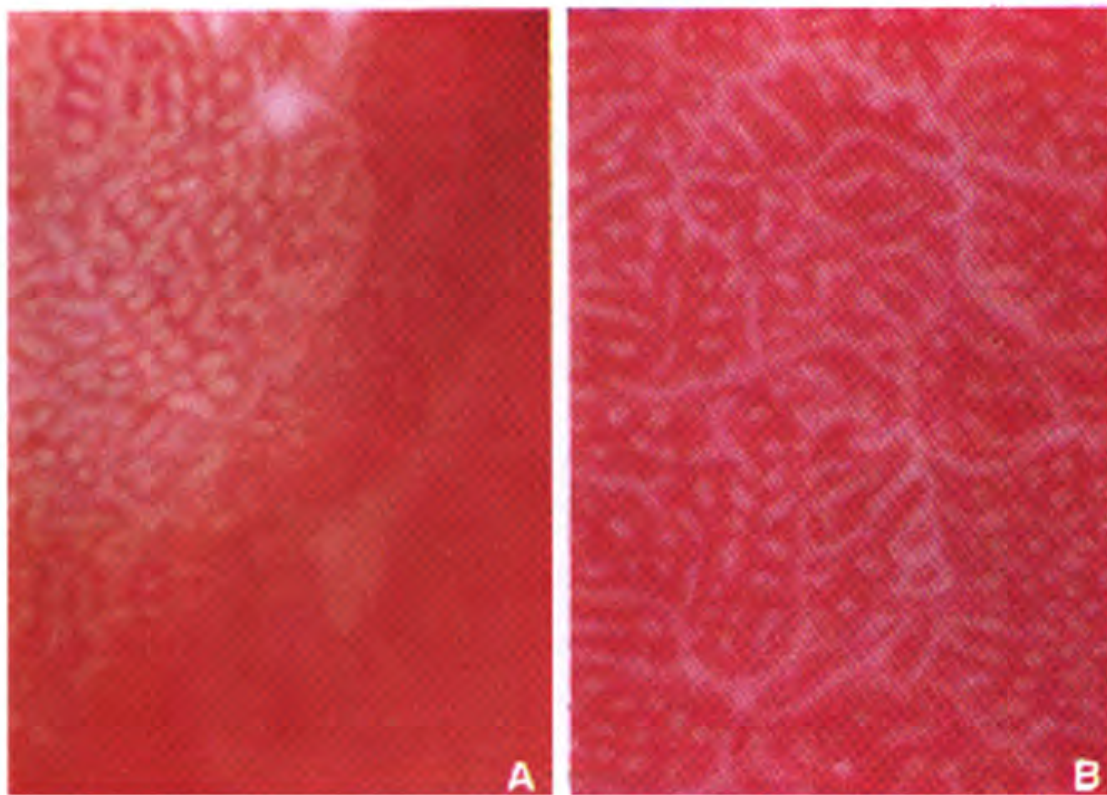
C. Close-up of A with interior folds exposed by increased intraabdominal pressure.

D. Same type of close-up of B. Note merger of slender folds in hyperfunctioning stomach.

under his eyes on the exposed portion of his gastric mucous membrane. The carcinoma did not occur at the site of the earlier experimental peptic ulcer, but on the opposite side of the exposed collar of mucosa. It was first seen by Tom during the last week of August, 1956, as a small, pin-head sized papilla which bled easily when touched. Six weeks later, when we saw it, it was a firm, whitish, fungating, friable lesion the size of a golf ball, as shown in Figure 4. The microscopic picture was that of an adenocarcinoma of very malignant appearance. Tom refused to consider any surgical operation except a local removal. He particularly refused to countenance a procedure directed at closing the stoma with which he had lived for so many years. His wishes were respected, and only a narrow margin of skin and uninvolved gastric mucosa were resected. Nevertheless, at the time of his death two years later, careful autopsy failed to reveal any evidence anywhere of persistent or recurrent malignancy.

Biopsy of the uninvolved portion of the exposed mucosa made at the time of the removal of the carcinoma in 1956, showed typical atrophic gastritis very similar to that which we induced experimentally in dogs





Hypofunction

Hyperfunction

FIG. 3. Photomicrographs of Tom's gastric mucosa showing the venous lakes, contracted in A and dilated in B, surrounding the parenchymal glandular structures.

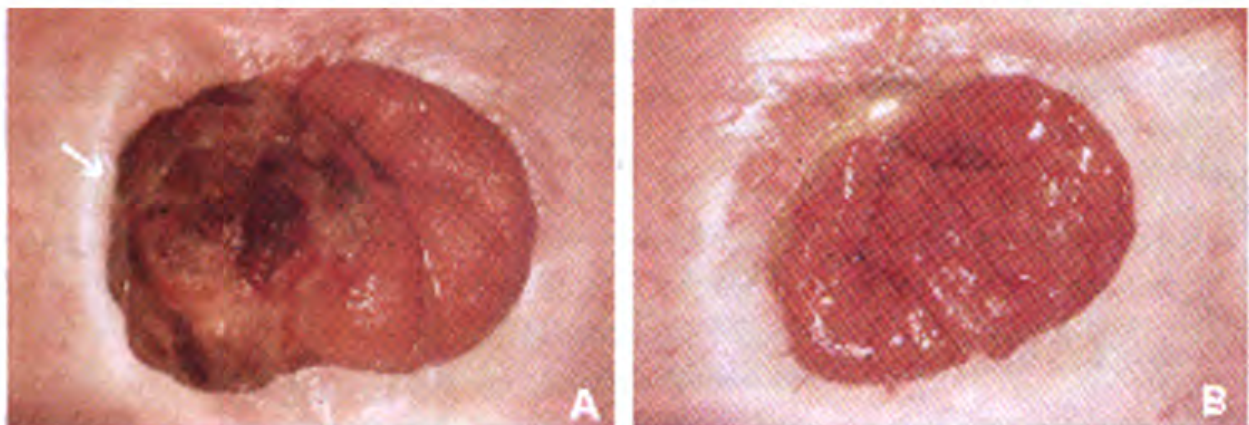


FIG. 4. A. Adenocarcinoma of the stomach of Tom. B. The exposed collar of Tom's gastric mucosa after local resection of the carcinoma.

by repeated intravenous injections of a preparation of human gastric juice containing a property of powerfully inhibiting hydrochloric acid secretion. In Figure 5 A is shown a photomicrograph of the normal human gastric mucosa and in 5 B the biopsy of the uninvolved portion of the gastric mucosa of Tom at the time of his carcinoma resection illustrating the typical atrophic gastritis which so frequently accompanies carcinoma of the stomach. This lesion resembles the atrophic gastritis induced experimentally in the dog by repeated injection of dialyzed lyophilized human gastric juice.<sup>2, 3</sup>



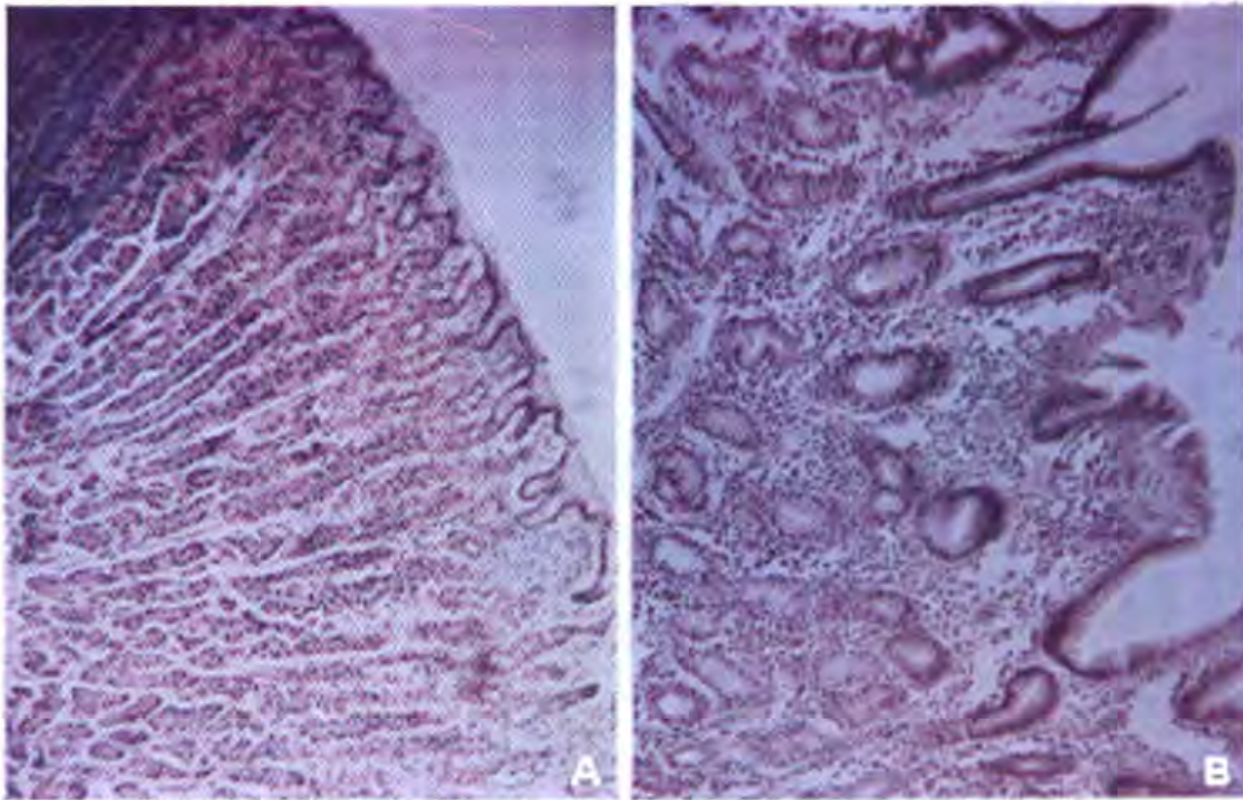


FIG. 5. Histological preparations of fundus of human stomach.

A. Normal mucosa.

B. Atrophic gastritis in Tom associated with carcinoma.

During the year of continuous study from 1941 to 1942, the concentration of titratable acid in the gastric secretion was between zero and 110 milliequivalents per liter. The usual range was between 10 and 70 milliequivalents per liter, depending on the time of day and circumstances. The volume of secretion per hour also covered a very wide range, but was usually between 5 and 15 cc. representing something in the neighborhood of from 1/10th to 1 milliequivalent of hydrochloric acid secreted per hour during resting conditions and ranging up to the neighborhood of 12 milliequivalents per hour during intense gastric hyperfunction. Four months before the discovery of the small, friable, warty growth on the exposed portion of Tom's gastric mucosa, two specimens of gastric juice were titrated at 35 and 75 milliequivalents per liter respectively. During the days before the cancer was resected five specimens of gastric juice were examined. In none was the titratable acid greater than 15 milliequivalents per liter. Six weeks after resection, however, a specimen was titrated at 40 milliequivalents per liter, and thereafter until his death, two years later, 14 specimens were examined. Hydrochloric acid was found to range between 10 and 80 milliequivalents per liter.

During the 2 years for which Tom survived following operation he was in almost constant difficulty because of the enlargement of his stoma necessitated by the local removal of his cancer. It was literally impossible



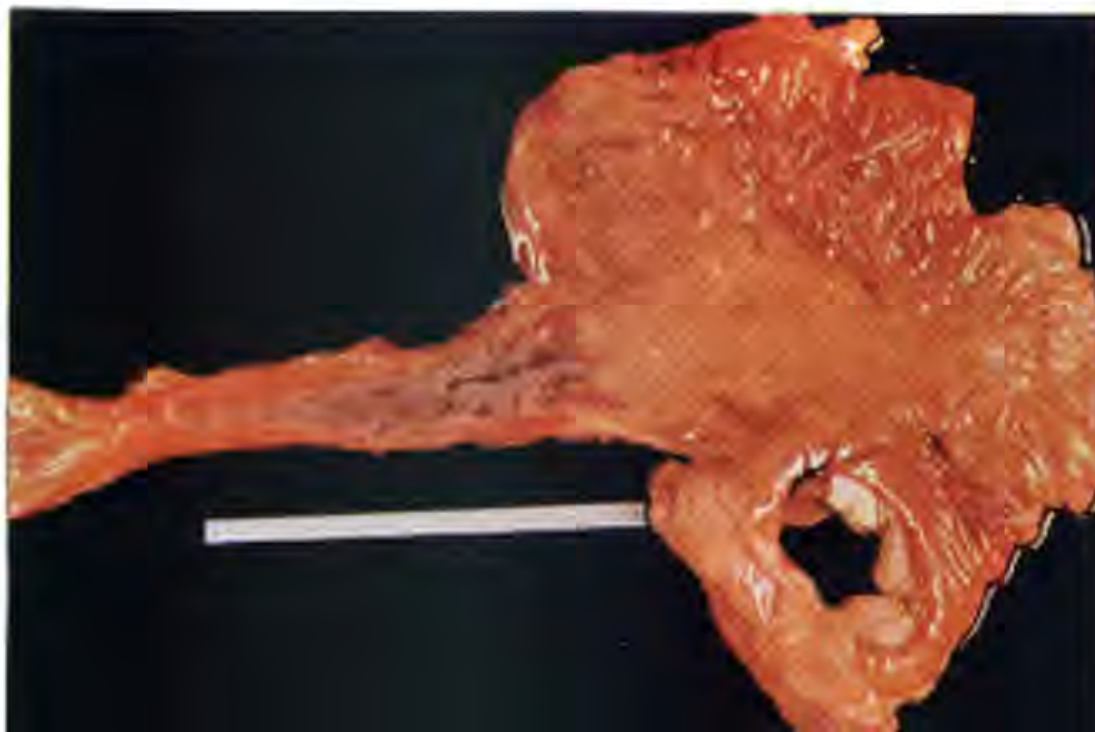


FIG. 6. Autopsy specimen of Tom showing esophagus with stricture and stomach with gastrostomy.

for him to keep enough fluid inside him to keep him in water and electrolyte balance. His serum potassium was persistently low and could not be corrected. In fact, during the last months of his life it was not possible to keep him in ideal balance even with supplementary liquid into the stoma and daily intravenous infusions. The dressings which he wore over his stoma and which were removed prior to each meal were weighed and sometimes contained as much as  $2\frac{1}{2}$  to 3 liters of liquid. Tom consistently resisted the most vigorous entreaties to undergo a revision of his stoma. An old pyelonephritis flared up, and he finally died in uremia in his 74th year, 65 years after his esophageal occlusion. At autopsy there was advanced pyelonephritis with small contracted kidneys and broncho pneumonia. His occluded esophagus and stomach, with stoma, are shown in Figure 6.

Thus ends the story of Tom—faithful friend and collaborator—in whose stomach we were able to study an experimentally induced peptic ulcer and later a carcinoma with atrophic gastritis. Neither lesion was responsible for his death. He died because we were not skillful enough to persuade him to undergo a surgical revision of his stoma.

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## DISCUSSION

DR. WALTER PALMER (Chicago): Dr. Wolf has told us a fascinating story. I hope it is appropriate for me at this time to pay tribute to these brilliant studies of Dr. Wolf's on Tom and express the hope, of course, that they are not final, that this is not my final tribute to the work of Dr. Wolf.

There have been many studies of human beings in the course of history but over the centuries the first one Dr. Wolf mentioned, has stood out, that of Beaumont on Alexis St. Martin, which really was a great stepping stone in the progress of physiology and which led to Beaumont being termed the father of American physiology.

These studies, of course, had to do primarily with the gastric tone and with the appearance of the gastric mucosa under a variety of circumstances. Then in the first quarter of this century there were the splendid studies of Dr. Carlson. These studies had to do primarily with motility, although they were published, along with certain other studies by Carlson, in his book on the stomach, then finally there came these studies of Dr. Wolf's, which again mark a step forward in the knowledge of gastric physiology. He examined the role of life situations which no one else had done and showed these in his various publications and other papers. It is a fascinating story and now we have the problem of cancer and the relationship which we have again examined of cancer and gastric secretion and secretory depressants, which may have something to do with gastric secretion in cancer.

It may be of interest to remind you that Carlson died of carcinoma of the esophagus. I don't remember the cause of death of St. Martin.

DR. WOLF: He was 83 at the time and so I think he died of natural causes. I don't know.

DR. FRANCIS C. WOOD: May I say that he did not have an autopsy, as I recall it. He made his family promise never to even divulge where he was buried to that awful man Beaumont.

May I ask one other question? I remember, if I am not mistaken, that Beaumont described similar appearances in the oral mucosa and the gastric mucosa. When Alexis St. Martin had aphthous ulcers on his tongue, he had something that looked like it in his stomach, did this pertain in Tom also?

DR. WOLF: We examined Tom's tongue and mouth repeatedly while the examinations of his stomach were taking place and we weren't able to see any very striking change in the mouth. The best correlation that we could see outside of the stomach was the color of the face. When Tom was hyperemic and engorged and red in the stomach he was also likely to be red in the face. This, of course, was particularly true if he was resentful. On the other hand, when Tom was overwhelmed and dejected his face was likely to be pale. This was when his stomach was flat, and pale with very little secretion.

DR. FISHER (Baltimore): Dr. Wolf, did you take any of the carcinoma material and make an extract of that and try injecting that into a dog? Do you feel that was a contributory factor?

DR. WOLF: We have that in the freezer, Dr. Fisher, and we have hesitated to use it because we know so little about using tissue extracts at the present time. All of our experience with the inhibitor in the production of atrophic gastritis experimentally has been with a gastric juice fraction or with a crude preparation of dialyzed lyophilized juice. We were afraid of losing the material if it were present in the tissue so we hung on to it in the deep freeze until we feel more competent to study it.



## THE PHARMACOLOGY OF PLACEBOS

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The title presents a picturesque contradiction. Pharmacology concerns itself with the chemical properties of drugs and their effects on biological mechanisms. Placebos produce effects on biological mechanisms independently of their chemical properties. The term "placebo" derives from the Latin "I will please," or "placate." The origins and usages of the term have been elegantly researched and described by Pepper (48) in a delightful and informative commentary of a sort so rarely offered in present day medical literature.

Placebos have been used for centuries by physicians under pressure to "do something," but wishing to do no harm. Traditionally, the function of the placebo was to pacify without actually benefiting the patient. The benefit, however, has proved to be unexpectedly lavish. Not only has the hopeful reassurance of placebos engendered in patients a feeling of increased well-being, but recent experimental evidence has shown that placebo administration may be followed by substantial and measurable changes in bodily mechanisms (66). Therefore, since placebos do a great deal more than placate or pacify, a new definition may be offered as follows: *Placebo effect = any effect attributable to a pill, potion, or procedure, but not to its pharmacodynamic or specific properties.* Placebo effects derive from the significance to the patient of the whole situation surrounding the therapeutic effort. Thereby is implied a connection between a particular end organ and the interpretive areas of the brain. Placebo effects may be mediated via autonomic pathways, other neural channels, or through humoral mechanisms. Relatively few of the routes are really well understood but certain it is that virtually all organs and organ systems are capable of responding to meaningful situations and among them the administration of placebos.

### *Historical perspective*

Placebos have been used to alleviate human suffering since the beginnings of medicine, but not usually knowingly. Each medical era has brought forward chemical agents, efficacious at the time, but later found to lack the pertinent pharmacodynamic property. Countless herbs and potions fill the pages of textbooks as prevailing fashions have changed with each generation, their placebo action deriving in part from the faith and enthusiasm of earnest physicians. Many such agents have died out with difficulty. When, from time to time, various ones of them have been exposed as chemically useless, new, often more expensive but equally intrinsically inert nostrums have taken their places, each enjoying its day of clinical effectiveness. Modell writes (43) that the placebo effect "... is the only single action which all drugs have in common and in some instances it is the only useful action which the medication can exert." An engaging and articulate tribute to the placebo is contained in the article, already referred to, by Perry Pepper (48).

The potentially dependable effect of whatever agent was recognized by Eugene DuBois in his presidential address to the Association of American Physicians (15). In another publication (78), DuBois listed three classes of placebos. The first included simple substances, inert and unpretentious, such as lactose and starch. The second class included pseudomedicaments, extracts of herbs, poisonous metals, superfluous vitamins, and so forth. Such are the ingredients of most proprietary medicines sold over the counter. The third is the placebo effect that goes along with the pharmacodynamic action of a specific therapeutic agent (78).

Unfortunately, many herbs, hormones, and chemical agents of various sorts may exert some harmful action and thereby counteract their potentially salubrious placebo effects. This observation led William Osler fifty years ago to write in the introduction to the fifth edition of his textbook of medicine (46): "The young practitioner may bear in mind that patients are more often damaged than helped by the promiscuous drugging which is still only too prevalent." A more recent warning against "promiscuous drugging" was issued by Barr (2) who said: "It may be as useful to the patient that his physician know when not to treat as when to treat, and that the use of potentially dangerous agents for trivial or inconsequential complaints may not be justifiable. Only by such discipline and understanding may we as physicians avoid doing unnecessary harm and minimize the price we and our patients pay for modern management of disease."

The placebo acquired a special dignity when, in 1946, it became the subject of one of the Cornell Conferences on Therapy (78). Gold, who organized the conference, had the perspicacity to take seriously the power of the heretofore humble placebo. He and Garb and their associates had identified various physiological alterations attributable to the placebo. Wolff at this same conference told of observed effects of placebos on pain perception (78).

Among the powerful circumstances which aid the placebo in alleviating symptoms and curing disease is the inherent, recuperative power of the human organism, the tendency for diseases to be self-limited. As long ago as 1800, Gall (21) was asking himself, "What is nature's share and what is medicine's in the healing of disease." Before his time, the dictates of authority had determined pretty well what treatments would be used and the weight of authority was considered adequate as evidence for the efficacy of a particular agent or procedure. Sixty-three years after Gall, bleeding was still the most popular treatment for pneumonia when Bèclard, in one of the first well-controlled therapeutic experiments, proved that bleeding had no specific value (4). Nevertheless, forty years later and despite his good advice to the young practitioner, as quoted above, William Osler in the same textbook (46) recommended for the treatment of pneumonia: "bleeding, *Veratrum viride*, Paquelin cautery, hot poultices, cold baths, Dover's powder, and strychnine."

Undisciplined inferences concerning medical treatment were widely and easily accepted among the best in the profession. For example, Edward Trudeau had gone up to his favorite haunt in the Adirondack Mountains to die of tuberculosis. When, instead, he recovered, he attributed his conquest of tuberculosis to the

mountain air (61) and thereby fostered a placebo ritual which long outlived him. He might, with equal justification, have credited the nourishing qualities of the rabbits which he shot on the hillside.

*The meaningful situation*

One vivid example of the power of a meaningful situation to bring about striking bodily effects was provided by a woman who had a gastric ulcer. Although her symptoms were typical enough, we were naturally concerned lest her lesion be malignant, particularly because on two occasions she had failed to produce an acid response to histamine (Histamine Phosphate, U.S.P.). This woman had lived an emotionally arid life with many frustrations and few satisfactions. Life with her first husband was as unsatisfactory as it had been with her parents. Ultimately, she divorced this man, and somewhat later, met and married a gentle, kindly person. He was interesting and interested in her. Her life was soon filled with new-found satisfactions. Things went well until she happened to discover her fine new husband molesting her twelve-year-old daughter by her first husband. If he had robbed a bank, killed his mother, or sold secrets to the Russians, she could probably have gone on living happily with him, standing by him and deriving the satisfactions which this marriage afforded, but he had done the one thing which was beyond the pale. At this time, she developed her first symptoms of ulcer. Shortly thereafter, her husband was drafted and sent overseas leaving her in conflict as to what to do. Before he returned, she made the decision not to take him back. On the third occasion of gastric analysis, instead of giving this patient an injection of histamine, she was simply asked, "Tell me why it was that you did not take your husband back when he returned from overseas?" This question, a powerful and meaningful stimulus, was followed by a prompt secretion of gastric acid to 40 mEq/l when the most powerful secretory drug available had failed (69). From this experience, it is evident that meaningful situations which do not involve the taking of medicaments may equally well affect the organs and organ systems of the human body. This principle is the foundation of psychosomatic medicine.

Strong experimental evidence indicates that many of the component changes in disease processes including fever, leucocytosis, headache, nausea, and alterations in vasomotor, glandular, smooth muscle, and mucous membrane function are capable of being set in motion by impulses arising in the cerebral cortex. It is not implied that the diseases are, therefore, dependent upon or necessarily require the intervention of cortical mechanisms, but simply that the organs involved are connected with and capable of responding to impulses arising in the cortex. Examples have been found in experimental studies on the nose (30), bladder (58), esophagus (71), colon (24), heart (72), the blood flow through the kidneys (75), and in the behavior of the stomach (77) and duodenum during nausea (1). Nausea, for example may be produced by irrigating one external auditory canal with cold water. We have also brought about nausea by a discussion of pregnancy with a female patient (68). Objective evidence of the presence of nausea was available in recordings of motor activity from the stomach and



duodenum. It has been shown elsewhere that nausea is always accompanied by an interruption of gastric motor activity, loss of gastric tonus and usually a transitory increase in the contractile state of the duodenum (65). In this experiment the mention of pregnancy was followed by a sudden cessation of vigorous waves of gastric motor activity and nausea, accompanied by a transitory increase in the contractile state of the duodenum. I refer to this condition as hyperemesis gravidarum praecox, because the young woman was not pregnant at the time but the mere discussion of pregnancy made her ill. This experiment and others like it establish the fact that bodily mechanisms are responsive to impulses arising in the cortex, impulses which are originally set in motion by language symbols. This important fact has soaked only slowly into the scientific consciousness of today. The phenomenon explains the responsiveness of any organ or organ system to placebo therapy. Although less reliable, placebo effects may be as potent as those of well-established agents, as helpful, for example to the patient with rheumatoid arthritis as salicylates or even cortisone (17-hydroxy-11-dehydrocorticosterone, Cortisone Acetate, U.S.P.) (60), as potent in lowering blood pressure as reserpine (Reserpoid, Serpasil) (47), as useful as opiates in dealing with the anguish of the postoperative state (6). Lasagna and associates showed that several customarily relied upon characteristics of pharmacodynamic agents including the dose-response curve with "peak" effect, cumulative action, and holdover effects could be observed during the course of placebo therapy (36).

### *Predictability*

Except in the case of a patient's special need, a physician's special hope, or an experimenter's deliberate manipulation of the situation by suggestion, or otherwise, there appears to be nothing predictable about placebo effects. Placebos may induce in an organ a change in one direction or in another, or no change at all. A vivid example of the way a placebo may produce changes in opposite directions in a single organ is available in the studies of gastric acid secretion in man. Two separate investigators measured gastric secretion in healthy human subjects in response to an oral placebo without verbal suggestion. In one group of 22 subjects a 12% increase of gastric acidity was observed and in the other group of 15 subjects an 18% decrease following the administration of a placebo (70). The difference between the two groups was significant at the 0.001 level of confidence.

### *Toxic effects of placebos*

Several authors have observed toxic reactions in response to the administration of placebos (17, 25, 26). Sheldon, in a study of reserpine administered to hypertensive patients, found that the patients who were receiving placebos complained of nasal stuffiness as often as did those who were getting reserpine (57). Shapiro and Grollman, studying effects of antihypertensive agents given by mouth to ambulatory patients, found that one of their most troublesome and persistent "Hydralazine" (Apresoline, 1-hydrazinophthalazine hydrochloride) headaches occurred in an individual who was getting placebo at the time (56).

Our own experiences with the toxic effect of placebos included a study of the purported anxiety-relieving effects of the relaxant drug, mephensin (Tolserol, 3-*o*-toloxy-1,2-propanediol) (76). Because it was so difficult to quantify subjective and objective signs of anxiety, five unknown medications were used. Some of them contained the agent and some the placebo. The lack of precision in quantifying the data was thus equalized among the five groups. When the key was finally broken, it was found that the results with the drug and placebo were almost identical (76). Many of the patients noted minor toxic effects including sleepiness, sleeplessness, anorexia, nausea, tremulousness, dizziness and palpitation. The incidence of these minor side effects was identical with the placebo and the agent. Three patients had serious toxic reactions. One developed what the dermatologist called "dermatitis medicamentosa" while taking only a placebo. Another individual suddenly collapsed in an anaphylactoid reaction with nausea and lowering of blood pressure, clammy white skin and fainting within fifteen minutes after taking the medication. Identical reactions occurred following the placebo and the agent. The third severe reaction included epigastric pain coming on within ten minutes of taking the pill. This response occurred on three separate occasions with three different batches of pills. Watery diarrhea, urticaria, and angioneurotic edema of the lips followed on each occasion. It later developed that these reactions had occurred first on placebo and then on the drug. Diehl and his associates in demonstrating that placebos were as effective as cold vaccines in stopping colds found also that they were associated with numerous toxic symptoms including drowsiness, lassitude, listlessness, dizziness, giddiness, vertigo, headaches, depression, insomnia and gastrointestinal disturbances (11, 12). Leslie reported that in morphine addicts, saline has eventually been substituted for the drug without withdrawal symptoms appearing until saline injections were stopped (38). Numerous instances of addiction to placebos have been reported by Tyler and, among the toxic effects, he noted in fatigued subjects that hallucinations sometimes followed the administration of placebos (63).

#### *The mechanisms of placebo action*

The fundamental stimulus is the meaningful situation. Its force, often underestimated, may altogether reverse the effects of a potent drug. In studies with Methantheline Bromide, U.S.P. (Banthine,  $\beta$ -diethylaminoethyl-9-xanthene-carboxylate methobromide), for example, it was determined that 100 mg of the agent powerfully inhibited gastric secretion with the maximum effect occurring approximately 90 minutes after oral ingestion. In repeated experiments after inhibition of gastric acid secretion by the agent had been achieved but before the maximum effect, an interview covering significant personal conflicts was undertaken. There was observed a brisk increase in gastric acid secretion above control levels despite the inhibitory effect of the methantheline bromide. Another dramatic instance of the power of the placebo as a meaningful situation to outweigh the action of a potent pharmacodynamic agent was encountered in the course of a study of the effects of Syrup of Ipecac, U.S.P., on gastric function. When 10 ml of syrup of ipecac were ingested by a group of individuals who were

not nauseated at the time the vigorous waves of motor activity were abruptly interrupted within ten minutes after the ingestion of the ipecac and ten minutes later nausea with retching occurred. Ultimately, as nausea subsided, vigorous motor activity was resumed. The experiment was repeated on one of these subjects at a time when the patient was nauseated. No gastric activity was being recorded. The ipecac was introduced blindly through an open lumen of the intra-gastric tube in the same amount and in the same manner as before, but the patient was told that it was a new medicine which was sure to correct the troublesome nausea and vomiting. Within fifteen minutes, nausea had disappeared and gastric motor activity had resumed. Had it not been for the recorded tracing of gastric motor activity, one might have assumed that the patient had imagined the disappearance of nausea, but the resumption of gastric motor activity established reliably that there was no longer any nausea (65).

It is important to realize that placebo effects are not imaginary. Neither are they necessarily suggestive in the usual sense of the word. For example, certain workers have induced changes in circulating eosinophiles, either during the discussion of meaningful topics or following the administration of placebos (71). Eosinophilia, a phenomenon of which the patient may have no knowledge whatever, could obviously not be achieved by suggestion. Perhaps a person could think himself into a disturbance such as sweating or tachycardia, or even hives on the skin, but hardly eosinophilia. Cleghorn *et al.* (10) were able significantly to activate adrenocortical activity by the hypodermic injection of sterile saline. Rinzler *et al.* (52) were able to effect a statistically significant reduction in the concentration of serum lipoproteins by the administration of placebos. All of these findings indicate simply that the responsible mechanisms are connected with circuits in the cerebral cortex. Thus, for placebos, a variety of modes of action become possible, including suggestion, conditioning, and other as yet obscure mechanisms. Gliedman *et al.* make the special point that placebo effect may be reinforced in the presence of a state of central excitation induced through conditioning (22). Thus the desired response may be conditioned, the conditional stimulus being a variety of circumstances deliberately or accidentally introduced. They point out that one of the most important is the doctor himself. The degree to which he is able to induce in his patients a state of arousal or readiness for a favorable response, the more potent the medication he gives will be. In other words, placebo effects are potent when there is strong motivation on the part of the patient toward recovery. This inference corresponds well with the point made by Beecher that the greater the subject's stress, the greater the effect of the placebo (6). It is implied here and in the work of Gliedman *et al.* (22, 23) that the intensity of the patient's perceptions plus that of his reaction to the situation of suffering set up a central excitatory state which facilitates the action of a placebo. More simply stated, the greater the patient's need for help, the more likely a positive response from the placebo would be.

#### *Role of the unconscious*

It is evident that the receptor, integrative and effector phenomena in the placebo response may take place without the patient's conscious awareness.



Perhaps the simplest illustration of unconscious receptor activity occurs whenever one looks through a monocular microscope with both eyes open. The experienced microscopist has learned to blot out from consciousness the image which appears on the retina of the eye which is not looking in the ocular even though the electrical impulses set up in the optic nerve are doubtless carried through the visual pathways to the perceptive areas of the brain.

Complex integrative and efferent activity may be set in motion whenever receptor impulses activate circuits in the brain which have been established in connection with earlier experiences. For example, if someone should call you a goat in Spanish, your response would depend on whether or not earlier experiences with the language had established appropriate circuits in your brain, would depend, that is, on your familiarity with the language and the folk customs of Spain. The stimulus, the pattern of sound waves impinging on the eardrum and transmitted from the organ of corti as electrical impulses would be identical for two listeners, one who did and the one who did not understand the language. The pattern of reaction of the two would, however, likely be very different. The listener familiar with Spanish language and customs would have some sort of electrical circuit in his cortex with which the receptor impulses would connect. He would thus react to the implication that his wife had been unfaithful to him. Thus the stimulus, the word "cabron," lacking any intrinsic power to elicit a response in the hearer might nevertheless evoke a violent reaction because of its meaning. The responses set in motion in such a situation may include not only an emotional reaction, but widespread vasomotor changes, possibly changes in glandular activity in the stomach and elsewhere, in smooth muscle function and, of course, perhaps in skeletal muscle activity in the form of punching the speaker in the nose. In short, this meaningful experience is capable, through cortical mechanisms, of inducing widespread bodily changes, some of which may be recognized by the subject as symptoms. Some may be pertinent to a variety of tissue disturbances and disease states.

Since the administration of a medication inevitably has meaning for the patient, it would follow that a degree of variability in effect from person to person and from time to time in the same person would be expected irrespective of the pharmacodynamic properties of the agent in question.

It would appear that variability is due to opposing or reinforcing forces growing out of the meaning of the particular circumstance of drug administration and also out of other meaningful situations in the day-to-day life of the subject. The proof of this inference would be available if there were a human subject whose responses were normal except for an inability to interpret his surroundings. We had the opportunity to study one such subject who had been rendered effectively decorticate in an automobile accident. The study has been published elsewhere (13). Suffice it to say here that he gave no evidence of awareness or responsiveness to his environment. A gastrostomy, which had been done to facilitate his management, offered a convenient opportunity for the study of gastric function. Like our earlier fistulous subject, Tom, this individual displayed cyclic activity in his stomach with periods of accelerated acid secretion every few hours. Accordingly, he was given a small dose (0.4 mg) of atropine sulfate hypodermically at

various stages in the cycle of spontaneous activity. A larger dose (0.6 mg) administered to Tom had produced effective inhibition on one occasion and apparently had had no effect whatever on another when there were opposing stimuli arising presumably from stressful life experiences (77). In the decorticate subject, however, the smaller dose of atropine was followed uniformly by an inhibitory effect regardless of the prevailing level of secretion (13).

### *The placebo in therapeutic research*

There is not universal agreement as to the place of the placebo in therapeutic research. Some investigators have asserted that the placebo control is unnecessary or even misleading (3, 55), but most agree that it is an indispensable step toward the establishment of the therapeutic efficacy of any new agent. The placebo by no means provides a perfect control procedure, however (8, 9, 39, 44, 53, 62). Telltale side effects of a potent agent may vitiate the attempt to keep the physician or the subject unaware of what is being given. While placebos may induce almost any side effect, they do not produce them as predictably as an active agent. Furthermore, the use of a placebo control may be awkward and cumbersome when establishing a dose range or when looking for serious toxic effects of an agent. In a clinical trial, however, and before the presumed therapeutic action of the agent can be accepted, the placebo must be given and given without the knowledge of either the one who gives it or the one who gets it because, as already pointed out, drug therapy backed by unconscious enthusiasm and solicitude of the physician may result in powerful and measurable bodily changes which are not attributable to the pharmacodynamic effects of the agent in question (69). A case in point was that of a patient who had had chronic asthma for twenty-seven years. Having suffered almost continuous asthma for the past seventeen, he had become a favorite subject on which to test new drugs. He had become refractory even to epinephrine. Finally, the product of one pharmaceutical company seemed effective in his case. When he was given the agent, he was free of asthma; when it was stopped, the asthma returned. Accordingly, his physician substituted a placebo without the patient's knowledge. Asthma was not relieved. Shifts from agent to placebo and back again were carried out several times with consistent results in favor of the agent. When the company was approached for an additional supply of the material, their representative acknowledged that, because they had had so much trouble with positive enthusiastic reports, they had, in this instance, sent along the placebo first. It would be hard to find a more vivid illustration of the need for placebo control to be blindly undertaken so that the doctor as well as the patient is in ignorance of what is being administered. Investigators have often been naive in failing to recognize that patients, like dogs and children, are likely to know what is in the atmosphere without our telling them and even when we try desperately to conceal our attitudes.

Early enthusiastic reports of new pharmacodynamic agents rarely include placebo controls. Data on "tranquilizers" have provided no exception. From 1949 to 1953, numerous publications described the powers of mephenesin to reduce the subjective and objective manifestations of anxiety and tension. When



these powers were tested with adequate controls, it was discovered that they did not exceed those of a placebo (76).

In the evaluation of a new pharmacodynamic agent, the most relevant question is, "What is the agent being asked to accomplish?" Until recently, despite a great deal of literature on the "tranquilizers" and a good deal of earnest effort by honest investigators, we had only impressions and enthusiasms. It is well to remember that the man who first stumbled onto sulfur water in the first spa was also greatly impressed and enthusiastic about its curative properties. The sulfur water, so it seemed, proved highly efficacious for him and for others for many years. There was no question that people got very much better of various forms of arthritis, asthma, and other disorders when they drank these sulfurous waters or immersed themselves in them. People still go to spas, still improve vastly, but don't bother with drinking or bathing in the water! The realization of the irrelevance of the waters themselves was so gradual that we never really got the impact.

In every branch of therapeutics, including drug therapy and psychotherapy, we must take into consideration the accidental introduction of the really important therapeutic principle and of wrongly attributing the good result to the factor which we had in mind. The resulting misconceptions spread rapidly and may hold sway for a long time. As DuBois (15) wrote, "Any young neophyte can introduce a new drug. It requires a man of large experience and considerable reputation to destroy an old one."

#### *Placebo effects of surgery*

Like the giving of drugs or the laying on of hands, surgery is often productive of powerful placebo effects. In the 1920's, the leading surgeons of the nation were congratulating themselves for having found a "procedure . . . sound in its principles, doing away as it does with the fundamental factor (the pylorus) in the persistence of ulcer, permitting of the discharge of gastric contents into the duodenum where they belong and allowing alkaline duodenal contents to pass back into the stomach for neutralization of gastric acids" (34). These words of Frank Lahey were spoken in the heat of the battle between the surgeons who advocated gastroenterostomy and those who recommended gastric resection for duodenal ulcer. At a symposium of the American Surgical Society, John Douglas reported 80% five-year cures in 68 patients with duodenal ulcer who had been treated with gastroenterostomy (14). This is interesting in view of the fact that today gastroenterostomy for duodenal ulcer would be considered malpractice. The powerful placebo effect of the operation is inherent in the fact that Douglas found only 1.6% marginal ulcers among his patients while A. A. Berg, a man who did not believe in the value of the operation, was reporting a 33.33% incidence of marginal ulcer (7). Among powerful placebo personalities who had done well in treating duodenal ulcer by gastroenterostomy were Crile and Lord Moynihan and W. J. Mayo. Perhaps in the perspective of a few more years, we will be in a better position to evaluate such currently controversial surgical procedures as thoracolumbar sympathectomy in the treatment of hypertension.

The comparative figures of Douglas and Berg on the incidence of marginal ulcer in patients followed for five years following gastroenterostomy bring home the important point that the demonstration of statistical significance of differences using various forms of therapy is not enough, even when large numbers of cases are involved. In order to attribute the observed differences to a given procedure or pharmacodynamic property, it is necessary to have the possibility of placebo action under careful scrutiny.

### *Therapeutic design*

"Take care of the experimental design and the tests of significance will take care of themselves" (51). As a first step in design and in order for a therapeutic experiment to produce results which can be satisfactorily evaluated, it is necessary to know that the observed changes would not have taken place spontaneously. Attempts to define the natural history of a disease, allowing for comparison of results of an untreated group with a series treated with a certain therapeutic agent, have failed to bear fruit in one disease after another. This unfortunate limitation of medical statistics has been vividly pointed out in peptic ulcer. In 1932, Jordan and Kiefer reported in a series of 392 patients, 9 % recurrence of duodenal ulcer in one year and 46 % in five years (32). Emery and Monroe, on the other hand, with an even larger series, reported figures that bore very little resemblance to those of Jordan and Kiefer: 59 % recurrences in one year and 93 % in five years (16). Many years earlier, Pinel had suggested that the therapeutic efficacy of drugs could be tested by treating patients one year and not the next (50), but his data did not hold up because the severity of disease, especially infectious diseases, varies greatly from year to year. It was failure to recognize this fact that led to the conviction in the minds of many medical leaders in the late 1940's that chlortetracycline (Aureomycin) was effective in the treatment of atypical pneumonia (19, 33, 41, 45, 54, 79). It was not until four years later (in 1953) and after many hundred of pounds of Aureomycin had been used in the treatment of atypical pneumonia that Walker published his controlled study of 212 cases in which Aureomycin was found to be no more effective than a placebo (64).

Haight has applied the placebo control to his studies in the antibiotic field (27). In an investigation of the comparative effects of penicillin (Benzyl Penicillin Sodium, U.S.P. XIV), erythromycin (Erythrocin, Ilotycin) and placebo on the duration of illness in scarlet fever he found that those patients treated with penicillin and erythromycin recovered in less than half the time of those treated with placebo. In a similar experiment when he treated "non-specific" respiratory infections in the same way he found that when sore throats and flu-like syndromes were unaccompanied by the presence of beta-hemolytic streptococci in the throat, the course of the illness was no shorter in those patients treated with penicillin or erythromycin than in those treated with placebo (28). Grossman and Masserman found, in studying the analgesic and antirheumatic effects of Aspirin (acetylsalicylic acid), acetophenetidin (Phenacetin, *p*-acetphenetidin) and other agents, using a blind placebo technique, that the placebo was usually

just as effective as the agent. They also observed nearly the same percentage of untoward reactions from the placebos as from the agents (40).

When isoniazid (INH, Nydrazid, Rimifon) was first tried in tuberculosis, patients were photographed dancing in the hospital corridors. Since the drug could not have cured the disease in this length of time, it was concluded that it was exerting a euphorogenic effect. This was held to be responsible for the patients' dancing in the corridors. Patients are no longer dancing and it is now clear that isoniazid does not induce euphoria (42). The early patients who received the drug were euphoric without a doubt, but the euphoria was not due to the pharmacodynamic properties of the drug. It was probably due to the fact that the physicians of these patients in the tuberculosis hospitals had just been suddenly converted from jailers to therapists, and it was their renewed hope and faith and pleasure in this event that rubbed off on the patients and produced euphoria. We must remember that we are capable of the same mistakes that were made by our forefathers.

With respect to tranquilizing drugs, a recent experiment was particularly revealing (18). The patients were catalogued according to how well they had done on the individual tranquilizing drugs. In addition, an estimate was made of the degree of enthusiasm that the doctor had for the agent he was using. The correlation showed that those patients that had done the best were in the group treated by the doctors who like the drug best. Those who did poorly were patients of the therapeutic nihilists.

Before leaving the subject of the design of therapeutic trials, it is important to emphasize, as pointed out by Lasagna, that the use of a placebo control does not eliminate the bias of either the patient or physician in interpreting results. Neither will data from a placebo group substitute for the untreated control (35). According to Modell and Houde (44), "No simple device such as the double-blind technique will correct astigmatism or myopia in the examination of drugs. The blind will not lead the blind to a valid conclusion unless the method somehow also provides vision. It is our contention that the evaluation of the effects of drugs in man is by no means simpler, nor does it permit a less rigorous method of examination, than the formal experiment with the laboratory animal. The methodology has a strict discipline of its own. A great danger in interpreting clinical evaluations lies in failure to recognize the meaninglessness of the negative answer when the method is not sufficiently sensitive for the purpose. The failure to demonstrate statistically significant differences between drugs or treatments is frequently misinterpreted to mean that no real differences exist. . . . However, when the differences are statistically insignificant, a high probability of their being due to chance does not rule out the possibility that they may be real or even important. Such an occurrence could simply result from an inadequate trial or from an insensitive method of evaluation which statistical analysis may not indicate."

#### *Detection of the placebo reactor*

The growing understanding of the measurable effects which may follow exhibition of an agent but are not attributable to its pharmacodynamic properties



has aroused the hope that those human subjects who frequently display placebo responses may be avoided by the investigator. Lasagna *et al.* (37) have described the placebo reactor as "... a recognizable type, but only in the sense that intensive interview and psychologic testing can differentiate him from a non-reactor." Jellinek, in testing the effects of placebos and analgesics on headache, found that placebo reactors could be separated from non-reactors on a U-shaped curve (31). Other workers, on the other hand, were unable to adduce evidence that a placebo reactor was sufficiently characteristic to be identifiable even after six trials in an experimental situation (73). Twenty-seven healthy young subjects were given ipecac, each on two occasions. The incidence of nausea among these individuals was 100% on both occasions. Most of them vomited both times. On seven successive occasions, however, after a premedication with a placebo, the situation changed. Nausea failed to occur in many instances. Many who did become nauseated felt that it was not so severe as it had been on the two original occasions. During the seven trials with placebo premedication, it was found that all of the subjects at one time failed to become nauseated and thereby showed a placebo reaction although it was not possible to predict, after several experiences, whether or not an individual would be more or less likely to show the placebo reaction. In fact, the pattern of distribution of placebo responses was identical with a chance distribution achieved by designating coins as subjects and flipping each coin seven times. Heads was called placebo response and tails, no response. The findings of the experiment were almost identical with those observed in the coin tossing (73). In this study, the lack of predictability of the placebo reaction was evident. Furthermore, there was observed a lack of consistency in the way in which the various individuals responded to placebos.

The differences in the conclusions implied from the studies of the various workers may be reconciled in view of the evidence that placebo reactions depend upon the particular circumstances prevailing at each administration. Relevant among these would be the nature of the symptom being treated, the motivation of patient and physician, the nature of the test agent, its mode of administration and the life situation of the subject at the time he is tested. The significant point here is not the apparently conflicting findings of investigators with respect to placebo reactors, but rather that in any given situation, responses to a placebo may vary as compared to any other situation and the significance of situations to human subjects cannot be precisely duplicated. Therefore, it seems unlikely that a placebo reactor can be identified and eliminated from an experimental situation on the basis of evidence gathered from some other situation. Rigorous placebo control will probably continue to be necessary in therapeutic research. The evidence indicates that any hopefully therapeutic maneuver will induce effects in some subjects and may change a previously stable biological situation into an unstable one, characterized by quantitative changes in organ function which may exceed in either direction those induced by potent pharmacologic agents.

## PHARMACOLOGY OF PLACEBOS

### *The place of the placebo in therapy*

Placebo effects are probably the most relied upon aspects of pharmacotherapy today, however unintentional this may be on the part of the physician. The daily flood of samples and advertisements for nostrums which flows over the desk of every medical practitioner in the United States is proof enough. Only a fraction of these materials has been rigorously tested and shown to have any kind of worthwhile pharmacodynamic effects. Thus, the question of whether or not to use placebos is an academic one. As Modell has stated it (43), "No physician can correctly make a blanket statement that he never applies a placebo; he merely uses it involuntarily without knowledge or understanding. The question is not whether the physician should or should not use placebo, but how he should best utilize the omnipresent effect."

Hofling (29) reported on the results of a questionnaire asking, "What is a good example you have seen of the effective use of placebo-type therapy?" Most frequently mentioned were reduction of pain, increase in appetite, increase in sexual desire, induction of sleep, relief of various allergic disturbances and removal of skin blemishes. Hofling pointed out: "Here is a point at which medicine appears to become magic again and, therefore, such a discussion can become a source of some uneasiness and embarrassment to physicians trained in a tradition originating in nineteenth century scientific attitudes. The existence of these feelings received confirmation from the answers to [the question] having to do with the doctor's opinions as to the relative frequency with which they have made use of placebo-type therapeutic measures. Three times as many physicians interrogated were of the opinion that they used placebos less frequently than was average practice as were of the opinion that they used placebos more frequently than was average practice. In other words, the average physician preferred to think of himself as needing to resort to the use of placebos less often than did his colleagues." Hofling further stated: "... [the physician] should prescribe placebo-type therapy only when he feels comfortable about it, for otherwise, the effect is bound to be impaired from the outset. This condition means that some physicians should never utilize a placebo. Incidentally, it is curious to note how frequently a placebo is ordered in a negative or even a hostile frame of mind . . . as one doctor put it, 'I had to quiet ————'s demands some way!'"

Gliedman *et al.* (22) reported two groups of patients with bleeding ulcers treated with placebos. One group was told by the doctor that a new medicine would be given them which would undoubtedly produce relief. The other group was told by nurses that an experimental medicine would be administered, the effects of which were more or less unknown. In both instances, the same agent was employed, namely, the placebo. In the first group 70% of the patients had excellent results, while, in the second group, only 25% showed a favorable response.

Some authors have argued warmly in favor of the deliberate giving of placebos,



while others, fearing a diminution in emphasis on understanding of the patient as a person, have vigorously decried their use. The most frequently proposed indications are: 1) in substitution for narcotic agents to allay anxiety and minimize the possibilities of addiction; 2) to administer to those who demand medication to tide them over until an effective relationship can be made for psychotherapy; 3) to test the effectiveness of therapeutic agents.

Fischer and Dlin (20) point out: "The 'potency' of the placebo is derived from, and is a part of, the emotionally-invested doctor-patient relationship. Its therapeutic ranges are the extremes of practical psychotherapy. . . . 'The 'placebo reaction' occurs in psychotherapy, even without a pill, in the so-called 'transference' cure." Most of their patients improved more under psychotherapy with the added placebo. According to Tibbetts and Hawkins (59), "Whether or not the placebo has a place in psychiatric treatment, it is certain that its use in an uncritical manner cannot be justified. Used in that spirit, it could make for laxity of diagnosis, a static approach to treatment and general stultification of effort. Perhaps the same can be said for psychotherapy." Palmer (47) recommends the use of the double blind placebo in office practice because "... it instructs equally the observer and the observed, adds interest to the daily clinical chore, restores the clinical science of therapeutic verification to the practitioner, where it belongs."

Placebo therapy should not be relied on too heavily. Although results are, at times, brilliant, they can hardly be expected to be either consistent or persistent. Perhaps the most satisfactory position on placebo therapy was taken by Perry Pepper (48) who wrote, "The giving of a placebo—when, how, and what—seems to be a function of the physician which, like certain of the functions of the body, is not to be mentioned in polite society."

#### *Formulation*

It is important to realize that every contact with a physician may be a meaningful situation to the patient, and, hence, may set off visceral responses which can have salutary or adverse effects on his health and well-being. A placebo in the form of a drug may potentiate such effects. So may a host of rituals and procedures including surgery and a variety of forms of psychotherapy. To establish the intrinsic worth of any therapeutic maneuver, a well-designed and properly controlled test situation is required. The therapeutic experiment requires skill, experience and sophistication. Until recently, however, few highly qualified investigators had caught its challenge. It is hoped that their efforts will supplant those of the legions of amateur investigators who, year after year, convert the free pills of the detail men into enthusiastic print. Pickering has referred to the controlled therapeutic trial as the most important medical development of the past ten years (49). Recognition of the power and the properties of the placebo has been an important part of this development and the placebo, for an understanding of the extensive bodily changes it may induce, has gained a more dignified place in the therapeutic armamentarium.

# PHARMACOLOGY OF PLACEBOS

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# Modern Concepts of Cardiovascular Disease

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## STRESS AND HEART DISEASE\*

Stress, for the purpose of this discussion, is present when the adaptive mechanisms of the living organism, in this instance man, are taxed or strained. The results are by no means specific. In fact, the variability of response of the human being may be immense, varying from invention or artistic creation, on the one hand, to surrender or death on the other. Among the great variety of possible reactions to stressful circumstances are a host of alterations in visceral function, including the elements of the cardiovascular system.

Evidence that the highest neural centers are involved in cardiovascular phenomena has been available from time immemorial, since it has been observed that symbolic stimuli, that is, circumstances without intrinsic force but having a peculiar meaning for the individual concerned, were capable of arousing a multitude of cardiovascular responses, including changes in rate, rhythm and peripheral vascular function. Somehow, the potential importance of such changes escaped notice until they were produced experimentally with electrodes in the laboratory.

Vascular reactions subserved by neural mechanisms range from the altogether peripheral axon reflex through a variety of autonomic effector functions mediated via the spinal cord, and reflexes at the level of the brain stem brought about through afferents from various specialized receptors, such as osmoreceptors, baroreceptors, chemoreceptors, and others in the blood vessels and in the brain. These are sensitive to minor changes in the composition of the blood, especially to reductions in oxygen tension or alterations in blood pH. In many instances, it is known that the efferent impulses activated thereby may result in

widespread and often disabling bodily changes.

Information as to precisely what circulatory patterns are subject to influence from the highest neural centers is still only fragmentary, but already impressive enough to indicate that the cerebral cortex must be considered along with the thyroid, the adrenal gland and the pituitary as potentially controlling cardiovascular responses in man. Rarely such changes are volitional, as they were in the case reported by McClure.<sup>1</sup> His patient was able to produce temporary cardiac arrest at will. In most instances, however, it would appear that the activity of the highest neural centers in governing the cardiovascular apparatus is part of unconscious neural processes and often, perhaps, as part of a general bodily adaptation to a challenging situation or circumstance. Very commonly, such experiences involve anticipation of some action requiring a change in cardiovascular dynamics or function.

### Need for Increased Peripheral Flow

The hemodynamic changes appropriate to situations requiring an increased peripheral circulation, such as anemia, vitamin deficiencies, arteriovenous shunts and hyperthyroidism, include tachycardia and increased stroke volume with a lowering of peripheral resistance. It is well known that the same adjustments occur temporarily during vigorous muscular effort. They may also occur in anticipation of such an effort as before running a race. It is less clear, but an equally demonstrable fact, that precisely the same bodily reactions occur in the man who is driving his automobile and suddenly hears the shrill whirr of a motorcycle policeman's siren. He is not running or even planning to run, if he is wise, and yet his cardiovascular apparatus behaves as if he were running and as if his muscles

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needed added nourishment. Such "as if" reactions occurring unconsciously and in association with conscious or unconscious emotional conflicts have provided the subject of another communication.<sup>2</sup>

### Need to Increase Pressure in the System

During blood loss, as in donors for transfusion, an increase has been observed in peripheral resistance without increased cardiac output but with the maintenance, or even elevation, of blood pressure. Such changes have also been seen to occur in subjects volunteering as transfusion donors but before venapuncture was carried out.<sup>3</sup> These changes, of course, are typical of those encountered in essential hypertension and they may also be seen as overcorrective responses following the injection of hypotensive drugs, or upon assuming the recumbent position after an episode of postural hypotension. Psychiatrists have for years pointed out that patients with essential hypertension are psychologically poised for combat but that the aggressive action is unconsciously and powerfully restrained. An ingenious experimental situation was set up by certain Russian workers at the primate station in Zukhumi.<sup>4</sup> Baboons who had become self-selected mates were separated. The female was placed in a large cage with a strange male. Her mate was placed alone in a smaller cage alongside. The workers observed that the cuckolded male regularly developed sustained hypertension. There is insufficient evidence to conclude that essential hypertension occurs in a suitable susceptible subject as part of a cardiovascular adjustment, as if in preparation for combat with threatened blood loss. Nevertheless, the fact remains that the appropriate hemodynamic mechanisms are connected with, and capable of reacting to, neural connections in the interpretive areas of the brain.

### Cardiac Arrest

There has been some difference of opinion among investigators as to whether such effects as "voodoo death" or sudden death in healthy individuals, as seen from time to time in our own culture, are attributable to massive sympathetic or parasympathetic discharges. Cannon took the former view, but more recently the experiments of Richter indicate that heart slowing as a result of vagal stimuli may be the important factor with the ultimate production of ventricular fibrillation.<sup>5</sup> Richter was able to produce such vagal effects experimentally in rats who were placed in a tank from which they could not escape and in which they were made to swim indefinitely. It is interesting that survival among these rats was greatly reduced when their orienting moustache hairs were cut off, thus putting them into an even more unaccustomed, "terrifying" and presumably

hopeless situation. Richter further noted that wild rats did not survive this ordeal as well as did the domesticated rats, who had been accustomed over the generations to the arduous buffetings of the experimental laboratory. A comparable observation in a human being was made by W. Fuqua, who was on duty in a field hospital during the war in Korea (personal communication). He was examining a marine with symptoms of influenza and, after listening to the breath sounds with his stethoscope, Fuqua said "now stop breathing" as he began to listen to the heart. At that moment, there was heard a loud burst of enemy artillery fire. The marine's heart suddenly stopped; he remained in asystole for one minute and with no effective pulsation for at least two minutes. Further contributory evidence in human beings was gathered by R. H. Furman in the course of examining the hearts of soldiers at the time of induction into the military service (personal communication). The long line of recruits came for their cardiovascular examination immediately after a blood sampling syringe was withdrawn from their veins. He thus caught many subjects almost in the process of fainting and indeed caught some of them as they were falling to the floor. Prompt examination revealed pulse rates in the low 40's and blood pressure that was almost unobtainable. Although many recruits showed tachycardia, those who fainted uniformly displayed a vagal pattern.

### Work of the Heart

Muscular effort is a familiar stimulus to cardiovascular function. On the basis of the predictability in degree and duration of changes evoked by measured amounts of exercise, various workers have devised tests of adequacy of cardiac function and of cardiac reserve.

Briefly, expected changes include temporary tachycardia and increase in the cardiac output with each beat (stroke volume), followed by return to resting levels at a rate depending upon the amount of exertion undertaken. In healthy subjects, changes in the pattern of the electrocardiogram do not ordinarily occur with exercise; when they do, they are thought to indicate a degree of cardiac insufficiency and a reduction of the reserve capacity of the heart.

Tests of exercise tolerance have been difficult to interpret because factors other than exercise are capable of inducing tachycardia, increase in stroke volume, and even T-wave changes in the electrocardiogram.<sup>6</sup> Prominent among such factors are life situations, either consciously or unconsciously threatening to the security of the individual. Situations of pleasurable anticipation may also be associated with tachycardia and an increase in stroke volume. It is as though bodily changes were occurring in preparation for exertion, e.g., fighting, running away, or active par-

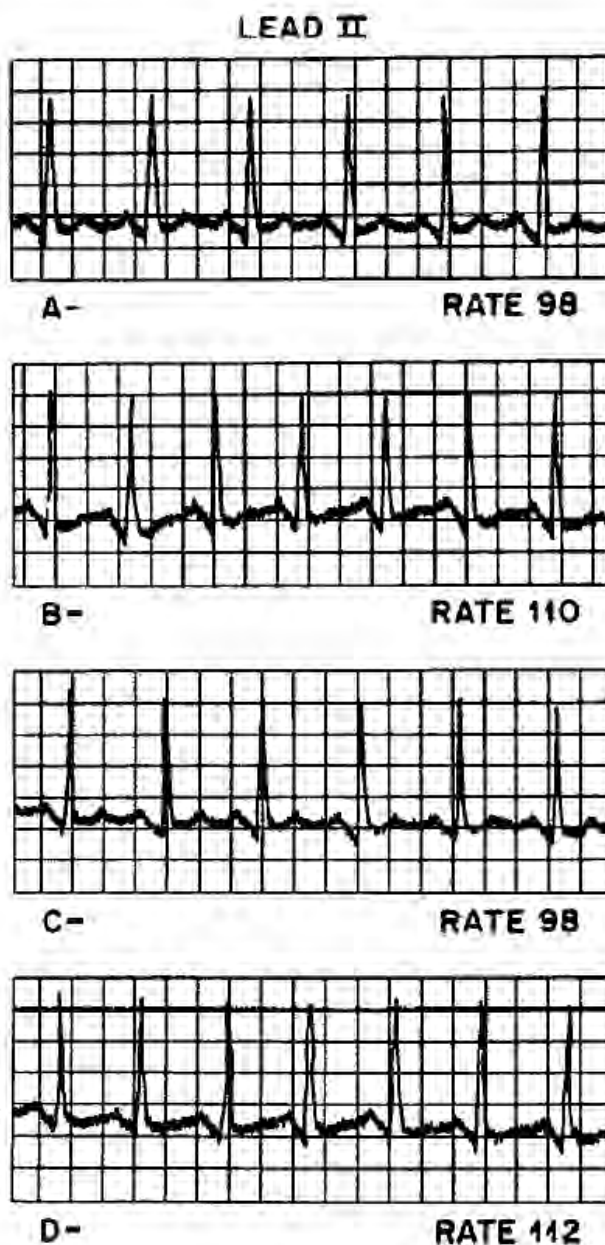


ticipation in some pleasurable situation. When exercise is actually undertaken under such circumstances, the cardiovascular adaptation may be excessive or unduly prolonged during recovery, as though a much greater muscular effort had been anticipated.

The work of Wolf and Wolff,<sup>7</sup> and later of Hickam, et al.,<sup>8</sup> established that variations in stroke volume and cardiac output correspond with changes in life situation and emotional state. Duncan, et al.,<sup>9</sup> related them to some of the symptoms of neurocirculatory asthenia. The possible importance of such alterations in cardiac function to patients with already damaged hearts has not been assessed. It is noteworthy, however, that the work of the heart may be increased and its efficiency affected by circumstances constituting figurative burdens. It is evident that the work of the heart cannot be estimated with any degree of accuracy with reference to the amount of exertion actually undertaken. If the subject is "in training," cardiovascular efficiency will be such that a relatively great load may be carried on with a minimum of work. On the other hand, in training or not, the heart may be called up to work hard with the subject sitting or lying while contemplating, consciously or unconsciously, some troublesome personal problem.

**Cardiac Rhythm.** Arrhythmias, including paroxysmal atrial tachycardia, extrasystoles, atrial fibrillation, and even the more serious paroxysmal ventricular tachycardia may occur in association with troublesome events in the day-to-day experiences of individuals who have no other detectable evidence of heart disease. It would appear that this variety of disorders of cardiac rhythm may be precipitated by, or possibly fundamentally related to, threats arising out of the life situation. It is certainly unnecessary always to postulate underlying structural disease of the myocardium as a cause of arrhythmias, even in the case of such potentially serious disorders as atrial fibrillation and ventricular tachycardia.<sup>3</sup>

**Electrocardiogram.** Ordinarily, when there are changes in the pattern of the electrocardiogram during exercise, the assumption is made that there is a disturbance of cardiac nutrition. In the study of Stevenson, et al.,<sup>10</sup> 19 patients displayed changes in S-T segments or T waves to a degree considered significant, according to the criteria of Master, when exercise was performed during a period of stress. The same exercise on a day of relative security and relaxation produced less change in the electrocardiogram, or none at all. In all but one of the 19, it was possible to produce electrocardiographic changes during an interview covering pertinent personal problems and without exercise or conscious anticipation of muscular effort. This information



**A- QUIET BEFORE EXERCISE.**  
**B- ONE MINUTE AFTER EXERCISE.**  
**C- SIX MINUTES AFTER EXERCISE.**  
**D- TWO MINUTES LATER. ANXIOUS ABOUT HEART.**

Figure 1. Electrocardiographic changes induced by exercise and during anxiety without exercise.

is in keeping with the general concept that man during stress may react with his cardiovascular apparatus as if he were about to engage in strenuous muscular activity without any actual awareness of anticipating exercise.

Figure 1 illustrates changes observed in the electrocardiogram of one subject, aged 32, who at the time had symptoms of palpitation and reduced exercise tolerance without evidence of struc-

tural heart disease except in the electrocardiogram; this was normal at rest but the T waves became inverted during exercise or during a stressful interview. Seven years later, the patient still showed no further evidence of heart disease.

The mechanisms responsible for these changes cannot be stated on the basis of the data at hand. They may include coronary ischemia or perhaps merely sympathetic stimulation. In any case, the electrocardiogram recorded during severe anxiety in a man with suspected coronary artery disease must be interpreted in the light of these findings. Although the changes may be quickly reversible and not always of such grave import as is ordinarily thought, the possibility that repeated or sustained situational stress may lead to irreversible changes must be taken into consideration in planning therapy.

### **Need for Available Lipids as Fuel for Strenuous Effort**

It is easier to produce sustained hyperlipemia in man by starvation than by feeding. This may be due to the fact that there is a pressing need to conserve glucose during starvation because nervous tissues cannot metabolize other products. The muscles, however, and other bodily tissues, can use fat for fuel as readily as glucose. The mechanism responsible for lipid mobilization in this situation is not known, but the evidence of Seifter, et al.,<sup>11</sup> would implicate the pituitary. Fat must also be metabolized in preference to glucose during strenuous muscular effort. There is not sufficient glucose in the body, or in glycogen stores, to support the stoking of a furnace or a cross-country ski. Therefore, as in starvation, the muscles must rely on fat as a source of energy. Here again, as shown in the work of B. Balke and J. A. Green, there occurs an elevation in serum cholesterol and lipids (personal communication).

Numerous investigators have shown that stressful life experiences are also capable of evoking hypercholesterolemia. Several workers have studied the serum concentration of cholesterol and lipids in students before, during and after the stress of examinations. All of them, including Thomas and Murphy,<sup>12</sup> Wertlake, et al.,<sup>13</sup> Grundy and Griffin,<sup>14</sup> and Dreyfuss and Czaczkes,<sup>15</sup> found higher values during the stressful periods than otherwise. Dreyfuss also measured the clotting time and found it accelerated in 36 medical students the morning of a final examination in medicine. The studies of Groen,<sup>16</sup> Groover,<sup>17</sup> Friedman and Rosenman,<sup>18</sup> and Hammarsten, and associates,<sup>19</sup> have given evidence that the lipid regulating mechanisms are responsive to situational stresses. The latter studies were undertaken on 12 men ranging in age from 30 to 70. They all had well documented evidence of

myocardial infarction. These individuals were followed at weekly intervals with chemical determination of serum cholesterol, lipid phosphorus and lipoproteins, as estimated by the ultracentrifugal technique. At the same time, each subject kept a written record of everything consumed each day at meals, and between meals. The dietary records were later analyzed and roughly quantitated in terms of caloric content and proportion of fat, carbohydrate and protein in the diet. In addition, the subjects were weighed each week and carefully interviewed concerning events of the week and their attitude and reactions to potentially stressful situations. Following the interview, the investigator recorded a judgment concerning the presence or absence of significant stress during the week and an estimate of its degree. These data were, of course, gathered and recorded entirely separately from the chemical measurements. Later correlation showed that unusually high cholesterol concentration, more than 15 per cent above the mean for any individual in the study, correlated with a high degree of significance with periods that had been separately judged as especially stressful. Similar correlation was found in the lipoproteins of the SF 0-12 and the SF 12-20 fractions. More recently, these data have been reinforced by studies of four subjects on balance regimens in a metabolic ward. During the period of rigidly maintained uniform diet and exercise, variations in the concentration of the serum cholesterol of 15 to 40 per cent were observed, amounting to nearly 100 mg. per cent. A high degree of statistical significance was noted when periods of cholesterol elevation were correlated with periods of separately judged emotional stress. Further documentation was available from short-term experiments in which the patients were subjected to stressful interviews concerning significant personal conflicts. In control interviews covering neutral topics, no elevations of serum cholesterol were observed. Following an hour of stressful discussion, however, an increase in the serum cholesterol was observed five out of six times.

The studies of Hammarsten, and his associates, indicated that patients with coronary artery disease were oriented to life along the line of effort, of doing things "the hard way." These patients placed an especially high value on doing things "on their own" and being solely responsible for their activities and experiences. Like Sisyphus, they appeared to be continually carrying a burden and never quite getting it to the top of the hill or the resting place. Moreover, the occurrence of coronary attacks appeared to correlate with periods when the individuals were carrying an especially heavy emotional load. It may be that the mechanisms that govern the concentration of serum lipid are brought into play in the face of demand for effort that is figurative as



well as literal. The possibility that any such changes are actually related to the mechanisms of coronary atherosclerosis is entirely speculative. Moreover, it should be borne in mind that not only are the mechanisms regulating the concentration of serum lipids and cholesterol unknown at present, but the significance of the relation of serum concentration of these substances to the integrity of arteries is equally obscure. Indeed, the extent to which the presence of atherosclerosis determines vascular accidents is also unknown.

The opinion of many present-day investigators is reflected in the following editorial comment of Oliver and Boyd in the *British Heart Journal*: "The remarkable social and economic changes of the century are undoubtedly stressful to some people. Increasing stress might favor the development of clinical coronary disease by disturbing normal endocrine balance and thus influencing both cholesterol metabolism and the coagulation and fibrinolytic systems. Similarly, long, continued environmental stress might disturb the autonomic control of the coronary arteries."<sup>20</sup> Convincing evidence to support such notions is still lacking, but several clinical studies of groups of patients with coronary artery disease would tend to support them. Thus, Friedman and Rosenman found higher serum cholesterol concentrations, a far greater incidence of arcus senilis and a vastly increased incidence of evidence of coronary artery diseases in subjects classified as oriented toward competitive activities with deadlines, as compared with anxious but noncompetitive people or with more passive subjects.<sup>21</sup> Russek reported similar findings among coronary patients,<sup>22</sup> and Dreyfuss<sup>23</sup> and Weiss, et al.,<sup>24</sup> observed special situational stresses as antecedent events to episodes of coronary occlusion.

Much of the confusion concerning the role of life stress in disease derives from failure to distinguish between cause and mechanism. All mechanisms are perforce organic and at the same time functional, since they involve the function of units of the body's equipment. Causes, on the other hand, are likely to derive from the outside, often from noxious stimuli in the environment. The causes, which may be multiple, activate the pathogenic mechanisms and produce bodily disorders and diseases. The ability of symbolic stresses to participate in the activation of disease mechanisms depends upon the fact that most bodily organs are connected with, and responsive to, impulses reaching them via autonomic and endocrine pathways, from the highest integrative centers of the nervous system, the interpretative areas of the brain.

The characteristics of a situation acting as a stimulus may activate, but do not determine, the nature of the response. The response will depend upon the state of the organism at the time of stimulation and on the organism's inherent char-

acteristics. Thus, a precisely similar situation may have entirely different effects on two individuals or on the same individual at different times. The determinants include genetic equipment and other inherent characteristics of the individual which may be acquired. Thus, the effect of the stimulus must depend heavily on the prevailing state of the organism. The pertinence of the stimulus as a determinant of the pattern of response derives simply from the fact that it is the most recent event. Neither can one explain the phenomena observed in response to a symbolic stimulus in terms of the degree of emotional vulnerability of a particular subject, or in terms of nervous imbalance. As obtains with respect to exposure to infectious agents, it can simply be said that some people adapt more smoothly and effectively than others and thus remain healthier.

The evidence relating psychological phenomena to disease of the heart and blood vessels is fragmentary and at this stage altogether unconvincing. It is sufficiently promising, however, to warrant a great deal more systematic study and serious interest on the part of physiologists and clinicians.

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## EDITORIALS

### HUMAN VALUES

Much postgraduate education in medicine today is concerned with what might be called medical artisanship. Here the emphasis is on naming, classifying, and prescribing. Here the deep roots of tradition and the strong winds of fashion or of prevailing opinion govern thought and practice. Thus, on looking back over programs of past postgraduate sessions in recent years in any area of the United States, one sees that those who have attended have paid to learn, for example, for the treatment of burns, and the value of pressure bandages, plastic sprays, tannic acid, salt baths, sulfa gels, and, of course, the inevitable ACTH. Today, some postgraduate speakers are urging that burned areas be left alone if they can remain exposed. It is doubtless important to acquaint the practitioner with current opinion, but there may be room for other, perhaps more important, emphases in professional education.

William Osler, in the 1903 edition of his text book of medicine, recommended, for the treatment of pneumonia: hot baths, cold compresses, Dover's powders, strychnine, venous section, and the Paquelin cautery.<sup>1</sup> Today, the physician's weapons against disease are more potent and, when misused, far more dangerous than those of his forefathers. His responsibility for accurate analysis of the clinical problem is therefore correspondingly greater.

Not only has the growth of chemotherapy imposed on the physician a heavy responsibility for precise diagnoses, but so has the enormous elaboration of medical technology and instrumental techniques, and the increasing boldness of our interven-

tion with the processes and structures of the human body.

The challenge for the continuing education of the physician is not only to sharpen his ability to elicit and evaluate evidence, but also to help him realize that his value to his fellow man transcends his conscious skills and insights into nature. If the physician's importance to society had depended on his ability to reverse or materially alter the progress of disease, society would have dispensed with him centuries ago. The fact is, however, that in all societies over the centuries the medicine man has been cherished, until recently. Throughout the long period of recorded history, the medicine man had no potion or procedure with which to reverse or materially affect the progress of disease, except for himself—his spirit—until recently. Now, with his more impressive weapons with which to protect his fellow man from the ravages of disease, he nevertheless seems to earn from him less kindly affection. Perhaps our concern with the milliequivalent has made us less aware of the healing force of a genuine interest in a patient.

It is not just a pious thought that medicine is more than a science, more than an art or a profession, but as it has to do with the fulfillment of a man—his health, it is one of the humanities. Whether practiced in an ivory tower or at the crossroads, medicine must concern itself with human values. A physician, part philosopher and part scientist, must learn to take the artisan aspects of his practice in his stride and not hold them as his central concern. Postgraduate efforts won't be able to reorient the physician, but at least they can contribute to a change in emphasis with respect to his educational needs and his responsibilities.

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<sup>1</sup> Osler, W.: *Principles and Practice of Medicine*, (Ed. 5), New York and London: D. Appleton, 1903.



## GASTRICSIN

The existence in human gastric juice of a proteolytic enzyme other than pepsin has been suspected for many years. Several workers have advanced strong evidence, usually designating the postulated enzyme as a cathepsin. When the enzyme was finally isolated<sup>1</sup> and crystallized,<sup>2</sup> it was given the name gastricsin. The zymogen precursor of both enzymes was then isolated from human gastric mucosa,<sup>3</sup> and the conditions under which the two proteolytic activities are produced have become known.

Pepsin and gastricsin have been shown to be different in their enzymatic, physicochemical, and chemical properties, including pH optimum, electrophoretic mobility, behavior in ion exchange chromatography, specific activity in proteolysis and milk-clotting,<sup>2</sup> N-terminal amino acid residue, and molecular weight.<sup>4</sup> The amount of gastricsin in normal human gastric juice is about one-third that of human pepsin, but gastricsin has been found to have a higher specific activity with some protein substrates than does pepsin. An item of special interest is the fact that the zymogen isolated from human gastric mucosa may yield either pepsin or gastricsin depending on the conditions of activation. When the zymogen was activated in 0.5 N HCl, 29 per cent of the total proteolytic activity was attributable to gastricsin. However, when activation was accomplished at pH 3.5, gastricsin accounted for 43 per cent of the total proteolytic activity. Thus almost twice as much gastricsin was produced when the medium was at pH 3.5 as compared to 0.5 N HCl. Since gastricsin is optimally effective at a higher pH than pepsin, pII 3.2 as compared to pII 1.5 to 2.0 for human pepsin, it would appear that this versatile system plays an important role in the physiology of gastric digestion. A single zymogen can produce a predominant amount of whichever enzyme would work best in the existing environment, thereby allowing the stomach to maintain a high proteolytic activity over a wide pH range. This finding would explain the observation

of Taylor that the proteolytic curve with higher pH optimum occurs in the gastric juice in the face of a degenerating mucosa,<sup>5</sup> but would not support his hypothesis that the two enzymes in humans are secreted by different portions of the stomach.<sup>6</sup>

It would appear that there is considerable species difference among animals with respect to the mechanism of production of proteolytic enzymes. Gastricsin was found to be absent in the gastric juice of the rat and dog and in extract of porcine gastric mucosa. The latter contains, instead, four pepsins.<sup>7</sup> Thus far gastricsin has been found only in the gastric juice of humans.

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## THE BRADYCARDIA OF THE DIVE REFLEX—A POSSIBLE MECHANISM OF SUDDEN DEATH

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J. B. S. Haldane once wrote "the growth of scientific medicine has been based on the study of the manner in which the human body expresses itself in response to change in the environment." In recent years evidence has accumulated that some diseases constitute simply exaggerated or inappropriate adaptations.<sup>1</sup> Thus disability and death may result from fundamentally protective reaction patterns gone awry.

The present report calls attention to the intriguing possibility that the oxygen conserving reflex, elicited in a wide variety of animals when they dive under water may be related to a mechanism of sudden death in angina pectoris, myocardial infarction and certain other conditions. The phenomena that characterize the oxygen conserving reflex have been studied in greatest detail in diving reptiles, mammals and birds, but they have been identified in man. The series of adjustments which make up the reflex is listed in Table 1.

The term "oxygen-conserving reflex" is applied because these changes listed enable the animal to survive under water for a longer period than its supply of oxygen would warrant under ordinary circumstances.

In 1879, Paul Bert reported a startling observation, that a duck held under water survived a remarkably long time, up to 20 minutes or more, before dying of asphyxia.<sup>2</sup> In addition he pointed out that the animal experienced a remarkable slowing of the heart. Bert concluded that the duck must possess some mechanism for storing oxygen and mobilizing it when needed.

Charles Richet, one of Bert's students, heard him lecture about the ducks and was skeptical about the oxygen storage mechanism. He determined to test it out and attacked the problem with the brilliant simplicity of approach which was, a few years later, to win him the Nobel Prize in quite another field, the discovery of anaphylaxis.<sup>3</sup> Richet tied off the tracheas of 2 groups of ducks. Then he held one group under water. Those ducks who were held under water lived an average of 23 minutes, more than 3 times as long as their partners who were not immersed and who lived an average of only 7 minutes.<sup>4</sup> Richet's conclusion was that the immersed ducks, by virtue of the touch of water to their faces, had conserved their oxygen, partly by slowing the heart rate.

Seventy-five years passed before the final proof of Richet's deduction

TABLE I  
Circulatory

1. Bradycardia.
2. Decreased blood flow to skin and viscera.
3. Increased arterial pressure.

## Metabolic

1. Fall in blood pH.
2. Rise in lactic and other organic acids.
3. Rise in blood  $\text{CO}_2$  and K.

was established by the studies of Harald Andersen of Oslo, Norway.<sup>5</sup> Andersen, by a series of nerve cutting experiments, documented the fact that the diving reflex, as manifest by slowing of the heart, depended on the integrity of the ophthalmic branch of the trigeminal nerve.<sup>6</sup> With the nerve intact a duck could survive under water for 20 minutes. When the ophthalmic branch of the trigeminal was severed bilaterally, immersed ducks failed to slow their hearts and survived for only 6 or 7 minutes.

The researches which spanned the period of 70 years between Richet and Andersen were performed by men who were in continuity with one another, like the runners in a relay race, each carrying the baton for a time. They include our own esteemed fellow Climatologist, John Talbot.<sup>7-15</sup>

I became interested in the reflex on a visit to California when I met the remarkable Norwegian investigator, Per Scholander. Scholander and associates documented the diving reflex in a variety of reptiles and mammals, including man.<sup>16</sup> His studies of Japanese pearl divers showed that they developed not only bradycardia but a variety of arrhythmias as well.<sup>17</sup>

While talking with Scholander I suddenly suspected that the diving, or more properly, oxygen-conserving reflex might, if overdone, lead to serious arrhythmias, cardiac arrest and even death. I wondered if this might not be a frequent mechanism of death from myocardial infarction. Last year when I was in Europe on sabbatical I visited Harald Andersen in Norway. On returning to Paris I borrowed an electrocardiograph and took it to my apartment, where I induced the various members of my family to dunk their faces in the bathroom sink.

It became apparent that there were a few very interesting differences between the duck and man. While the heart slowing reflex was very predictable, even monotonous in the duck, it was variable in man and very clearly subject to influence from the higher centers in the cerebral hemispheres.

Figure 1 illustrates the usual response during ordinary breath holding



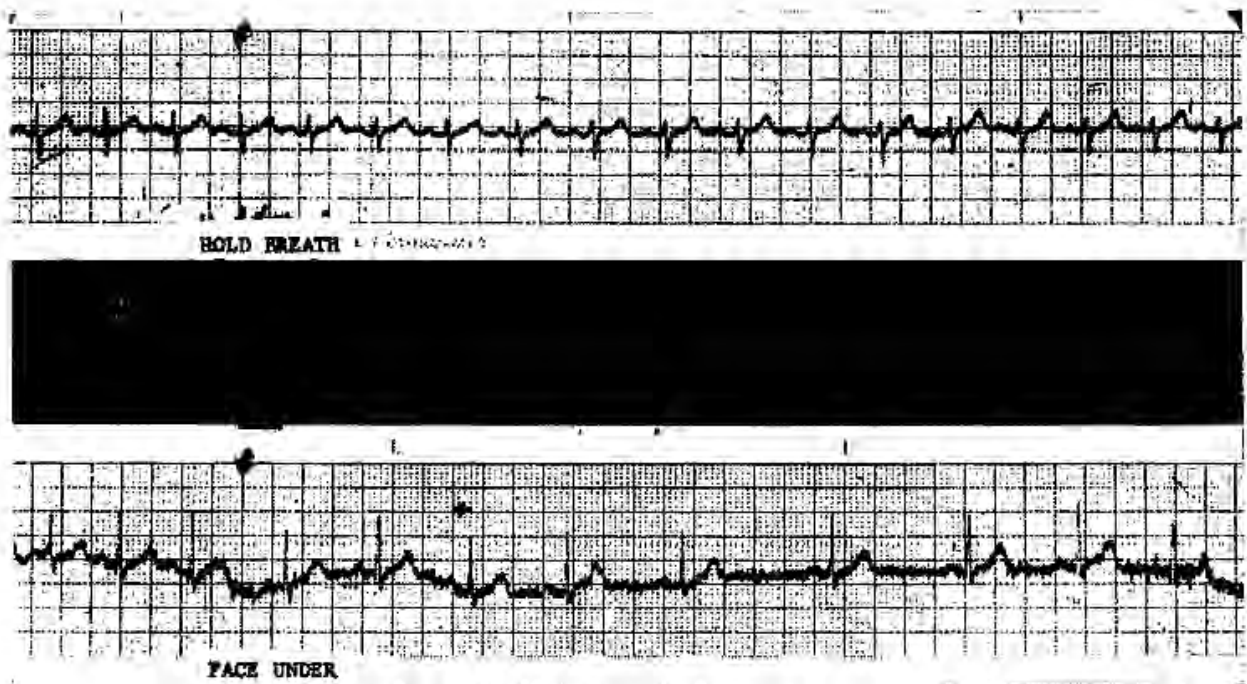


FIG. 1. Change in heart rate observed during simple breath holding (upper tracing) and with face under water (lower tracing). The pulse before the arrow in each instance was stabilized at a constant rate.

as contrasted with breath holding with the face under water. During ordinary breath holding slowing of the heart was observed relatively late as compared to the almost immediate slowing which occurred when the face was immersed. Under quiet circumstances the slowing of the heart which promptly followed immersion of the face was predictable and actually became more pronounced with practice. When the subjects were distracted, however, or harassed in any way the reflex bradycardia often failed to occur, despite the face being under water. Thus in man the reflex could be inhibited presumably through the higher nervous centers. Figure 2 illustrates how the higher centers may also facilitate the reflex.

On several occasions it was noted that the slowing began immediately after the order to immerse was given and before the face reached the water. Thus the reflex was observed to occur in anticipation of immersion. To further strengthen the inference that the highest neural levels were able to initiate the bradycardia without immersion of the face in water, a 'false order' was given. That is, the subject was instructed to immerse the face and then immediately the order was countermanded. Clear cut slowing occurred nevertheless.

The portion of the oxygen conserving reflex manifest in slowing of the heart is subserved presumably by vagal impulses. A similar kind of vagal behavior is a familiar feature of certain types of syncope and of unexplained instances of sudden death. Figure 3 illustrates an instance of

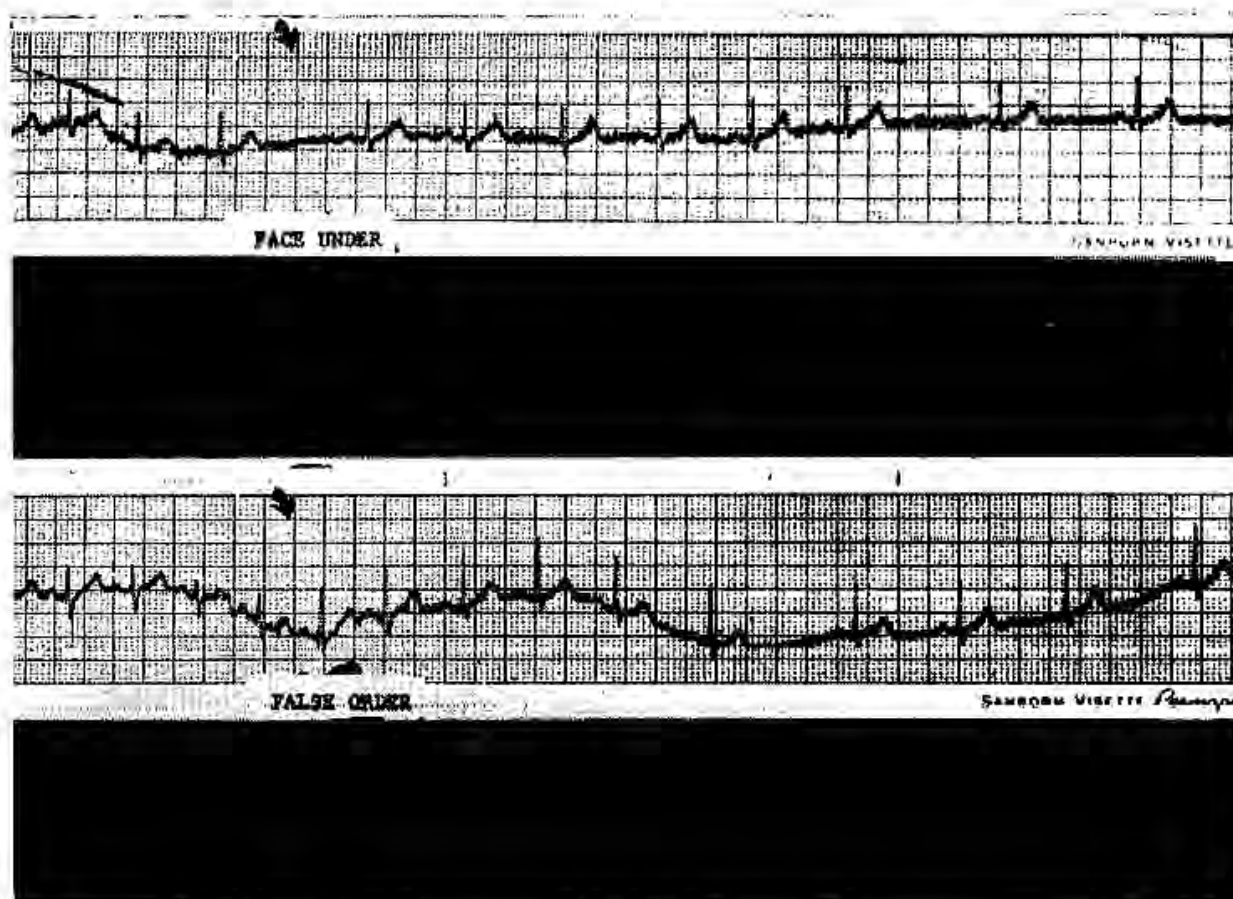


FIG. 2. Slowing of pulse associated with face under water (upper tracing) and following a false order, after which there was no actual immersion. The pulse before the arrow in each instance was stabilized at a constant rate.

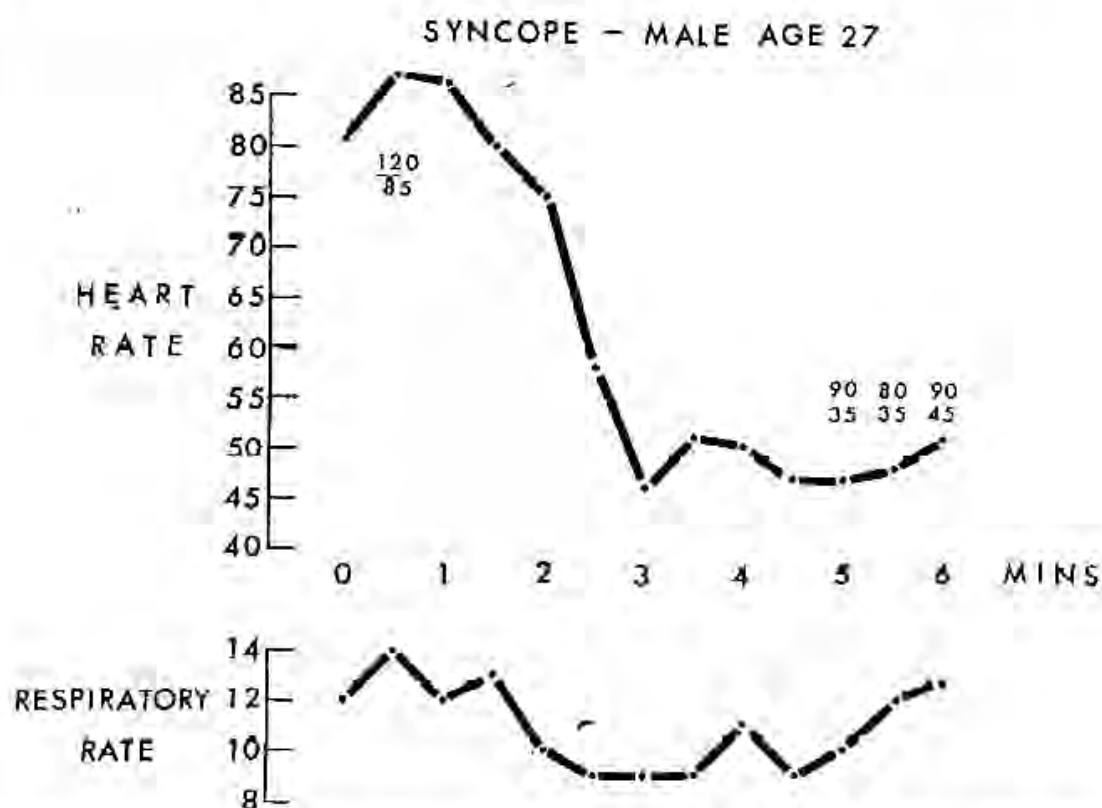


FIG. 3. Slowing of the pulse associated with syncope in a healthy young man during a needle prick.



striking association with syncope occurring in a young man while an attempt was being made to insert a needle in his brachial artery.

### COMMENT

Many deaths following myocardial infarction are, as is well known, attributable to what appear to be vagal effects, cardiac slowing to the point of arrest or ventricular fibrillation. The mechanisms responsible for such disturbances of the heart beat are not understood, but they may involve a reflex set off because of stimulation of receptor neurons in the heart. It is known that there are a great many afferent endings in the coronary vessels and the myocardium.<sup>18, 19</sup> Dr. Timothy Talbot told us the day before yesterday of their susceptibility to stimulation when their threshold is lowered by inflammation. Metabolic products from an ischemic or infarcted myocardium may set up a barrage of afferents which activate an adjustment designed to conserve oxygen in the face of the threat of impaired pumping action by the heart, certainly an appropriate reaction under the circumstances unless it goes too far.

In studies on dogs that have undergone coronary ligation there is evidence that eliminating afferent impulses from the heart results in a substantially larger percentage of survivors.<sup>20</sup>

In man, as already pointed out, the evidence indicates that cardiac slowing may be effected not only by afferent impulses from the periphery, but also by impulses from the highest integrative levels of the brain. Impulses from the highest centers may also inhibit the reflex.

It would be intriguing to enquire whether or not individuals in whom cardiac slowing was relatively readily induced by a variety of stimuli might be in greater jeopardy of death from myocardial infarction than those less susceptible to the reflex.

My colleague, Dr. Robert Schneider, has for the past three years been studying various parameters of autonomic reactivity in patients who have suffered a myocardial infarction compared to a control population matched for age, sex, social classification and a few other things. One of Dr. Schneider's maneuvers is to put his subject at rest in a dark sound-proof room and suddenly to open the door and turn on the light. This is not a stressful experience but it does elicit a startle or alerting response characterized in most subjects by a transient slight acceleration of heart rate. As shown in Figure 4 the control subject reacted very little each time and showed little variability in response from day to day on three trials separated by several weeks. The patient, however, who was characteristic of the patient group showed greater responses and marked variability from day to day, tachycardia, tachypnoea and fall in blood pressure on some occasions, and bradycardia, slowed respiration and in-

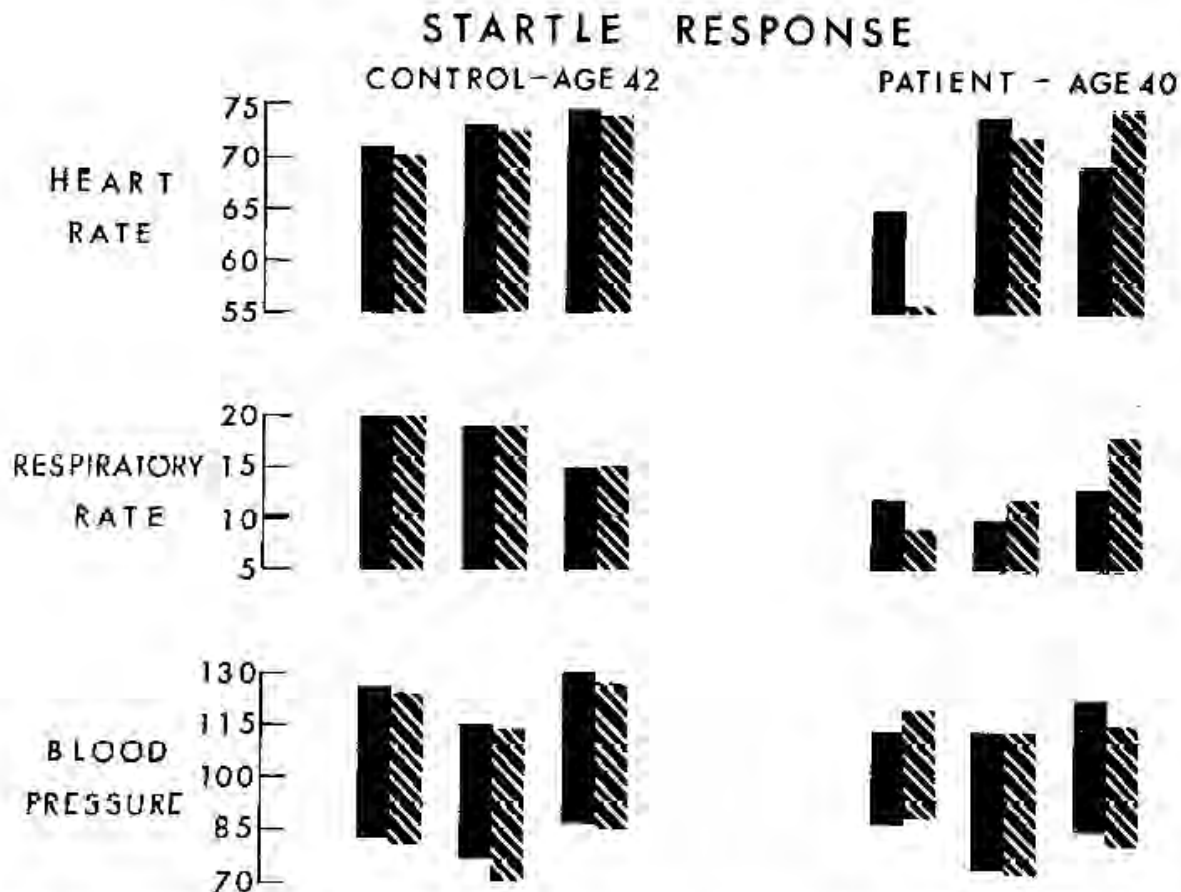


FIG. 4. Response of pulse, respiration and blood pressure to a minor startle stimulus delivered to a healthy control and a patient with known coronary artery disease. Solid bars indicate measurements prior to stimulus and hatched bars those immediately following stimulus. Each set of bars represents a separate occasion a few weeks apart.

creased arterial pressure on others—very much like the diving or oxygen-conserving reflex.

(Of 50 coronary patients whom we have followed from one and one-half to three years, eight have died of recurrent myocardial infarction. Four of these were the four that showed the most striking cardiac slowing during startle.

#### SUMMARY AND CONCLUSIONS

Slowing of the heart rate as part of an oxygen-conserving reflex has been observed in man when breath holding with the face under water. Emotionally significant situations were found capable of either inhibiting or facilitating the reflex, thus placing the mechanism under the control of the cerebral hemispheres. Indeed, features of the reflex have been induced in human subjects during attempts to penetrate the brachial artery with a hypodermic needle and in association with a mild startle reaction. The latter was observed to a striking degree in four subjects who subsequently died of recurrent myocardial infarction.

It is suggested that a protective response designed to conserve oxygen may be inappropriately involved under a variety of circumstances and may be lethal if excessive or if unbalanced by opposing forces.

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## DISCUSSION

DR. JAMES METCALFE (Portland, Oregon): Dr. Wolf, is cessation of breathing necessary to produce this reflex? If you put your face under water and continue to breathe through a tube, do you still slow your heart rate, or does a duck?

DR. RICHARD P. STETSON (Boston): I would like to ask Dr. Wolf if there are any data as to chilling of the face with or without oxygen deprivation, and whether the temperature of the water makes any difference.

DR. RICHARD S. ROSS (Baltimore): Does it make any difference whether you stop breathing in inspiration or in expiration?

DR. CHESTER S. KEEFER (Boston): I am delighted that Dr. Wolf is studying the oxygen-conserving reflex in man.

The famous case of George Smith, who was accused and convicted of murdering three of his wives, has a special bearing on the oxygen-conserving reflex in man. This was a case famous in Britain, commonly known as "Brides in the Bath." What George Smith did was to buy a small bathtub after he married a woman with some money and then cleverly immerse her in the bathtub. When she was discovered dead in the bathtub, at first it was considered that she drowned. But autopsies subsequently provided evidence that she had not drowned. The great attorney for the defense in Great Britain, Sir Marshall Hall, defended George Smith, but he was finally convicted of murdering three of his wives. Smith was hung by the neck until he was dead. Now I think that on the basis of modern evidence from the studies of Scholander and your studies which are now being made, it's possible to explain how these women were murdered by the famous George Smith after immersion in water, but without drowning.

DR. J. WILLIS HURST (Atlanta): A very interesting discussion Dr. Wolf. I would like to ask Dr. Wolf to describe the location of the infarcts in the patients who died. Was there a higher incidence of posterior infarcts in the patients who died in contrast to those who lived? As all of you know, the incidence of sinus bradycardia and A-V block is much more common in patients with posterior infarcts than in patients with anterior infarcts. Have you considered this aspect of the problem in your thoughts about "the oxygen-conserving reflex"?

DR. EDGAR GORDON (Madison, Wisconsin): Do you need an infarct to stimulate afferents in the heart and produce a reflex death? Would not the ischemia of angina do the same thing?

DR. WOLF: The answer to Dr. Metcalfe's question is very interesting. In the studies of ducks, the cessation of breathing is not necessary. Andersen attached a tracheal cannula to the duck and just put the duck's face under water. Nevertheless, the duck refused to breathe through the tracheal cannula. He held his breath and showed the reflex behavior described. Andersen force-breathed him, but despite adequate ventilation of the lungs, the animal showed the same cardiac slowing and the other manifestations of this reflex.

Dr. Stetson, the temperature of the water, within relatively wide limits, is not important. However, since this reflex can also be elicited by noxious stimulation of the face, I presume that a sufficient chill might accentuate it, although I don't know. Very acrid odors and other experiences that actually irritate and stimulate the branches of the fifth nerve may slow the heart. Since inhaling irritants makes us involuntarily stop breathing, oxygen-conserving behavior seems appropriate.

Dr. Ross's question about stopping in inspiration or expiration is also important. If one stops breathing in inspiration with the lungs distended, the bradycardia doesn't

## STEWART WOLF

occur so readily, and often isn't evident at all. Scholander showed some years ago that the seals that he trained to dive for him always dove after expiration. This may or may not have something to do with buoyancy, but it is very definitely connected with the bradycardia and other parts of the oxygen-conserving reflex.

Dr. Keefer's remarks also are very intriguing. The fact is that most people who drown don't get water in their lungs. Moreover, the length of time it takes people to drown is very variable. The suspicion is that the stressful nature of the circumstances may elicit impulses from the higher centers which, in an attempt to save oxygen may slow the heart to the point of stopping. Dr. Curt Richter at Hopkins put rats in a Bell jar and made them swim around until they died. They always died with cardiac slowing and finally arrest. He found that the death could be enormously accelerated by simply cutting the mustache of the rat. It has been shown in the laboratory of Albert Fessard in Paris that the major part of the sensory cortex of a rat is a representation of impulses from the mustache. Presumably, the loss of this orienting support, and no other change, made the rats slow their hearts and die in cardiac arrest in a fraction of the time that an unshaven rat did.

In connection with Dr. Hurst's question, two of the patients who died did have inferoseptal infarcts. Three of them we don't know about because they died suddenly and didn't get post mortem examinations.

I don't think it is widely realized that the heart has a very rich afferent nerve supply. Dr. Timothy Talbot, a couple of days ago, described very graphically his own experience with cardiac reactivity when the sensory threshold was lowered by an inflammatory process. Presumably the local tissue disturbance associated with an infarct, or even the ischemia of angina, as Dr. Gordon suggested, may stimulate afferent nerves and set off an integrative process in the brain which may deal with the threat of impairment of the pumping action of the heart by a conservative maneuver that includes slowing of the heart—an adjustment that, if carried too far, may be fatal.



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# **The Turned-Off Heart\***

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## The Turned-Off Heart\*

**OFTEN** enough when an individual is said to have drowned at the sea shore an autopsy fails to yield evidence that water has been aspirated. The same absence of evidence of actually drowning is also encountered in many who die in lakes or swimming pools. Fresh water might be more difficult to detect in the lungs, however, since being hypotonic it might diffuse through the alveolar membrane into the capillaries. Salt water, on the other hand, being hypertonic would tend to draw

even more water into the alveolar spaces. The mechanism of death in such "drowning" without water in the lungs is unexplained. So is death in those who are fished out of the water before there is time for death from suffocation. So also are many sudden deaths following snake bite when the wound of entry scarcely admitted a significant amount of venom or indeed when the bite was inflicted by a non-venomous snake. Such cases have been described and indeed there are other types of unexplained sudden death in presumably healthy people such as, for example, crib death in infants.

The activation of a neural mechanism involving vagal effects on the heart could possibly explain some of the deaths. In scattered reports in the literature a striking slowing of the heart and sometimes sudden death due to cardiac arrest has been shown to occur by a

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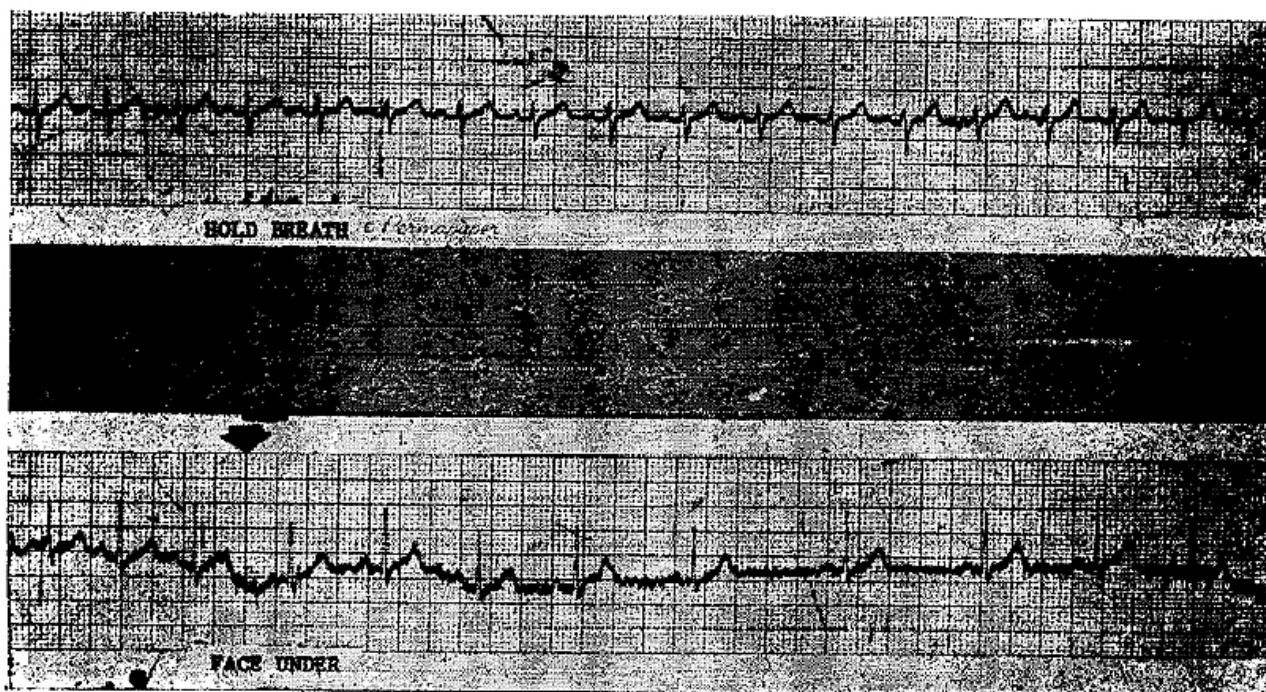
Portions of this paper were presented at the Seventy-Seventh Annual Meeting of the American Clinical and Climatological Association, 1964.

Manuscript submitted 3/16/67.

variety of means, including intense noxious stimulation of any part of the body, instrumental manipulation of air passages, esophagus or serous membranes such as the pleura and peritoneum, or other maneuvers such as sudden decompression of the bladder. A striking bradycardia may also occur under circumstances of extreme dejection or sudden fright.

Curt Richter of Johns Hopkins attempted to study the phenomenon of sudden cardiac death in healthy rats forced to swim for long periods in a jar from which they could not escape. He found that they were capable of remaining alive in the water for very long periods, up to 90 hours. Thereafter as the animal sank to the bottom of the jar a striking bradycardia was recorded that ended in cardiac arrest. From watching the animals Richter had the impression that they were dying not so

much from exhaustion as from "giving up." Accordingly he removed rats from the water after hours of swimming at the point when they appeared about to sink to the bottom. Placed back in their cages they did not appear exhausted but moved about normally. The next day Richter put them back in the water and found now that they were able to swim and stay alive twice as long. Interpreting this experiment as an illustration of the survival value of hope, Richter devised a way of depriving the rats of environmental support by clipping their moustache hairs, or vibrissae, the principal source of orienting information for the rat. When rats with clipped vibrissae were placed in the water jars they invariably died in a matter of minutes, death occurring as described with bradycardia and ultimately cardiac arrest.



**FIGURE 1** Change in heart rate observed during simple breath holding (upper tracing), and with face under water (lower tracing). The pulse before the arrow in each instance was stabilized at a constant rate.

## *The Turned-Off Heart*

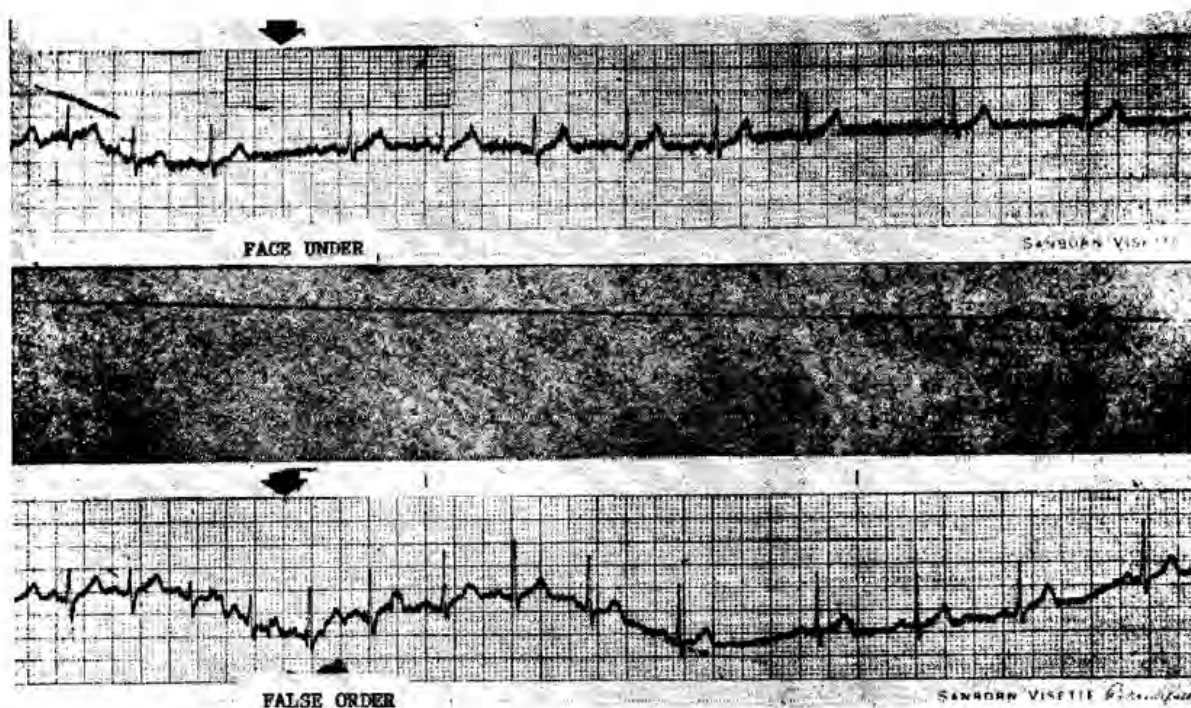
It is difficult to escape the inference that Richter demonstrated the survival value of hope and the potentially lethal nature of situations that rob the organism of support from his environment. Richter suggested that the sudden death of ostracized persons in primitive societies, voodoo death, might also be attributable to a vagal mechanism in reaction to loss of hope. Such a response becomes more understandable when seen as an essentially protective conservative reflex, inappropriate and useless under the circumstances, but crudely adaptive nevertheless.

Sudden deaths occurring in civilized society are usually attributed to myocardial infarction, although often enough no significant coronary atheroma is found, no thrombosis and no

necrosis of the myocardium. When it has been possible to monitor with the electrocardiogram the occurrence of death following myocardial infarction, either cardiac arrest, ventricular fibrillation, or both, have been recorded.

Survival for men and animals requires that the fundamental movements of eating, drinking and breathing be performed at fairly fixed intervals. Although the maintenance of these three primary functions requires periodic impulses from the brain, many secondary processing functions performed by the heart, gut, liver and kidney, although capable of regulation by the central nervous system, will nevertheless continue independently of the nervous system.

Thus, the heart, unlike the lungs, has an



**FIGURE 2** Slowing of pulse associated with face under water (upper tracing) and following a false order, after which there was no actual immersion. The pulse before the arrow in each instance was stabilized at a constant rate.

intrinsic mechanism to maintain its beat. If it is supplied with oxygen and nutriment, the heart will continue to pump for long periods, even when separated from the body. It is therefore a paradox that sudden death should occur in the well-nourished man who is quite capable of breathing. The present report suggests that it is the heart's connections with the central nervous system that, under certain circumstances, may result in the heart being permanently "turned off".

The respiratory—heart rate reflex that induces sinus arrhythmia illustrates the responsiveness of the heart to stimuli from the central nervous system. There occurs an acceleration and deceleration of heart rate associated with the rhythm of breathing. Such an effect is abolished by anesthesia or by extensive damage to the brain. When brain damage is sufficient to interrupt the process of breathing, as in the case of medullary compression, the individual may be kept alive if artificially supplied with air, water and nutriment. Under the circumstances, as the respiratory-heart reflex is obliterated, the electrocardiogram will remain remarkably stable, the rate varying but little.

### **The Oxygen Conserving (Diving) Reflex**

In 1879, Paul Bert reported a startling observation, that a duck held under water survived a remarkably long time, up to 20 minutes or more, before dying of asphyxia.<sup>1</sup> In addition he pointed out that the animal experienced a remarkable slowing of the heart. Bert concluded that the duck must possess some mechanism for storing oxygen and mobilizing it when needed.

Charles Richet, one of Bert's students, heard him lecture about the ducks and was skeptical about the oxygen storage mechanism. He determined to test it out and attacked the problem



**FIGURE 3** Photograph of apparatus used in studying "diving" reflex in human subjects.

with the brilliant simplicity of approach which was, a few years later, to win him the Nobel Prize in quite another field, the discovery of anaphylaxis.<sup>2</sup> Richet tied off the tracheas of 2 groups of ducks. Then he held one group under water. Those ducks who were held under water lived an average of 23 minutes, more than 3 times as long as their partners who were not immersed and who lived an average of only 7 minutes.<sup>3</sup> Richet's conclusion was that the immersed ducks, by virtue of the touch of water to their faces, had conserved their oxygen, partly by slowing the heart rate.

Seventy-five years passed before the final proof of Richet's deduction was established by the studies of Harald Andersen of Oslo, Norway.<sup>4</sup> Andersen, by a series of nerve cutting experiments, documented the fact that the diving reflex, as manifest by slowing of the



## *The Turned-Off Heart*

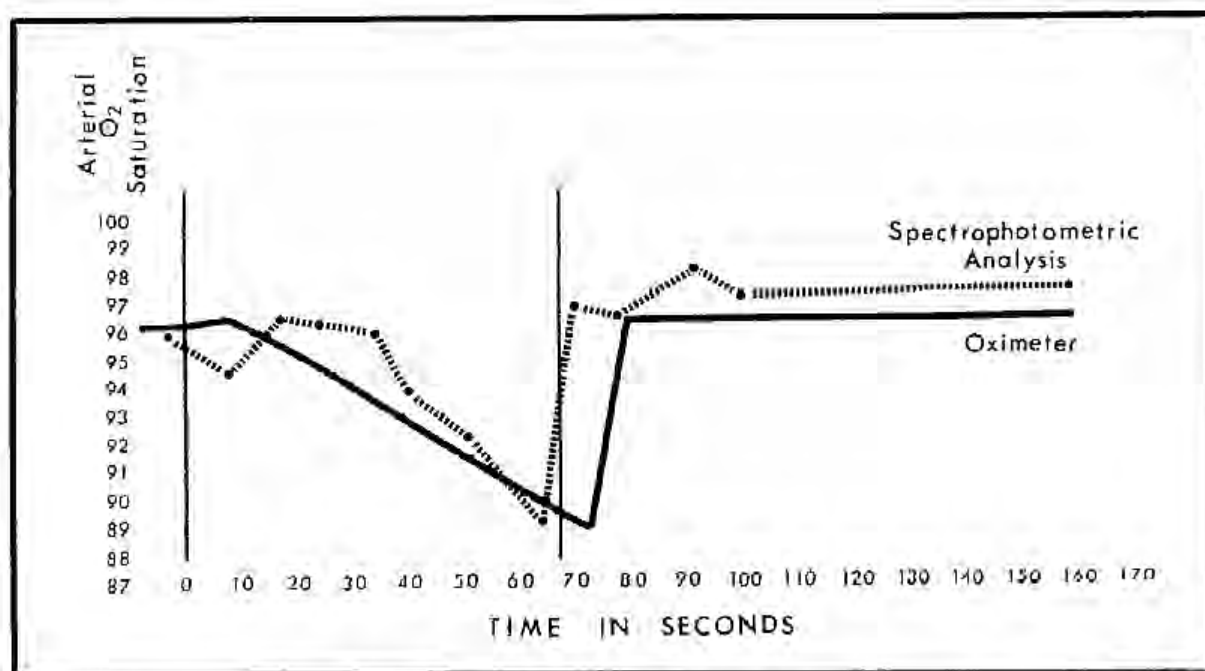
heart, depended on the integrity of the ophthalmic branch of the trigeminal nerve.<sup>5</sup> With the nerve intact a duck could survive under water for 20 minutes. When the ophthalmic branch of the trigeminal was severed bilaterally, immersed ducks failed to slow their hearts and survived for only 6 or 7 minutes.

The researches which spanned the period of years between Richet and Andersen were performed by men who were in continuity with one another, like the runners in a relay race, each carrying the baton for a time.

I became interested in the reflex on a visit to California when I met the remarkable Norwegian investigator, Per Scholander. Scholander and associates documented the diving reflex in a variety of reptiles and mammals, including man.<sup>6</sup> His studies of Japanese pearl divers showed that they developed not only bradycardia but a variety of arrhythmias as well.<sup>7</sup>

While talking with Scholander I suddenly suspected that the diving, or more properly, oxygen-conserving reflex might, if overdone, lead to serious arrhythmias, cardiac arrest and even death. I wondered if this might not be a frequent mechanism of death from myocardial infarction. Four years ago when I was in Europe on sabbatical I visited Harald Andersen in Norway. On returning to Paris I borrowed an electrocardiograph and took it to my apartment, where I induced the various members of my family to dunk their faces in the bathroom sink.

It became apparent that there were a few very interesting differences between the duck and man. While the heart slowing reflex was very predictable, even monotonous in the duck, it was variable in man and very clearly subject to influence from higher centers in the cerebral hemispheres.



**FIGURE 4** Correlation of oximeter reading with direct measurement of oxygen on arterial blood.

Figure 1 illustrates the usual response during ordinary breath holding as contrasted with breath holding with the face under water. During ordinary breath holding slowing of the heart was observed relatively late as compared to the almost immediate slowing which occurred when the face was immersed. Under quiet circumstances the slowing of the heart which promptly followed immersion of the face was predictable and actually became more pronounced with practice. When the subjects were distracted, however, or harassed in any way the reflex bradycardia often failed to occur, despite the face being under water. Thus in man the reflex could be inhibited presumably through the higher nervous centers.

Figure 2 illustrates how the higher centers may also facilitate the reflex. On several occasions it was noted that the slowing began immediately after the order to immerse was given and before the face reached the water. Thus the reflex was observed to occur in anticipation of immersion. To further strengthen the inference that the highest neural levels were able to initiate the bradycardia without immersion of the face in water, a 'false order' was given. That is, the subject was instructed to immerse the face and then immediately the order was countermanded. Clear cut slowing occurred nevertheless.

Following return to the United States it became possible to study the oxygen-conserving reflex in man in greater detail. Initial studies were carried out on 30 healthy men, varying in age from 19 to 54 years, in the fashion illustrated in Figure 3.

The subject was seated in a chair inclined forward with the forehead supported in a sling. A recording ear oximeter, Waters Model X.P. 90-A, was applied to the left pinna, an automatic recording sphygmomanometer to the right arm, skin resistance

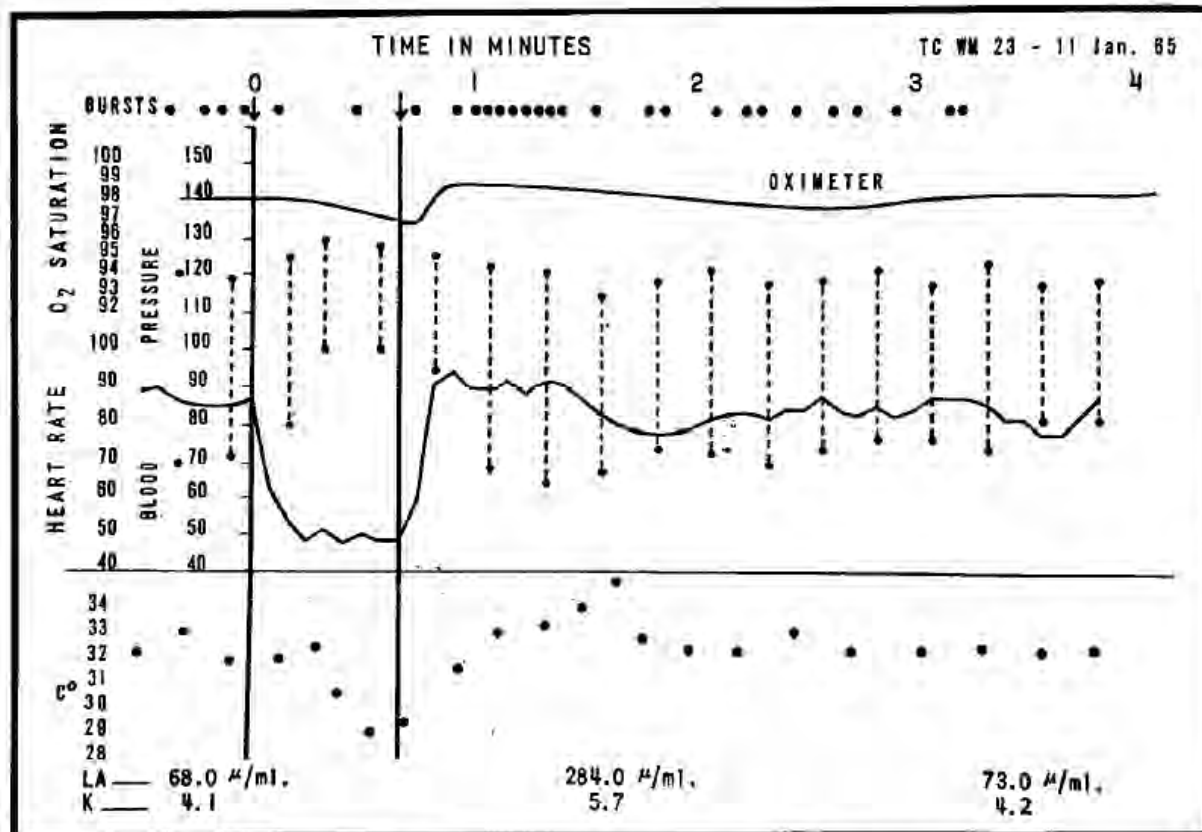
electrodes to the right palm, cardiometer electrodes to the right arm and left leg, and separate EKG electrodes for lead two. Skin temperature on the fingers of the left hand was measured by a Hardy radiometer.<sup>8</sup> After a suitable control period a water-containing plastic basin was raised up to the subject's face so that it could be immersed without the need to change position. On a finger signal to terminate the dive, the basin was lowered away and the face was blotted with a towel, the subject still in his original position. Arterial blood samples from the brachial artery were drawn by arterial puncture before and immediately after the dive in most experiments. In others, an arterial catheter was introduced and left in place throughout the experiment. Samples were obtained at 10-second intervals throughout the dive and following the dive. The values for arterial oxygen saturation, determined by a modified method of Johnston,<sup>9</sup> corresponded closely with the readings obtained on the ear oximeter, as shown in Figure 4. Other determinations on the arterial blood included:

Lactic acid, determined by a modification of the Conway microdiffusion method.<sup>10</sup> Oxygen saturation, determined using a two-component, double wavelength spectrophotometric procedure, with measurements at 650 and 508 nanometers using a modified Nahas cuvette.

Potassium was determined by a flame photometer using a lithium internal standard. Carbon dioxide content was determined with a motorized Natelson microgasometer, pH electrometrically using a thermostated micro capillary glass electrode system.

The most striking finding was the close correlation among the various indicators of the oxygen-conserving reflex, as indicated in Figures 5 and 6. The extent of bradycardia accompanied by the other indicators was variable from person to person and from time to

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**FIGURE 5** Striking bradycardia associated with the other changes of the oxygen conserving reflex observed during breath-holding with face under water for 40 seconds. The lower scale is finger temperature.

time in the same person, depending on the circumstances, especially the presence or absence of surrounding confusion or excitement and the phase of breathing during which breath was held.

Approximately 60 runs were made under prevailing circumstances of quiet calm with the breath held in mid respiration or partial expiration, and without the performance of a valsalva. Bradycardia promptly followed immersion each time, with a sharp decrease in frequency of sinus arrhythmia, recorded as "bursts" on Figure 5, and with a roughly proportional change in the other indicators of the

oxygen-conserving reflex. In approximately 30 runs, in which the subjects were rushed or harassed with a multitude of instructions, the pulse failed to slow, bursts of sinus arrhythmia continued, and the other indicators remained stable, despite the face being immersed in water (Figure 6). Arterial oxygen saturation fell very little during immersion when the reflex was highly developed, but markedly when it failed to occur.

Accentuation of the reflex to the greatest degree was observed when the immersion experience was accompanied by fear. One apprehensive medical student slowed his heart rate

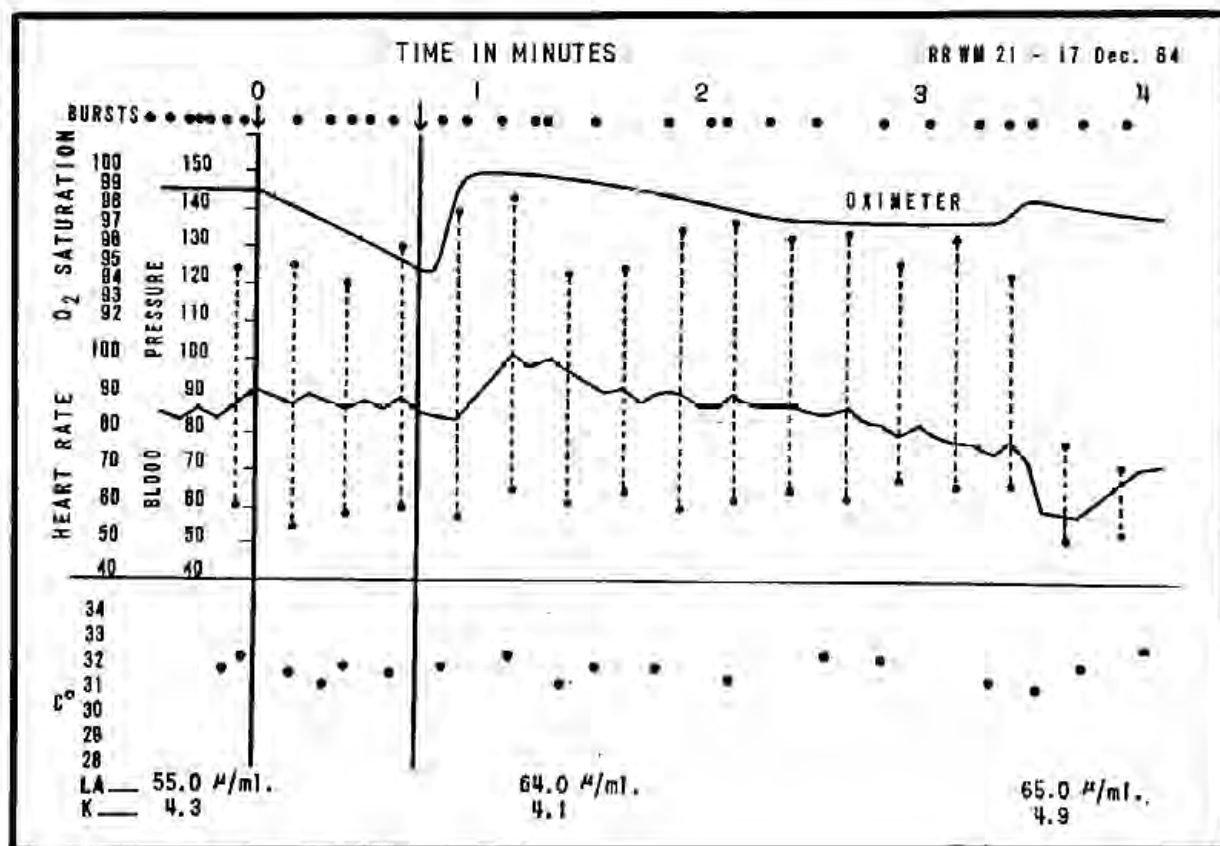


FIGURE 6 Failure of the oxygen-conserving reflex to appear in harassed subject during breath-holding with face under water for 40 seconds.

from 86 to 36 beats per minute within ten seconds of immersion of his face in water. Indeed, in three subjects the stress of arterial puncture prior to immersing the face in water induced a striking bradycardia associated with vigorous arterial constriction in the extremities, the diving reflex without diving. When the needle was finally introduced into the artery to yield blood samples, it was found that all of the elements of the oxygen-conserving reflex had been elicited without their having been any interruption of breathing. In each instance, serum lactic acid and potassium were found to be high (Table 1). In samples taken 15 minutes later, when the pulse rate of all three

subjects was above 70, the values for the lactic acid and potassium in the arterial blood had returned to the normal range.

From these data it would appear that the oxygen-conserving reflex may be elicited in man not only by immersion of the face in water, but by other stimuli as well, including fearful experiences in which there is no palpable threat of oxygen deprivation. The complex bodily response is subserved presumably by autonomic impulses in the vagus for slowing the heart and perhaps sympathetic effects as well to bring about vasoconstriction and mobilization of glycogen from the liver for anaerobic metabolism. It would appear, therefore, that



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the diving reflex is an atavistic response, available under appropriate circumstances of oxygen lack, but also invoked, seemingly inappropriately, in response to emotionally-charged or threatening events. The characteristics of the response are similar to those of the hibernating animal, and are reminiscent of the opossum, who, when threatened, plays dead.

Individuals can be trained to breathe very little, and thereby consume little oxygen. Professor Anand of New Delhi made a classical study of Yogis who stay sealed in coffins under water for several hours. He found a striking bradycardia associated with the diminished respiration, very likely an example of the oxygen-conserving reflex coming into play.<sup>11</sup>

### **The Mechanism of Death**

Hellerstein and Associates<sup>12</sup> monitored with the EKG a varied group of patients moribund from non-cardiac conditions such as poisoning, terminal cancer and pulmonary conditions. They found that death occurred with ventricular fibrillation or cardiac arrest in approximately the same relative proportion as seen in death from myocardial infarction. The inference is that to achieve death the heart must somehow be turned off.

### **Experimental Study**

The possible relevance of the oxygen-conserving reflex to the mechanism of sudden death

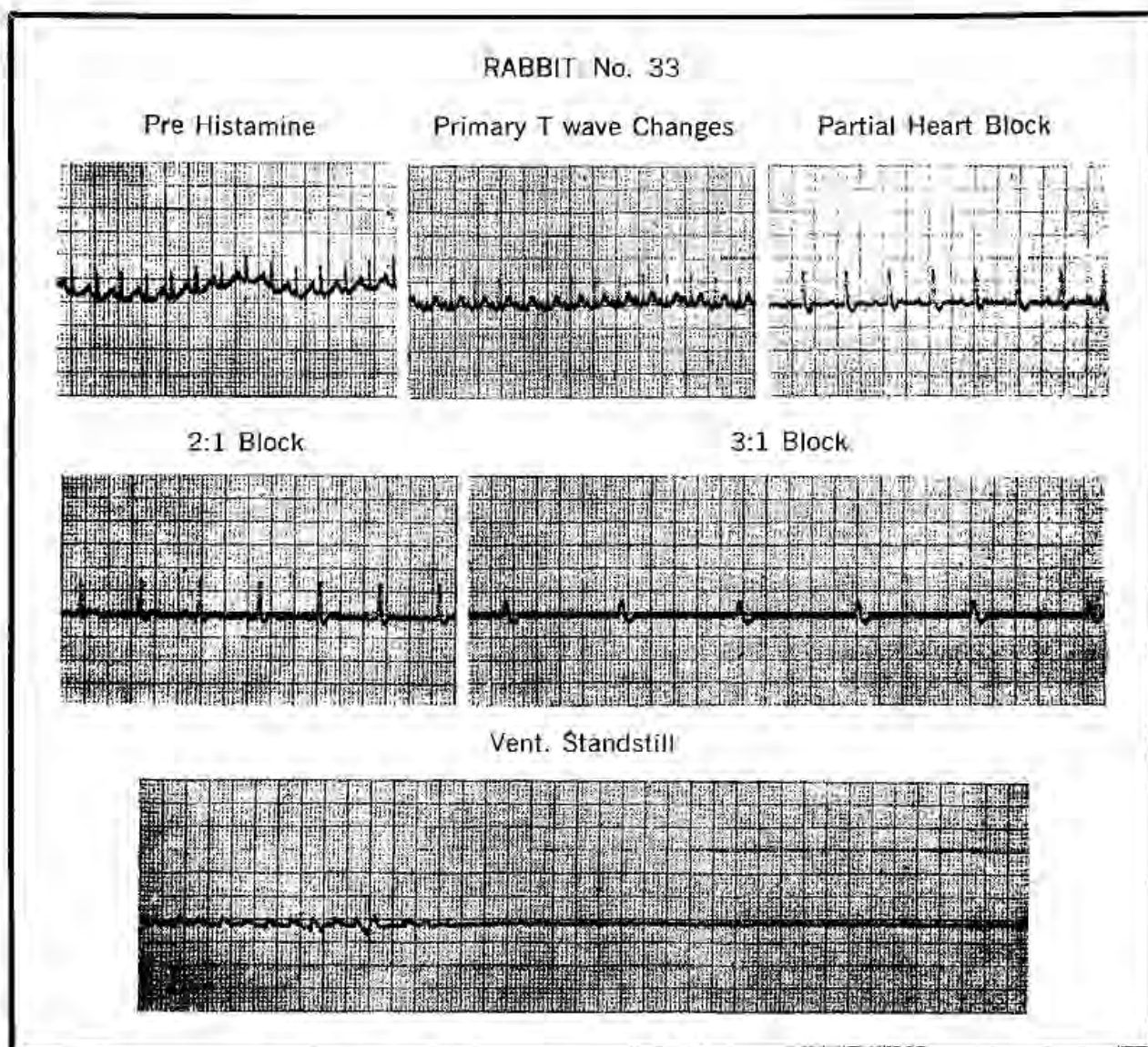
in the absence of direct injury to the heart was explored in a series of 37 rabbits equipped with polyethylene catheters in appropriate arteries and veins to record pressures and yield blood samples for analysis. Some of the animals were sensitized to human or horse serum and later killed by intravenous challenge by the antigen.

The sequence of events leading to death was initiated by manifestations characteristic of the oxygen-conserving reflex, namely bradycardia and a transitory rise in arterial pressure associated with a fall in the pH of arterial blood and a rise in lactic acid and potassium. There ensued generalized convulsions, hypotension and a series of arrhythmias including ventricular premature contractions, auricular fibrillation, prolongation of PR conduction time, variable AV blocks, complete AV dissociation, ventricular fibrillation and cardiac arrest. (Figure 7A & 7B) It was found that the whole process could be simulated by injecting histamine intravenously into non-sensitized rabbits. The brain was identified as the site of action of the histamine by comparing the time of onset of the effect after injecting threshold doses of histamine into a carotid artery with that following injection into a femoral vein. The effects of both anaphylaxis and histamine could be blocked by anesthesia and the bradycardia, EKG abnormalities and death could be prevented by prophylactic atropinization. Indeed atropinized rabbits could survive 10 times the

**TABLE 1**

	Lactic Acid $\mu\text{g./ml.}$		Potassium $\text{mEq/L}$	
	Initial	15 Minutes	Initial	15 Minutes
M.C.	316	68	5.6	4.2
O.L.	134	72	5.1	4.1
N.A.	222	81	5.4	4.4





**FIGURE 7A** The electrocardiogram following parenteral injection of 1 milligram of histamine into a 10 pound unanesthetized rabbit.

quantity of injected histamine lethal to non-atropinized animals.

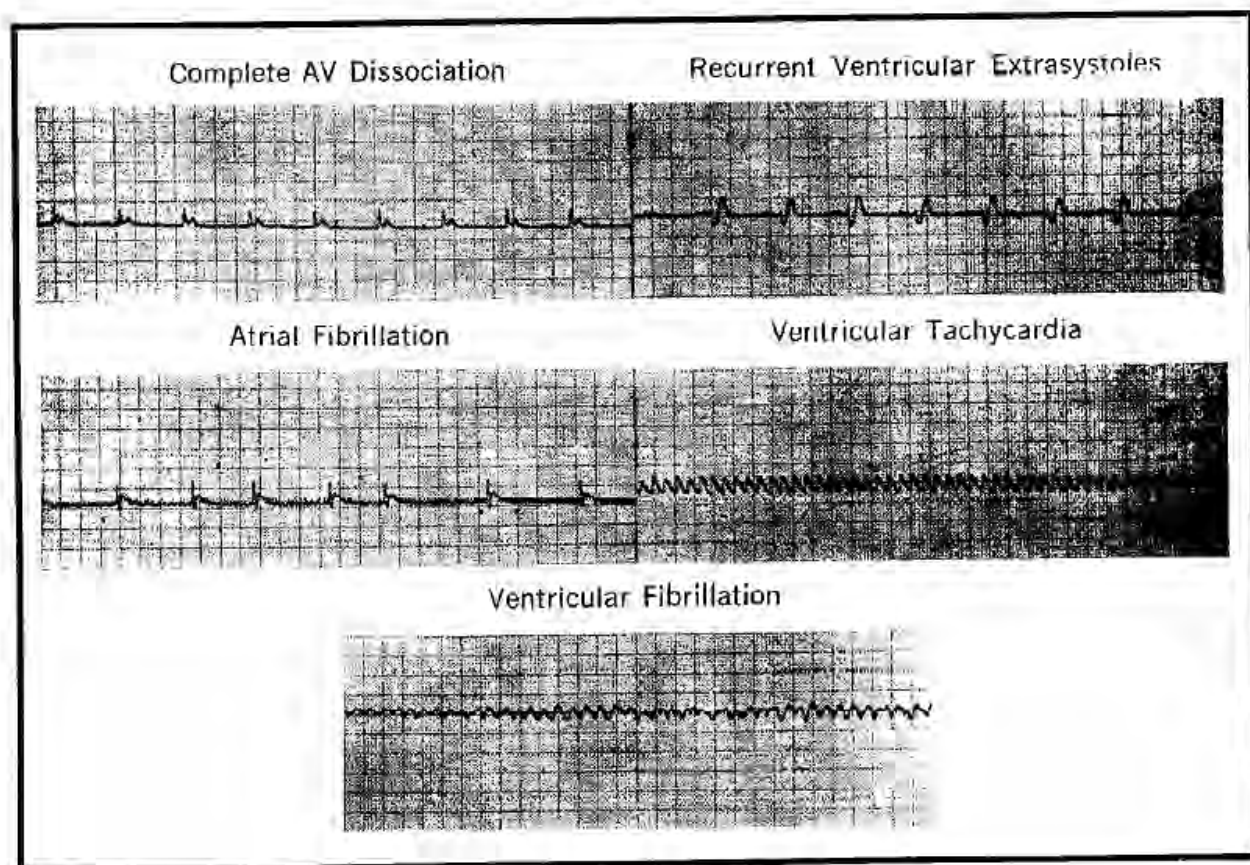
The site of central coordination of the cardiovascular manifestations of the oxygen-conserving reflex has been identified by stereotaxic methods in dogs and cats as the area of the nucleus of the tractus solitarius<sup>13</sup> Figure 8 illus-

trates the effects of stimulation at this site.

### **Sudden Death in Myocardial Infarction**

Sigler has suggested that patients with coronary artery disease, as manifest by myocardial infarction or angina pectoris may have an unduly easily elicited vagal mechanism, having

## The Turned-Off Heart



**FIGURE 7B** Further electrocardiographic changes in the rabbit induced by parenteral histamine injection.

observed that they have more sensitive carotid sinus reflexes than do healthy controls.<sup>14</sup> In confirmation of this notion, Schneider found that among patients who have had a myocardial infarction at some time in the past, those with the greatest tendency to bradycardia in response to startle had the poorest prognosis.<sup>16</sup> Finally, as pointed out above, fright may be associated with bradycardia and the other features of the diving reflex. Intense fear commonly accompanies myocardial infarction. Thus, the hazard of bradycardia is increased with the possibility of death from an over-exuberant oxygen-conserving reflex.

McWilliam, in his description of ventricular

fibrillation in 1889, suggested that it could be produced by "... inhibitory influences exerted through the vagus nerves and dependent on reflex excitation."<sup>18</sup> Later investigators, including Starling in 1921, found evidence that vagal stimulation could induce varying degrees of heart block, including complete heart block.<sup>17</sup> Experimental confirmation was achieved in man when Weiss, Ferris and Capps induced temporary complete heart block by sudden inflation of a balloon in their patient's esophagus.<sup>18</sup> From further studies of the autonomic control of the heart Weiss concluded "in the presence of ischemic myocardium and hyperactive reflexes, fright or other emotional stress may induce

cardiac arrhythmia, syncope and death."<sup>19</sup>

### **Experimental Myocardial Infarction**

More than 35 years ago Leriche and associates demonstrated in animals that excision of the upper thoracic sympathetic ganglia reduced greatly the likelihood of extrasystoles and ventricular fibrillation immediately following sudden occlusion of a coronary artery.<sup>20</sup> The findings were extended in the studies of Mauning, et al.<sup>21</sup> and of de Takats, Beck and Fenn<sup>22</sup> who demonstrated reflex coronary constriction in pulmonary embolization. The Canadian group, and later LeRoy and Snider described in dogs a generalized vasoconstriction in the heart immediately following experimental occlusion of one artery.<sup>23</sup> They observed that "the uninfarcted part of the myocardium gradually becomes as dark as the infarct just before ventricular fibrillation commences." Seventy-five percent of their ligated animals died in this fashion. In as many as two-thirds of them, however, both groups of authors were able to prevent ventricular fibrillation and death by partial deafferentation of the heart through sympathectomy, by performing the procedure under deep anesthesia, or by pre-treatment with atropine or atropine plus theophylline derivatives. More recently, Porter and French demonstrated an important central element in the reflex, namely increased excitability in the reticular activating system induced by hypoxia, hypoglycemia or hypercapnia, but also by light anesthesia.<sup>24</sup> In very recent studies in rabbits, death from anaphylactic shock or intravenously administered histamine was shown to be attributable to reflex effects on the heart capable of being blocked either by deep anesthesia or atropine.<sup>25</sup>

### **Psychosocial Factors**

Since it appears that both cardiac arrest and

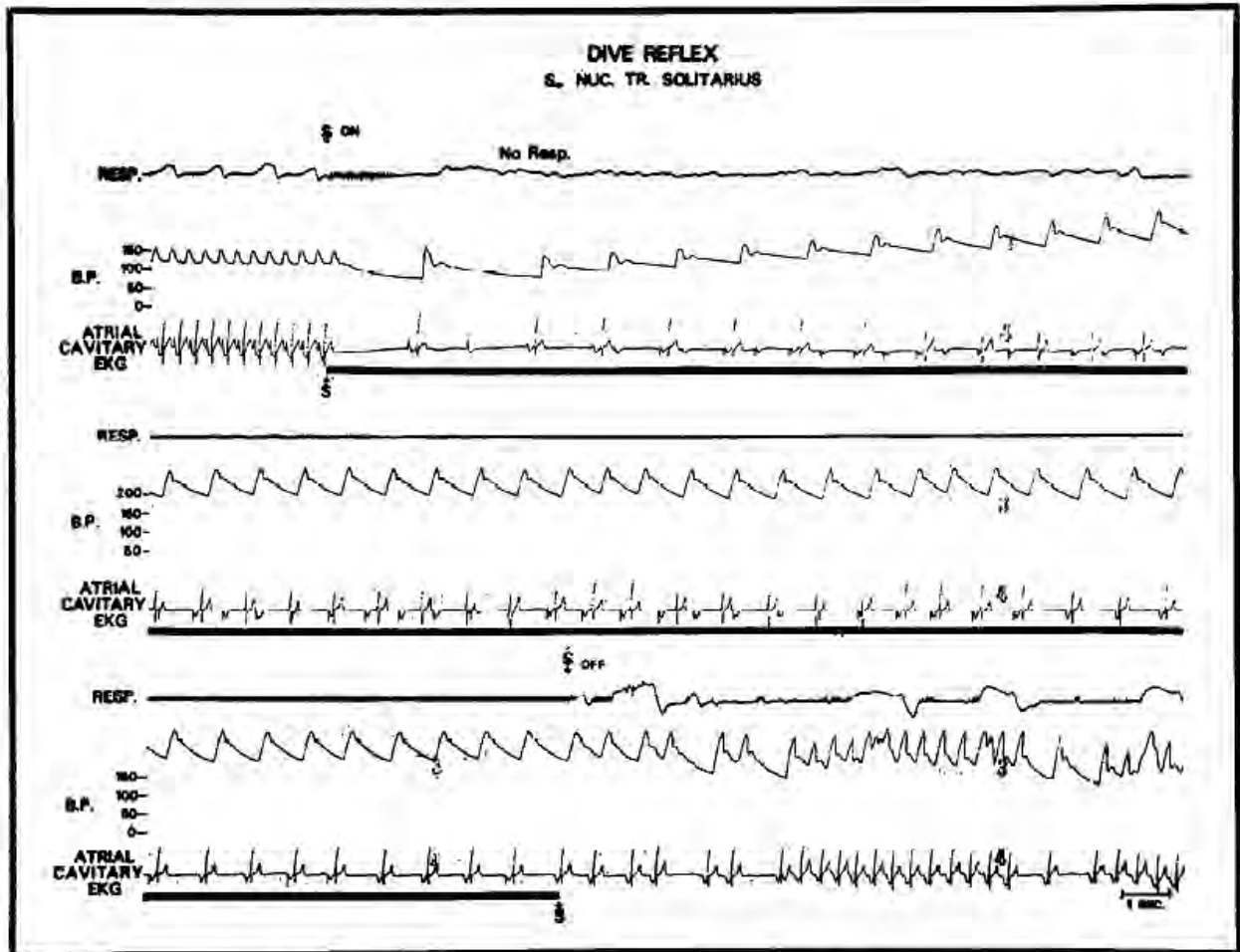
ventricular fibrillation, potentially fatal as they are, can be induced via neural mechanisms that may be actuated through the highest integrative levels of the brain, it becomes interesting to explore those symbolic stimuli that may be relevant to these processes.

Dasberg has reported that myocardial infarction is disproportionately high among patients hospitalized for mental depression.<sup>26</sup> Our own group has observed that those who have suffered or died from myocardial infarction have been alienated to some degree from their culture or social setting.<sup>27</sup> Bruhn and Adsett reported preliminary analysis of psychosocial data obtained at intervals over a five-year period on 24 patients with coronary disease who have since died. Two of them died by suicide, and the others of recurrent myocardial infarction. In each instance the patients achieved higher depression scores on the Minnesota Multiphasic Personality Inventory over this time period than did their healthy matched controls.<sup>28</sup> More of the patients than controls had experienced long term frustration in their jobs and at home. They were unable to find meaningful satisfaction in leisure and social activities, and made either no attempts, or only slight attempts, to modify their way of life following myocardial infarction.<sup>28, 29</sup> These characteristics appeared to exert an additive effect over time. The observations are in keeping with those of Paffenbarger, et al.,<sup>30</sup> who found that social and psychological exhaustion correlated significantly with subsequent death from coronary heart disease.

### **Community Studies**

To observe the other side of the coin it might be appropriate to consider the findings in Roseto, Pennsylvania, an Italian-American community where not only is the incidence of myocardial infarction in the first five decades

## The Turned-Off Heart



**FIGURE 8** Continuous record showing pattern similar to dive reflex with stimulation in dog nucleus Tr. Solitarius. Apnea, bradycardia with A-V dissociation and rise in arterial pressure are shown, (Stimulation 30/s 0.2 msec. 1.7v).

of life remarkably low, but so also is the death rate following myocardial infarction in the older age groups.<sup>31</sup> Roseto is a place where the populace is generally obese, where the diet is at least as rich in saturated fats as the average American diet,<sup>32</sup> and yet where the death rate from myocardial infarction is less than half that of neighboring communities, or of the U.S. at large. The most striking peculiarity of Roseto is its social structure. Unlike most American communities, it is cohesive and

mutually supportive, with strong family and community ties. Because of the concern of the inhabitants for their neighbors there is no poverty and little crime in Roseto. Data gathered prior to death among the small number of Rosetans who have succumbed to myocardial infarction indicates that they were, to a large extent, alienated or excluded from the mainstream of their culture. Thus it would appear that some of the elements of voodoo death may be operative in our society today.



The extent to which such factors may be responsible for our relatively high mortality from myocardial infarction is yet to be determined, but the available evidence certainly warrants more careful study of the possible relevance of psychosocial factors to myocardial infarction and sudden death.

### Death as Adaptation

Irrespective of the potential importance of emotionally significant stimuli, it does appear from the data that sudden cardiac death is the result of an adaptive maneuver, and represents the operation of a regulatory process rather than the breakdown of a mechanism. J. B. S. Haldane once wrote "The growth of scientific

medicine has been based on the study of the manner in which the human body expresses itself in response to change in the environment." In recent years evidence has accumulated that some diseases constitute simply exaggerated or inappropriate adaptations.<sup>33</sup> Thus, disability and death may result from fundamentally protective reaction patterns gone awry.

The adaptive significance of a mechanism that results in cardiac death must indicate that death at times is the ultimate solution to a pressing problem or difficulty. Thus, when intolerable suffering is imminent from an incurable disease or circumstances, death may best serve the needs of the individual.

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## SOCIAL READJUSTMENT AND ILLNESS PATTERNS: COMPARISONS BETWEEN FIRST, SECOND AND THIRD GENERATION ITALIAN-AMERICANS LIVING IN THE SAME COMMUNITY

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HOLMES' quantitative instrument for studying the association between the clustering of life events and illness onset has been applied to various diagnostic and cultural groups [1-9]. The scale has been shown to have a high degree of recall validity and to be a valid predictor of illness onset [10].

Holmes Social Readjustment Rating Questionnaire (SRRQ) was felt to be especially relevant in further elucidating the association between life events and illness onset in an Italian-American community, Roseto, Pennsylvania. This community has been the focus of clinical and sociological studies since 1962 in an effort to seek explanations for the community's low death rate from myocardial infarction [11, 12]. Studies also showed that the community had a low incidence of treated mental illness of all types [13]. A house-to-house sociological survey of 86 per cent of the adult residents of Roseto, carried out in 1966, provided baseline data regarding social conditions, life styles, values and attitudes [14]. These data could be compared with subsequent data in order to document the processes of community change and the effects of change on the health of the residents. The present paper is a follow-up of our earlier studies and focuses on life change in the community and among family groups.

The purpose of the study was threefold: (1) to ascertain what differences, if any, existed in the Life Change Unit (LCU) scores among first, second and third generation Italian-Americans living in the same community; (2) to determine the degree of association between LCU scores and illness experience among these three groups; and (3) to gain insight into the possible association between the types and degree of life change occurring in the community since the sociological survey was undertaken five years previously.

### METHOD

#### *The social readjustment rating questionnaire*

The SRRQ and the method for its administration has been described in detail elsewhere [1]. In summary, it is a self-administered questionnaire comprised of 43 life events derived from clinical experience. Subjects are asked to indicate the number of times each of these events have occurred in their lives during the last six months, six months to one year, one year to two years and two to three years. The number of marks for each item are tabulated, multiplied by the value of the item as reported by Holmes [1], and then summed to obtain the subject's total life change units. A face sheet provides information regarding the subject's age, sex, marital status, religion, education, occupation and other social data. In the present study, in addition to the above, each subject was

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asked to list all illnesses (minor and major) which occurred during each of the four time intervals and indicate whether or not he consulted a physician for these illnesses. If the subject saw a physician the physician's name was requested in order that the visit could be validated.

### *Subjects*

The subjects were 204 Italian-Americans living in Roseto, Pennsylvania in 1971. Subjects were the adult members of 18 families or "clans" which were selected for study because they were the largest family groups in the community and, in addition, provided a cross-section of first, second and third generation family life. The subjects were visited in their homes by one of four members of our research team who administered the SRRQ. The social characteristics of the total sample are shown in Table 1. The majority of the subjects were second and third generation Italian-Americans who had lived in Roseto for most or all of their lives. The majority of the subjects were Roman Catholic, married, had completed grade or high school and were engaged in skilled or unskilled occupations. The subjects in the sample were representative of the community with respect to these characteristics as determined by the previous sociological survey.

TABLE 1.—SOCIAL CHARACTERISTICS OF TOTAL SAMPLE

Social characteristic	Frequency	%
1. Sex		
Males	94	46
Females	110	54
2. Mean Age = 54 (range 23-93)		
3. Religion		
Protestants	41	20
Catholics	163	80
4. Marital Status		
Married	171	84
Never married	19	9
Widowed	14	7
Divorced or separated	0	0
5. Education (completed)		
Grade school	96	47
High school	82	40
Technical school	6	3
College	20	10
6. Occupation		
Professional or managerial	35	15
Sales and service	12	6
Clerical	4	2
Skilled	92	46
Unskilled	13	8
Retired	48	23
7. Length of residence in community		
One year	5	2
Two years	7	3
Five years	16	8
Ten years	9	4
Over ten years	167	82
8. Generation		
First generation (subject and both parents born in Italy)	13	7
Second generation (Subject born in U.S., both parents born in Italy)	117	57
Mixed (Subject born in U.S., one parent born in Italy, the other in U.S.)	25	12
Third generation (Subject born in U.S., both parents born in U.S.)	49	24

### Definitions

Four generational groups were identified for the purposes of the present study. Subjects who were born in Italy and whose parents were also born in Italy were included in the first generational group. Subjects who were born in the United States, but whose parents were born in Italy were included in the second generational group. Subjects who were born in the United States and had one parent born in Italy and the other parent born in the United States were considered a "mixed" generational group. Subjects who were born in the United States and whose parents were also born in the United States comprised the third generational group.

## RESULTS

### Total LCU scores by social variables

The generational groups, as would be expected, differed with respect to age; the mean age of the first generation was 73 yr, the second generation 57 yr, the "mixed" group 52 yr and the third generation 41 yr. A Pearson Product Moment correlation was computed and it was found that age was significantly negatively correlated with LCU ( $r = -0.37, p < 0.001$ ), i.e. the lower the age the higher the LCU score. Mann-Whitney  $U$  tests were performed to see if sex, religion and education were related to LCU, but none of these comparisons were statistically significant. The Kruskal-Wallis  $H$  test was used to determine the association between occupational groups and LCU, but was not statistically significant. Since 84 per cent of the sample was married no correlations were made between marital status and LCU.

### Total LCU scores by generation

Figure 1 shows the cumulative percentage distribution of LCU scores by generational group. When the LCU scores of these groups were compared using the Mann-Whitney  $U$  test it was found that the first generation differed significantly from each of the other three groups. The LCU scores of the second generation differed significantly from those of the third generation. However, the LCU scores of the second and third generation did not differ significantly from the "mixed" group. The mean LCU scores were 161 for the first generation, 253 for the second, 277 for the "mixed" and 344 for the third.

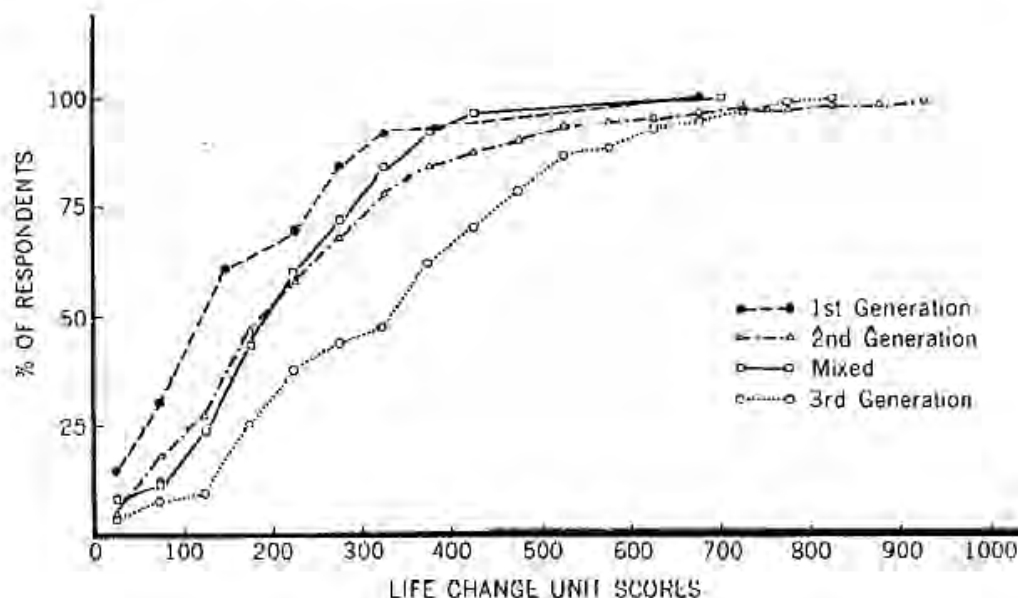


FIG. 1.—Cumulative percentage distribution of life change scores by generational groups.

### Frequency and magnitude of life changes in sample

Table 2 shows the frequency distribution of the total sample on each of the 43 life events. Vacation was the most frequently reported life change followed by death of a close family member or close friend. Six life events were not reported, i.e. jail term, divorce, marital reconciliation, marital separation, fired at work and foreclosure of a mortgage or loan. The reported frequency of life events is in accord with the cultural norms of Roseto. It is a small community of predominately Italians who



TABLE 2.—MAGNITUDE AND FREQUENCY OF LIFE CHANGE IN TOTAL SAMPLE AND BY GENERATION

Life change	Magnitude	Total sample	Frequency			
			First gen.	Second gen.	"Mixed" gen.	Third gen.
Vacation	13	593	18	340	73	162
Death of a close family member	63	158	10	99	19	30
Death of a close friend	37	120	2	80	10	28
Personal injury or illness	53	87	6	49	5	27
Change in health of a family member	44	85	3	38	11	33
Change in financial state	38	85	—	43	7	35
Gain of new family member	39	74	—	28	11	35
Change in sleeping habits	16	60	2	27	13	18
Change in eating habits	15	54	4	30	5	15
Change in work hours or conditions	20	52	3	32	5	12
Change in church activities	19	50	—	27	9	14
Outstanding personal achievement	28	50	1	34	5	10
Changes in social activities	18	49	—	30	2	17
Change in responsibilities at work	29	47	—	21	8	18
Change in recreation	19	46	—	19	6	21
Son or daughter leaving home	29	46	—	29	7	10
Wife began or stopped work	26	42	—	28	1	13
Change in living conditions	25	38	—	20	6	12
Change in number of family get-togethers	15	36	—	17	8	11
Business readjustment	39	27	—	10	3	14
Change in residence	20	23	—	8	10	5
Mortgage or loan less than \$10,000	17	23	—	5	4	14
Retirement	45	17	2	14	1	—
Change to different line of work	36	17	1	6	2	8
Revision of personal habits	24	14	—	5	5	4
Sex difficulties	39	14	—	12	1	1
Minor violations of the law	11	13	—	7	—	6
Trouble with boss	23	12	—	5	2	5
Change in number of arguments with spouse	35	11	—	6	1	4
Pregnancy	40	10	—	1	2	7
Trouble with in-laws	29	6	—	1	—	5
Death of spouse	100	9	4	4	—	1
Mortgage over \$10,000	31	6	—	—	1	5
Begin or end school	26	8	—	1	2	5
Marriage	50	2	—	—	—	2
Change in schools	20	2	—	—	—	2
Jail term	63	—	—	—	—	—
Divorce	73	—	—	—	—	—
Marital separation	65	—	—	—	—	—
Fired at work	47	—	—	—	—	—
Foreclosure of mortgage or loan	30	—	—	—	—	—
Marital reconciliation	45	—	—	—	—	—

are largely Roman Catholic and who have lived in the community most of their lives. The community has remained remarkably stable, not having experienced an influx of Italians from Italy



since the early 1900's. Its culture has been modified by the values of larger American society primarily through Rosetans working in nearby towns and young Rosetans attending college. While industrious, Rosetans take time for annual vacations, in fact, the mills which employ a majority of Rosetan women as sewing machine operators close for bi-annual vacations. A high degree of family and community solidarity prevails, hence deaths occurring in the community have a marked impact, this is especially so when the death of an older member occurs signalling the decreasing influence of Old World ways in the life of the community. The prevailing religion is Roman Catholic, thus accounting for the lack of divorce, marital separation or marital reconciliation as life events of consequence. Pride in economic self-sufficiency and rallying to aid those in financial distress accounts for the lack of foreclosure of a mortgage or loan as a major life event. Respect for family and community norms necessitates only a token police force and an inactive jail. Therefore, the majority of life changes reported are largely those involving personal habits.

#### *Life change categories by generation*

When the 43 life events were grouped in a manner similar to that used by Rahe [7] it was found that the generational groups differed significantly according to the categories of reported life events (Table 3). Significantly more of the first and "mixed" generational subjects than expected reported familial life changes, more second generational subjects reported personal life changes and more third generational subjects reported changes in the area of work and finance ( $\chi^2 = 177.30$ ; 6 *df*;  $p < 0.001$ ).

TABLE 3.—FREQUENCY OF LIFE CHANGE CATEGORIES BY GENERATION

Life change categories*	Generation							
	First		Second		"Mixed"		Third	
	N=	%	N=	%	N=	%	N=	%
Family	17	30	250	23	152	62	147	24
Personal	33	59	691	64	59	24	347	57
Work and Finance	6	11	136	13	33	14	111	18
Total no. changes	56	100	1077	100	244	100	605	99

\*  $\chi^2 = 177.30$ ; 6 *df*;  $p < 0.001$ .

#### *Total LCU scores by illness experience*

Subjects were grouped into two categories, those reporting illnesses and those who did not. The Mann-Whitney *U* test was used to assess the relationship between LCU scores and illness and was statistically significant ( $U = 3947$ ,  $p < 0.01$ ). The group of subjects reporting illnesses had higher LCU scores than those subjects reporting no illnesses.

#### *Frequency and type of illness by generation*

Table 4 shows the frequency distribution of illness by generation. The majority (77 per cent) of the first generation reported no illnesses over the three year period covered by the SRRQ. Approximately half of the second and third generation reported no illnesses and one-third of the "mixed" generation reported no illnesses. It is especially interesting that very few individuals in all generations reported more than one illness during the three year period. Table 5 shows the distribution of illness categories by generation for those individuals who reported illnesses. Since only four individuals in the first generation reported illnesses the sample size does not warrant inferences about illness type. However, it is of interest that the majority of individuals in the second, "mixed" and third generation groups reported gastro-intestinal, musculoskeletal, respiratory and genito-urinary illnesses. Sixteen per cent of the second generation reported cardiovascular illnesses, while none were reported among the "mixed" generational group and only six per cent were reported among the third generation. The high frequency of physician visits among all four generational groups is of particular interest. Undoubtedly the accessibility of Italian physicians within one mile of Roseto is a factor in the high utilization. Also, the fact that the community has been under study by our group since 1962 has modified the community's views toward illness, especially heart disease, and may account for the greater utilization of physicians.

TABLE 4.—FREQUENCY OF ILLNESS BY GENERATION

Number of illnesses per person	Generation							
	First		Second		"Mixed"		Third	
	N=	%	N=	%	N=	%	N=	%
None	10	77	55	47	8	32	24	49
1	2	15	42	36	16	64	18	37
2	1	8	14	12	1	4	6	12
3			5	4	—	—	1	2
4+			1	1	—	—	—	—
Totals	13	100	117	100	25	100	49	100

TABLE 5.—FREQUENCY OF ILLNESS TYPE BY GENERATION

Illness category	Generation							
	First		Second		"Mixed"		Third	
	N=	%	N=	%	N=	%	N=	%
Dermatological			5	5	1	6	3	9
Respiratory	—	—	6	7	3	17	5	15
Gastro-intestinal	—	—	15	16	7	39	5	15
Musculoskeletal	1	25	16	17	2	11	8	24
Cranial	1	25	7	8	2	11	2	6
Cardiovascular	—	—	15	16	—	—	2	6
Genito-urinary	1	25	7	8	1	6	5	15
Neuropsychiatric	—	—	3	3	—	—	1	3
General	1	25	18	20	2	11	2	6
Totals	4	100	92	100	18	100	33	100
Those sick who consulted a physician	4	100	85	92	17	94	32	97

*Life change in Roseto in historical perspective*

The historical evolution of Roseto and descriptions of the early life of its inhabitants has been well documented [16, 17]. In addition, a description of the way of life of the community as we found it in 1962 has been reported [11]. Roseto is markedly different from other Italian settlements in large American cities [17]. Rosetans share a common ancestry which, in the past, has bound them to relatives and friends in Roseto, Valfortore in the Province of Foggia, Italy. Like other immigrants around the turn of the 19th century a small group of Rosetans came to America in search of freedom from feudal lords and poverty. Roseto has maintained itself as a separate ethnic enclave composed almost entirely of Italians since 1912, and has admitted only non-Italians who have married Italians into the community. Immigrants from Roseto, and other parts of Italy have settled in Toronto, Canada since that time. While Roseto, Pennsylvania has lost many young residents to the mainstream of American society through inter-ethnic marriage and better jobs, it has been able to retain its exclusivity since incorporation as a separate municipal borough. Rosetans have been able to retain many of the Old World ways which are closely tied to religion and the extended family. We noted in 1962, however, that Roseto was rapidly undergoing acculturation as young Rosetans went to school in a nearby non-Italian community. Many young men went away to college, or worked outside the community. Also, as Rosetans have become more affluent they have increasingly sought the pleasures of material goods and leisure activities offered outside the community. By 1965 the social clubs in Roseto began to decline in membership. Inter-ethnic and inter-religious marriages increased. The birth rate began to decline. Rosetans began building fashionable homes outside the borough boundary and some attended churches outside the community. Since 1966, when the house-to-house sociological survey was conducted, there has been a notable increase in the number of Rosetans with summer homes, swimming pools, bars in their homes, boats and new cars. Dietary habits have changed as young Rosetans eat away from home more frequently and women engage in dieting. Rosetans now go to Europe on vacation, to Las Vegas or to the racetrack. The community initiated

its first Golf Tournament in 1971. In the past year the Presbyterian Churches in Roseto and adjacent Bangor have consolidated. Third and fourth generation Rosetans seldom know the Italian language and perhaps more striking the first two deaths from myocardial infarction among men under the age of 45 were recorded in 1971.

It is in this setting of accelerating social and cultural change that the present study was conducted in 1971 to ascertain the degree to which the Holmes Social Readjustment Scale would shed light on life changes and illness experienced among the different generational groups living in the community. As the first generation die the last remaining ties of the community to the Old World are rapidly disappearing and the community is fast becoming indistinguishable in habits, customs, folkways and language from larger American society.

## DISCUSSION

The findings that LCU scores were highest among third generation Rosetans, who were also younger, would be expected if the number and type of life change is related to age and acculturation. Indeed, third generation Rosetans reported more life changes related to work and finance, the second generation had more changes in their personal lives and the first and "mixed" generation reported more life changes related to family life. Vacation and death were the two most frequently reported life changes across generational groups. Death has been the most prevalent life change reported in other cultural groups [5-7], but vacation has ranked toward the bottom in these groups when the frequency of the 43 life events are ordered. This difference is undoubtedly due to the fact that vacations are an important event in the community of Roseto. Work for those employed in the community is suspended for two weeks twice each year and the impact of this is evidenced by the marked decrease in the social activities of the town during these periods. The obvious omission of divorce, separation and reconciliation as life changes is related to the Roman Catholic religious norms which guide the lives of 75 per cent of Rosetans.

Illness experience was significantly related to LCU. However, 77 per cent of the first generation reported no illnesses over a three year period. It should be pointed out, however, that first generation Rosetans are no doubt a select group. The fact that they are living beyond the usual life expectancy for most Americans and report few health problems attests to their physical stamina. It is of interest that 16 per cent of the second generation which is a high risk age group for cardiovascular disease reported such illnesses. Since the prevalence of cardiovascular disease in the community has been of special interest in our studies, the continuation of follow-up studies among second and third generation Rosetans will further elucidate the relationship between changes in the rate of cardiovascular disease and the processes of social change and acculturation in the community.

## SUMMARY

After about 80 yr as a fairly stable society Roseto, over the past seven to ten years, has been undergoing a rapid acculturation into the conventional American pattern. Formerly close family and community ties have been weakened and the self-contained, self-sufficient character of the society has been eroded as the oldest inhabitants have died and the youngsters of ten years ago have come into a position of social influence. To document the changes as they have affected individuals, the Holmes Social Readjustment Rating Questionnaire was given to 204 Italian-Americans living in Roseto, Pennsylvania to ascertain what differences, if any, existed in the Life Change Unit scores of first, second and third generation groups and to determine



the degree of association between LCU scores and illness experience in these three groups. The LCU scores were found to increase with acculturation, i.e. the first generation had the lowest and the third generation had the highest LCU scores. The generational groups also differed with respect to the type of life change they experienced. The first generation reported more changes in family life, the second generation experienced more change in their personal lives and third generation reported more changes with respect to work and financial matters. LCU was found to be significantly related to illness experience. The majority of the first generation reported no illnesses, while the second and third generation were more similar than different in both the number and types of illness experienced. The results were discussed in terms of the social and cultural changes that have occurred in the community during the past ten years it has been undergoing study by our group.

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# The Place of the Person in Medical Education

Stewart Wolf

**T**HE KEY PERSONS in the process of medical education are, of course, the patient, the teacher, and the student himself. Unfortunately, susceptible as we are to the winds of fashion, we have tended to depersonalize all three. The popular preoccupation with statistics and risk factors has encouraged a tendency to think of patients as numbers rather than as people. With the aim of making Grand Rounds exercises neater and crisper, the patient is often dispensed with; even if he is presented, his specific problem is rarely dealt with. Rather, he becomes a springboard for discussion of some disease or pathophysiological process.

The teacher, too, is being pushed aside to some extent by the computer and the multimedia approach. With the help of such powerful techniques, the teacher should be in a position to spend more person-to-person time with his students; instead, he is in committee meetings or planning sessions or traveling. Moreover, many teachers are beginning to believe that computer-aided histories and questionnaires have not only better memory and reproducibility but better discrimination than does the interview. They overlook the fact that the human computer can catch subtle cues and change pace or direction to pursue a pertinent lead toward the solution of the individual patient's problem.

Finally, the students are becoming somewhat depersonalized by virtue of their sheer numbers. The faculty talks about increasing enrollment, core curricula, shortening the years in medical school, allied health professionals, and the delivery of health care. These "buzz words" of today would have been anathema to the academic 20 short years ago. The chief reason for this change of heart is the availability of earmarked money, and it has become popular in high governmental circles to think that health care problems can be solved by a quantitative approach. One result of this is reduced personal contact between student and teacher. Most of us can recall unplanned and even casual contact with teachers and patients in the clinic or the laboratory as a rich source of learning. The current trend toward shortening the curriculum, at the same time standardizing it with what is euphemistically called a core, tends to minimize the opportunity for such leisure learning—what I call the education from "hanging around." Shortening the curriculum also greatly reduces the opportunity for student research and tends to make the whole educational process more passive in the face of what we all know: that the vitality of the educated man stems from his ability to inquire on his own.

## OBJECTIVES IN MEDICAL EDUCATION

Educationalists are inclined to focus on methods, on modifying behavior, rather than on ascertaining what is happening in the person. The currently honored trinity of information, skills, and attitudes are clearly part of the necessary harvest of an



educational experience, but they do not define the process of education. The objective of all education is the cultivation of the person. One finds fairly universal agreement on this point at faculty retreats, but the agreement dissolves when the same individuals come together in a meeting of the Curriculum Committee. They then revert to the habit of equating education to the transfer of information. The person is central to everything we do in teaching and learning in medicine. It is the human being in all his variety that challenges us and makes it all worthwhile.

The etymology of the word cultivation is interesting: the Latin *colere* means to care for. The past participle of *colere* is *cultus*, the root for cult, culture, and cultivate. *Colere*, therefore, means not only to care for but to till, to refine, and also to venerate or worship. The word worship comes from a Middle English root that means worth, merit, or value. To value highly is to worship. Care or caring is the common denominator in the etymology of both roots. As Francis Peabody insisted many years ago, the care of the patient begins with caring for the patient.

### ACHIEVEMENT OF OBJECTIVES

In my judgment the process of education, of cultivation of the person, takes place primarily in three ways. First, from exposure, including unplanned exposure, hanging around, to achieve a breadth of experience. Lucretius once said, "I am a part of all I have seen." That may be true, but from an educational standpoint it is certain that all I have seen is a part of me. At one of the institutes of the Association of American Medical Colleges held in Swampscott, Mass., on the subject of clinical teaching, it was agreed after considerable thoughtful discussion that education implies growth, training, and discipline. An excess of training might lead to the beautiful symmetry of the espaliered tree, pleasing to the eye but bearing little fruit. Growth undisciplined, on the other hand, might lead to the leafy fullness of the tree in the untended wilderness, dense and green but again bearing little fruit. The best yield of fruit comes from the tree in the well-kept orchard, trimmed and disciplined but growing free and not necessarily identical with its neighbors. A second component of the education process is discipline. A third element in education is inspiration, or in the current vernacular, being "turned on." I liken the role of the teacher in education to that of the starting motor used in the old days at airports. The great plane parked at the ramp cannot possibly fly on the power of the starting motor, and yet the starting motor is required to activate the plane's own engine. So it is with the student. Often the teacher, mistaking his role as the starting motor, thinks that the student can fly on the power that he can transmit. The student can fly only if his own engines are activated.

### STANDARDS AND STANDARDIZATION

The proper function of the educator is reproduction, not duplication. *Educo* in Latin means to lead out. Teachers sometimes apply instead a Latin derivative that means to lead into, namely to indoctrinate. Such behavior on the part of teachers and the consequent less-than-optimal motivation among many students may be, in part, due to the fact that our social patterns encourage conformity rather than distinction or originality. The large number of boards and reviewing bodies in existence today reflects a general self-consciousness characterized by each of us

seeking reassurance from the other that he passes muster. The result is to substitute approval for achievement as the goal of the learner.

Society has always built safeguards against the deviant. Today the medical teacher is hemmed in on both sides by powerful approving (and disapproving) forces. To survive in research he must satisfy the study sections of the NIH. To work with students and house officers he must earn the approval of the various visiting teams of the American Medical Association and specialty boards. There is a danger in undue emphasis on peer approval. Dr. Alan Gregg, in referring to the Specialty Board of Internal Medicine, once told an august gathering of the American College of Physicians something to this effect: You are fooling yourselves, gentlemen. You are not finding out what these young men can do. You are not even finding out what they know. You are only finding out whether or not they know the same things you know.

The justification for the boards is of course the need to establish and maintain standards. Standards is a deceptive word. Like love and motherhood, it has a good sound—not at all like its cousin, standardization—and yet so often those who court standards end up marrying standardization. A standard was originally a flag or emblem, a visible evidence of authority. Ultimately it connoted a level to which one could aspire. A minimum standard may not imply a limit of aspiration, but its very tangible nature makes it an attractive and natural goal for many who, had they had only the abstract goal of learning, might have developed themselves and thus contributed more to our world. "A man's reach should exceed his grasp, or what's a Heaven for."\*

#### PEER REVIEW

The scientific establishment has been tremendously strengthened by the funds appropriated by Congress that have been conscientiously administered by the peers of the scientific community. The need for continuing financial support has, however, accentuated the trend toward conformity. It is sobering to contemplate the ultimate effect of such a system on the truly creative mind. The need to achieve popular approval would have hampered Galileo, Pasteur, or thousands of other less well known original thinkers. The eagerness for more and more financial support and the need to achieve it by seeking approval has led in some quarters to an attitude close to prostitution.

#### HAZARDS OF INDEPENDENT THOUGHT

Progress in any field is dependent upon freedom of thought, not upon the possession of passports stamped by an approving authority. As pointed out earlier, education differs from training in that it is fecund, productive. It is also in a sense cumulative. A horse well trained 100 years ago would not be inferior to a well-trained horse today. In the interim, however, well-educated people have explored new territories. Such explorations require courage as well as freedom of thought. Several years ago in a commencement address at the University of Colorado, I quoted from a movie scenario by Dylan Thomas. The story is about Rock, a professor of anatomy in a medical school in the Middle Ages. He is giving his last

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\*Robert Browning, "Andrea del Sarto," *Men and Women*, London, Chapman and Hall, 1855.

lecture:

To think, then, is to enter into a perilous country, colder of welcome than the polar wastes, darker than a Scottish Sunday, where the hand of the unthinker is always raised against you, where the wild animals who go by such names as Envy, Hypocrisy, and Tradition are notoriously carnivorous, and where the parasites rule.

To think is dangerous. The majority of men have found it easier to write their way into the parasitical bureaucracy, or to droop into the slack ranks of the ruled. I beg you all to devote your lives to danger; I pledge you to adventure; I command you to experiment. Remember the practice of anatomy is absolutely vital to the progress of medicine. Remember that the progress of medicine is vital to the progress of mankind. And mankind is worth fighting for—killing and lying and dying for. Forget what you like, forget all I have ever told you, but remember that.

I guess what Rock was saying to us is that the truth will set you free. That, after all, is what science and education are all about.

As was pointed out early in this essay, freedom is not wildness or license, not the absence of discipline. Freedom is uniquely human; it is a social inheritance, if you will, having to do with the person. Freedom is such a simple word that having uttered it we may not realize how much has been said.

A wise Oklahoma City man once compared the modern scholar to a squirrel: He should be free to garner the best from the topmost boughs of the boundless forest. Committed to the annulling tread of conformity within the confines of a miserable cage, however, he cracks only the nuts supplied by his keeper. Emerson, in these words, saw the business of cracking only nuts supplied by a keeper: "Men grind and grind in the mill of truism, and nothing comes out but what was put in. But the moment they desert the tradition for a spontaneous thought, then poetry, wit, hope, virtue, learning, anecdote, all flock to their aid." Unfortunately, those with creative imagination are not always equally endowed with courage. It takes a hardy soul to withstand the pressure of disapproval and continue running on the topmost bough. Too many of us walk voluntarily in the cage of conformity. Thus in our efforts to achieve acceptance we cultivate habits of thinking that lack freshness and originality.

#### ENVOI

The capacity for education has evolved as a unique attribute of man. It utilizes the vast neural interactions in the human brain that can yield almost limitless variety in thought and behavior. It allows for development of insight and understanding based on learning and on access to the accumulated wisdom of the ages. Few of us approach our potential for education, for personal cultivation. Those who do have usually been inspired by another individual or by a rich personal experience. Thus the person is central to medical as to all education.



# Bill Bean in New Guinea

The time was 30 years ago, 1944. The place was Biak, a small coral island off the northwest coast of New Guinea. New Guinea is a large island, the second largest on the face of the earth; only Greenland is bigger. Biak was part of what was then called Dutch New Guinea, now west New Guinea.

In their sweep south early in World War II, the Japanese had driven the natives from Biak. They entrenched themselves in caves, along with a large coast artillery piece or two. In a costly battle, the Americans drove the Japanese out of the caves and off the island, thereby making a place for the Ninth General Hospital, the Cornell affiliated unit. That was us.

We had spent the previous year on another island located off the northeast corner of New Guinea. It was called, ironically, Goodenough. During the 12 months that we had been stationed at Goodenough, we had not tasted a single piece of fresh meat or bread, or had a single egg or sip of milk. The only exceptions were Thanksgiving and Christmas when the US Army, by dint of extraordinary organization and effort, produced real turkeys with the inevitable "all the trimmings." Otherwise we had dined on Australian canned rations, five varieties of mixed victuals that differed from one another in consistency, but that all tasted the same—bad!

Against this background, it is easy to imagine how delighted we were to learn that the famous nutrition expert, Bill Bean, was going to visit us. We were confident that, as soon as he

had an opportunity to recognize our plight, he would start wheels turning that would bring us the sustenance we needed and deserved.

Bill had two major jobs in the Army, as a researcher on climate stress and as a consultant on nutrition. In the former capacity he had been working with the Tank Corps in the desert trying to figure out how to stop sweating and whether or not it was worthwhile to try to air-condition the tanks. As a nutrition consultant, he had participated in the development of the famous K ration. The earlier inedible little cans of food had been called C rations. Under Bill, the nutrition program vaulted all the way from C to K in a single leap.

We had heard of the K ration, and the word was that it was "finger-lickin' good." We had high hopes that Bill would convert our supplies to K. So, naturally, we gave him a warm welcome—in fact, we gave him the red carpet treatment. My tentmates and I had been hoarding a couple of bottles of Australian brandy for several months. Bill's arrival seemed like an ideal time to break it out, but we didn't want him to feel that we were making any sacrifice. We decided to serve it before supper in the tent, inviting Bill to join us as if we were observing a regular ritual on a normal day.

At the appointed time for Bill's visit he arrived, cheerful and dapper, his khaki uniform starched and pressed. For over a year I had been washing my own clothes in Goodenough, beating them against a rock in a stream and, in Biak, in a fresh

water pool near the shore.

Together, Bill and I made a striking picture of the prince and the pauper. As the supper hour approached, I poured lavish amounts of Australian brandy into Bill's glass and my tentmate's and mine. We pressed fresh fruit on him (limes and bananas that we had painstakingly gathered from an abandoned native village a few miles away). The only thing I remember hearing Bill's cheery voice say was, "You fellows certainly live well." We had yet to take him to supper, however, where on portable metal mess gear, he would have to dine with us on that wretched Australian canned ration.

Supper time came and went. Bill said very little. I expected him to explode with expletives or to say, "You fellows can't live on this stuff. I'll see to it that you get K from now on." Instead, he smacked his lips.

It is a credit to our restraint that we continued to show our hospitable side to Bill during the two or three days he spent with us. We finished the Australian brandy. Bill had some private high-level talks with our colonel, and we learned later that he had expressed satisfaction with the lean and healthy appearance of the officers and men of the Ninth General Hospital. He confided that he was going to give our outfit high marks for nutrition. High marks were what the colonel lived for, so Bill left us, smiling that engaging smile of his. As his plane disappeared into the distant clouds, it was time for chow again!

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## PRESIDENTIAL ADDRESS

### SOCIAL ANTHROPOLOGY IN MEDICINE: THE CLIMATE YOU AND I CREATE

STEWART WOLF, M.D.\*

GALVESTON

Since the dawn of recorded history man's view of the cause of disease has vacillated between attributing it to forces from without—cosmic influences—to those within—devils, humors, being possessed, etc. Outside forces gained center stage a hundred years ago with the emergence of the germ theory of disease. In 1884, just a few years after that bacteriologic milestone, the American Climatological Association came into being because the founders were not convinced that microbes explained everything about such diseases as tuberculosis, the leading scourge of those days. Koch's identification of the tubercle bacillus was well known to them but they could not believe that the microbes alone determined either pathogenesis or recovery from the disease. On the other hand, differences in geographical distribution of prevalence and severity of tuberculosis directed the attention of our member Climatologists to the physical ambience, air, temperature and moisture, so they devoted much of their meetings to a consideration of the curative powers of spas and resorts. Ultimately, the members became dissatisfied with such a narrow focus of concern. In 1915 Dr. Henry Sewall of Denver stated in his Presidential Address:<sup>1</sup>

"The noble scheme conceived by the founders of this society to bring together a band of workers who should systematically investigate the physical forces of nature as they influence the physiological reactions of the body does not seem to have been sufficient to maintain the enthusiasm of our body."

In recent years a new aspect of the environment has come in for consideration. Rene Dubos, who spent much of his scientific life in pursuit of the tubercle bacillus, eventually concluded that more important than the physical atmosphere, and even more significant to the spread of tuberculosis than crowding, malnutrition and poor hygiene, was the social environment, especially social upheaval.<sup>2</sup> In several parts of the world, he found that mortality from tuberculosis reached its peak within ten to twenty years after industrialization and thereafter declined.<sup>3</sup>

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During the Romantic Era, tuberculosis was the disease of the productive years of life and the leading social malaise was unrequited love. The behavior of the romantic was characterized by expressiveness and spending. Today, in contrast, the characteristic attitude of our Calvinistic culture, dominated by the work ethic, is accumulation and restraint. Moreover, our social emphasis is on the individual rather than on family and group relationships. As Henry Sigerist has observed, each era in the development of western culture has been characterized by the prevalence of certain diseases.<sup>4</sup> Today the scourge we face is arterial disease, especially coronary artery disease and hypertension with the all too frequent consequences of stroke, myocardial infarction and sudden death.

I should like to explore with you the relevance of social forces to disease, medical anthropology, if you will, proposing that we add to our interest in altitude, temperature, rainfall, humidity and so forth, a concern with the social climate.

People create the social climate and, in turn, are greatly affected by it. Their behavior is organized and systematized into social patterns, ground rules that evolve into traditions and taboos as they weave the fabric of a culture. Much as we hate to admit it, cultures are built on conformity. What we call progress comes chiefly from the breaking of traditions, from new ideas that generate new ground rules. There is something in each of us that leans in both directions—toward change, exploration and the testing of new ideas on the one hand, and on the other toward conformity with tradition and the stability that comes from approval of one's peers.

It is fascinating to me that the diseases of western civilization—myocardial infarction, hypertension, arthritis, and so forth—are uncommon in strongly traditional societies whose stability contrasts sharply with our highly mobile western culture.<sup>5</sup> The absence of the ravages of cardiovascular diseases is particularly striking in so-called primitive countries where vector borne and other infectious diseases have been all but wiped out.

#### MEDICAL IMPLICATIONS AND SOCIAL CHANGE IN BRUNEI, BORNEO

Summer before last, I had an opportunity to join the cruise of the Scripps research vessel, ALPHA HELIX, to Brunei, in north Borneo, where I studied the effects of rapid social change on rural tribes dwelling in jungle communities.<sup>6</sup> Figure 1 is a map of Borneo. For about 10,000 years and until oil was discovered on the shore, very little change in social patterns seems to have taken place among jungle dwellers. Since World War II, however, in the wake of enormous affluence from the offshore oil and gas deposits, the country has been undergoing an extraor-



FIG. 1. Southeast Asia. In the early centuries of the present millenium, much of the territory shown, plus the southern Philippines, belonged to the Sultanate of Brunei.

dinarily rapid social change. The villages, formerly accessible only by river boat and jungle tracking, are now visited frequently by helicopters that bring, among other things, sanitation, insect control, free medical services and supplies. A network of new roads is rapidly invading the jungle and schools are springing up in nearly every neighborhood among formerly illiterate tribal people. Finally the State, in the person of the Sultan, is encouraging everyone to adopt the religion of Islam. In the face of these multi-faceted social pressures, the rural people have adapted remarkably well, at the same time holding tenaciously to their extremely cohesive family structure and their traditional animistic religious beliefs that go back thousands of years.

We were assisted in our work. In fact, our work was made possible by our association with two people on the scene who had spent more than a dozen years in Brunei in contact with the rural jungle tribes. One, Barbara Harrisson, is an anthropologist and the other, John Moran, is a physician with the British Army assigned to the Royal Brunei Malay Regiment. Both know the territory and the people and spoke the language. They accompanied me and my son, Tom. We went by foot, by boat and by helicopter and were able to visit 12 of the villages, mainly long houses of the Iban tribe, erstwhile head hunters who have given up the practice. Figures 2 to 13 illustrate some features of the life of the Iban in Brunei.



FIG. 2. An Iban in a typical skiff on a river waterway in Brunei. (Fig. by Hedda Morrison-courtesy of Borneo Literature Bureau.)

It was evident that despite recent rapid social change there prevails, at present, an effective equilibrium in rural Brunei and, associated with this, an essentially healthy state among the inhabitants of the villages. People are living to very old ages. Dr. Moran told us that in 13 years of examining and treating the rural tribal people he had never seen a myocardial infarction or a stroke. Similarly, we found no evidence of systemic hypertension, myocardial infarction, rheumatoid arthritis, peptic ulcer or ulcerative colitis. Figures 14 and 15 show mortality, population and epidemiologic data. Tentative conclusions from this brief study are suggested by our previous experience with the Italian community of Roseto, Pennsylvania, whose salubrious state of health appears to have lasted only as long as old world attitudes and traditions were maintained while adapting to American economic and political patterns.<sup>7</sup> In order to test the implied social hypothesis, we ventured a prediction that as the newly educated youth of rural Brunei grow up in a world alien to their unschooled parents and as the anxiety relieving powers of old traditions and practices are eroded, the chronic diseases of western society may at last make their appearance. Maybe, maybe not. The answer must await an opportunity to make a return trip in a few





FIG. 3. The roof of an Iban long house amid dense vegetation alongside a river. (Fig. by Hedda Morrison-courtesy of Borneo Literature Bureau.)

years, the Sultan permitting. Either way, the results will be interesting and informative.

#### PROBLEMS OF RESEARCH DESIGN AND THE ESTABLISHMENT OF EVIDENCE

Marshalling evidence concerning the relevance of psychological and social forces to health and disease involves taking into account identifiable but non-quantifiable aspects of human interaction, a process that anthropologists and other social scientists are comfortable with but which is foreign to most of us whose background is in physical sciences and biology. Since the forces involved in sociobiological phenomena cannot be weighed or precisely measured, one must have recourse to the perceptive and descriptive skills of the investigator. No available hardware can do this job. The human computer is required, a far more complex and sophisticated instrument than the largest electronic device but, interestingly, the product of volunteer labor.

While social attitudes and values and such emotions as anxiety, fear and feelings of being abandoned on the one hand and, on the other, love,



FIG. 4 A typical Iban long house. (Fig. by Hedda Morrison-courtesy of Borneo Literature Bureau.)

loyalty and trust cannot be quantified, they are relatively easily identified and certainly must not be dropped from consideration. There is very persuasive evidence that the lack of human warmth can have a disastrously stunting effect on the growth and development of infants.<sup>8</sup> The mortality rate among infants cared for in this fashion is alarmingly high despite good sanitation and adequate food. Even among adults the sudden loss of love, especially with the death of a spouse, may increase the risk of death, especially sudden death. Parkes,<sup>9</sup> and Rees and Lutkins,<sup>10</sup> epidemiological data clearly relate recent bereavement to a predisposition to sudden death. Lynch has learned from published reports that the death rate from heart disease is two to five times higher among those who are single, widowed or divorced than among married people.<sup>11</sup> He calls particular attention to the contrasting statistics in two neighboring states, Nevada and Utah. While they have about the same population and roughly the same ethnic mix, Nevada, marked by fragile and fracturing human relationships, has one of the highest mortality





FIG. 5. The interior of a long house, the huge living room where families intermingle. (Fig. by Thomas Wolf.)



FIG. 6. Dr. John Moran holding sick call in an Iban long house. (Fig. by Thomas Wolf.)



FIG. 7 The hornbill, sacred bird, on the wrist of a typically tattooed Iban man. (Fig. by Hedda Morrison-courtesy of Borneo Literature Bureau.)

rates from myocardial infarction of any state of the union. In contrast its neighbor, Utah, where family ties are strong, traditions are well entrenched and divorce is uncommon, has one of the lowest. It is strange that such striking evidence has been largely ignored in the cardiovascular literature and in the material circulated to the public by the American Heart Association. Lynch suggests that the strategy of the war on heart disease should include a war on loneliness. He points out that although the recognition that human contact is a source of the spread of disease and death was a landmark discovery in medicine, it is also necessary to recognize that "human relationships" may function to prevent disease and death.

As loneliness, frustration and self-doubts appear to have pathogenic significance, self-esteem, self-confidence and optimism appear to be conducive to health. In any case, it seems appropriate to supplement our consideration of emotional stress with attention to forces that counteract stress and sustain the person. Among them may be numbered strong

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FIG. 8. An outdoor altar, characteristic of the local animistic religion. (Fig. by Thomas Wolf.)



FIG. 9. Accompanying a dance with traditional gongs. (Fig. by Hedda Morris... courtesy of Borneo Literature Bureau.)

and confident religious beliefs, family solidarity and all manner of love relationships as well as the satisfaction of achievement and a sense of purpose in activities. These are forces that appear to be at work among the Abkhassians in Russia's Caucasus that are among the longest lived and healthiest people on earth.

#### THE LONG LIVED INHABITANTS OF THE CAUCASUS

The anthropologist, Dr. Sulah Benet, notes "The high degree of integration in their lives, the sense of group identity that gives each individual an unshaken feeling of personal security and continuity and permits the Abkhassians as a people to adapt themselves, yet preserve themselves, to the changing conditions imposed by the larger society in which they live."<sup>12</sup> Dr. Benet describes the Abkhassians as "a life loving, optimistic people". Concerning the place of the elderly she writes, "Unlike so many very old dependent people in the United States who feel they are a burden to themselves and their families (the Abkhassians) enjoy the prospect of continued life . . . in a culture which so highly values continuity in its traditions. The old are indispensable in their



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FIG. 10. Playing an Iban stringed instrument. (Fig. by Hedda Morrison-courtesy of Borneo Literature Bureau.)





FIG. 11. Artistic handwork.



FIG. 12. Iban boys smoking.



FIG. 13. A young man outside a new school house. (Fig. by Thomas Wolf.)

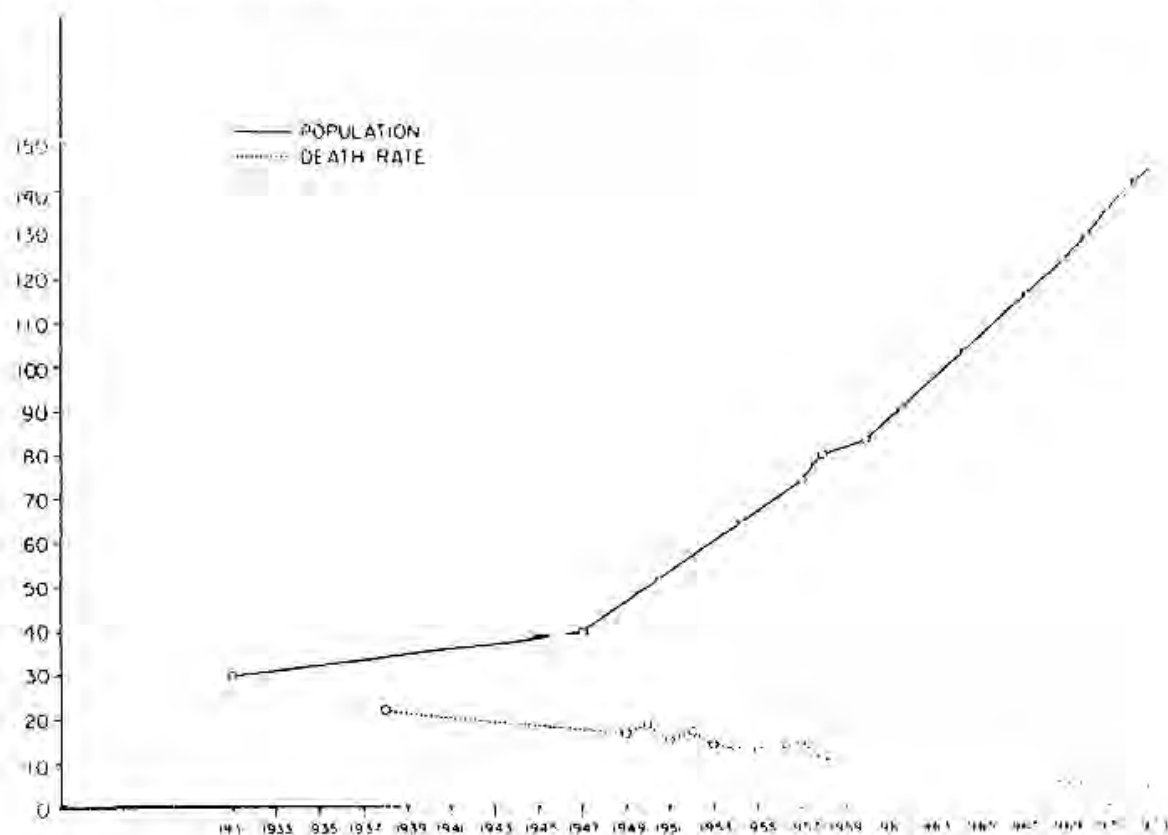


FIG. 14. Rapidly rising population in Brunei associated with a sharp decline in death rate.

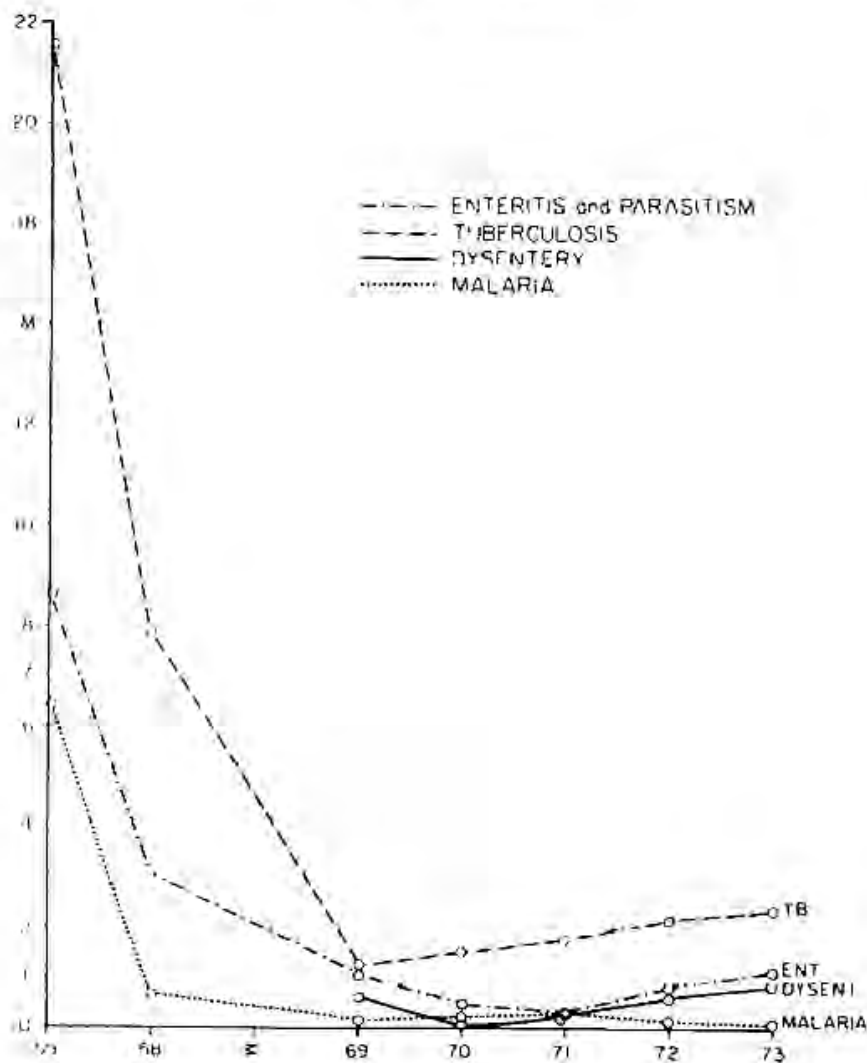
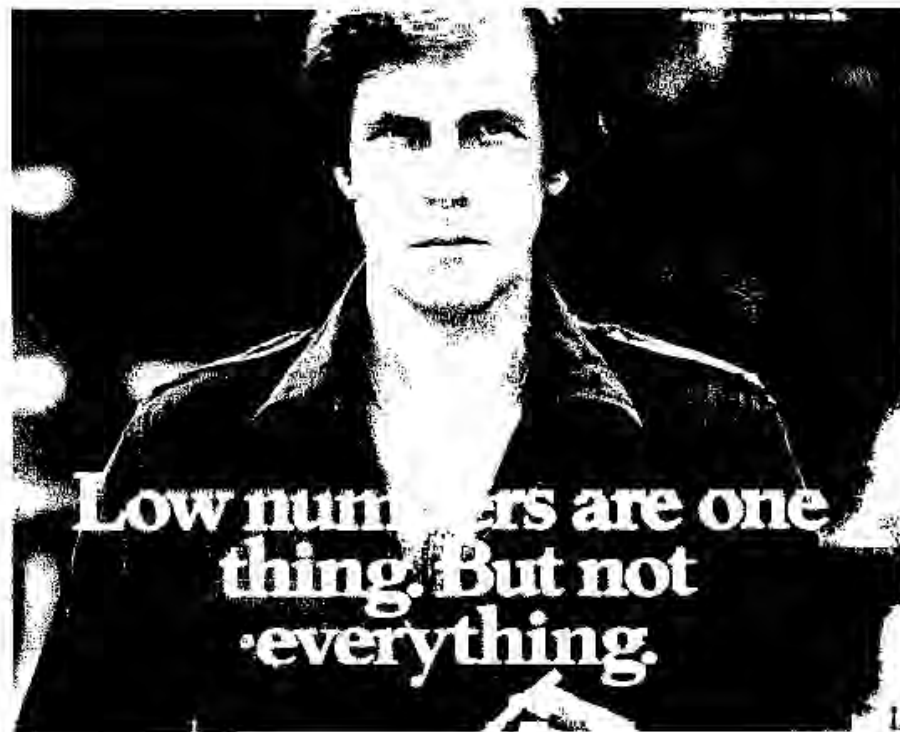


FIG. 15. Precipitous decline in infectious diseases following the institution of public health measures. Per 1000 rate 1959-73.

transmission. The elders preside at important ceremonial occasions, they mediate disputes and their knowledge of farming is sought. They feel needed because . . . they are." The similarity to the cultural pattern in Roseto and indeed in Borneo is striking.

#### THE SEARCH FOR PERSONAL FULFILLMENT

The urge to find one's place in the social scheme has preoccupied perceptive minds in Madison Avenue that seem able to reflect our social attitudes with considerable accuracy. In fact, that is what keeps them in business. What do they reflect? A dogged independence, Figures 16 and 17. The picture is telling us, "I don't depend on others and their opinions, I'm my own man or woman. I share the free spirit in almost everyone. You've come a long way, baby. You're liberated, free from entanglements and dependence on others." The ultimate in this direction is the total break away. One approach is through sensory isolation. John Lilly who, at one time, was almost conversing with dolphins in their own



Figs. 16 and 17. Young faces designed to appeal to the upcoming generation.

language has, following a residency in psychiatry, returned to his earlier work with sensory isolation and has devised a sensory damped water tank in which one can lie with only the nose and mouth exposed in order to screen out the world and get into one's self and find one's own identity.<sup>10</sup> Lilly appears to be recommending that the ultimate in the search for freedom comes from withdrawal from the world and the contemplation of one's navel.

In contrast others seek liberation through the relentless pursuit of career, often at the expense of family relationships and community roots. To such a view of personal fulfillment, everything else becomes secondary, spouse, family, friends, relaxation, aesthetic pursuits. Full-blown it is Freedman's Type A or our Sisyphus Reaction that carries a high risk of myocardial infarction and premature death. Perhaps self-sufficiency serves sometimes as a euphemism for loneliness.

The physiologic consequences of human interactions that provide the socio-cultural milieu in which we live are vividly illustrated by a placebo experiment we did several years ago in which opposite effects were obtained when the placebo was administered by different individuals on different occasions to the same 18 medical students<sup>14</sup> (see Fig. 18). One of the individuals administering the placebo was a young research fellow. The other was chairman of the department. Such results tell us something of the dynamics of the doctor-patient relationship, the effects of which are mediated through the complex circuitry of the brain to be expressed in terms of skeletal muscle and visceral function of all sorts. It appears, therefore, that the psychologic interaction of human beings, the relationship of people to each other and to

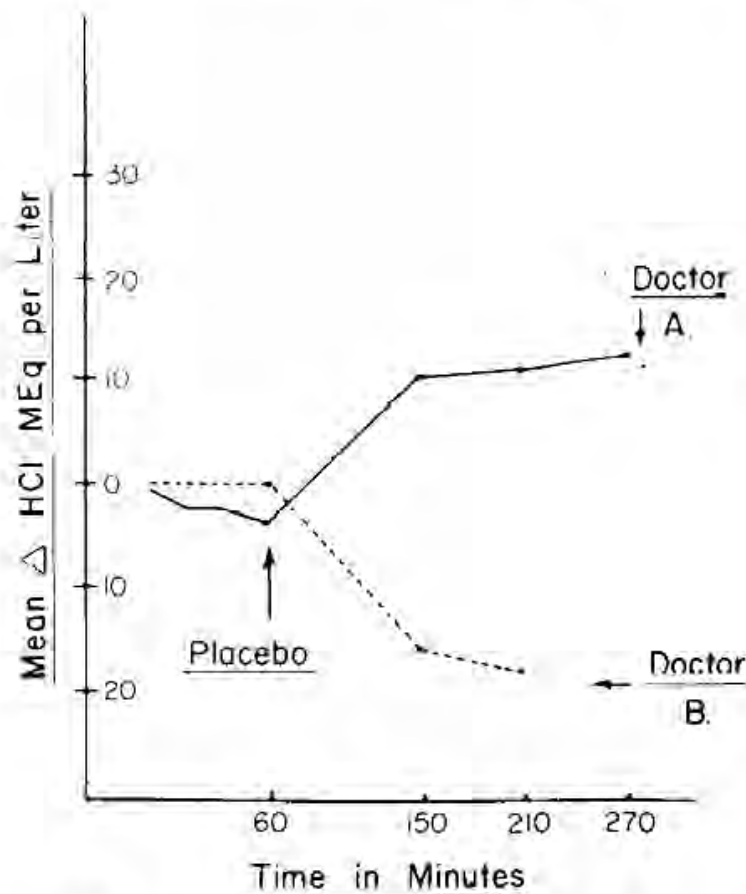


FIG. 18. Contrasting effects of a placebo given to healthy subjects under different circumstances.



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groups may be pathogenic on the one hand or helpful to your health on the other, depending on circumstances.

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# A Preliminary Study in Medical Anthropology in Brunei, Borneo

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**Abstract**—Nine rural village communities in the jungle of Brunei, Borneo were studied to ascertain possible effects of rapid social change on the health of the inhabitants. The social mores and religious beliefs of the rural tribes—Iban, Dusun, and Punan—have undergone but little change over many hundreds of years. During the past three decades, however, enormous social pressures for change have evolved from extraordinary economic prosperity of the region, due to the exploitation of large discoveries of oil and gas. Much of the money has been invested in health care, with the result that malaria, typhus and other tropical scourges have been virtually wiped out. Child and maternal mortality have been reduced to the standards of some of the healthiest countries in the world. The young of the formerly illiterate population are being rapidly educated in new schools scattered throughout the nation. New roads are penetrating the jungle and a thriving lumber industry has been established. Motor boats for the rivers, T.V. and even a national airline have been added. Despite these incursions a vigorous proselytizing by the Moslem and to a lesser extent by the Christian church, the villagers have held tenaciously to their ancient animistic beliefs. Living in long houses, they have also been able to maintain a tightly cohesive patriarchal family structure. Against this background there is as yet little or no evidence of the major diseases of Western society—coronary artery disease and hypertension, although most forms of cancer are commonly encountered. Brunei offers a splendid opportunity to test the putative relationship of chronic vascular disease to social structure and a way of life. Future studies may be made prospectively as the almost inevitable breakdown of old customs and patterns of living occurs in the face of rapid modernization.

THE OPPORTUNITY TO MAKE the observations reported here was afforded by an invitation to join the scientific party of an expedition of the ALPHA HELIX, a biological research vessel of the Scripps Institution of Oceanography. The chief scientist for the expedition was Dr. Brian McNab, Associate Professor of Zoology, University of Florida at Gainesville. The ship was moored in the Brunei River six miles from the town of Bandar Seri Begawan from July 15 to August 9, 1975.

Data were gathered during visits to nine rural village communities in the jungle terrain of Brunei, Borneo, during July and August 1975. Six Iban long houses, two Dusun villages and one Punan long house were visited with the aim of identifying strategies for coping with social change and ascertaining the effects of such change on the health of the rural villagers. Information on prevailing social patterns and pressures as well as social and behavioral changes in each cultural group was obtained from direct observation, from discussions with the inhabitants (through interpreter) and with anthropologically sophisticated informants who had lived for extended periods with the tribes. Special attention was accorded diet, work patterns, smoking, drinking, divorce, number of children, occupation and recreation. Further data were obtained from published reports available in the Brunei Museum Library. Evidence was adduced on changes in the incidence and prevalence of diseases over the past 40 years and especially over the past 10-15 years, since the institution of regular helicopter borne medical service to all villages. Discussions with local medical authorities supplemented information contained in published annual reports of the Government of Brunei.

### **The Locale and the People**

Brunei, an Islamic Sultanate and self-governing State of close to 150,000 people is located 5° above the equator in the chain of islands that extends from Singapore to New Guinea. The territory comprises two separate areas on the Northwest coast of Borneo. Now limited to 2,226 square miles, Brunei once claimed suzerainty not only over the whole of Borneo (the third largest island in the world, the name of which is a derivation of Brunei), but over a vast trading empire extending south to Java and over substantial parts of the Philippines to the northeast. The topography of Brunei consists of an alluvial, often swampy coastal plain that rises rapidly to irregular hills separated by valleys and river systems. There is relatively dense, tropical vegetation, a part of which has been cleared for cultivation.

The north Borneo coast and parts of the interior uplands attracted settlers and traders from diverse parts of mainland Asia in the course of prehistory, mainly India, China, Indochina and the Malay Peninsula. Protohistoric and historic documents describe movements between the islands of Southeast Asia, notably from Sumatra to Borneo. The racial affinities of the Brunei peoples are not clearly understood. The various ethnic groups, described as Kedayan, Dusun, Murut, Iban, Punan and



FIG. 1. Aerial view of a long house in a jungle clearing.

others, are not thought to be racially distinct from one another. Although one can point to certain physical and temperamental features of each group, they are more clearly distinguishable on the basis of the locale of their habitat and their peculiar native customs and life-style. There is little evidence of distinct racial differences.

Early and important inhabitants of this coast of Borneo included the Bajau, a nomadic water people who originally lived only on boats. A segment of them known locally as *Orang Sama* began to settle in stilt houses built very close together over and extending into the tidal waters of rivers and estuaries. This water oriented life is preferred to this day by most Brunei Malays, the core Moslem population of the State with a long history of service to the Brunei Sultanate.

Away from the coast live various other groups, notably the Iban Dayaks and Dusun, both traditional rice farmers by "slash-and-burn" technique, both feared as head-hunters until recently. Dusun villages consist of clusters of houses, each containing an extended family. The Iban, late-comers to Brunei, live in long houses that accommodate an entire village under one large roof. The Iban progressed from Sumatra to west Borneo some centuries ago, moving along river systems and coasts north and eastward, mainly through Sarawak. Iban villages in Brunei may contain between 30-300 people. Depending on local resources a long house may be built of timber, bamboo or imported materials (Fig. 1). The floor-plan has separate rooms for individual family units, each connecting with a large common hall that extends the entire length of the house in the





FIG. 2. The interior of a long house. The long common room.

manner of a corridor in a European railway car (Fig. 2). The village head-man and his family traditionally occupy the central portion of a long house. The rooms that extend either side tend to be occupied by his relatives and friends, arranged in decreasing social importance with distance from the head-man's quarters.

### **The Establishment of Islam**

The peoples of the north coast of Borneo were exposed to a variety of religious influences, including Hinduism and Tantric Buddhism, by traders and other migrants from the Asian mainland. With the advent of Islam across southeast Asia, however, these early events were submerged. The 15th century found Brunei and its people nominally Muslim under a Sultan. They nevertheless maintained their ancient "pagan" beliefs and customs to a considerable extent.

### **Ethnic Origins and Social Arrangements**

There is a very persuasive evidence from the publications of Evans (1922), St. John (1974) and others (1968) that the present day Brunei Malays as well as Kedayans and perhaps other native peoples, who possess uncanny ability to navigate in the jungle, represent a cultural evolution from an ancient sea nomad origin.

Other anthropologists have attempted to establish ethnic rather than occupational distinctions. The Dusun, who acquired



their name from the "Malays" by reason of their devotion to farming, are for example considered ethnically distinct by some. Many of them became Christians, but most, satisfied with traditional animistic beliefs, have not adopted organized religions. Those who became Muslim are usually regarded as "Brunei Malay." The Dusun and the Murut, another farming people of the interior, are listed as "indigenous" in Government records. They are entitled to citizenship and are eligible for Government employment, a desirable status (in 1973 15% of the Brunei Malay population were in Government employ). Certain native peoples, notably the Iban and Punan, as well as Chinese and Indians, whose families may have lived in Brunei for many generations, are not accepted as Brunei citizens unless they pass an examination in the Malay language, embrace Islam or negotiate, in addition, other formalities.

### **The Brunei Malay Society**

The Brunei Malay, while clearly the most privileged of the peoples of Brunei, are themselves socially stratified. Various perquisites in the form of housing, automobiles, servants, pensions and allowances filter through the hierarchy from the oil-rich State coffers of the Sultan. Most indulged are the near and distant relatives of the Sultan's family, Pengerans. Next come those of noble but not royal blood. Ranking after them are the aristocracy, the Government Bureau chiefs and other functionaries. Finally the ordinary Brunei Malay, all of whom, with all other inhabitants of Brunei, are offered free education and free medical care. There are no taxes in Brunei.

### **Social Forces at Work in Rural Society**

The social structure and cultural patterns of rural Borneo were little disturbed in the turbulent 19th century. It was the policy of the Brookes, the white Rajas of neighboring Sarawak, to assist and to utilize native peoples but to leave their customs and way of life little disturbed. The rural populations of Brunei remained largely isolated and undisturbed until the 1930's, when the discovery of oil brought changes. A gradual increase in communication and in affluence developed. Not until the end of World War II, however, and especially since 1962, a time of military confrontation with Brunei rebels and with Indonesia, did accelerated social change occur thanks mainly to road building and telecommunications and especially to greatly expanded educational opportunities and health services. Rural peoples now feel keenly the social impact of sharply reduced mortality, especially infant mortality, and of the steadily in-

tensifying educational programs. Children are emerging into a world unknown by their parents.

### Occupational Changes

In addition many of the men in the long houses have taken jobs in the oil fields, in forestry or in road construction that keep them away from home for days or weeks at a time. Thus, while industrial development has brought economic advantages to the family, new and important stresses have been introduced, among them the need for women to cope with household management problems without help from their husbands.

Traditionally adapted to the hard work and rugged life of the long house, the Iban, especially those close to the rapidly developing road system in Brunei, are becoming "modernized," shopping for some of their food and buying cars, radios and T.V. sets. Life in Sarawak being far more spartan and land very scarce, the Iban continued their movements into Brunei until a few years ago. Immigration is now discouraged by the Brunei Government. Some of the early migrants and second generation, Iban, with at least a *pro forma* conversion to Islam, have achieved citizenship and the perquisites that go with it including the highly sought after eligibility for Government employment.

### Tribal Differences

The Punan, nomadic hunters of wild boar and other game with blow gun by tradition, have been less well accepted in Brunei than the Iban. They are scorned for their relative nakedness by the modest, well-covered and conventional Malays. The Punan, however, typically light skinned, lithe and lightly built have maintained an evident dignity, grace and good humor. They spontaneously react to friendly overtures with friendly and generous behavior. The Christian missionaries, who required fewer rules of behavior than the Muslims, have had an easier acceptance among the Punan than among most other groups.

### Strategies for Coping with Change

The rural tribesmen have met the challenge of modernization with a friendly genial spirit, accepting what is proffered but at the same time holding fast to traditional beliefs and practices. Thus, while individual activities may have changed substantially, interpersonal attitudes and relationships have remained pretty much the same. With the young there seems to be less reliance on long established customs and less emphasis on tra-

dition. Still, however, the visitor finds a community focussed on itself and its own people with little curiosity about or concern with the outside world.

### Animistic Religion

Although the rural peoples (Dusan, Iban and Punan) are distinct by language, life style and to some extent physical characteristics, they share traditional animistic beliefs. Despite conversion to Islam or to Christianity, most have held on to them, continuing to wear amulets and offering sacrifices to attract good luck and ward off evil spirits (Fig. 3). Even many Brunei Malays, who are forbidden such indulgence by the Moslem religion, nevertheless perpetuate their animistic traditions. For the rural peoples traditional rituals and beliefs are of prime importance in daily life. Certain trees, the horn bill and other birds are sacred; great emphasis is placed on dreams, omens, ghosts and spirits good and evil. The interpretation of meaning is the job of the "*Bomoh*" or native "doctor" whose judgment is heavily relied upon. To some extent each family has its own peculiar and inviolate tradition. Thus superstitions are likely to be more characteristic of a particular locality than of an ethnic grouping.

### Native "Doctors"

Most Brunei inhabitants, when sick are likely to consult first the bomoh or native "doctor." Even many of the sophisticated Malay officers do so. *Bomohs* who adapt the treatment to their estimate of the level of the patient's intelligence, may treat exogenous depression with a trance and a sleight of hand production of a worm or stone from the umbilicus, ear or mouth. Native "doctors" tend to work in harmony with western M.D.s especially in treating psychiatric illness.

Despite the ready availability and widespread acceptance of modern health care in the presence of serious illness or misfortune, a prognosis is still often arrived at through the examination of the liver of a pig. Failure to find a favorable sign after the examination of the livers of three freshly killed pigs clearly establishes a bad omen. One villager told of the occasion when the son of the head man of a long house was ill and the pig livers yielded a bad omen. Nevertheless, the young man recovered. A few days later, however, while swimming in the river he was hit in the head by a floating log and killed.

As omens are widely accepted with fatalistic certainty, several sudden deaths have been witnessed among young men who were neither ill nor injured. Two of such episodes oc-



FIG. 3. An altar outside the long house on which special materials are placed to appease the spirits.



curred while the victim was under observation in the military hospital and following thorough diagnostic study prompted by the patient's insistence that he was going to die. Less serious signs, dreams and omens have led to sudden transitory unconsciousness.

The men like to carry walking sticks with special handles. They confer status as well as protection against spirits and the more tangible dangers of snakes and honey bears. They are usually of hard wood such as *Meranti*, with the handle carved in the shape of an animal or bird. *Kayu utus*, a tree found only in Brunei, is considered the best and most suitable material for such ornamental sticks that also serve as symbols of authority.

### Continuation of Ancient Customs at the Birth of a Child

While in the city of Bandar Seri Begawan most deliveries occur in the hospital, among the rural Brunei Malay villages the birth of a child at home is an event participated in by the whole family sitting in a semi-circle on the floor. Custom dictates that the cord must not be cut until the placenta is delivered. Thereupon, depending on customs peculiar to each family group, the placenta is burned and the ashes disposed of either by putting them in a small boat and pushing them into river or sea, burying them, or placing them in a container at the top of a tree.

A key, preferably gold, may be tied around the baby's neck to prevent the slobbering of saliva and a black string may be tied around a big toe to keep away evil spirits.

### Diet, Work, Smoking and Sexual Behavior

Food supplies, especially protein in the rural areas, are marginal at best. As a rule only enough rice can be harvested to supply the long house. Other vegetables and fruits are available

in only limited quantities. For the non-Moslem, wild pig is a principal source of protein. Thus the problem of securing adequate protein in the diet is difficult for the Moslems in the interior who are forbidden pork. Even in the cities where beef is available, however, the Moslem Brunei Malay will eat it only sparingly believing that meat makes them hot and shortens life. Instead he relies mainly on fish, fresh and in dried form.

The Iban, open, direct, trusting and highly hospitable people, are also hard-working. They farm for home consumption and maintain cash crops such as rubber and pepper, whenever this is possible. They are also good boat builders; they make mats and baskets; they brew rice wine if they can afford it; they forge parang knives from scrap metal such as old automobile springs. Both men and women love to smoke. Commercial cigarettes carry great status but most long house villagers roll their own from home tobacco using nipa palm leaves for cigarette paper. These very thin short cigarettes are more or less continuous occupants of their lips.

Sexual behavior is much freer among the Iban peoples than among the Brunei Malays. Marriage is young, 14-16 for girls, 15-17 for boys. Courting is fairly uninhibited and divorce is easy for both parties. Most unions are fairly firm, however, and there is very little extra marital sexual activity. Children confer special honor on the household and many Iban couples have 6-8 children, most nowadays living to adulthood.

### **Esthetics and Recreation**

Esthetic expression has traditionally included weaving stiff grasses into mats and hats decorated with colorful designs. This art is gradually dying out. Most fine mats are now heirlooms proudly cherished by the leading families in a clan. The practice of decorating the bodies of young men with intricate tatoos continues but is gradually dying out also. A rich musical tradition continues, however. The singing, lute and gong playing, and dancing persist especially at times of celebration. Parties lasting for one to three or four days punctuate life in a long house, designating engagements, marriages and other important social events. Such parties are a major source of recreation. Enormous amounts of rice wine are consumed. Indeed the duration of the party is defined by the size of the supply of rice wine. Guests are not expected to leave a party until all of the rice wine has been consumed. If this should take more than a day, the guests customarily sleep on the floor of the large common room of the long house.



### Health

The incidence and prevalence of various diseases differs considerably between the rural and the urbanized populations. Moreover with the introduction of modern hygiene and medical services there has been over the past few years a dramatic change in morbidity and mortality in both city and country. The vector borne scourges of former times, malaria, typhus and typhoid began to mitigate after World War II and have now all but been eliminated. Since 1962 the once frequent severe cases of measles and chickenpox among adults are only rarely seen. Mild forms of these diseases as well as mumps are now frequent only among children. Tuberculosis, especially death from tuberculosis, has decreased substantially during the 13 year period. Other infectious diseases, yellow fever, leptospirosis, filariasis and dengue, for example, common in other parts of Southeast Asia, have not been a serious problem in Brunei (Fig. 4).

In the wake of such public health improvements the overall mortality rate has dramatically decreased from 14/1000 in 1946 to 4.8/1000 in 1973. Infant mortality has fallen from 110/1000 to 30/1000. There has also been a sharp decrease in maternal mortality. On the other hand, diabetes, especially common among the Indian population, has, together with obesity, hypertension and ischemic heart disease become increasingly prevalent among the urbanized Brunei Malay although the rate for the latter has not nearly reached that in the U.S. Among Iban, Dusun and Punan in the rural villages the medical teams frequently encounter emphysema, perhaps associated with heavy cigarette smoking, and occasionally cor pulmonale. Other forms of cardiovascular disease including hypertension and myocardial infarction are rarely if ever seen among the rural population. Rheumatoid arthritis is rare although asthma and allergic skin diseases are said to be fairly common. One genetic disorder, *Thalassemia*, is occasionally encountered.

Infertile marriages are common and are said to occur especially during periods of rapid change or difficult social adjustment. Because of the importance of having children, barren parents are eager to adopt. Thus there are no orphans because the demand for adoption exceeds the number of available orphaned or illegitimate children.

With the decrease in anemia of pregnancy and in maternal and infant mortality there has been an increase in the average weight of babies born from about 5 to 7½ pounds.

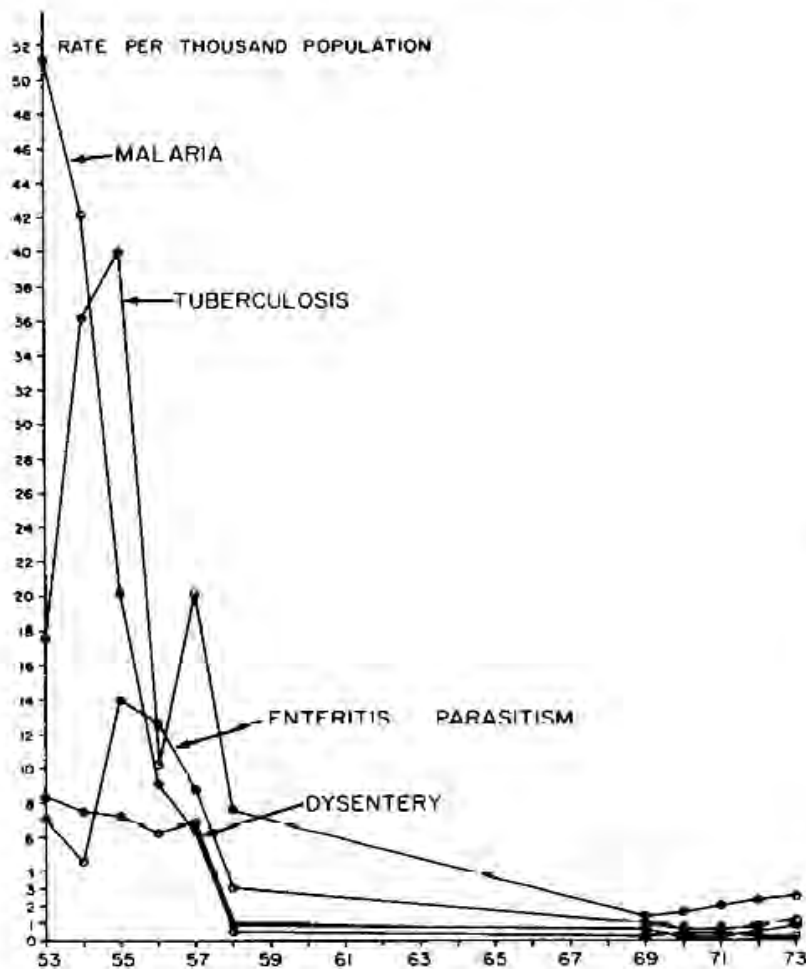


FIG. 4. The abscissa records reported incidence of diseases from 1953-1973.

Among psychiatric disorders senile dementia is rare despite the fact that many reach their eighties and a few live to be over 100 years of age. Reactive and involutional depressions are frequently seen but suicide is extremely rare. Schizophrenia, like senile dementia, is only rarely encountered among the rural population but hysterical faints and trances punctuate their relationships with the supernatural. There have, indeed, been a few documented instances of a type of "voodoo" death. Although the cause of death frequently remains unknown, cancer is the major recognized cause of death among the rural populations, especially cancer of the nasopharynx, perhaps related to heavy cigarette smoking or the smoking of fish which takes place more or less continuously in the close vicinity of long houses. The remaining infectious diseases, tuberculosis, hook worm and bacillary or amebic dysentery, account for most of the rest of the deaths (Fig. 5).

### Summary

The results of our study indicate that social change in the rural areas was gradual from the 1930's following the discovery of oil, until 1962 when it accelerated greatly up to the present.

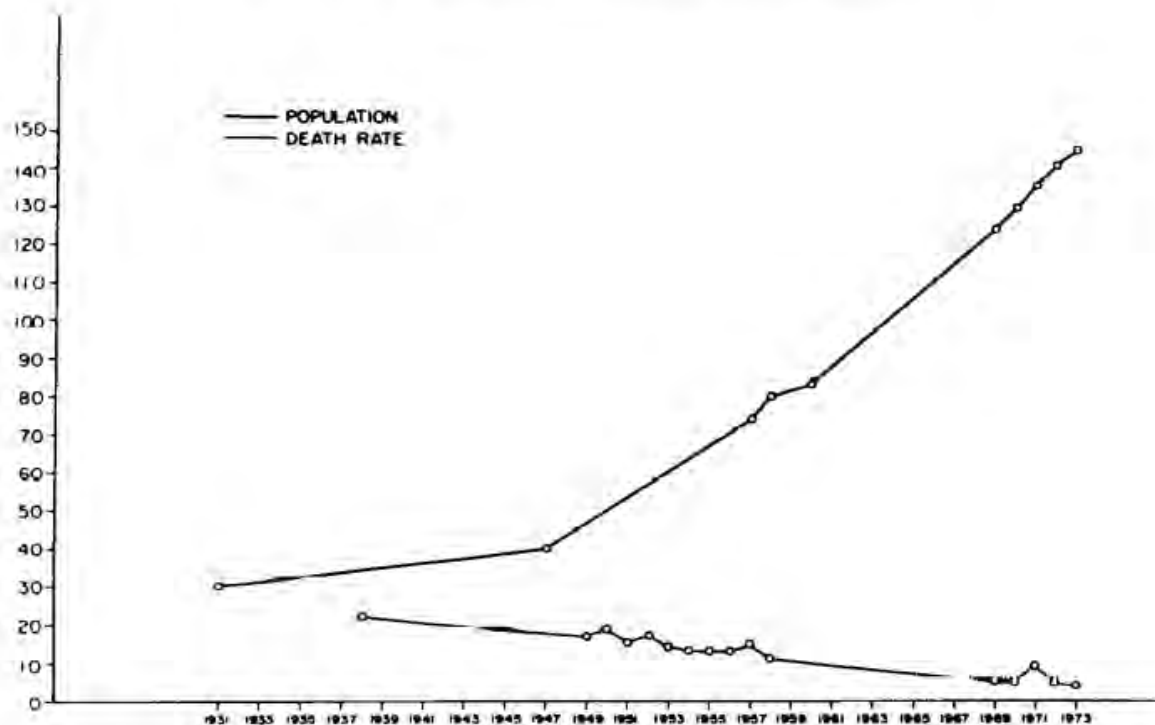


FIG. 5. Decline in death rate and growth of population.

The rapid introduction since 1962 of modern communications, roads, radios and helicopters, modern medicine with the virtual abolition of malaria, cholera, typhus and other vector borne infectious diseases, the sharp reduction in infant mortality, and the almost universally available schooling together with encouragement to embrace the Moslem religion have posed important and difficult challenges for native peoples whose traditional pattern of life had been established over many centuries. In the process of a remarkably successful adaptation to these changes these peoples have maintained a cohesive and mutually supportive family structure and have clung tenaciously to their animistic beliefs in spirits, omens and dreams. They have continued to rely on their own medicine men despite widespread acceptance of Western medical services and the conversion by many to the religion of Islam.

The hospital physicians declared that they often cooperate with native "doctors" and may defer to them, especially in the management of psychiatric problems. There appears to be, at present, an effective equilibrium and an essentially healthy state among the inhabitants of the villages. The most prevalent illnesses, apart from almost ubiquitous intestinal parasitism, are simple goiter (being brought under control with iodized salt), emphysema (perhaps associated with widespread heavy smoking by men and women), marginal nutritional states, especially protein deficiency (being combated by regular supplies of powdered milk) and infant diarrhea. Among genetically deter-

mined diseases, thalassemia appears to be most prominent. Accidents and injuries were not uncommon but among rural inhabitants we found no evidence of systemic hypertension, myocardial infarction or stroke, diseases with a low but significant prevalence among city dwellers.

Tentative conclusions from this brief study are suggested by previous experience with an Italian enclave in the United States, Roseto, Pennsylvania, whose salubrious state of health with respect to cardiovascular disease lasted only as long as old world attitudes and traditions were maintained while adapting to American economic and political patterns. A prediction is therefore ventured that as the newly educated youth of rural Brunei grow up in a world alien to their unschooled parents and as the anxiety relieving powers of old traditions and practices are eroded, the cardiovascular diseases of western society may make their appearance.

### Acknowledgment

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# QT Interval Prolongation as Predictor of Sudden Death in Patients with Myocardial Infarction

P. J. SCHWARTZ, M.D., AND STEWART WOLF, M.D.

**SUMMARY** Fifty-five patients with recent myocardial infarction and 55 healthy controls, matched for age, sex, race, height, weight, education and job, had an electrocardiogram taken every two months for seven years. Twenty-eight patients and one control had a sudden cardiac death. The  $QT_c$  (mean of all values recorded) was found prolonged in one control (2%), five of 27 surviving patients (18%) and in 16 of 28 patients who had sudden death (57%). The difference

between surviving and sudden death patients is significant ( $P < 0.01$ ). It is interesting that the only control with a long QT was the one who died suddenly of myocardial infarction. Among patients with previous myocardial infarction a prolonged  $QT_c$  constitutes a 2.16 times greater risk for sudden death. We conclude that a constant prolongation of  $QT_c$  in patients with myocardial infarction may help, with other risk factors, in defining a subgroup at higher risk for sudden death.

IN EARLIER STUDIES<sup>1,2</sup> an imbalance in cardiac sympathetic innervation which prolongs the QT interval was shown to increase the arrhythmias associated with coronary artery occlusion and to lower the ventricular fibrillation threshold. The present study focuses on whether or not a prolonged QT corrected for rate ( $QT_c$ ) ( $> 440$  msec), irrespective of its causes, is associated with sudden death in patients with myocardial infarction.

Our attention to the possibility that QT interval prolongation might be associated with increased risk of sudden death was brought about by clinical and experimental data. Congenital prolongation of QT interval (long QT syndrome) is associated with an extremely high incidence of ventricular fibrillation (VF) and sudden death.<sup>3</sup> Drugs that prolong the QT interval (quinidine, amiodarone, tricyclic antidepressants and others) are also associated with sudden death

due to VF.<sup>4</sup> A vulnerability index has been proposed based on QT interval prolongation.<sup>5</sup> In experimental animals manipulation of the sympathetic nervous system affects the QT interval.<sup>6</sup> Maneuvers that lengthen it, such as ablation of the right stellate ganglion or stimulation of the left, increase the incidence of ventricular arrhythmias and of VF in anesthetized animals during myocardial ischemia<sup>1</sup> as well as in conscious animals during physical or emotional stresses.<sup>7,8</sup>

To test the prognostic significance of a consistently prolonged QT, a group of patients with previous myocardial infarction and their matched controls were followed for ten years, during the first four to seven years of which repeated ECGs were recorded every two months. Approximately half of the patient group and one of the controls died suddenly during the period of study. Among both patients and controls the QT measurements were correlated with the clinical outcome.

## Methods

### Population Under Study

There were 134 subjects in all, 67 patients and 67 healthy controls. The patients, 53 men and 14 women, had suffered a

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# PREDICTIVE SIGNIFICANCE OF LONG QT INTERVAL/Schwartz, Wolf

TABLE 1. *QTc and Variability ( $\Delta$ ) of QTc in the Population under Study*

	N	QTc	Significance	$\Delta$ QTc	Significance
Controls	55	418 $\pm$ 15 ( $\pm$ 2)	$P < 0.001$	16 $\pm$ 6 ( $\pm$ 1)	$P < 0.005$
Patients	55	436 $\pm$ 25 ( $\pm$ 3)		24 $\pm$ 12 ( $\pm$ 2)	
Survivors	27	420 $\pm$ 20 ( $\pm$ 4)	$P < 0.05$	20 $\pm$ 10 ( $\pm$ 2)	$P < 0.025$
Deceased	28	443 $\pm$ 27 ( $\pm$ 5)		28 $\pm$ 13 ( $\pm$ 2)	

Figures are means  $\pm$  SD and are expressed in msec. Values in parenthesis are SE.

well-documented myocardial infarction two months to six years in the past. The study group was drawn from a consecutive series of patients seen at the University of Oklahoma Medical Center between 1962 and 1965. Selection was made only on the basis of geographic proximity to Oklahoma City. None of the patients declined to participate. The diagnosis of myocardial infarction was established by unequivocal electrocardiographic changes and elevated SGOT at the time of their acute attack. The healthy controls were drawn from more than 1,000 candidates in two industrial firms and the State Highway Department. They were selected to match individually with the patients on the basis of age ( $\pm$  2 years), sex, race, height ( $\pm$  2 inches), weight ( $\pm$  8 pounds), educational background (years of schooling) and type of job (laborer, skilled, clerical, professional). The ages are reported as of September 1962. The subjects, patients and controls, were initially hospitalized on a research ward where psychological, sociological, physical, X-ray and laboratory data were gathered. The various tests were repeated at two month intervals on both patients and controls over a seven year period. Many of the findings have been reported elsewhere.<sup>9-10</sup> This report concerns only the ECG data.

## QT Interval Study

Discarded from the study together with their matched controls were ten patients because of bundle branch block or digitalis-induced changes that obscured the ECG analysis, and two others who committed suicide during the ten year period of study. Omitting these 12 patients and their matched controls reduced the total number of patients and controls to 110. The QT interval was measured from five nonconsecutive beats in each ECG tracing taken at a speed

of 50 mm/sec. QT<sub>c</sub> was calculated according to Bazett's formula:  $QT_c = \frac{QT}{\sqrt{R-R}}$ . The five values of QT<sub>c</sub> for each subject were then averaged and the mean values  $\pm$  SD were calculated along with the measurements of heart rate. All measurements were made by one of us without knowing whether the tracings were those of a patient or a control. Only when all the measurements were completed was the code broken. A QT<sub>c</sub> exceeding 440 msec was defined as prolonged.<sup>20</sup>

## Statistical Analysis

The absolute values of QT<sub>c</sub> were compared between controls, survivors and deceased, using the unpaired *t*-test. The standard deviations were similarly analyzed to determine the variability of QT<sub>c</sub> and HR among the groups.

Comparisons between survivors and deceased with respect to QT<sub>c</sub> and premature ventricular beats (PVBs) were made using the chi square test or the Fisher exact test. The relative risk of sudden death was also calculated.<sup>21</sup>

## Results

At the end of seven years of repeated observation and three additional years of follow-up study 27 of the 55 patients were still alive. The remaining 28 had died, all of them suddenly. Among the 55 controls only one had died and he died suddenly (within 24 hours following beginning of symptoms).

**QT<sub>c</sub>.** The QT<sub>c</sub> among the controls was 418  $\pm$  15 msec (mean  $\pm$  SD), while among the patients it was significantly longer, 436  $\pm$  25 ( $P < 0.001$ ). The QT<sub>c</sub> among the surviving patients was 429  $\pm$  20 and among the deceased was 443  $\pm$  27, the latter being significantly longer than the value for surviving patients ( $P < 0.05$ ) and in the abnormal range (table 1, fig. 1). The fact that it is necessary to add 1½ standard deviations to the QT<sub>c</sub> of the controls in order to reach 440 msec supports the concept that 440 msec is a proper limit for QT<sub>c</sub>.

The only control whose QT<sub>c</sub> was prolonged (457  $\pm$  14) died suddenly. A fresh myocardial infarction was found at autopsy. Among 21 patients who had a mean value greater than 440 msec, 16 (77%) died suddenly (fig. 2).

The variability of QT<sub>c</sub> from month to month and year to year as determined by the mean differences in measurement  $\pm$  SE was least among controls (16  $\pm$  1 msec), intermediate among surviving patients (20  $\pm$  2) and greatest among the deceased (28  $\pm$  2). The mean difference in QT interval variability between surviving patients and deceased was statistically significant ( $P < 0.025$ ) (table 1).

A QT interval greater than 440 msec was present in 57%

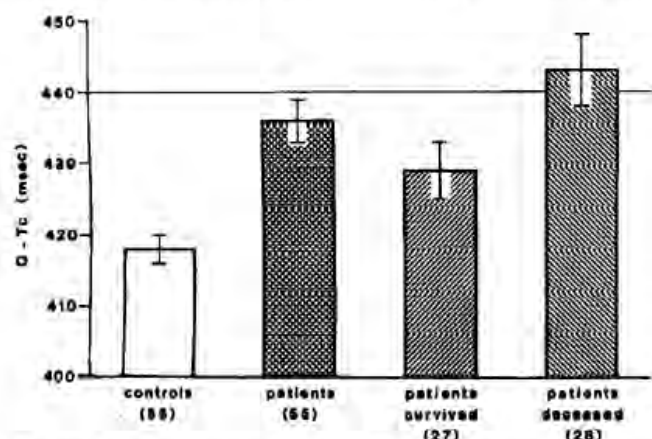


FIGURE 1. Comparison of mean QT<sub>c</sub> values among the groups studied.

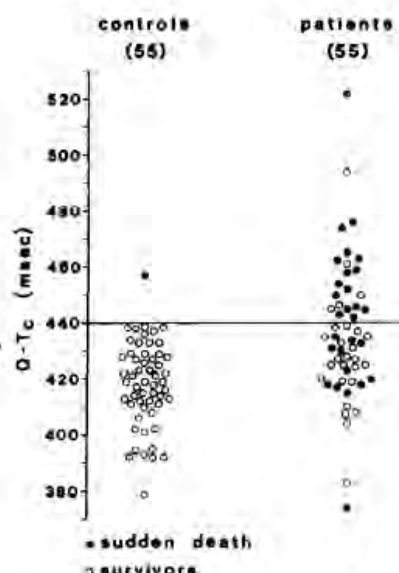


FIGURE 2. Distribution of  $QT_c$  values among patients and controls.

of the deceased in contrast to 18% of the survivors; values greater than 450 msec were found in 36% of the deceased and in only 8% of the survivors. The differences are significant ( $P = 0.003$  at the 440 msec level and  $P = 0.005$  at the 450 msec level). The calculated risk of sudden death for patients with a previous myocardial infarction and prolonged QT intervals was respectively 2.16 and 2.36 times greater than for those with a normal QT interval (table 2).

**PVBs.** The presence of premature ventricular beats (PVBs) on an eight hour ECG monitor correlated with risk of sudden death. Twenty-seven out of the 55 patients had PVBs (more than 10 per minute). The presence of such frequent PVBs increased the risk of sudden death among those who had suffered a myocardial infarction in the past by a factor of 2.19. Table 2 shows that a prolonged QT with or without PVBs carried a risk of sudden death between 5 and 6 times higher than a normal QT and no PVBs.

**Age.** Controls and patients were matched for age ( $\pm 2$  years). The mean age of controls was  $52 \pm 12$ . The mean

age of surviving patients was  $49 \pm 13$  compared to  $54 \pm 12$  for the deceased, a difference that was not statistically significant. The association between prolonged QT and sudden death was separately tested among the 26 patients between the ages of 41 and 60 years. Seven out of eight (87%) of these patients with a prolonged QT interval died suddenly. Therefore, for men aged 41–60 years who had sustained a previous myocardial infarction, we found that a prolonged QT interval enhanced the risk of sudden death during the period of study by a factor of 2.25.

**Heart Rate.** The HR in the three groups was almost identical ( $72 \pm 9$  beats/min for the control group,  $71 \pm 7$  for the survivors and  $71 \pm 9$  for deceased). Important differences were apparent, however, in the day-to-day variability of HR. Variability was  $6 \pm 1$  beats/min (mean  $\pm$  SE) for the controls,  $7 \pm 1$  for the survivors and  $10 \pm 1$  for the deceased. While the difference between survivors and controls was not significant, the difference between survivors and deceased was significant ( $P < 0.01$ ). In other words, the deceased had a greater variability in their HR values from day to day than the survivors who, in this sense, did not differ from the controls.

### Discussion

Unexpected sudden death is one of the most distressing and baffling events in contemporary society. Among those most vulnerable to sudden death are individuals who have sustained a myocardial infarction and who are either in the acute stages or in the early or even late stages of recovery. Patients whose myocardial infarction occurred as long as five years ago continue to be at high risk of sudden death. The ability to predict those at greatest risk might conceivably lead to effective precautionary or preventive measures.

Of the number of risk factors for sudden death proposed in the past, many have been discarded for their lack of specificity. Frequent ventricular beats, however, remain a most important predictor, being associated with a doubling of the risk of sudden death. Our findings indicate that persistent prolongation of the QT interval constitutes a further important risk indicator in persons with ischemic heart disease. Prolongation of the QT interval is a familiar finding in the acute phase of myocardial infarction,<sup>22</sup> whereas its presence and possible significance among those with healed myocardial infarction have not previously been explored.

QT prolongation is caused by delayed ventricular repolarization and usually leads to an increase in the degree of temporal dispersion of refractory periods.<sup>3</sup> Such increased dispersion results in prolongation of the vulnerable period and may thereby enhance susceptibility to ventricular tachyarrhythmias,<sup>23, 24</sup> thus providing the rationale for our study.

The findings reported here do not illuminate the mechanisms responsible for the prolongation of  $QT_c$ . The striking difference in QT interval between all patients and controls, however, suggests that local myocardial changes secondary to the infarction may be a critical factor. Whether or not a sympathetic imbalance comparable to that produced in experimental animals is implicated cannot be stated from the data at hand.<sup>1, 2, 6-8</sup>

Nevertheless, the findings in man implicating prolonged

TABLE 2. Risk of Sudden Death in Patients with Prolonged QT Interval

	Deceased	Survivors	Total
$QT_c > 440$ msec	16	5	21
$QT_c < 440$ msec	12	22	34
Total	28	27	55
$P = 0.003$			
Calculated risk = 2.16			
$QT_c > 450$ msec	10	2	12
$QT_c < 450$ msec	12	22	34
Total	22	24	46
$P = 0.005$			
Calculated risk = 2.36			

QT<sub>c</sub> as indicative of vulnerability to sudden death tend to validate studies in animals performed independently in several laboratories where experimental maneuvers leading to QT prolongation were associated with VF, an association not always stressed by the authors.<sup>1, 2, 24, 26</sup>

A striking finding from the study was that the greater the variability of QT from month to month, the greater the risk of sudden death. Variability in HR was observed also to be pronounced among those destined for sudden death. Undue variability in measurements of cardiovascular functions has in previous publications been correlated with high risk of recurrent myocardial infarction or sudden death.<sup>21, 22, 18, 19, 27</sup> The variabilities in blood clotting factors,<sup>11</sup> in heart rate and blood pressure,<sup>12</sup> in ballistocardiographic tracings<sup>18, 19</sup> and other indicators had been presumed to be due to a want of stabilizing influence of autonomic inhibitory impulses, related in turn to a lack of emotional stability.<sup>17, 18</sup>

Sudden increases in sympathetic activity in the setting of an ischemic myocardium facilitate VF.<sup>24</sup> Our data on QT<sub>c</sub> and heart rate variability suggest that the patients who died suddenly were exposed to substantial shifts in autonomic activity. The first presentation of our data<sup>25</sup> led Cobb's group in Seattle to analyze the QT<sub>c</sub> in their unique group of patients with coronary heart disease who had been resuscitated from VF outside the hospital. They found that 37% of the patients had a prolonged QT<sub>c</sub> compared to 18% of patients with a myocardial infarction not complicated by VF, a difference significant at the 0.005 level of confidence.<sup>28</sup> This is a very important confirmation of our data despite the fact that Cobb and his associates were able to measure only a single electrocardiogram. Our analysis was made on a very large number of ECGs; indeed, it was not uncommon for patients whose mean QT<sub>c</sub> was normal to have had occasionally a prolonged value and vice versa. A prognostic judgment of increased risk for sudden death because of prolongation of QT<sub>c</sub> should be made only on the basis of measurements of several ECGs in the same individual.

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# Social forces, neural mechanisms, and health

Effective social adjustment that yields personal satisfaction and fulfillment is conducive to health; and social failure, frustration, dissatisfaction, deprivation, and disapproval increase vulnerability to disease. These ideas are not new. Neither are they widely accepted.

In Nazareth, Pennsylvania, a community settled in 1740 by the Moravians, a strict religious group from southern Germany, senior citizens are expected to pass the torch of leadership on to their younger middle-aged sons. In fact, the first old folks' home in the United States was established in Nazareth.

In contrast, in the Italian community of Roseto, just 12 miles from Nazareth, originally settled in 1882, the aged retain their position of influence in the family and in the community. They are kept in the home, cherished, respected, and

listened to. We also have found striking contrasts between Roseto and neighboring communities with respect to the prevalence of illness. Roseto had a death rate from myocardial infarction less than half of that encountered in Nazareth and other eastern Pennsylvania communities. The incidence of senile dementia was also very low in Roseto.<sup>1</sup> Whether or not a continuing and even enhanced role in society exerted a salubrious effect on old people cannot be stated at present, but certainly bears watching.

Although it is readily acknowledged that man, as a tribal creature, depends on his fellows for recognition, support, and understanding, the hypothesis that the quality of his social adjustment is pertinent to his health and longevity has not been incorporated into the mainstream of biomedical scientific thought and is not likely to

be unless and until there develops some solid understanding as to *how* social forces can actually affect function and structure of bodily organs. Such understanding, still not fully at hand, has nevertheless been building rapidly in recent years. Studies of animals and man have yielded three classes of evidence—descriptive (often called “anecdotal”), epidemiologic, and experimental. The interpretation of such evidence depends, of course, on prevailing attitudes and assumptions about health and disease and about man's relationship to his world.

The impact of social forces can best be seen during attempts of a community to adapt to rapid social change. In 1938 in a book entitled *Civilization and Disease*, Donnison, who had worked for many years as a physician in black Africa, reported that he had encountered no hypertension, diabetes, or peptic ulcer in remote areas of the continent where the prevailing social structure was relatively stable. However, these and other chronic diseases did appear where “civiliz-

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ing" forces were rapidly invading an established culture.<sup>2</sup>

Donnison's book develops the idea that as man has lived in groups of increasing size, social patterns have evolved to deal with prevailing circumstances and that over the course of history and in various parts of the world, social structures have been altered and remodeled to meet changing circumstances. When the speed of change has out-run the pace of adaptation, Donnison holds, man's internal mechanisms, mental and physical, acting inappropriately, provide what he calls the basis of the diseases of civilization.

Recognizing the importance of adaptation to health, J.B.S. Haldane<sup>3</sup> declared: "Progress in medicine depends on understanding how the human organism adapts to changes in his environment." I would further suggest that the adaptations of the human organism, when exaggerated, insufficient, or inappropriate in some way actually constitute the manifestations of disease.

For example, a healthy person living at a high altitude, as in the Andes, maintains a substantially elevated red blood cell count, thereby compensating for the diminished atmospheric pressure of oxygen. The additional red cells are needed to deliver adequate oxygen to the tissues. When such a rise in a red cell count occurs at sea level, however, the increase is inappropriate and a disease, polycythemia, is present. The bodily mechanisms required to increase the number of circulating red blood cells are, nevertheless, identical in both situations, in health and disease. As another example, a heart rate of 120 in a runner immediately after a 100-yard dash would be considered

a sign of health, but in a sedentary patient the same heart rate would be a clear evidence of illness.

### Environment and metabolism

Some years ago, Dr. William Schottstaedt and I studied the impact of a social environment on the metabolism of human subjects who were resident on a research ward. We analyzed a wide range of chemical substances from day to day in the urine and feces, while diet and exercise were kept uniform.<sup>4-6</sup> The social interactions among the 15 to 20 long-term inhabitants of the ward were carefully observed and recorded. Those responsible for recording behavior and emotional responses were kept ignorant of the laboratory findings.

The metabolic ward had the special characteristics of a well-defined community with its own pressures, values, prestige points, and taboos. In short, it had established its own social equilibrium. Even transient disruptions of the equilibrium were associated with substantial measurable metabolic changes.

Major metabolic changes in terms of urinary excretion of water, sodium, potassium, calcium, nitrogen, and creatinine occurred repeatedly in situations of stress among the patients (Table). Deviations in excretion of metabolites of greater than two standard deviations occurred on 60 of a total of 213 patient-days for which data were available. We found that the metabolic deviations correlated

**Table—Significant Shifts in Excretion of Metabolites on a Metabolic Ward**

	Ward atmosphere		
	Quiet	Disturbed	Total
Stressful days on which metabolic data were available	25	42	67
Nonstressful days on which metabolic data were available	78	68	146
Total patient-days on which metabolic data were available	103	110	213
Stressful days with significant metabolic deviations	12	36	48
Nonstressful days with significant metabolic deviations	7	5	12
% of stressful days with significant metabolic deviations	48	86	72
% of nonstressful days with significant metabolic deviations	9	7	8



with the prevailing atmosphere of the ward: many more occurred when the ward community as a whole was disrupted. Furthermore, a higher percentage of the stressful events were accompanied by metabolic changes when the ward was upset as compared with when its atmosphere was relatively serene. Eighty-six percent of stressful events were accompanied by significant alterations in the balance data when the atmosphere of the ward was disturbed, while during relatively calm periods for the group as a whole only 48% of episodes rated as stressful were accompanied by significant changes. "False positives," or metabolic deviations of significant degree, occurred on only 12 of 146 patient-days (8%) that had not been independently judged as stressful.

Interpersonal difficulties among those with strong ties were much the most common sources of stress to be associated with metabolic deviations, accounting for 28 of the 46 stressful situations associated with such deviations. Interpersonal stresses arising between individuals without strong ties were less often associated with significant changes in the metabolic data.

### **Configuration vs quantitation of data**

When the nurses on the ward were asked to submit to a psychological testing procedure and to evaluate the performance of one another in relating to individual patients, they proved to be reluctant and personally threatened by the request. The atmosphere of the ward for the next several days was tense and subdued. Throughout this period of uneasiness, all of the patients under study on the ward displayed a uniform metabolic response consisting

of a negative balance of all measured metabolites, even though the patients were unaware of the circumstances responsible for the nurses' anxiety.

This experience illustrates that a bodily response to stress depends not so much on the *quantity* of the noxious stimulus but rather on the quality or *configuration* of the prevailing circumstances. Thus, looking only for quantifiable data may cause one to miss the most pertinent evidence.

A vivid example of the importance of configuration in biology is evident in the contrast of smell and taste between the enantiomers (isomers) spearmint and caraway.<sup>7</sup> Shapes and electrical changes are now explaining the action of many molecules in a way that a knowledge of their quantitative composition could never do. In medicine we are just beginning to learn to relegate our preoccupation with quantitation to its proper place and also to ask configurational questions in more than one dimension. The configuration or pattern of an individual's adaptive response to a meaningful circumstance depends first of all on perception, beyond that on the interpretive process in the brain, and finally on the character of the control mechanisms that are expressed as behavior.

### **Neural mechanisms**

We now have ample evidence that the immunologic, metabolic, and vascular adjustments that adapt an individual to his environment are regulated by an extensive hierarchy of chemical and electrical mechanisms that encompass the whole range from local responses to supratentorial commands. Too much or too little of such adaptive responses or their inappropriate use

constitutes, as has already been mentioned, the very manifestations of disease.

To ignore the workings of the brain would be as appropriate for the psychiatrist or behavioral scientists as it would for the nephrologist to ignore the kidney and study only the urine. Since 1949, when Ling and Gerard<sup>8</sup> recorded action potentials from inside a single muscle fiber and later from single units in the central nervous system, technologic development in the study of the circuitry of the brain and of the relationship of brain mechanisms to behavior has been so rapid as to be dizzying. A major part of the advance has consisted of the identification, localization, and manipulation of neurotransmitters and the clear demonstration of the importance of inhibitory systems in the overall process of human behavior regulation.

As more and more has been learned about facilitatory and inhibitory regulation of synaptic transmission at every level of the nervous system, the concept of reflex control of visceral function has given way to a concept of neural interaction in which virtually all parts of the nervous and endocrine systems are interconnected, so that local perturbations may have widespread effects. Studies have clearly revealed that the somatic and visceral pathways are not two systems after all but a single system in a state of continuous dynamic interaction as behaviors are initiated, maintained, and modified.

### **Modulation and illness**

It is, therefore, reasonable to state that the regulation of behaviors of all sorts requires a balance of excitatory and inhibitory influences. This principle, reminiscent of the

yin and yang of the ancient Chinese, is applicable to all aspects of human behavior. Behavior involving viscera as well as skeletal muscles must be modulated, damped to some extent, in order to be maximally adaptive.

The rapidly growing understanding of the importance of modulation of all bodily functions arouses the speculation that failure of restraints or a defective balance between excitatory and inhibitory mechanisms may be responsible for a multitude of disorders. Among them may be included pathologic aggressiveness, alcoholism, epilepsy, and visceral disturbances such as the almost continuous gastric secretion of hydrochloric acid and proteolytic enzymes characteristic of duodenal ulcer. So also may be the sustained contraction of initially normal arterioles in hypertension, or the exaggerated ratio of destruction of red blood cells in hemolytic anemia as well as aber-

rations in other bodily systems such as the cardiac arrhythmias that lead to sudden death.

### Learned control of visceral function

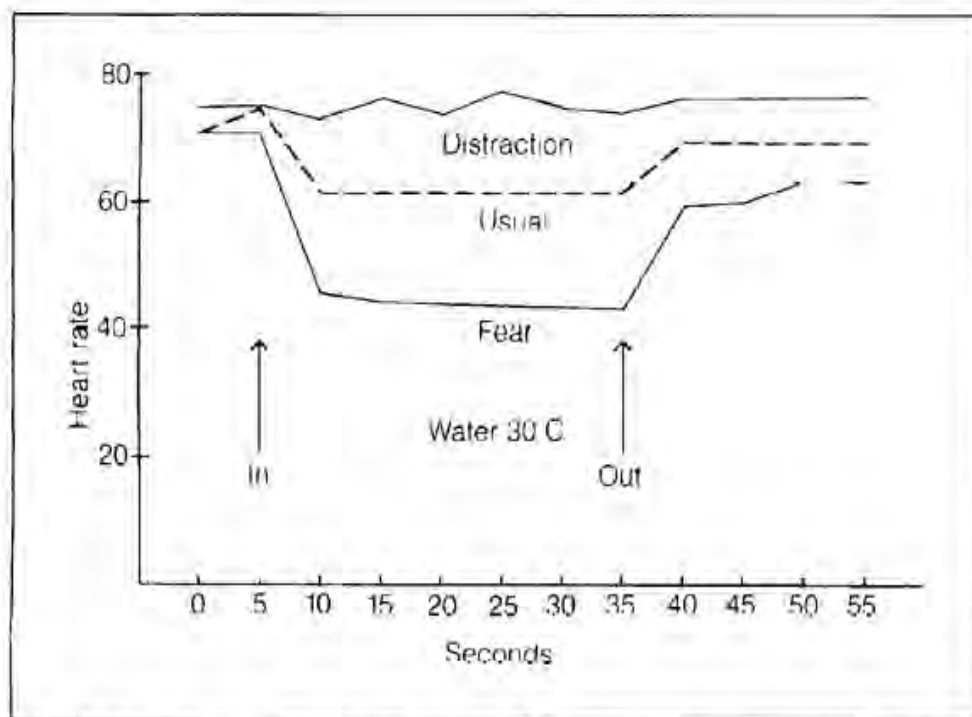
The phenomenon of visceral learning must be considered part of the process of neural control of visceral function. A variety of terms—operant conditioning, instrumental learning, biofeedback, and autogenic training—have been applied to a capability long familiar to the yogis of India. Successful manipulation of visceral function has been demonstrated in man, and some therapeutic effects have even been achieved with attempts to correct cardiac rate and rhythm, arterial blood pressure level, gastric acid secretion, and esophageal and rectal sphincter action.

The techniques vary widely in detail but involve a common principle, namely, transmitting to the subject a signal that indicates whether or not he is succeeding in

manipulating the measured function in the desired direction or to the desired degree. Success, then, in the terms of the behaviorist, becomes a reinforcer. Moreover, the reward and punishment paradigms of the behaviorist involve mainly symbols of social approval or disapproval. Thus, to a large extent social forces are crucial to successful manipulation of symptoms and bodily changes by means of both behavioral techniques and operant conditioning.

Hypnosis is another device whereby regulatory neural circuits may be recruited to control the behavior of vascular, glandular, and other autonomically innervated structures. The effects of hypnosis are apparently achieved through the activation of inhibitory neurons in both sensory and motor pathways. On the sensory side, anesthesia may be induced by a mechanism comparable to that in the experiment of Hernandez-Peon and associates,<sup>9</sup> where concentration on one object blocked incoming information from another. Tissue damage may also be mitigated or aggravated through the use of hypnosis. Chapman, Goodell, and Wolf<sup>10</sup> were able to limit blister formation from heat applied to the skin by hypnotic suggestions of anesthesia. On the other hand, they enhanced blister formation by suggesting during hypnosis that the subject's skin was sore and highly vulnerable.

In studies on the bradycardia of the dive reflex, we observed that it was greatly enhanced during fright, with heart rates dipping into the 30s, 20s, or even teens. On the other hand, the dive reflex was totally inhibited when the subject was preoccupied or concentrating on something else (Figure).<sup>11</sup>



FIGURE—Differences in the degree of heart-rate slowing achieved during face immersion under various emotional states.

It is abundantly clear from these and other studies that quantification of the stimulus is not the issue. What counts are the circumstances surrounding an experience, the timing, and who is involved.

The evidence suggests that an important modulator of aberrations in adaptive behavior of bodily organs is morale, a group phenomenon reflecting common purpose and implying mutual support and assigning to all members of the group a respected place in the scheme of things. Perhaps in future research, attention should be given to social forces that sustain, encourage, and provide emotional nourishment, thereby balancing or counteracting the effects of life stresses. □

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# Lessons From Roseto 20 Years Later: A Community Study of Heart Disease

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**ABSTRACT:** The findings of a community study of coronary artery disease were reviewed retrospectively to highlight applications to current research and clinical practice. Roseto, Pennsylvania, an ethnically homogenous county, was studied in the 1960s by an interdisciplinary team of researchers. Twenty years later the findings are being confirmed in the studies of other investigators. The major finding was the importance of social support and close family ties in buffering the deleterious effects of stress and life change, factors which have been implicated in the occurrence of myocardial infarction and sudden death.

Although knowledge of precursors to coronary heart disease has increased greatly in the past two decades, the best combinations of the standard "risk factors" fail to identify most new cases of the disease. Limitations in the current knowledge of the etiology and modes of prevention of coronary heart disease argue for broadening the research for contributing causes and possible dynamics of pathogenesis, rather than merely intensifying the study of the few traditional "risk factors."<sup>1</sup>

THESE STATEMENTS summarized a comprehensive review of the literature on psychologic and social precursors of coronary disease published by Jenkins<sup>1</sup> in 1971. Psychologic and social factors were generally passed off as being spurious, tangential, or not sufficiently quantifiable to be seriously considered as etiologic factors contributing to the occurrence of coronary artery disease. Indeed, the large-scale, well funded, longitudinal community studies of coronary artery disease in Tecumseh, Michigan,<sup>2</sup> Evans County, Georgia,<sup>3</sup> Framingham, Massachusetts,<sup>4</sup> and Alameda County, California,<sup>5</sup> only superficially included psychologic and social factors, if at all. Despite criticism from "hard core" heart researchers, especially those who had invested a great deal of time and effort in studying single causes of coronary artery disease, research into the role of psychologic and social risk factors continued.<sup>6</sup>

In updating his review in 1976, Jenkins noted:

The last five years of published studies relating psychosocial risk factors to coronary disease have reaffirmed that these variables are measurable, usually by more than one approach. In addition, the validity of the relation between certain psychosocial risk factors and coronary disease has been confirmed in both prospective and retrospective studies in a variety of different populations by a great many research teams. Finally, a start has been made toward delineating the pathophysiologic mechanisms by which social and psychologic factors create changes in the cardiovascular system.<sup>7</sup>

Indeed, much of the knowledge obtained in research on psychosocial factors has been applied in recent intervention programs designed to reduce or eliminate known risk factors.<sup>8-10</sup> As Stallones<sup>11</sup> has noted:

We now have strong assurance that programs based on our present knowledge can reduce the risk of death from ischemic heart disease. Unfortunately these programs require people to stop doing certain things they like to do, such as smoking cigarettes or eating whatever they want to, or to do things they do not want to do, such as taking antihypertensive drugs or exercising strenuously.

It is apparent that psychologic and social factors continue to be relevant to the understanding of the etiology, treatment, and prevention of coronary artery disease.

One of the longitudinal community studies of coronary artery disease that included an investigation of traditional risk factors and psychosocial factors was that of Roseto, Pennsylvania.<sup>12</sup> The Roseto study did not receive the same attention given to other concurrent community studies, primarily because researchers suggested that psychosocial factors appeared to be as important as currently accepted risk factors in understanding the low mortality and morbidity from myocardial infarction in Roseto. Indeed, the importance of social support as a factor in the etiology, survival, and recovery from myocardial infarction has since led other researchers to study the role of support in understanding several chronic diseases.

The purpose of our paper is to review the findings of the Roseto study to highlight lessons that can be applied from the study in future research and clinical practice.

## WHY ROSETO WAS STUDIED

The initial study of heart disease in Roseto was

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prompted by the observation of a local physician in the late 1950s that heart attacks were relatively uncommon among residents, especially among men in their 40s and 50s. A retrospective study of mortality due to myocardial infarction in Roseto from 1955 to 1961 showed an age-adjusted mortality in Roseto of 1/1,000 men and 0.6/1,000 women as compared to the average in the United States of 3.5/1,000 for men and 2.09/1,000 for women. This low death rate in Roseto confirmed the clinical observation of the local physician. Furthermore, Roseto had a lower rate of deaths from myocardial infarction than four of their neighbors. Mortality due to arteriosclerotic heart disease without evidence of myocardial infarction, the prevalence of hypertension, and the prevalence of diabetes were almost identical to that of the nearby communities. Finally, upon physical examination it was found that Roseto's mean serum cholesterol levels were similar to those reported in the Framingham study.

The absence of conventionally accepted risk factors for heart attacks among Rosetans was eliminated as an explanation for their lower rates of myocardial infarction. Ethnic homogeneity was also eliminated as an explanation because persons in neighboring communities who had heart attacks included many Italians, some of them relatives of Rosetans.

Rosetan culture, however, made it distinct from its neighbors. Italian customs and a way of life reflecting Old World values were evident in the early 1960s. Families and clans were close and mutually supportive, there was respect for the elderly (they and the mentally ill and mentally retarded being retained at home), and there was a strong sense of community pride and participation in community organizations and religious events. Roseto was studied because it offered a unique opportunity to test the importance and equanimity of traditional and new risk factors for coronary artery disease in a total community over an extended period. Roseto also provided an opportunity to study the natural history of a chronic disease using an interdisciplinary team.

#### **TIES THAT BIND: ROSETO AS IT WAS**

Ethnic ties kept Roseto a unique, closely knit community. Almost all Rosetans traced their ancestry to Roseto, Valfortore, Italy, though a few families originated from Naples. Rosetans who married non-Italians lived on the fringes of the town and were not as fully accepted as Italians, especially those of Rosetan ancestry. The ethnic solidarity of Roseto created an atmosphere of common understanding about values and what was acceptable behavior.

Another tie that bound Rosetans was the importance of the family. Most Rosetans were related to one another, and families, especially those of the first generation, were large. Families or "clans," as Rosetans

referred to them, rallied to the aid of members when they had problems such as the death of a family member, financial need, or illness. Several single women in the community assumed the role of pillar of the family, in lieu of marriage, to take care of elderly parents. Common attitudes among these pillars, the importance of close family ties, the security derived from their religion, and the knowledge that the respected people in the community were on their side, supported them in assuming major responsibilities for anchoring the families.

Religious beliefs also kept Rosetans together: 75% of the Rosetans were Roman Catholic, and the remaining 25% were Presbyterians and Jehovah's Witnesses or of other Protestant faiths. Regardless of denominational affiliation, however, religion was important to Rosetans. Religious artifacts were common in homes, church attendance on Sunday and at church organizations and activities was important, and weddings, confirmations, baptisms, and funerals provided opportunities not only for religious ceremony, but also for families to gather for good food and wine.

Social clubs and organizations also provided a means for Roseto to remain cohesive. Men and women had their separate organizations, but membership was essential for both sexes. Men often gathered to cook meals for themselves in the firehouse or to play cards, banter, and tell stories in one of the local bars. Women usually had auxiliary groups to the men's organizations and usually their role was to cook. There was no need for ongoing charitable activities in Roseto since Rosetans usually rallied to assist one another in time of need.

Perhaps a more important group for Rosetan women than formal organizations was the work group. Most Rosetan women worked in one of the approximately 16 family-owned blouse mills in or near Roseto. They usually worked from 8 AM until 3:30 PM, when they returned home to cook the evening meal and to gather their young children from grandmothers, aunts, or other relatives who cared for them during the day.

Most Rosetan women had worked in the same blouse mill as sewing machine operators for many years, so they knew one another. The work environment was one of constancy and predictability. Women had a great deal of control over their jobs since many were paid by piecework. They experienced satisfaction in seeing the completed product, and increased collective output of the group was usually rewarded by bonuses or time off. The combined incomes of spouses made it possible to satisfy their middle-class wants with no notable financial stress and to help their children become upwardly mobile by sending them to college.



## TRADEOFFS: BENEFITS AND COSTS

Rosetans came to America to escape the oppression of poverty and lack of power and civic participation in Italy. They had heard about the "good life" in America and were eager to become accepted as citizens. Although their language and customs were different, their industriousness and frugality were highly regarded values in both cultures. Rosetans soon learned that education could enhance opportunities for better paying jobs, which would, in turn, enable them to have the "good life."

Material acquisitions and certain life-styles in American society are regarded as evidence of success. Social acceptance into groups with power and influence and which hold the key to new opportunities is usually based on status and money. Some of the values and customs that Rosetans adhered to most closely, such as ethnic and organizational exclusivity, working at the same job in the same geographic area, and relinquishing personal goals for the care of sick or elderly family members, were prohibitive of social mobility in American society. As younger Rosetans attended college they became aware that they could not return to Roseto to work. There were no jobs there for the college educated. Indeed, many young Rosetans married non-Italians and Protestants and obtained jobs in urban areas along the eastern coast of the United States.

Although Rosetan parents and grandparents exhibited great pride in the number of Rosetan youth who had entered professional and business fields, they also were sad about what this meant to them as Rosetans. Young Rosetans, on their way to becoming independent and middle-class Americans in search of the satisfactions of the traditional good life would return home less often, have smaller families, attend church less often, work long hours at their jobs with little or no time for leisure activities, often smoke and drink alcoholic beverages, pay less attention to their needs for sleep and nutrition, and become more intent on getting a better job, a better car, and a better home. Older Rosetans had traded some of their cultural assets for the need for social acceptance and opportunity. Some young Rosetans, having experienced both the Old World and the New World, rejected the old for the new, sometimes at the strong encouragement of their relatives and the pressure from friends.

Other young Rosetans, though few in number, did attend college but chose to work, marry, and live in the community, perhaps because of the fear of the unknown or unwillingness to cut some of the ties that provided them security, acceptance, and satisfaction. Still a few Rosetans chose the best of both worlds. They chose to remain in Roseto, yet worked to attain a position of power and affluence. It was this group of Rosetans that was of special interest as they became

outsiders in their own community and several became heart attack victims.

## CHANGES AND CHOICES

Roseto and Rosetans changed over the 20 years we have known them. The change has been gradual and perhaps even imperceptible at times to Rosetans themselves, for they knowingly could have speeded up or slowed the process of acculturation had they chosen to do so. Nonetheless, value choices had to be made at various points by individuals, families, and the community collectively in the evolution of this new generation of Rosetans. The choices made by some individuals, in retrospect, were not healthy. Fatal heart attacks among young Rosetan men began to occur for the first time in the early 1970s.

The study of 18 family units in 1972 confirmed the accelerating rate of acculturation and social change in the community. A sharp contrast in the three generations was noted in illness experience and life change. The cohesive social structure that characterized the immigrant generation was almost nonexistent among the grandchildren of the immigrants. Several of the youth had married non-Italians, attendance at church and at the social clubs had fallen off, and the birth rate was declining. In effect, the young Rosetans had drifted from the values of their parents and grandparents.

Roseto had become American. Rosetan institutions such as the family, the church, and the work place, which previously had provided some degree of security, stability, and direction for life goals, were no longer effective social safety nets.

## SOCIAL SUPPORT AND HEALTH

Social support is the gratification of basic human needs for approval, esteem, and succor. It is through interaction with others that we give and receive social support. The presence of social support has been suggested by others as a buffer or cushion against the deleterious effects of stress, bereavement, changes in life events, and circumstances.<sup>13-17</sup> Cobb<sup>14</sup> has suggested that health professionals should teach their patients, both sick and well, how to give and receive social support. This should not require special instruction by mental health professionals, but can be a part of teaching patients how to assume self-responsibility for staying well.

Another component of social support is the phenomenon of "networking."<sup>18</sup> Roseto illustrated a family and community "clannishness" that made use of each other's skills, helped satisfy individual and collective needs, and instilled a sense of belonging and pride. Networking is a safety net that we all need, not only in times of ill health or adversity, but as social beings who need recognition and acceptance as a part of our daily existence.

TABLE. Summary of Major Studies of Cardiovascular and Related Disease in Roseto, Pennsylvania

Purposes of Study	Study Design/Subjects	Data Sources	Major Findings
To estimate the mortality from myocardial infarction (MI) in five ethnically distinct Pennsylvania communities in the same vicinity.	Cross-sectional—1955-1961. Adult residents of Nazareth, Roseto, Bangor, Stroudsburg, and E. Stroudsburg.	Death certificates, hospital records, family physicians.	Mortality due to myocardial infarction (MI) significantly lower in Roseto than other four communities, one half that of nearby Bangor. Typical Rosetan diet contains more calories and fat than the average American diet.
To estimate morbidity from MI in the living population in three of the five communities.	Cross-sectional—1961-1966. Volunteers over 21 in Roseto, Bangor, and Nazareth.	Physical examination in community clinics.	Rosetans are simple, warm, and hospitable people. Mutual trust and support were observed to be important characteristics of social interactions.
To identify medical and/or social factors that might explain the low death rate from MI in Roseto. To estimate the prevalence of MI in the community. To describe the social structure and other sociologic factors in Roseto.	Cross-sectional—1962-1964. Volunteers over age 21, born in Roseto, Bangor, or elsewhere, who participated in clinics operated by the study team.	Physical and laboratory examinations. House-to-house sociologic interviews with all Rosetans.	Comparison of prevalence rates of MI of native-born Rosetans living in Roseto, Bangor, and elsewhere shows a trend that as one moves away from Roseto the prevalence rate increases. Males in Roseto had a lower prevalence rate than males in Bangor and elsewhere, especially among those over 65. Females had lower rates of MI than males in all three groups.
To determine if the three communities, which showed different MI mortality experience, also differ in the incidence of treated mental illness.	Cross-sectional—1950-1960. All adults, 21 or above, who were treated for the first time in a psychiatric hospital or clinic or by a psychiatrist during the study period and who resided in Roseto, Bangor or Nazareth.	Records of all public mental hospitals and private practicing psychiatrists in Northampton County, Pa.	Roseto has lower rates of treated mental illness than Bangor and Nazareth. No differences by diagnostic categories between patients from Bangor and Nazareth.
To examine the ways in which Roseto differs culturally from its neighboring adjacent community, Bangor, by: (1) describing the social structure of Bangor; (2) reporting sociologic data on Bangor residents who participated in MI study; (3) comparing Roseto and Bangor subjects with clinical evidence of MI; and (4) comparing the social structures of Roseto and Bangor.	Case-control within a cohort and cohort comparison—1964. All Bangor residents, 21 or above, participated in the clinical study of MI, especially those with clinical evidence of MI, and all residents of Roseto with clinical evidence of MI.	Same as reference 20.	Bangor ethnically diverse with no distinct cultural traditions or customs, predominantly Protestant, extended family contact infrequent, formal social affiliations, emphasis on self-reliance, ambiguous male-female roles, typical American diet. Roseto ethnically uniform, cohesive, retaining Italian traditions and customs. Predominantly Roman Catholic, patriarchal families with strong clan associations and high community involvement. Emphasis on mutual support, male-female roles clearly defined, typical Italian diet.
To determine whether the comparatively low death rate in Roseto from MI is due to a low prevalence of MI or a greater likelihood of survival following MI.	Cross-sectional retrospective—1955-1965. Adult residents of Roseto, Bangor, and elsewhere who voluntarily attended the clinics sponsored by the study team during the summers of 1962-1965. Also a random sample from resident pools of each community was taken to correct possible volunteer bias.	Clinical measurements and dietary data were collected by study team.	No Rosetan male under age 55 in either the volunteer group or a random sample of residents showed evidence of prior MI. Increased survival among Rosetans who had MI. Italians born in Roseto but living in Bangor had MI experience similar to other Bangor residents. Rosetan males were significantly more obese and hypertensive than males from Bangor but had lower rates of diabetes.

### *Study Design/Subjects*

Double-blind, case-control. Adult residents of Nazareth who voluntarily participated in clinics sponsored by the study team during the summers of 1962-1965. Groups include persons with evidence of MI, the patients, and a normal control group.

Cross-sectional with five-year follow-up—1971; 204 residents of Roseto in 1971 who had participated in the earlier clinical and sociologic studies and representing 18 major families or "clans" of the community.

Cross-sectional—1955-1970. Adult residents of Roseto, Bangor, and Nazareth.

Retrospective comparison of smoking habits and reported illness in two communities with different ethnic composition and social structure. Adults in Roseto and Tecumseh who participated in studies of coronary heart disease.

### *Data Sources*

Same as reference 23.

Holmes and Rahe social readjustment rating questionnaire and a brief interview focused on recent illness experience.

Death certificates, hospital records, contacts with family physicians.

Published reports.

### *Major Findings*

Patients were more recent migrants to the community, with low status crystallization and higher anxiety than controls.

Life change highest among third generation Rosetans independent of sex, religion, education, or occupation. Categories of life change differ by generation, with the third generation reporting more life change related to work and finances; the second generation reported more changes in their personal lives, and the first generation reported more changes related to family.

For the years 1955 to 1961, MI mortality in Roseto for men under 65 was a fraction of that in other two communities. For the years 1962 to 1965, the MI mortality for Roseto had risen to about 20% of the other two communities. For the years 1966 to 1970, the MI mortality for Roseto had risen to two thirds of the other two communities.

Smoking habits in both communities were similar for both men and women; smoking habits of husbands and wives were almost identical. No significant relationships were found in either community between smoking and coronary heart disease, hypertension, or somatic complaints. Smoking was associated with peptic ulcers in both communities. A greater prevalence in hypertension was found in Tecumseh.



## A LESSON FROM ROSETO

The major lesson from Roseto is that we all have a need for a safety net. We all have a need for ties that bind us to the social fabric. We need someone to talk to, to listen; we need social institutions, clubs, organizations, and informal groups to provide us with a sense of purpose for living; we need close personal ties with a loved one, with family members, and with others who care beyond listening; we need a philosophy or point of view of life to help us set personal goals and assess our personal ability to share, to give, and to take; and finally we need to select a physical and social environment in which to live that will provide a meaningful mixture of opportunities and security.

From our studies and observations over the years in Roseto (Table<sup>19-27</sup>), we found that Rosetans made choices about their life-style, and certain young Rosetans had heart attacks. They thought they were purposefully retaining the best of the Old World and gaining the benefits of the good life. By living in Roseto and attempting to live the good life, however, they deviated from Rosetan norms. They were not fully accepted either in Rosetan or in middle-class American society. Roseto is not a community one can return to as a former Rosetan, except to visit. Those Rosetans who leave are changed persons. Those who remain in Roseto choose to do so. How we perceive and assess the life choices before us at any given time, and the choice we eventually make, will be made easier or more difficult by the degree of social support we have. Our social ties can affect our resilience to change and both can profoundly influence our health.

Other researchers have also confirmed that supportive relationships from family, friends, and social organizations can act as buffers against stressful situations. Perhaps the most important lesson from Roseto for each of us personally is that close personal ties with others for whom we care and who care for us are important to our health and well-being. Social isolation can occur rather easily in our rapidly changing and mobile society. Change of any type has its costs and benefits. These choices must be weighed as decisions are made about the kind of life-style we want and the purpose and meaning of our lives.

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# The courage to think

Dylan Thomas once wrote a movie scenario about a professor of anatomy in a medieval medical school who, having fallen afoul of the establishment, had lost his job.<sup>1</sup> In his final lecture he said: "To think, then, is to enter into a perilous country, colder of welcome than the polar wastes, darker than a Scottish Sunday, where the hand of the unthinker is always raised against you, where the wild animals, who go by such names as Envy, Hypocrisy, and Tradition, are notoriously carnivorous. . . . To think is dangerous."

The wild animals that threaten today's medical school graduates go by such names as Information Overload, Prescribed Learning, and Approving Authority. Some of them lurk among the drastic changes in medical school curricula that were introduced in the 1950s and 1960s. They prescribed an "indispensable" core of information and knowledge, command of which was to be tested for "objectively." The test instrument selected was usually the multiple choice examination, where only the presumed right answer is required, with no concern for the reasoning powers that led to it. Thus, not only was analytical ability not encouraged but there was little reward, or even opportunity, for the exercise of imagination. Moreover, important intangible qualities of students, not susceptible to objective assessment, such as reliability, honesty, dedication, perspicacity, understanding, and interest in patients were often lost sight of.

Demand for "relevance," another wild animal, soon began to preoccupy medical faculties. Accordingly, the administration shortened or eliminated the medical students' experience in the basic science laboratories that formerly had offered them an opportunity, initially to flounder, but ultimately to learn how to inquire. Their science was, instead, served up in lectures where the stimulus to sharpen their sense of wonder and to cultivate an attitude of inquiry was lost among the pressures for absorption of the "es-

sential" facts.

Also lost to students in recent years has been elective time sufficient to allow them to associate closely with one of the professors in the laboratory, to learn, to grow, to develop their powers of observation, and even sometimes to savor the satisfaction of being a contributor to the literature. As a consequence of such curricular "improvements," a student's most important intellectual resource — his ability to question, to analyze and test, a resource indispensable to the educated scientist and the mature clinician alike — may simply not be developed.

The faculties of some schools have now become aware that their overstructuring of the curriculum has not accelerated the pace nor contributed to the quality of learning. In an earlier day, the period from 1880 to 1912, American medical education advanced with almost explosive speed. It was a time when ambitious young physicians applied themselves to what might be called open-ended learning without curricula or qualifying requirements. They learned from "hanging around" and from myriad unplanned exposures to special people, ideas, and experience. At the turn of the century young American doctors, innocents abroad, visited and worked in the great laboratories and clinics of Europe, electing and digesting their experiences in their own way. Returning home they brought forth on this continent a new and vital form of medical education that in turn made America the "mecca."

Faculties then understood that the proper function of the educator is procreation, not duplication. Gradually, however, there developed pressures toward intellectual conformity in the shape of specialty boards. While the boards were aimed at maintaining high standards of training for practitioners, to some extent they encouraged, instead, standardization of educational experience. Thus, Alan Gregg, in referring to the Specialty Board of Internal Medicine, once told an august

gathering of the American College of Physicians that "the tradition of examinations in this country is not to find out what a candidate knows, but whether he knows what his examiners know. . . . Every tendency in our profession, especially every trend that seeks to strengthen its position by means of standardization, obligatory uniformity and unvarying acceptance deserves to be challenged as a threat to variety and survival."<sup>2</sup> Intellectual conformity may confer a sense of belonging and of acceptance by one's fellows but often at the sacrifice of freshness and originality. Carried to an extreme, efforts to gain acceptance can result in a continuous intellectual minuet in which we bow to each other and walk around arm in arm according to a cadence that can not be broken for risk of disapproval.

Education properly encourages both high standards and diversity in learning, in inquiry and in interpretation. Lewis Moorman, an outstanding medical scholar and one-time dean of the University of Oklahoma School of Medicine, compared the modern scholar to a squirrel: "He should be free to garner the best from the topmost boughs of the boundless forest. Committed to the annuling tread of conformity within the confines of a miserable cage, however, he cracks only the nuts supplied by his keeper."<sup>\*</sup> Unfortunately, those with creative imagination are not always equally endowed with courage. Too many of us walk voluntarily in the cage of conformity. It takes a hardy soul to withstand the pressure of disapproval and continue running on the topmost bough.

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\* Lewis J. Moorman, 1954; personal communication.



# ROSETO, PENNSYLVANIA 25 YEARS LATER—HIGHLIGHTS OF A MEDICAL AND SOCIOLOGICAL SURVEY<sup>†‡</sup>

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The study of Roseto, an exclusively Italian-American town in eastern Pennsylvania was prompted by a comment by a local physician, Dr. Benjamin Falcone, who had been practicing there for 17 years. He declared to one of us (SW) that he rarely saw a case of myocardial infarction in any of the 1600 inhabitants of Roseto under age 65.

Settlement of Roseto had begun in 1882 by Italians from a town of the same name, Roseto Val Fortore, in the province of Foggia near the Adriatic coast of Italy. The newcomers endured many hardships as they tried to make a home among the Welsh, Dutch and German ethnic groups in northeastern Pennsylvania. With the help of a wise, enterprising and energetic priest, Father Denisco, however, they were able to accommodate successfully to social exclusion and exploitation by the locally powerful Welsh who had established and developed the slate industry in the area. In 1912 Roseto, Pennsylvania was incorporated as an exclusively Italian-American borough governed by officials elected by the villagers themselves. Considerable economic growth followed and with it a steady diminution of ethnic prejudice. By the time we studied Roseto in the early 1960s it was a thriving and moderately affluent community whose inhabitants were well respected and even envied throughout their corner of eastern Pennsylvania.

We first studied the mortality rates in Roseto from 1955-1961, comparing them with those in four surrounding communities, predominantly Welsh Bangor, an immediately adjacent town that shared with Roseto the same water supply, doctors and medical facilities; originally exclusively German Nazareth; and more ethnically mixed Stroudsburg and East Stroudsburg. Working with death certificates obtained through the

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Pennsylvania Department of Health, we verified the diagnoses by studying hospital records and the records of area physicians. The comparative mortality over the seven year period for men in various age decades is shown in Figure 1. The coronary death rate in Roseto was less than half of that in its four neighbors, in the California Cooperative Study and in the U.S. at large (1).

Encouraged by these findings, beginning in 1962 we undertook a medical survey of the living inhabitants of three of the communities, Roseto and two "control" towns, Bangor and Nazareth (2-6). The results of this study were reported in a monograph published in 1979 (7).

The data from individual histories, physical examinations, electrocardiograms and laboratory tests, as well as detailed inquiries into dietary, drinking and smoking behavior, and lengthy structured psychosocial interviews yielded a picture of a healthy, prosperous, long lived and remarkably cohesive community with not only a low death rate from myocardial infarction but a remarkably low rate of coronary disease among the living, despite the fact that the conventional coronary risk factors were found to be at least as prevalent in Roseto as in the two control communities.

The Roseto that we saw in the early 1960s was sustained by the traditional values of southern Italian villagers. The family, not the

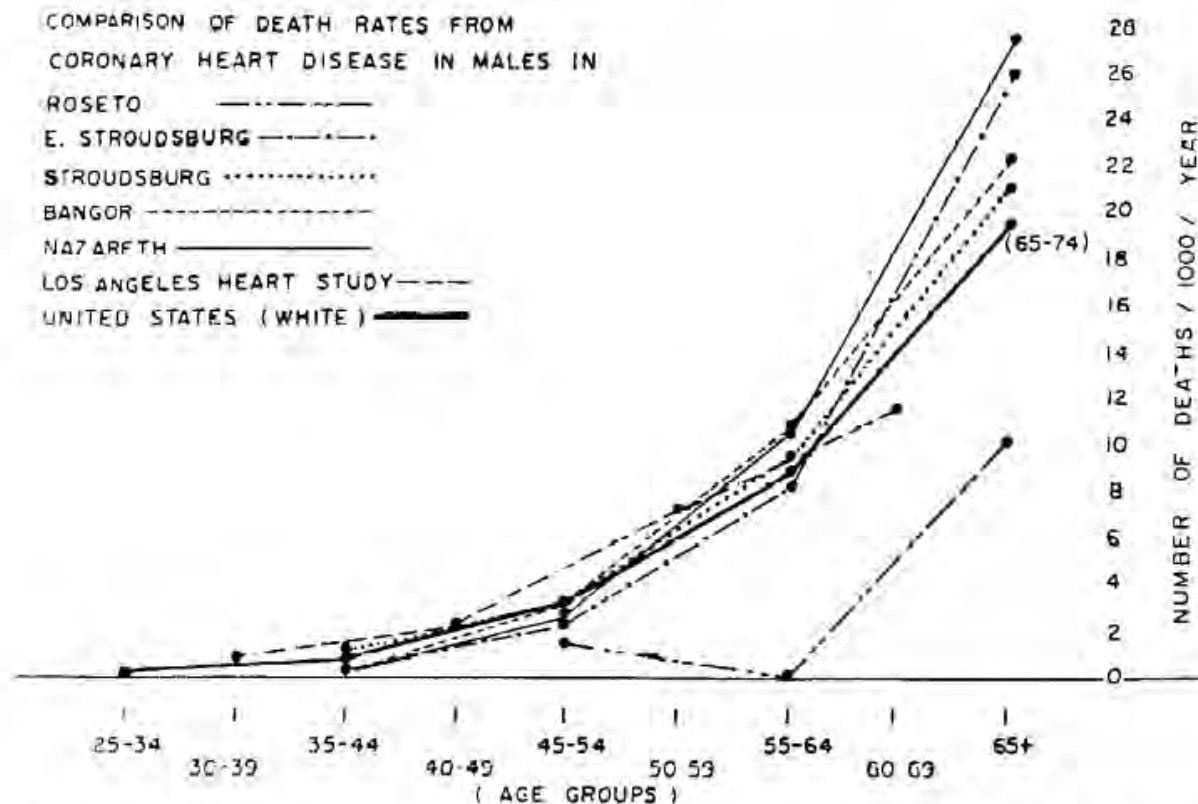


FIG. 1. Comparative mortality from myocardial infarction in men Roseto, 4 nearby communities, the Los Angeles heart study and white males in the U.S. at large.

individual, was the unit of their society. The community was their base of operations and each inhabitant felt a responsibility for its welfare and quality. Most households contained three generations. Rosetans were proud and happy, generous, hospitable and ready to celebrate any small triumph of their citizens. The elderly were not only cherished but, instead of being retired from family and community responsibilities, they were promoted to the "supreme court." There was no shortage of stress among Rosetans. They experienced many of the same social problems and personal conflicts as their neighbors, but they had a philosophy of cohesion with powerful support from family and neighbor and deep religious convictions to shield them against and to counteract the stresses.

The comments made during the psychosocial interviews by the younger Rosetans, those under age 35 led us to suspect that Roseto was due for a sweeping social change. These young men and women, two or three generations removed from the early struggles against the social discrimination and exploitation endured by their grandparents and great grandparents, expressed respect for the old world values and traditions, but no desire to live by them. Therefore, in 1963, we boldly made and recorded a prediction that, should the inhabitants of Roseto abandon their traditional values and behavior, they would lose their relative immunity from fatal myocardial infarction.

At the time of our interval report to this association in 1973, we already had a strong indication that the coronary death rate in Roseto was climbing toward the level of its neighbor, Bangor (8). We began a 25 year follow-up in 1985, replicating our original study and concluding in 1988.

## METHOD

### Mortality:

To control the possibility that our original 1955-61 mortality figures reflected only a non-significant aberration, we collected and studied all death certificates of Bangor and Roseto residents from 1935-1985.

### Health Survey:

Individual histories and physical examinations, EKGs and laboratory studies were performed as before. Changes in dietary, smoking and drinking behavior were documented, exercise habits were estimated and a 40 minute individual psychosocial interval was conducted, closely similar to the original one. Again the homes in the communities were visited and interviews were carried out with key members of each household. To avoid bias in the study, neither the non-Italian partners in mixed ethnic marriages that had occurred in the interval, nor the offspring of those marriages were accepted for examination. We were able either to examine, interview, or collect medical data from personal



physicians on 89% of the survivors of our original survey and on 60% of the total 1985 Roseto population. The data on mortality from all causes among inhabitants of Roseto and Bangor were analyzed according to date and age decade.

## RESULTS

### Social Change:

The most striking social change was a widespread rejection of a long standing taboo against ostentation. Initially puzzled by the almost universal avoidance of ostentation among the wealthy in Roseto, we learned from a young Italian anthropologist, who was also conducting a study of the town, that fear of ostentation derived from an ancient belief among Italian villagers relating to the evil eye, *malocchio* (9). Children were taught that any display of wealth or superiority over a neighbor would bring bad luck. We saw evidences in the late 1960s that the taboo had begun to crumble. Expensive automobiles began to appear on the streets of Roseto and occupants of the small, closely placed houses on Garibaldi and other streets of Roseto built and moved to typical suburban ranch houses with spacious lawns on the wooded edges of town. Those who formerly walked to the neighborhood stores for groceries, goods and services, began to drive to the supermarkets elsewhere. Local businesses soon began to close down (Figure 2.). People joined country clubs and attendance at the men's clubs in Roseto declined. There was even a decline in church attendance at the local catholic church. Marriages, which had traditionally been to Italians were becoming ethnically mixed (Figure 3). A couple's first 2 baby girls and boys were not longer uniformly

**Businesses in Roseto from 1945 to 1985**

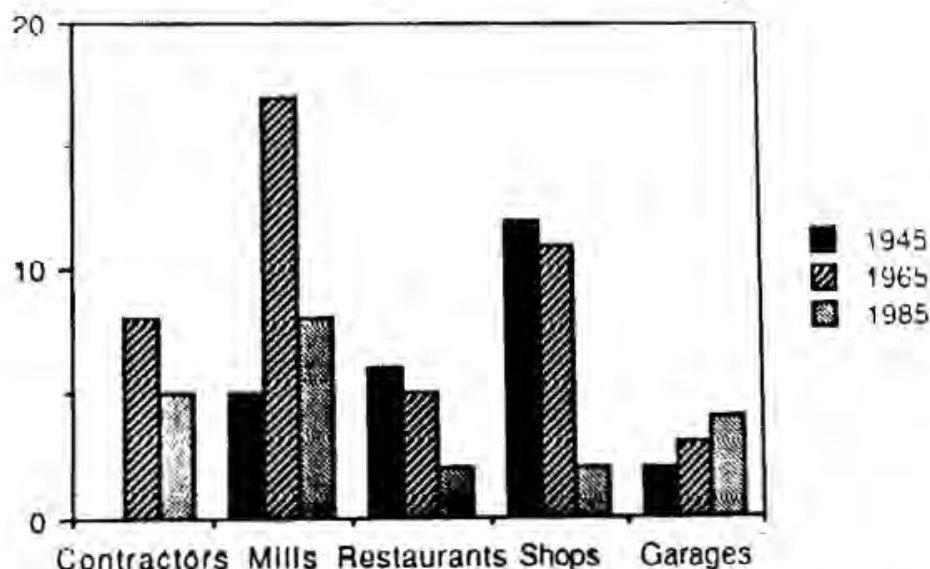


FIG. 2. Changes in Roseto business establishments over a span of 40 years.

### Marriages in Roseto to Non-Italian Spouses

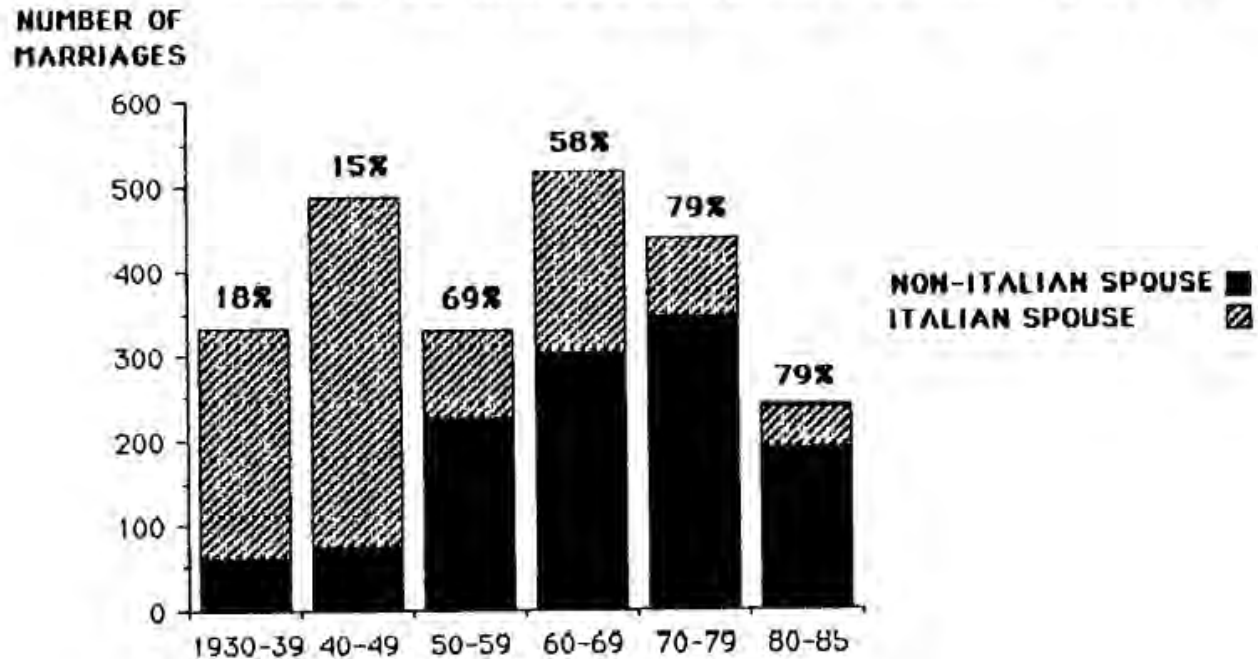


FIG. 3. Marriages of Rosetans to Italians and non-Italians from 1930-1985.

named for grandparents, but now the girls bore such names as Lisa, Kelly, and Allison while the first boy was named for his father rather than grandfather and younger boys might be named after a godfather or no one in particular. As the grandparents lost their prime position there was a strong indication that the individual, not the family, had become the unit of society.

The educational level of Rosetans had climbed steadily since the early days when few had even completed primary school. But even by 1940 less than 10% of the population had completed high school. By 1980, however, 65% had had a high school education and 10% had completed college or professional school. By this time the educational level of the inhabitants of Roseto had exceeded that of Bangor.

#### Mortality:

The mortality data from all causes occurring in each decade among Bangor and Roseto men and women since 1935 are shown in Figure 4. In Figures 5-6 are data for Roseto and Bangor by sex and age decades on deaths from myocardial infarction and myocardial infarction and congestive heart failure combined. With the respect to all causes the death rates for both towns climbed from decade to decade, suggesting a somewhat shortened life span, especially for Bangor men and women and Roseto men. The death rate for myocardial infarction and for myocardial infarction and congestive failure combined rose much more sharply for the men in both communities. In the case of Roseto men, the rise was mainly after 1964. The peak during the years 1965-74 may possibly



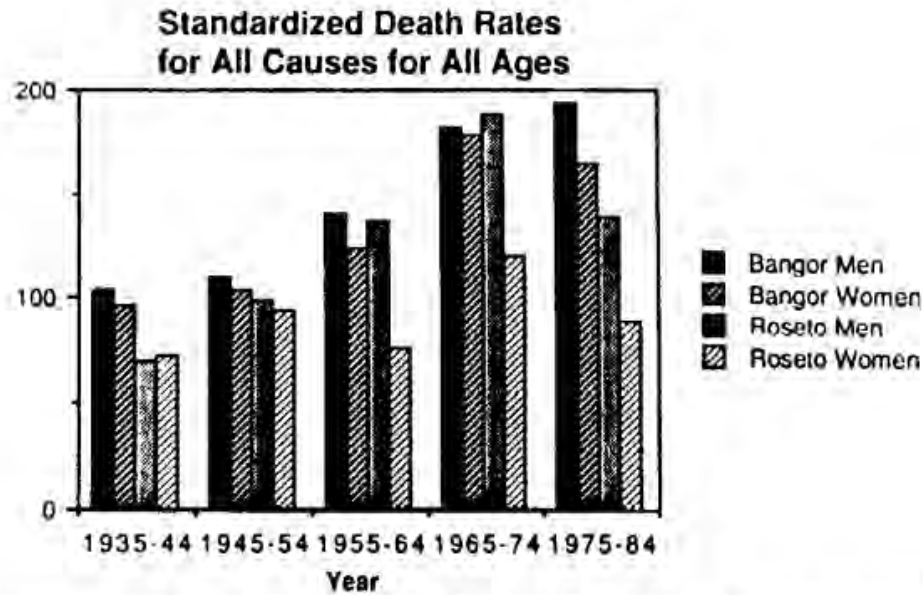


FIG. 4. Overall mortality rates per 1000 by decade among men and women in Bangor and Roseto.

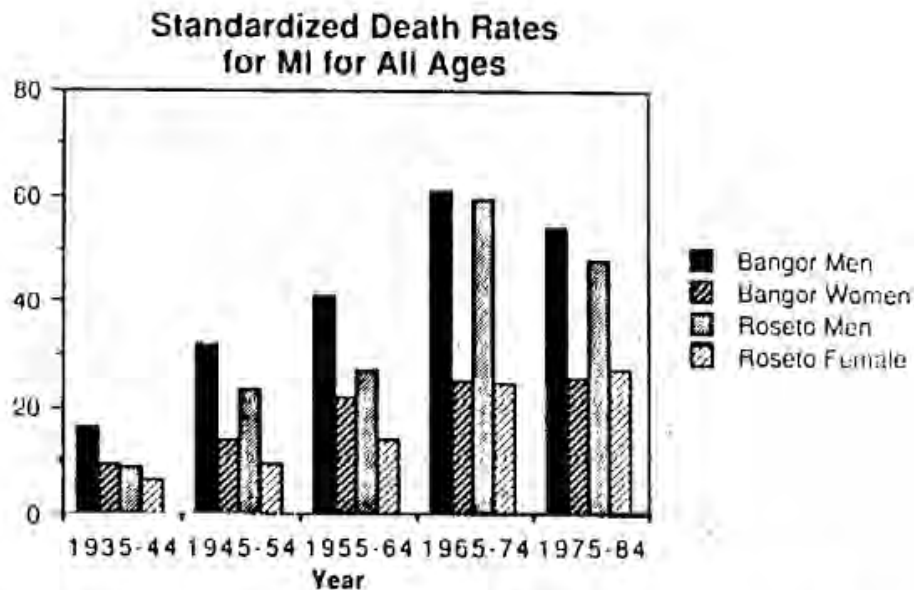


FIG. 5. Mortality rate per 1000 from myocardial infarction among men and women in Bangor and Roseto.

reflect the rapid rate of social change during that period followed, perhaps, by some accommodation.

#### History & Physical Findings:

The number of Rosetans in the survey who had experienced one or more myocardial infarctions was more than double the 1960s figure. There was a similar increase in symptoms of angina pectoris. Hypertension among Rosetans had increased by an even greater margin, becoming very close to the prevalence among their neighbors in Bangor. Cerebrovascular accidents, too, had more than doubled.

## ROSETO, PENNSYLVANIA 25 YEARS LATER

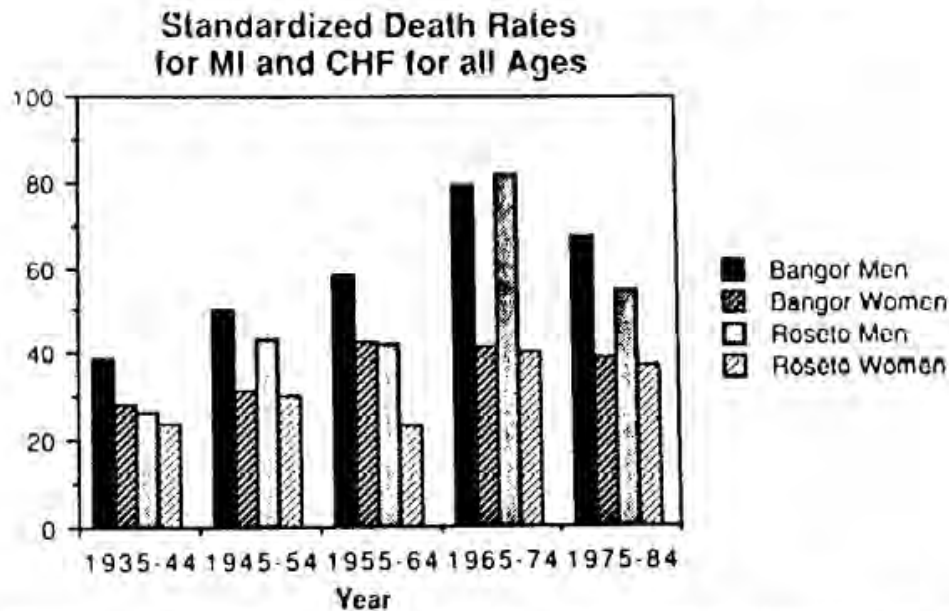


FIG. 6. Mortality rate per 1000 from myocardial infarction plus CHF among men and women in Bangor and Roseto.

### CORONARY RISK FACTORS

**Exercise**—the long standing tradition of Rosetans walking about the town in the evening visiting with neighbors began to fade and by 1985 was hardly observed at all. The degree to which this may have reduced the level of exercise for the Rosetans would be difficult to estimate. Another indication of less exercise might be found in the fact that by 1985 many fewer Rosetans were engaged in laboring jobs than in the 1960s. Otherwise there was very little indication from the histories of a change in exercise behavior over the 25 year period.

**Diet**—The individual data on dietary habits indicated a clear but modest decrease in the consumption of salt, animal fat and lard, and more use of corn oil in cooking. Consumption of olive oil among Rosetans was less than that of other oils in 1985 as it had been in 1963.

**Cholesterol**—There was not a significant change in blood cholesterol concentration among Rosetans over the 25 year span.

**Smoking**—In 1985 we found a decrease in the number of Rosetans who smoked. The decrease was evident only among the men, however.

**Drinking**—There was relatively little change in drinking habits among Rosetans during the 25 year interval except for a moderate reduction in hard liquor consumption.

**Hypertension**—As noted above the prevalence of hypertension by history had increased sharply in Roseto over the 25 year interval.

### DISCUSSION

From the psychosocial interviews carried out in the present follow-up study there appears to have been a shift of focus from the family needs

to individual needs. At the time of our original study, for example, the acceptance by the Rosetans of the death of a spouse or family member reflected their perception that the family constituted a kind of shared earthly immortality. Their attitude toward the death of a parent was similar to that toward the harvest, the natural cycle of planting, cultivation, maturity, followed by death and then fresh new growth. The death of someone who had produced and nourished a family was, therefore, in the natural order of events. The feeling of loss of the survivors was tempered by a sense of continuity and continued belonging to a family unit. Twenty-five years later the sense of a family's continuity seemed less powerful in mitigating the effects of losing a loved one through death.

Beyond the shift of social focus from family to individual, sharing, once typical of Roseto, had given way to competition. Their community pride and group morale appeared to have been partially displaced by concern with personal status and power. The number of three generation households had diminished greatly. Between 1960 and 1980 the population of Roseto had decreased by 8% but the number of households had increased by the same percentage. Another striking change was that elderly Rosetans, previously cared for at home, had been entered into nursing homes.

The contrasting perceptions and reactions of five generations of Rosetans, as gathered from the interviews, illustrated vividly the course of the rapid social change in the community that accompanied the shifts in health and longevity. Those whose birth dates fell between 1880 and 1899 were first and second generation inhabitants who were either born in Roseto, Pennsylvania or in Italy and had immigrated to the U.S. as young children with their parents. They endured the pain and hardships of the early days and ultimately saw the dawn of a new day with independence, social acceptance and a degree of affluence.

The next generation, born between 1900 and 1919 were children during the early development of the town and its incorporation in 1912. They, too, experienced the social traumas but their youthful horizons were broader than their parents'. Many of them finished high school and some served in World War II. Thereafter, they were ambitious for their children, but held firmly to the traditional values and behavior of the Italian villagers.

To the generation that followed, those born between 1920 and 1939, the early days of hardship and humiliation were remote. They had less need for the spiritual strength and moral support of their neighbors, the church, or even of their family. Many of them graduated from college and even graduate and professional schools a distance away. As already pointed out, not only did many of them marry non-Italians but they



often failed to observe the centuries old custom of naming their children after their grandparents. Moreover, they broke the tradition of *maloccio*, the prohibition against ostentation, flaunting success and possessions. It was the replies on the sociological interviews of this generation, the participants younger than 35, that caused us in our first study in the early 1960s to predict radical change in the community with loss of its relative immunity to death from myocardial infarction.

The following generation, those born between 1940 and 1959 were too young to have participated in our first study in the 60s but they included the teenagers with whom we organized "rap" sessions. We noted that they had little attachment to their ethnic heritage and were thoroughly entranced by the American Dream.

The final generation for this report, those whose birth dates fell between 1960 and 1979, were youngsters or unborn during the first survey. They were too young to have participated in either Viet Nam or the counter culture of the 60s. It was, therefore, of special interest that discussions with these Rosetans under age 25 during the summer of 1985 revealed an almost plaintive concern over the changing mores, the weakening of traditions and the lack of equanimity among the inhabitants of Roseto. Perhaps there will be another wave of change.

## CONCLUSION

Among the inhabitants of a relatively homogeneous community, where beliefs, traditions and behavior of their European forbears were firmly maintained for 2 or 3 generations in this country, there was relative immunity from fatal myocardial infarction. Later, however, in a setting of accelerated social change, coronary disease and hypertension reached levels comparable to those of neighboring towns and the U.S. at large, despite dietary "risk" having changed very little, or, among many individuals, having actually declined.

It appears likely, but by no means certain, that the increased vulnerability to ischaemic heart disease in Roseto can be attributed in part to both the nature and the rapidity of social change. Earlier workers have observed that rapid change itself has been associated with an increased burden of disease (10, 11, 12). There is also evidence from other studies of the apparent benefits of social support, morale and a sense of belonging (13, 14).

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## DISCUSSION

**Toole** (Winston-Salem): The morning began with the Boston marathon and ended with Roseto. I wonder why you don't include the change in exercise habits as a very important factor because you showed how the city had evolved with garages going up, the people moving to suburbs, and therefore using automobiles?

**Wolf:** When we first studied it, we couldn't tell the difference in exercise between the various communities. The exercise of the Rosetans has certainly decreased for the reasons that you suggest, but so has it in the surrounding communities so we can't attach a whole lot to it at the moment.

**Burrows** (Boston): I didn't notice any plates of spaghetti in the later dinner tables. Is there a "pasta" factor here? The other thing is what about smoking cigarettes? There are many risk factors to hypertension, coronary disease and strokes. I'm sure you controlled all of those with your studies.

**Wolf:** We studied the dietary habits and the smoking and the drinking habits of the Rosetans in great detail. As a matter of fact two Ph.D.'s in nutrition came out of the studies. It turns out that whatever dietary changes had occurred in our twenty-five year follow-up from the original study of Roseto had been in the direction of what the American Heart Association calls "prudent." There was less consumption of animal fat, not a great difference, and there was less smoking and, as I said, less exercise.

**Austrian** (Philadelphia): Do you think the change in marriage patterns and in the genetic homogeneity of the population are exerting any effect on your results?

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**Wolf:** No, because we studied the same people that we saw before and studied the pure Italians.

**Wood (Philadelphia):** Did personality structure, in terms of Type A and Type B, shift with this changing social situation?

**Wolf:** We didn't study that on the second go-round and probably should have. We studied it on the first go-round and it was not a very strong support of the Freedman hypothesis, but it went along with that.

**Horwitz (Philadelphia):** Stewart, I congratulate you on being one of the professors of medicine who are really looking into the situation as far as people and patients are concerned.

**Oates (Nashville):** You mentioned the animal fat in the diet. Would you comment on olive oil intake in this community?

**Wolf:** The oil intake of the Rosetans was relatively low in olive oil. They used a great deal more lard than the wives of the people in this room use. One of their favorite dishes was fried peppers. They would fry the peppers in lard and they are very good. Then you'd take a piece of Italian bread and rub it around in the gravy that is left and eat that and that's delicious! The Rosetans were very poor when they came and they are much more prosperous now. They eat everything. I've had many dinners with Rosetan families. They usually have more than one type of meat. When I eat ham I cut the rim of fat off and don't eat it, same way with roast beef. They cut right through and eat it all. We were very elaborate in our study of their diet because we had Ansel Keyes breathing down our necks. Incidentally some of you may have seen the quote from Ansel Keyes in the *New York Times* recently. He said we may have put too much emphasis on cholesterol.

# Studying the person in the patient: A look back at developments

Stewart Wolf, M.D.

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The idea that a patient's nature has a good deal to do with the nature of his or her illness is an old one. From time to time, however, it has been difficult to fit the concept into prevailing philosophical thinking. For example, the views of Pierre Gassendi (1592-1655) and of John Locke (1632-1704) were far more hospitable to the idea of the unity of mind and body than were those of René Descartes (1596-1650), who believed that mental and emotional functions were entirely independent from muscular and visceral activities.<sup>1</sup> Gassendi and Locke, on the other hand, believed that all mental and emotional activities, as well as bodily behaviors, are generated in response to sensory information from one's surroundings.<sup>2,3</sup> A century later their ideas were institutionalized by Etienne Bonnot de Condillac (1715-1780), one of a group of "idealoguees" who gathered at the Salon de Madame Helvétius in Paris.<sup>4</sup> Their fellow member, Pierre Jean George Cabanis (1757-1808), further evolved a unified concept of the mind-body relationship based on physiology. In 1796 he proposed that thoughts and emotions, as well as general somatic and visceral behavior, are shaped, not only by new experiences perceived through the senses and freshly processed in the brain, but also by remote and long-forgotten experiences stored somehow in the brain.<sup>5</sup> Thus, he came close to the notion of the unconscious. Cabanis also suggested that differences in thoughts and behavior

must, in part, reflect distinctive features of each human brain, adding that "according to one's state of mind and according to the different nature of the ideas and the moral affections, the activity of the organs can by turns be stimulated, suspended, or entirely reversed."<sup>5</sup>, p. 650

The teachings of the idealoguees were popular among medical students in nineteenth-century France, among them Charles Richet, who was to become professor of physiology at the University of Paris. Richet, who was interested in psychology, considered it to be part of physiology.<sup>6</sup> In the United States, Walter B. Cannon, who held similar views, was in close touch with developments in Europe. He knew Charles Richet, and, in fact, at a Festschrift for Richet in 1926, Cannon reported on the preliminary work that led to his famous concept of homeostasis.<sup>7</sup> Three years later (1929-1930) Cannon was in Paris again, serving as exchange professor from Harvard.

By the late 1930s and thereafter, thanks to the influence of Walter Cannon's work and the teachings of Adolph Meyer, the professor of psychiatry at Johns Hopkins University, the experimental study of mind-body relationships in human subjects had begun to attract an interdisciplinary range of medical scientists. Among them were Stanley Cobb, Soma Weiss, and their colleagues in Boston; Harold Wolff and his group in New York; Eugene Ferris and his associates in Cincinnati; Edward Weiss and his colleagues in Philadelphia; Robert Livingston at Yale; George Saslow in St. Louis; Roy Grinker in Chicago; J.J. Groen in Jerusalem; and Alberto Zanchetti and his group in Milan. Others experimented with animals, including Horsely Gantt and Curt Richter in Baltimore, Howard Liddell and his group in Ithaca, New York, and Hans Selye in Montreal.

Many of these workers and several others from the United States and Canada participated in establishing in 1943 the American Society for Research in Psychosomatic Problems. Shortly before that Mrs. Kate Macy Ladd, who in 1936 had

founded the Josiah Macy, Jr. Foundation, directed the foundation to provide support for the fledgling field of psychosomatic investigation. The foundation first financed the remarkable bibliographic and editorial work of Helen Flanders Dunbar at Columbia's College of Physicians and Surgeons in New York and later assisted in founding the journal *Psychosomatic Medicine*, which first appeared in 1939. The membership of the society during the early years included an impressive array of psychiatrists, physiologists, endocrinologists, neurologists, psychologists,

*Perceiving and feeling  
are both sensations and  
memory is a stored or  
transformed sensation.*

*Condillac*

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internists, and representatives of several medical subspecialties, all of whom were intent on exploring the relationships of life experiences to health and disease. Walter Cannon was a member of the society, as was Adolph Meyer, who, after presiding at the first meeting, continued as honorary president. In 1948 the society was renamed the American Psychosomatic Society.

In 1946 the Commonwealth Fund established at the University of Cincinnati and at Cornell-New York Hospital in New York City educational programs designed to teach young internists sufficient psychology and psychiatry to enable them to deal effectively with the social and emotional aspects of illness and thereby to influence medical education. At Cornell we sought to equip our Commonwealth Fund fellows for posts in academic medicine. Their curriculum consisted of spending each morning in an outpatient clinic taking care of patients under supervi-



sion and each afternoon in the laboratory, using their clinic patients as subjects for research into the disease that affected them. The purpose of the research was, of course, pedagogical as well as to generate new knowledge on the relevance of psychological and social forces to the pathophysiologic changes involved in symptoms and disease. In part, however, the purpose was therapeutic, to understand the patient and his disturbed physiology in order to help him or her to comprehend the psychological and social forces at work and cope with them. We often used the stress interview to elicit physiological and chemical responses. Topics for discussion were selected from what had been learned from careful study of the patient in the clinic. Thus, the stress applied was not only relevant to the patient, in contrast to so-called standard stresses such as mental arithmetic and horror movies, but it was able to provide therapeutic leverage as well. George Engel emphasized in his essay in *The Task of Medicine*, reviewed in the Winter 1990 issue of *The Pharos*, that "dialogue is truly foundational to scientific work in the clinical realm."<sup>8</sup>

By 1950 enough significant research had been done to fill the huge volume *Life Stress and Bodily Disease*, which was published as the proceedings of the Association for Research in Nervous and Mental Diseases.<sup>9</sup> Thirty years later a reprise by the association managed a volume only one-third the size, although in the interim major technical advances had made it possible to record chemical and physiological responses of human subjects with greater ease and remarkable accuracy.<sup>10</sup>

In the interim, however, there had developed among clinical investigators and among those who were supporting medical research an intense concern with the need for quantitative measurement and statistical testing in all investigations. Careful observational studies were often scorned as anecdotal and either abandoned by their proposers or

modified in a procrustean way to fit a contrived system of measurement or scoring. What could be learned from observation and dialogue was devalued so that even teaching at the bedside declined — not a new problem — as Mark D. Altschule reminded us in his book, *Essays on the Rise and Decline of Bedside Medicine*.<sup>11</sup> Interest in experimental studies of individual human subjects in the tradition of William Beaumont's classical work with his fistulous subject Alexis St. Martin had been all but abandoned by the mid 1960s,<sup>12</sup> giving way to epidemiological surveys, psychological testing, often coupled with measurements of hormones and neurotransmitters in the general circulation, and other techniques that did not require extended dialogue with the subject or close attention to the patient as a person.

The preoccupation with quantification, replication, and the elimination of observer bias often served to obscure important data, including the idiosyncratic meaning of an experience to the affected individual. Evidences of nonquantifiable qualities such as courage, honesty, loyalty, generosity, and creative imagination, or of such emotions as sadness, fear, and anger were ignored. Thus, although the studies afforded a valuable means of classifying groups of individuals, they did not contribute much to the understanding of individual patients, so essential in clinical practice. There soon developed among clinical investigators a self-conscious, apologetic attitude toward descriptive, nonquantifiable evidence. Such diffidence appears to have been quite unjustified if one considers the observations of Charles Darwin, which, if offered for the first time today, might be dismissed as anecdotal. His imaginative inferences from very acute and systematic observations yielded a work the influence of which on the development of biological science has hardly been equaled.<sup>13</sup> Darwin would probably be criticized today because his methods did not protect against the possibility of ob-

server bias. Bias does of course muddy the waters; it should be avoided in so far as possible but not at the cost of sacrificing intuition and the capacity to make perceptive judgments. These provide the gateway to creative discovery.

Traversing the gateway, the eighteenth-century physiologist, Cabanis, noting the visceral responses of individual subjects in a variety of emotional states, described what Walter Cannon later observed in his frightened cats, inhibition of gastric secretion and motor activity.<sup>14</sup> Cabanis wrote, "A vigorous and healthy man has just eaten a good meal; in the midst of this feeling of well-being, the foods that are at the moment carried to the various parts of the organisms are energetically digested, and the digestive juices dissolve them easily and quickly. Should this man receive bad news, or should sad and baneful passions suddenly arise in his soul, his stomach and intestines will immediately cease to act on the foods contained in them."<sup>15</sup>, p. 650

Cabanis also anticipated the findings of other investigators who observed acceleration and intensification of gastric functions in the face of situations that arouse aggressive emotions.<sup>15, 16</sup> He wrote: "Fear destroys and can annihilate the muscular and motor forces. Joy, hope, courageous sentiments can multiply their effects tenfold; anger can increase them almost indefinitely."<sup>15</sup>, p. 651

Cabanis's ideas, as bright and persuasive as they were, certainly did not carry the day or even the century. The late eighteenth century in Europe was a time of ceaseless debate

*Fear destroys and can annihilate the muscular and motor forces.*

*Cabanis*



*The living being is  
stable, it must be so in  
order not to be destroyed,  
dissolved or disintegrated  
by the colossal forces.*

*Richet*

over the mind-body issue, a debate that generated intense heat but little light. Nearly a century later, however, the remarkable insights into hysteria and other neurological disturbances achieved by Jean Louis Martin Charcot at the Salpêtrière Clinic in Paris relied heavily on getting to know the patient as an individual. Ivan Pavlov, whose studies in St. Petersburg were taking place at about the same time, viewed his dogs as individuals and thereby was able to show how specific canine characteristics were associated with differing responses to conditioning.

In these and other fruitful investigations quantification, while always desirable, was not always applicable to the material under study,

except in the measurement of functions at the end organ, which modern technology can achieve with such elegance. Nevertheless, the studies had a seminal influence on the progress of medical science. Thus, while always striving for quantification, replication and elimination of bias, keen observation, and cogent inference must be central to the inquiry. With a deep respect for evidence and a balanced approach, modern technology can help to revive and enhance studies of the relevance of life experience to disease in experimental investigations using individual human beings.

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# THE MEDICINE OF THE LATERAL PASS

STEWART WOLF\*

*[When] some historian traces the development of the profession . . . he will pass judgement—yes, severe judgement on the absence of the sense of responsibility . . . in medical education.—WILLIAM OSLER [1]*

William Osler's signal contribution to medical education was the hospital residency in which, while learning by doing, young physicians can grow through graduated stages of clinical responsibility. In a thoughtful and well-documented essay published recently in this journal, Alan Astrow traces the beginnings of such patient-centered clinical training to France before and during the Revolution [2]. Building on an idea proposed in 1778 by two prominent French physicians, Claude-François Duchanoy and Jean-Baptiste Junelin, Philippe Pinel, in 1803 proposed a pattern for clinical teaching that combined an emphasis on 24-hour availability to patients, personalized, humane care, and research [3]. Pinel's design was institutionalized in 1802 during the empire by Napoleon's minister of interior, Jean Antoine Chaptal, and was actually used in teaching a selected group of the brightest and most promising students in Paris by Pierre Jean George Cabanis, professor of medicine at the Ecole de Santé, a post-Revolutionary replacement for the then-abolished university medical schools. Cabanis hoped that a hospital-trained physician would have "the inquisitive attitude of an anthropologist as well as a zoologist" and would become "consoler of the suffering and the weak, indifferent to fame and wealth, subservient only to his conscience and patriotic duty" [4]. Astrow inferred that the need for precise observation of patients to further the science of medicine would require that the teaching physicians control the management of their hospitalization, an arrangement he viewed as having encroached on the

Adapted from a forthcoming book, *The Doctors and Their Teachers: A Fifty Year Perspective on Medical Education and Medical Practice*.

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independence and freedom of choice of the patients. He further speculated that, as physicians in charge focused more and more on the heuristic value of a patient's physical disturbances for teaching and research, they may have become less attentive to the needs of the individual, thereby gradually corrupting medical education to the point of "losing its soul." It would not be difficult to find hospitalized patients today who would quickly agree with Astrow's formulation, but whether erosion of the patients' freedom of choice or, alternatively, whether diffusion of responsibility in the care of patients has contributed most to corrupting medical education is not immediately evident.

For at least a century after the Revolution, members of the French medical establishment engaged in a dispute about whether the emphasis in medical education should be "practical" or "academic." In the United States, with the strong support of the American Medical Association, founded in 1847, the exponents of the practical held sway until the opening of the Johns Hopkins Medical School in 1893. The Hopkins gave a powerful boost to the scientific emphasis in medical education and viewed the hospital as a teaching and, to some extent, clinical research laboratory. At the same time, however, there is little evidence that humanitarian concerns in teaching and in the care of hospitalized patients were in any sense bypassed or downgraded. William Osler described his residency program as providing "an education that begins with the patient, continues with the patient and ends . . . with the patient, using books and lectures as tools, as a means to an end" [5]. Osler's method depended heavily on having a relatively small number of students in each class [6]. "With a small class I have been satisfied with the results," wrote Osler, "but the plan would be difficult to carry out with a large body of students."

I was exposed to the Oslerian approach to clinical teaching as a medical student at Johns Hopkins from 1934 to 1938. Although William Osler himself had left more than 20 years before to become Regius Professor of Medicine at Oxford, most of the still active senior faculty in the Department of Medicine had been taught by Osler and were heavily influenced by his standards and traditions. Faculty members, many of whom had visited or had worked in European clinics following their early medical training at Hopkins or elsewhere, were able to spend time with individual students since there were only about 60 students in each class. At that time the science of medicine was growing apace, and basic physiological and chemical mechanisms were emphasized in clinical teaching, as were civility and good communication with patients. At Harvard, Francis Peabody, who had studied under William Osler at Hopkins, became, in 1921, the first director of the Thorndike Memorial Laboratory, affiliated with the fourth (Harvard) ward service at Boston City Hospital. That institution became the most distinguished research



and teaching department in the United States. Peabody, clearly no enemy of science in medicine, championed the view that personal interest in and understanding of the patient are fundamental to good practice [7].

Teaching rounds, during my student days, although conducted with an entourage of students, interns, residents, and some faculty members, were anticipated with pleasure by most patients. The professor usually drew up a chair next to the patient's bed and chatted for a minute or two to offer reassurance and to learn a bit about the patient's circumstances and way of life. A student or other member of the group attending would then present the patient's history, after which the professor conducted a brief inquiry of his own, not infrequently turning up new relevant clues, before proceeding with a brief physical examination. This pedagogic exercise was usually characterized by a dignified and thoughtful concern for the patient's feelings. Before leaving the bedside, the teachers usually said a few words of explanation and encouragement and offered each patient an opportunity to ask questions. Bedside rounds were succeeded by a brief gathering in a conference room where the issues and alternatives in the care of the patients seen were dealt with and underlying mechanisms of their illnesses were discussed.

Dr. Astrow, being familiar with attending rounds as they are currently conducted, may not have seen evidence of the concern for the patient as a person that was manifest by clinical teachers 50 years ago. Today a diminishing number of teaching physicians are either willing or able, by virtue of their education and experience, to take on the beneficent and intellectually challenging exercise that was once a daily event in university and many private hospitals. I therefore suspect that the reasons for medicine's "loss of soul" have less to do with emphasis on science in clinical teaching than they do with another more recent development, the fragmentation of responsibility for the care of patients, what I call the medicine of the lateral pass. Several factors, some of them closely related, seem to have contributed to this baneful state of affairs.

### *Changed Criteria for Admission to Medical School*

Albert Jonsen recently called attention to a lecture given by William Osler not long before his death in 1919. In it he likened the effect of the humanities on medical progress to hormones, a word derived from the Greek meaning to excite or stimulate [8, 9]. His implication was that a liberal education engenders breadth of intellectual development and personal commitment to human service.

Although most deans and members of admission committees favor candidates with a broad social perspective and education in the humanities, in medical school today such a background is not accorded the



same level of priority that it once was. Despite urgent exhortations from numerous sources, including the Association of American Medical Colleges [10] and, although, as Cassel has pointed out, "commissions and reports, from the late 1920s to the present, have championed liberal education over narrow vocationalism" [11], today's admissions committees are driven to take refuge in quantifiable criteria such as grade point averages and MCAT scores in order to avoid accusations of bias. As a result, few medical students today have even a rudimentary acquaintance with the humanities. The problem, as Osler stated it, was that "By the time their college studies are completed these students have often forfeited the intellectual challenges and rewards that study in the humanities could have afforded" [9].

Daniel Tosteson, dean of the Harvard Medical School, has declared that "an attitude of skepticism and doubt . . . is the greatest gift of science to medicine" [12]. Essential to physician and researcher alike, the ability to think and to question is also usually acquired before medical school. Such an attribute does not necessarily equate with a high grade point average, and it is often missing among those selected for admission today.

### *Attenuated Relationships between Student and Teacher and Student and Patient*

The increased size of medical school classes has inevitably lessened the opportunity for a master-apprentice relationship between faculty and student. From roughly 1960 to 1980 the federal government, using the method of the carrot and stick, encouraged medical schools to accept larger classes and urged communities to establish more medical schools. The stated purpose was to provide better care and better access to it for those being denied medical care, mainly in the rural areas and inner cities. Paradoxically, the enlargement of student enrollment and the expansion and proliferation of medical schools brought more administrators, more bureaucracy, more salaried faculty, and more distance between student and teacher. Along with other post-World War II developments, the expansion caused medical students to be less consistently in personal contact with a role model teacher. Among the best of such teachers were seasoned leading practitioners who, as voluntary faculty, once acquainted students and house staff with the attitudes and standards of a cultivated and civilized practicing physician or surgeon. Those teachers have largely been replaced by young salaried faculty who are handicapped by the governmentally mandated shortening of the hospital stay as well as repeatedly introduced curricular "reforms" that have, by interrupting and foreshortening the students' time on the

ward, contributed to lessening the opportunity for bonding between faculty, student, and patient.

Sharing clinical responsibility without interruption over a reasonably sustained period of time can engender in interns and resident physicians a strong sense of commitment to meticulous attention to detail, wise decision making, and gentle care of the patients assigned to them. Moreover, the personal attention involved in such simple routines as taking blood for testing and starting intravenous infusions may serve to strengthen the student's sense of obligation to the patient. These opportunities for personal service waned when later they began to be shared with nurses and technicians.

After World War II, for the first time, significant numbers of students were married. Inevitably, their attention, at a critical time in their development as physicians, had to be divided between patients and family. By the 1970s resident physicians were no longer resident. Both they and the students spent far less time in the hospital than had their predecessors.

### *Weakening of Education in Preclinical Sciences*

Education in medical science is being slighted owing in part to the enlargement of medical school classes and the increased cost of laboratory participation. Instead of learning by doing in anatomy and cell biology, biochemistry, physiology, microbiology, and pharmacology firsthand in the laboratory and pathology in the autopsy room under the guidance of faculty scientists, students are consigned to classrooms where they listen to lectures and watch television demonstrations, the communication medium that will later be used for their postgraduate education by the representatives of pharmaceutical companies. Although videotapes may greatly assist those who are learning a technique, in the basic education of a physician they cannot substitute for hands-on experience. Unfortunately, Tosteson's "New Pathway" at Harvard, which resurrects many successful pre-World War II learning methods, says nothing about returning medical students to the basic science laboratories where they might polish their important "attitudes of skepticism and doubt" [12].

### *Foreshortening Clinical Education*

Clinical education in medicine was slighted for some who are leaders in academic medicine today. During and after World War II, an alternative to military service was established for especially promising residents in university hospitals. Called the Berry Plan, this arrangement allowed

for the appointment of young physicians to the U.S. Public Health Service after they had completed 2 or 3 years of hospital training. Many of them were assigned to the intramural laboratories of the NIH, where their efforts were focused on a sharply restricted problem, such as the purification of a single enzyme. Their clinical experience was often restricted to caring for a few selected patients in a narrow subspecialty in medicine.

Many of those talented young people—whose clinical education had been truncated, but intensified in a very restricted area—eventually joined the clinical faculties of medical schools, often serving as division heads or even department chairmen. When those doctors were called on to make teaching rounds on the general medicine services, however, their limited clinical experience seemed to accentuate an already prevalent tendency among young physicians to “cover themselves” by asking for the consultation of specialists or for a battery of “scattergun” tests and procedures. Responsibility for the care of individual patients was thus diffused. It still is today as resident physicians in medicine are accepted for specialty training after a relatively brief exposure to the broad range of sick people.

Prior to World War II and before specialty boards took over the reins, clinical education was planned and managed by the clinical departments in medical schools. The ablest among medical residents were selected for the post of chief resident in their fifth year of house staff service. Having lived in the hospital throughout that period, they had become well seasoned and usually capable of the intellectual and interpersonal challenges of a medical practice or a junior academic post. After the American Board of Internal Medicine became fully established, it required only 3 years of hospital training for certification in internal medicine. This minimum training became the ceiling for most general internists who are practicing today. Not surprisingly, many of these less practiced young clinicians lack the diagnostic maturity necessary to exploit the rich mine of clinical information available in a proper medical history, a skillfully managed exploratory dialogue with a patient that may yield the most crucial diagnostic information and give clues to where special attention should be focused in the physical examination. Often subtle, such clues, gathered from the history and from the physical examination as well, may be altogether inaccessible to chemical screening tests, scans, or other technical procedures. Moreover, effective communication with patients through history taking may contribute to the quality of the patient-physician relationship.

Today, some physicians leave most of the history taking to a relatively untutored assistant or to a computer terminal. They may even have the physical examinations of their patients performed by a surrogate. Thus, not only is an opportunity to perfect the patient-doctor relationship lost



but the resulting body of data, gathered as it is by less practiced eyes and ears and without the sensitive nose of a medical sleuth, and offering as it does little material for analysis, will likely suggest two or three or even several diagnostic possibilities, some of which could have been promptly eliminated by careful attention to incompatible data.

Students at some schools, once held responsible for a penetrating analysis of the clinical data and a parsimonious approach to diagnosis, are no longer required to refine the diagnostic possibilities in a particular case, combing out those conditions that appear to be incompatible with the findings.

In a properly conducted history, the physician keeps his intellectual motor running, so to speak, considering likely diagnoses from the moment of his first greeting the patient or shortly thereafter. The initial diagnostic impression then undergoes progressive modification as conjectures that do not fit the accumulating data are discarded. The surviving probabilities are then tested in the laboratory or by a suitable diagnostic procedure. Like Sherlock Holmes, the good diagnostician looks for features in a case that do not fit what may seem to be a possible diagnosis. Less astute clinicians, like Conan Doyle's Sergeant Lestrade, failing to heed a crucial clue, simply compile the evidence and settle on a diagnosis that seems in keeping with the preponderance of the data. The right answer is reached more often by the relentless pursuit of a highly reliable bit of evidence that does not fit the initial assumption.

### *Misuse of Technology*

Modern diagnostic and therapeutic technology has contributed enormously to the quality and success of the care of patients. The point is not that the highly precise laboratory tests and vivid imaging devices now available are superfluous but, rather, that they are often not required for a correct diagnosis. Premature testing, without adequate attention to the directly available data from history and physical examination, may actually derail the diagnostic inquiry. Furthermore, the greater the number of tests, the greater the opportunity for error and the higher the risk of accident.

When the sometimes easy answers from tests and procedures discourage analytical thinking and blunt the desire to know and understand the patient, the physician risks becoming merely a skilled artisan. As Tosteson put it, "technical complexity of medicine may distract physicians from the obligation to provide care" [12]. Wariness about the intellectual hazards of burgeoning medical technology is not new. In 1846 William Stokes of Stokes-Adams fame wrote that medicine was in danger of being turned into a mere technology rather than a learned profession [13]. "It is plain" wrote Stokes, "that unless all this be changed . . .



the time will come when we shall be shamed by seeing the more difficult problems of medicine attempted and solved by men outside the profession, men of large and liberal education who will succeed in doing that which its proper members were unable to perform."

With vastly more diagnostic and therapeutic technology available to doctors today and still appearing in increasing numbers and better precision, the diminished time and effort spent on each patient have encouraged physicians and surgeons to accept more and more patients and to allot less and less time to each. They thereby run the risk of losing the human touch, the source of the satisfaction of giving of oneself to relieve the suffering of another human being. Failure to build a bond of trust and understanding with patients may furthermore risk misunderstanding and contribute to the widespread tendency of patients to seek satisfaction through litigation.

### *Unclear Assignment of Responsibility for Hospitalized Patients*

Traditional rules governing responsibility for hospitalized patients have been relaxed in hospitals throughout the United States. Multiple consultants may write orders on patients' charts, often without consultation with the admitting physician. Thus it may be difficult to determine from the hospital record who, if anyone, is in charge.

In some group practices that cover a single specialty, one physician may be responsible for hospital rounds on certain days and other members of the group on the remaining days of the week. Although the partners may conscientiously exchange information, such sharing of responsibility means that not one of the group has a continuous relationship with the patient and hence cannot be fully in touch with the patient's needs.

When the admitting physician is a generalist who calls for consultation from one or more specialists and allows the consultants to supplement or alter his orders without consultation, he is no longer in charge. When a patient who is suffering from diabetes or congestive heart failure, for example, is admitted for elective surgery, if the surgeon delegates the medical management to a physician without becoming at all involved in the therapeutic decisions, neither of them is in charge. In office practice as well, the line between the accountability of physician and consultant is often blurred.

### *Commercialization of Medical Practice*

The prevailing bureaucratic system of third-party payment further contributes to the fragmentation of responsibility for the care of the patient since the performance of technical procedures, rather than time

spent in dialogue with the patient or in analyzing a clinical problem, is the current basis for compensating physicians. Moreover, the professional quality of medical service is diminished in many not very subtle ways by hospitals and even doctors vying with one another for market share, maintaining commercial laboratories, various types of imaging facilities, and pharmacies. Richard Landau has called attention to the striking shift in the language of medical practice from that of care to that of commerce. He also points out the subtle effect of the language change on the quality of care [14].

### *Distractions from Outside Interests and Business Commitments*

Before World War II, few physicians became wealthy. It was rare for a physician to own an automobile dealership or a fast-food franchise on the side or to belong to a doctor's investment club. Their brothers who entered the business world were usually far more prosperous. In recent years the opportunity for a medical education has become a highly reliable way of improving one's social and financial status. Such reasons for being attracted to medicine cannot but erode a physician's professional commitment.

Four years after World War II, Roscoe Pound, former dean of the Harvard Law School, addressed a meeting of the Massachusetts Medical Society as follows: "when we speak of the old recognized professions . . . we mean an organized calling in which men pursue a learned art and are united in the pursuit of it as a public service—no less a public service because they make a livelihood thereby . . . gaining of a livelihood is not a professional consideration. Indeed, the professional spirit, the spirit of a public service, constantly curbs the urge of the instinct" [15].

Edward Gibbon [16] wrote of a population whose citizens had become insensitive to their civil responsibilities, being more concerned with their livelihood than with contributing to their society. Referring to the Athenians, he said, "in the end more than they wanted freedom, they wanted security, they wanted a comfortable life and in their quest for it all, security, comfort, freedom they lost it all. When what Athenians wanted finally was not to give to society but for society to give to them; when the freedom they wished for most was the freedom from responsibility, then Athenians ceased to be free." To take responsibility for the care of the patient requires not only identifying a patient's problem but understanding the patient's needs, or, as Mark Altschule put it, "Listening to the patient's message" [17].

The patient's message may convey not only symptoms but individual needs and vulnerabilities and in addition, as noted above, valuable clues to the solution of the medical problem. Learning how to listen to the patient's message and how to analyze and deal with its contents defines

pretty well a major aim of medical education. It describes in essence the role of the "primary physician."

The concept of the primary physician was dealt with in a colloquium at Totts Gap, Pennsylvania, in 1975 [18]. "Primary" may be understood in temporal terms of the physician first consulted or in terms of responsibility and authority as the physician in charge. Considering primary in the latter sense, André Cournand, who participated in the colloquium (as did Mark Altschule), pointed out that the requirements to serve in that capacity include both intellectual and character qualities that can support a commitment to medical science and to patients.

Perhaps the character qualities are the key. Perhaps it is no accident that the first two professions, in Roscoe Pound's sense, were religion and medicine. Indeed, they were unified in what we now call primitive societies. With civilization they split into separate callings, but callings nevertheless. The clergy concerned themselves with the souls and morals of their parishioners; physicians, first and foremost, are concerned with the health, comfort, and survival of their patients. As Plato declared: "No physician, insofar as he is a physician, considers his own good . . . , but the good of his patients; for the true physician is also a ruler, having the human body as his subject, and is not a mere moneymaker" [19].

Both religion and medicine have been betrayed by their practitioners from time to time throughout history. In the French Revolution it was not by their commitment to the Sermon on the Mount but by their despotic political power by which the clergy betrayed their profession. Neither will it be by a commitment to the principles of the Hippocratic oath or to the book of nature (science) as Paracelsus prescribed [20], but by a primary concern with wealth and comfort, that the medical profession can betray its mission.

It is not too late to heed the words of Gibbon and select for admission to medicine those whose motivation is service, not enhancing their financial or social position. It is not too late for the medical schools and university-affiliated hospitals to take charge and set their own standards for education tailored to individuals, not to the anonymous mean. It is not too late for third-party payers to reward physicians for their commitment of time and intellectual effort on behalf of the patient. Neither is it too late for us to reaffirm that our primary responsibility is to the individual patients whom we serve.

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