SPECIAL ARTICLE

ANNUAL DISCOURSE — DON'T EAT THE QUAILS

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Abstract Physicians were the first individuals recorded by name in history. Their attempts to define disease influenced fundamentally the cultures and religions of the world. Surgical skills, although highly developed in ancient times, appear to have been less well documented historically than medical disorders. Because of the greater threat to survival that diseases posed, they became incorporated into religious customs. Contagious diseases also influenced greatly the laws, traditions and historical events of the Bible. Leprosy provided a physical example that presumably represented an image of sin, but it probably was no more prevalent as a disease during Biblical times than at present. Many of the Biblical stories assumed to be allegorical may have been founded on medical fact. For example, it appears likely that the quails that poisoned the wandering Jews were contaminated with cyanide. (N Engl J Med 297:472-475, 1977)

ONE of the privileges accorded the holder of this annual suzerainty is the opportunity to review the diverse discourses selected by his predecessors. The topics have been broad. Oliver Wendell Holmes twitted his heavy-handed peers for their excessive use of noxious drugs. At that moment in history, disease represented the personification of demonistic spirits that could be exorcised only by something stronger than they. Somewhat later, the more pragmatic practitioners selected subjects designed to establish their expertise in a subspecialty and thus broaden their patient-referral base. In the late 19th and early 20th centuries, experts in education began to appear. They analyzed what was wrong with the medical schools and what was right with the schools. They even impugned the ability of persons like you and me to guide the medicine of the future. On the occasion of this, the 169th oration to the Society, I reach far back for my topic to an era remote from the present. I shall discourse on the earliest roots of our professional heritage. When and how did medicine influence early cultures and peoples? To whom are we indebted for the grace with which we practice our art? Many of us have a smattering of knowledge about the history of medicine and recall a few isolated facts that have come down like dogma. There were the two giants of Greek healing, Hippocrates and Aesculapius; the notable Babylonian king, Hammurabi, who although not a physician was nonetheless the father of medical-malpractice codes; the Egyptian physician of the 30th century B.C., Imhotep, who first promulgated the great Rx of prescriptions, the *Do Thou* by which physicians communicated with their patients and pharmacists from then until Medex approval five milleniums later. Yet a glimpse of these great physicians does not readily present us with a living picture of early man or his afflictions. How did medical adversity affect his social development? What did man do in his attempts to cope with a hostile environment and multitudinous diseases?

Only a single document has come down to us that contains a degree of accuracy that physicians demand when establishing scientific truths. It covers a period between the emergence of Abraham from Elba in western Syria[1] and the time of Christ some 2000 years later. And that is the Bible. Admittedly, it records the movements of mostly a single tribe of people. It says nothing about the Chinese, who undoubtedly had a far advanced system of medicine and public health during this same period. It says little about the peoples of Persia or Mesopotamia except when they, like the Medes and the Hittites, went to war with the Israelites. But it records, with a degree of finesse and frankness not subsequently surpassed, the activities, aspirations and total ethos of a people. With a few notable exceptions such as Guido Majno,[2] medical historians have overlooked the Bible as a source of insight into the roots of our scientific heritage. Perhaps they thought it was only a religious book and confined chiefly to moral concepts. To the contrary, this stark, utterly candid history is replete with medical content. As in a Japanese garden, the viewer must search for the meaning. The answers are neither patent nor superficial. However, they are there for the digging.

My personal interest in the medical contents of the Bible began in Tlemcen, Algeria, one evening in December, 1942. As I sat in an army tent on the side of the Atlas mountains and stared out at the stark edges of the northern Sahara, I saw a camel lumber by in the moonlight. Its biphasic rhythm emphasized its awkward gait. A lone Arab, burnoose drawn tightly against the cool December air, rocked in the saddle contre-coup to the cadence. I was reminded of the Christmas season and of the fact that my closest knowledge of a camel or of the entire Middle East derived from playing the role of Belshazzar in a children's pageant. Rummaging through my musette bag, I was able to find a copy of the scriptures with which my clergyman father had dutifully sent me off to fight the Great War. As I leafed through it, I became aware

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not only that the 91st Psalm was marked in red by my concerned parent; I also noted that references to disease, and to coping with it, appeared in verse after verse. I began that very night to assemble the episodes that appeared to have medical importance. Over the subsequent decades, I have had great pleasure attempting a personal interpretation of these great events. When I retire a few years hence, I hope to devote my full time to this endeavor and complete the work I have started, before reaching Shakespeare's seventh stage: sans teeth, sans eyes, sans taste, sans everything.[3]

For the purposes of this oration, I shall select just a few illustrative episodes and speculate about their medical meaning. The first concerns the curious story of the death of the Jews who, while wandering through the desert, picked up dead quail and seized them in their teeth.

An approach to this episode brings with it the excitement of a Conan Doyle mystery. I quote from Numbers, Chapter 11, verses 31 through 33 (King James Version):

> ...And there went forth a wind from the Lord and brought quails from the sea and let them fall by the camp...and they gathered the quails...and while the flesh was yet between their teeth, ere it was chewed...the Lord smote the people....

To a physician, it appears obvious that the event being described was no ordinary illness. Its onset was too abrupt, and its ending too catastrophic. Should we take the easy course and assume that the Biblical author was using hyperbole or was describing a supernatural event, or are there seeds of historical fact woven into this mystery? In analyzing the event as accurately as possible, one can place its time in either April or September, and its location in the Sinai Desert about 160 kilometers southeast of the Mediterranean coastline. Vast flocks of quail are known to migrate north from Africa to Europe in the spring of the year and back again each autumn. The flocks fortunate enough to pass one of the islands that dot the Mediterranean often pause to rest. The normal flight time of a quail is quite short and the journey of 300 to 500 kilometers across open water is known to exhaust them so much that they often fall into the sea or onto the deck of a ship. Hence, the great heap of quail that fell around the Israelites did not in itself imply that the birds were sick or about to die. They might easily have been blown 160 kilometers inland on the great wind that is described in this passage. Could anything have been present on or in the quail that would cause death to anyone who ingested them? This could not have been a bacterial or viral contaminant either outside the birds or within the flesh. Even a lethal exotoxin like botulinum requires several hours or days for its paralytic effects to become manifest after ingestion by a human being. Nor could it have been a bacterial endotoxin in the unremoved entrails of the birds.

It is my speculation that the instantaneous death of the Israelites was caused by hydrogen cyanide. Any of you who have traveled in the Mediterranean during September have seen vast fields of almond trees shed their nuts at that time of year. Prussic acid (hydrogen cyanide) is present in high concentrations in a form combined with certain oils and emulsants in the shells and nuts of bitter almonds. The pharmacopeia tells us that amygdalin from oil of almonds can release cyanide while undergoing the mashing, fermentation and emulsification of digestion. Curiously enough, hydrocyanic acid can be tolerated in the stomach in amounts up to 50 mg[4] despite an almost instantaneously fatal effect if the liquid comes in contact with the mouth or lips or if it is breathed as a gas. Indeed, a 19th-century edition of the British pharmacopeia[5] describes aqua amygdalorum amararum as an aperitif that on peptic digestion releases a 2 per cent solution of hydrocyanic acid in the stomach. This high a concentration of cyanide is only tolerable because of the slow action in an acid medium of the enzyme that releases free cyanide radical from its organic form in amygdalin.[6] During the slow absorption, the toxic effects can be counterbalanced by respiratory and renal excretion and by conversion to harmless thiocyanate radicals.[7] If this substance or a similar organic compound had been ingested by the birds during a rest stop en route across the sea, it would have done nothing to them, but it could have produced rapid death when the gastric contents contaminated the meat that the famished Jews literally tore apart without benefit of evisceration and that then came in contact with their lips in liquid and gaseous form. It is worth pausing to note that the controversial cancer drug, Laetrile, may be nothing more than a slow reacting, sublethal dose of such amygdalin.[8]

Other authors have puzzled over this story. Sergent suggested that the Israelites were poisoned by hemlock seeds that the quails had ingested.[9,10] He was able to reproduce an experimental poisoning in dogs that were fed Algerian quail that had eaten hemlock seeds. However, in no case was the illness fatal. More recently, on the Greek island of Lesbos, Ouzounellis described a severe human disease that followed the ingestion of quail. This illness was accompanied by massive muscle destruction and myoglobinuria, followed in turn by acute renal shutdown. Noting that in patients who were physically fatigued at the time of ingestion, the disease developed within 90 minutes and had the most severe effects, he proposed that the Israelites wandering in the desert would have been likely victims.[11] He further postulated that an inborn error of enzyme metabolism may have been present in the victims and predisposed to a fatal outcome.

Turning for the next medical episode to the Lamentations of Jeremiah, Chapter 2, verse 11, we hear a prophet of that era express his grief and emotional distress over Jerusalem's misery and the bad times on

which it had fallen. The most poignant simile with which Jeremiah could express his sadness was to compare it to an epidemic of jaundice, perhaps viral hepatitis. At about the same time in history, the Greeks coined the word melancholy (i.e., black bile), thus revealing that they too were aware of the association of mental depression and obstructive biliary disorders. "Mine eyes do fail with tears, my bowels are troubled, my liver is poured upon the earth...."

It would be difficult to describe more classically the scleral icterus, keratitis sicca, acholic stools and bile-stained urine of the obstructive phase of chronic hepatitis. Unfortunately, theologians never like to leave things alone. In this they resemble physicians and only differ in the length of time it takes to undergo change. In a modern English translation of the Bible, the so-called Revised Standard version, they construct this passage in the far less accurate or pithy medical manner as: "My eyes are spent with weeping; my soul is in tumult; my heart is poured out in grief."

At the expense of offense, I would characterize such a translation as medical pap.

The preoccupation of the Biblical authors with medical illness and disease and their scanty reference to the well developed surgical skills that they also observed during the Egyptian sojourn were probably based on diverse factors. The fear of pandemics and great pestilence that often threatened to wipe out the whole race undoubtedly loomed more awesome in the minds of the prophets and seers than sporadic trauma in single individuals. The Jews, as well as the Arabs, the Chinese, the Japanese and many other races, incorporated multiple public-health measures into their formal religion. These rules were based on empiric observations of the natural course of disease and included the isolation of contagious patients, the washing of hands and clothing on frequent occasions (such as before prayers), and the avoidance of foods that were commonly contaminated with parasites. The regulations in Hebraic law on the quarantine of persons suspected of being leprous[12] were so clearly defined that the cities of medieval Europe were still using the same regulations nearly 4000 years later. Finally, sickness, because of its mysterious origin, was generally attributed to sin. This attitude put medical illness directly into the province of organized religion and assured its detailed inclusion in written accounts of rabbinical law.

A striking change takes place in the Biblical view of disease when one turns from that portion of the Bible referred to as the Old Testament to the New. The dual role of Jesus as a teacher and a physician-healer immediately gave increased emphasis to the treatment and cure of disease rather than simple diagnosis and control. This role is nowhere more evident than in the references to leprosy. Indeed, the frequency with which lepers are discussed in the Gospels may be far out of proportion to the actual incidence of the disease at that time. Many reasons for this emphasis exist. The physical signs of both the nodular and the anesthetic forms of the disease were widely evident and generally produced both rejection and loathing in the eyes of the viewer. Leprosy seemed to confirm the prevalent theory of that time that disease was a manifestation of sin. Only occasional persons who were exposed to its contagion actually came down with the disease — so that some other factor appeared necessary. What more likely cause than sin? Another reason for the overdiagnosis of leprosy was probably clinical error. Misdiagnoses unquestionably occurred. Such diseases as pityriasis rosea, ecthyma and desert sore were easily confused with leprosy. Moreover, the term "leprous" was probably used as an adjective to describe any white or atrophic lesion, much as we use the term "acneform" today to describe most red and nodular eruptions. Its principal contribution as a Biblical disease, however, was to permit the Gospel writers to portray the ability of Jesus to heal a whole man rather than a man's simple physical affliction. Let us turn to Luke 17:12 for illustration.

> ...as he entered into a certain village there met him ten lepers, which stood afar off:...And when he saw them he said... Go shew yourselves unto the priests. And it came to pass... that they were cleansed. And one of them when he saw that he was healed, turned back... And Jesus... said, Were there not ten cleansed?... where are the nine? Arise, go thy way: thy faith hath made thee whole.

This clear portrayal of total healing of one of the lepers as opposed to physical cure of the other nine has little counterpart today. In our modern culture we have few reminders of such seeming anachronisms as guilt. Instead of calling for expiation or remorse, current mores attempt to justify errors and to rationalize misbehavior as a consequence of social pressures.

It is also interesting that leprosy was the first disease singled out by name in the New Testament. In a separate reference to an encounter of Jesus with a leper, additional features became evident. For one thing, He touched the leper. Although it was known that a single physical contact usually did not transmit the disease, this symbolic gesture carried at least three implications: 1) His love and concern extended to immoral (leprous) persons as well as to moral ones; 2) He showed disdain for the fear and helplessness commonly manifest toward physical disfigurement; 3) the act of healing accompanied a laying-on of hands — a gesture that still has its counterpart during hospital rounds by occasional contemporary physicians who reach out and touch their sick patients as a gesture of reassurance. Finally, it should be noted that the act was performed within the rituals laid down by the Hebraic law of that time. The leper was referred back to his priest for purification rites and an appropriate gift of thanksgiving.

The actual frequency of leprosy in Asia Minor during this era can only be estimated. Most small villages of that period averaged about 1000 inhabitants.

That was a size that could be supported conveniently from the agriculture that lay within easy walking and hauling distance. The "ten lepers, which stood afar off..." probably represented all the active cases of that particular community, or an incidence of about 1 per cent. Curiously enough, that number has been only modestly reduced. It is estimated that about five million active cases currently exist throughout the world. These are mostly in Asia and Asia Minor and lie in a geographic belt between 15° north and south of the Tropic of Cancer. This area embraces a population of something less than one billion people or an incidence of around 0.5 per cent.

Strong evidence that it was no more prevalent than that during Biblical times can be drawn from a final reference. In Matthew,[13] there is a description of Jesus visiting the house of "Simon the leper," while in Bethany. Simon was a very common Jewish name of that time and place. If the incidence of leprosy had been 1 or 2 orders of magnitude higher, as many have suggested, this appellation would have been a nonsequitur.

In conclusion, what can we as physicians of the late 20th century take from an analysis of events such as these? For some they mean little; for others much. However, the Bible offers keen rewards if only for its stark history and its elegantly expressive prose. As a storehouse of medical heritage, it is unparalleled. I recommend it for your active years as well as for retirement. If you are as incorrigible an insomniac as I, it is also useful for midnight sedation. Unlike barbiturates, it permits one to awaken refurbished for another day.

Much more could be said about these randomly selected stories. Infinitely more episodes could be reviewed whose medical influence and teaching directly affect us some 2000 years later. One wonders if any of the current sociologic worries and medical-economic dissensions and governmental controls of clinical medicine that rain down on us in a spate each day will similarly survive the test of time. Or will they become mere quips and forgotten anecdotes when another century has passed? Let us resolve to protect our culture from too quick a trip over the canvas of life by returning to the more basic aspects of medicine. Before we exercise ourselves in vast agitation over contemporary trends, let us carefully sift out any truths of lasting value that they possess. Let us further resolve to set our medical commitments only on the basis of their benefit to the sick to whom we minister. Compassion of man for man will long outlive contemporary regulations, economies and governments. Let us be certain that medicine continues to set moral standards and codes that will remain of the type befitting an immutable profession. The first person whose actual name was ever recorded in written history was neither a conqueror nor a king, but a physician-architect. He was named Imhotep, and he was the chief adviser to Egyptian King Zoser, circa 2950 B.C.[14] If our profession continues to endure, let us hope that the last name in history similarly will be that of some physician, devoting his life to the needs of others.

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