The Stethoscope

SOME NOTES ON ITS HISTORY

MORRIS C. LEIKIND

Chief, Historical Research Division, Medical Museum, Armed Forces Institute of Pathology, Washington, D. C.

"Glory is due the inventor alone; those who come after him are only disciples."
—ISAAC NEWTON

IT has been said that the history of science can be written in terms of the invention of instruments which have amplified man's senses and increased his ability to apprehend the universe of which he is a part.

The same can be said of the history of medicine. It is sufficient to mention the thermometer, the microscope, the sphygmograph, the kymograph, the x-ray, the electrocardiograph and the electroencephalograph and then compare the state of medicine before and after the introduction of these devices to recognize the progress made.

One of the simplest instruments used by the medical man and yet one of the most important is the stethoscope. This little device was invented only 138 years ago, yet it has been taken so much for granted that its origins and its inventor seem at times to be forgotten.

These notes therefore are intended merely to refresh the memory of those who use the stethoscope in their daily work.

I. THE INVENTOR

The inventor of the stethoscope was René Theophile Hyacinthe Laennec. He was born in French Brittany on the 17th of February, 1781 and he died on the 13th of August, 1826 at the age of 45. In his brief life-span he accomplished enough to secure his place among the immortals of medical science.

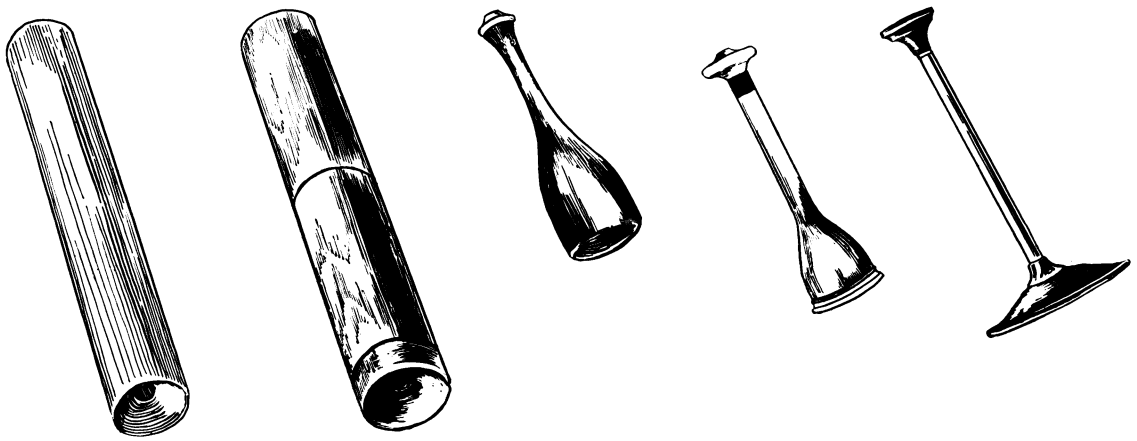
Laennec's mother died when he was only six and his father turned over the upbringing of René and his brother to an uncle. When this uncle died of consumption, a disease destined to play an important part in Laennec's life, he was sent to live with another uncle, a physician in Nantes. At the age of 14, young Laennec began his career.

He was a diligent student and somehow, besides his medical subjects, he found time to study and master Latin, Greek, and English as well as music, poetry, drawing and dancing. It is recorded, however, that he also engaged in such boyish activities as hiking, hunting, the raising of rabbits and the collection of minerals, plants, birds' eggs and insects.

In 1799 he went to Paris to complete his medical education after having served for a few months in the medical corps of the National Guard. In Paris he studied at the Hospital de Charité where one of his teachers was Corvisart whose aphorisms he collected and later published. Laennec received his medical degree in 1804.

His life in Paris was not too easy. Continuously plagued by poverty and ill health (he already showed signs of the tuberculous diathesis which marked him for an early grave), his output of scientific work was prodigious. He studied pathological anatomy under Bichat and spent long hours dissecting under the tutelage of Bayle and Dupuytren.

It was under Bayle's guidance that Laennec devoted himself to the study of tuberculosis. As a result of his anatomical and clinical studies, he soon convinced himself that, contrary to accepted medical doctrine, phthisis was the result of one pathological process and that its different forms were in reality the expression of one disease. He announced his findings and conclusions in 1804 and he continued to add to our knowledge of tuberculosis, a disease even then gnawing at his own vitals.



VARIETIES OF STETHOSCOPES

Fig. 1 Left to right. First figure—First stethoscope. A tight roll of paper. Second figure—Laennec's stethoscope, third model. Third figure—1845 model. Fourth figure—Ca. 1866. Last—Ca. 1908.

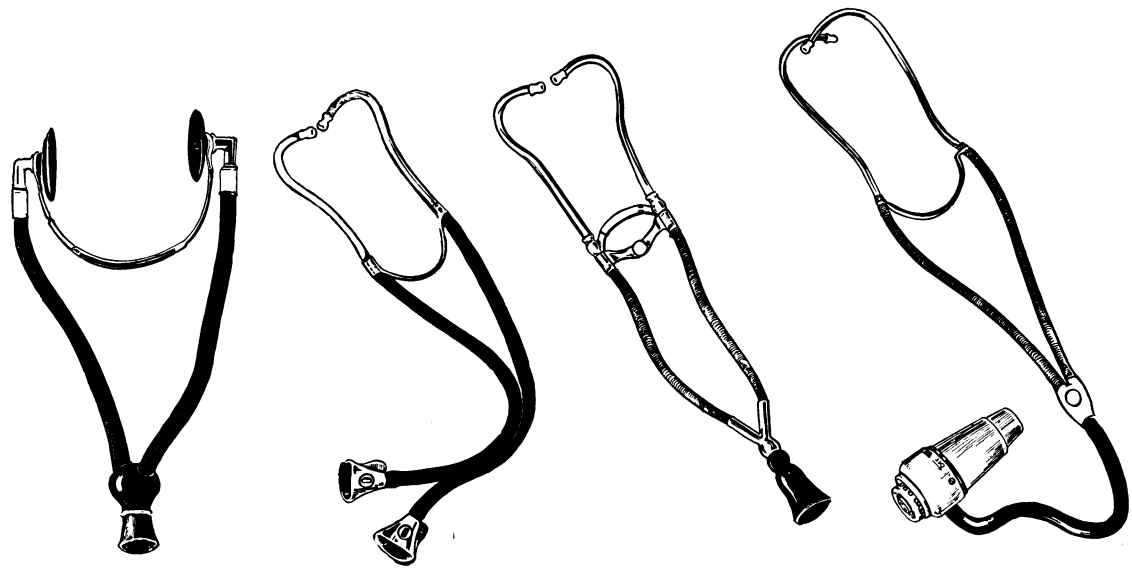
By 1816 already recognized as a master clinician he succeeded Bayle as Head of the Hospital Mecker upon the latter's death. It was here that Laennec invented the stethoscope and three years later produced his magnum opus—"De L'Auscultation Mediate ou Traité du Diagnostic des Maladies des Poumons et du Coeur fonde Principalement sur ce nouveau Moyen d'Exploration."

This massive work, a classic of medical literature and soon translated into other languages, is a landmark in the history of our knowledge of diseases of the chest and heart. It was in this book that Laennec summarized the results of his work with the stethoscope and demonstrated its utility as a diagnostic instrument. With the aid of his stethoscope he had listened to sounds never before heard or described and he added new words to the medical vocabulary such as rales, bronchophony, pectoriloquy and egophony. Nevertheless, this book was more than a manual for the stethoscope; it was in fact a treatise on pulmonary and cardiac diseases and in it were arranged a vast number of clinical observations correlated with autopsy findings. His chapter on pneumonia is still regarded as a classic and the chapters on tuberculosis and related conditions were the most complete of their time.

Nevertheless, the treatise was at first greeted with indifference. The general reaction is perhaps best summed up by John Forbes of England who translated Laennec's book into English. In his preface Forbes wrote, commenting on the stethoscope as a diagnostic tool: "That it will ever come into general use notwithstanding its value, I am extremely doubtful; because its beneficial application requires much time and gives a good bit of trouble both to the patient and the practitioner; because its whole hue and character are foreign, and opposed to all our habits and associations. It must be confessed that there is something even ludicrous in the picture of a grave physician proudly listening through a long tube applied to the patient's thorax, as if the disease were a living being that could communicate its condition to the sense without."

There were however, others, not so timid or conservative as Forbes who began to use the diagnostic technique and found it significantly useful.

In the meantime Laennec's health forced him to retire to his country estate for a time. After two years, his health improved but his finances had deteriorated and he was forced to return to Paris. By this time his fame had spread and he received a most enthusiastic reception. His lecture rooms and consultation rooms were crowded. He was appointed professor at the Collège de France and also at the Medical Clinic of the Charité. For the



VARIETIES OF STETHOSCOPES

Fig. 2—Left to right. First figure—Knopf binaural stethoscope, 1897. Second figure—Stethoscope with two chest pieces designed for simultaneous auscultation of different parts. Third figure—Ca. 1910. Last figure—Electronic stethoscope, 1951.

next four years Laennec worked on a second edition of his book. He knew he was risking his life but he persisted—writing—"the book I am going to publish will be, I hope, of more value than the life of a man, and in consequence my duty was to finish it, whatever might happen to me."

In the same year that the book was completed, Laennec having retired to Brittany once more, passed away, a victim of tuberculosis.

II. THE INVENTION

Until the time of Laennec, diseases of the chest still represented a major area of ignorance to the medical profession. It is true that Hippocrates had listened to and even described certain sounds in the thorax. But their significance, he was unable to assess. From his time on there are sporadic references to auscultation (a term first used by Laennec) in medical writing and early in the 18th century the British genius Robert Hooke suggested, "the possibility of discovering the internal motions and actions of bodies by the sound they make." "Who knows, I say, but that it may be possible to discover the motions of the internal parts of bodies, whether animal, vegetable or mineral, by the sound they make; that one may discover the works performed in the several offices and shops of man's body and thereby discover what instrument or engine is out of order, what works are going on at several times and lie still at others and the like. . . . I have been able to hear very plainly the beating of a man's heart· and it is common to hear the motion of wind to and fro in the guts and other small vessels. . . ." Hooke was no doctor himself and he apparently never followed up his prophecy. However, many doctors did make efforts to practice direct auscultation but without effective results. In obese individuals and in females the method was not practical. Besides, physicians for hygienic reasons were loath to place their head and ear in too close contact with their patient's anatomy.

Laennec was aware of all of these difficulties, yet he also felt the need of a method for studying in the living patient the pathogenesis of those diseases he had studied so intimately at the autopsy table. "Chance favors the prepared mind," said the great Pasteur and chance favored the searching mind of Laennec. For one day in 1816 as he pondered the problem while walking in the Louvres gardens near his hospitals he noticed some children at play. Some were gathered about a long timber and at one end a child scratched with a pin. At the other end, another playmate

listened with glee. To Laennec's prepared mind, the application was at once evident. He hurried back to the hospital where he had a patient whose chest he was anxious to examine. Her obesity and modesty had prevented him from listening to the girl's heart.

On the way to the ward, Laennec picked up a sheaf of paper which he rolled into a cylinder. When he reached his patient he applied one end of the cylinder to her chest, the other end was placed to his ear. And now Laennec heard sounds such as he had never before been able to hear with such clarity. Thus was the stethoscope invented.

The value of "mediate auscultation" as Laennec called it was at once evident to him. He also recognized quickly the impracticality of rolling up sheaves of paper and tying them with strings whenever he wished to examine a patient. He learned how to run a lathe and began to turn out wooden cylinders—batons, he called them. Experiment soon showed him that solid cylinders were not as efficient as those with a central canal. He also found that light woods like beech or linden were better than heavier woods such as teak. It was with such simple instruments that Laennec began to make the observations which made auscultation one of the most important techniques of physical diagnosis. Not until the advent of the x-ray and of the various methods of electrodiagnosis was the physician's ability increased, to discover "The works performed in the several offices and shops of man's body and thereby discover what instrument or engine is out of order. . . ."

In common with many other innovations, Laennec's instrument was at first received with indifference, yet within his lifetime its value was recognized. Laennec coined the name "stethoscope" by which the instrument is now know although he himself always referred to it simply as a baton. No military marshal ever gave more utility or glory to his baton.

GUM CHEWING AS RELATED TO PLAQUE pH

Subjects who chewed gum after rinsing the mouth with a glucose solution showed less tendency toward acid formation than when no chewing took place, Drs. A. A. Yurkstats and William Emerson of Tufts College Dental School, Boston, reported at the 33rd general meeting of the International Association for Dental Research in Chicago.

The effect of gum chewing on dental plaques was evaluated through pH readings on 45 subjects. Tests were alternated so each subject would serve as his own control.

A pH drop below 5.5, which has been termed "the critical level of decalcification," occurred 50 times among abstainers from gum and 14 times when the same subjects chewed gum after the rinse, the investigators said. Minimum pH readings averaged below 5.5 in seven subjects under control conditions, but only one fell into this category after chewing gum.

Among subjects who chewed gum after every meal for two weeks, no change in the activity of plaque material due to increased ingestion of sugars could be demonstrated.

Experiments at the Tufts laboratory of oral physiology indicate that "stimulation of saliva by chewing results in an increased alkalinity," and that "the oral clearance curve for carbohydrates in chewing gum resembles the salivary flow curve."

"The evidence that sugars are causative agents in producing tooth decay is overwhelming, but to imply that all sugar-containing foods are dangerous is not in keeping with the results of scientific researches," they said.

Drs. Yurkstas and Emerson cited recent Swedish findings to the effect that 100 pounds of sugar a year in a soluble or rapidly-clearing form can be added to the diet without a significant increase in caries.

Not all chewing gums result in the same magnitude of salivary secretion, they reported, nor do they inhibit pH drop in the same degree. Of three gums used after a glucose rinse, one (Dentyne) was followed by an average drop of 0.40 pH units and the others by 0.62 and 0.71 respectively. Lower sugar content, as well as greater saliva-stimulating capacity, may account for the result, the investigators believe.