

THE MEDICAL DEPARTMENT OF THE UNITED STATES ARMY¹MERRITTE W. IRELAND, MAJOR GENERAL M.C., U. S. A., D.S.M., F.A.C.S., WASHINGTON
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FEELING that you bestowed upon me the high honor of your Presidency for the reason that I am the head and so the representative of another organization with which most of you have had close affiliation, the Medical Department of the Army, I cannot do better than to talk of this and of its contribution to civilization.

The need for a military medical organization became apparent at Bunker Hill. Massachusetts provided it temporarily, but one of Washington's early recommendations to Congress was for the establishment of "an hospital," meaning thereby a medical service outside of the regiments. This Congress did, and during the period of the Revolution it frequently legislated in regard to the hospital. Some of the legislation was very liberal and gave to the medical authorities great apparent freedom to do whatever was necessary. The country was poor, inexperienced, poorly organized and the doctors had no military rank. It would be easy to argue that these circumstances prevented the success which they would otherwise have had, but I do not believe that it would be honest. They were very much more hampered by the ignorance of their day than by laws. To outline briefly the military medicine of the day let us consider some of its branches.

Anatomy. Gross, descriptive anatomy was pretty well known to a few. Most medical men of America had not dissected a body.

Physiology. This subject was still pretty primitive. The functions of the nervous system were known very slightly. Harvey had, of course, demonstrated that the blood circulates and Malpighi had shown the capillaries, but most teachers, even so great ones as Blumenbach, Haller, and Cullen, did not speak of them, but said that the arteries emptied into veins and the veins rose from arteries. Digestion was quite a mystery. The best work done upon it up to the time of Beaumont, 50 years later, was that of Spallanzani, whose ingenious experiments taught much about gastric juice, but not that it was acid.

Respiration could not be understood, as oxygen and carbon dioxide were just becoming known and Lavoisier himself had not yet wholly clarified his own views. Obviously, then, all cellular metabolism was unknown.

Electro-Physiology was not yet in terms of speech or thought. There was much speculation

as to humors of the body, but they were hypothetical humors, totally unrelated to the antibodies and hormones which might be so classed today.

Pathology had not passed, in America it had scarcely grasped, the organ pathology of John Hunter. The cell, its physiology, and disturbances were unknown. Medicine was scholastic, practice governed by "systems" founded upon hypotheses, some of them fantastic. The cause of no disease was known and the room for speculation was infinite. The means of investigation of disease were the unaided senses, and these gave information mainly as to symptoms. The most esteemed art used in diagnosis was the palpation of the pulse. There were no instrumental aids to diagnosis, no clinical thermometer, no blood pressure apparatus, no stethoscope or other "scope," no chemical or microscopic examination of blood or excreta. The distinction between diseases and symptoms was by no means clear, and fever, jaundice, dropsy, cough, diarrhoea, and vomiting were treated as diseases in themselves. Many men, notably Cullen, tried to differentiate diseases into many kinds and to classify them into genera and species. Benjamin Rush in his *American System* taught that these efforts were unnecessary, vain, and even harmful, and that what was necessary was to know the "nature" of the diseases, whether they required depletion or stimulation. Such were the stimulating qualities of the American climate that nearly all diseases in this country required depletion. This meant bleeding, purging, vomiting, low diet, sweating, and salivation. Alcohol, food, "bark," opium, and blisters were stimulating. Salivation, in addition to its depleting virtue, was regarded as specific treatment for all fevers. James Tilton expressed the general belief and practice when he wrote: "This Sampsonian remedy has the power of subduing all manner of contagion or infection that we are as yet acquainted with." Tilton was head of the Medical Department in the War of 1812.

Materia Medica included no alkaloids or isolated active principles, merely crude drugs, most of them nauseous and many valueless.

None of the present day specialties was practiced as such. One man could acquire all medical knowledge, and one year of medical school was all

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that was ordinarily required for the diploma. We learn from Thacher's *Medical Biography* that Josiah Bartlett was surgeon's mate in the Revolution at the age of 16, and John Thomas of Massachusetts was surgeon's mate at 17 and regimental surgeon at 18 years. Both of these men later attained prominence in their profession.

Surgery, without asepsis, antiseptis, or anæsthesia, was necessarily crude and unsatisfactory. Amputations were frequent and pus was the surgeon's best omen.

Hygiene had scarcely advanced beyond the teachings of Moses in any directions. In some respects it had fallen lamentably behind.

In such circumstances as the preceding remarks indicate the medical service (not yet a corps) of the United States Army came into being. The average number of medical officers in service from the Revolution to 1830 probably did not exceed 30 to 40. They were usually isolated in small places, yet from one of these, a lone doctor in a frontier post separated by a hundred miles of distance and a week of travel from his nearest fellow-physician, came America's first large contribution to scientific medicine.

William Beaumont, post surgeon at the fur trading, frontier post of Fort Mackinac, was the contributor and his contribution was the brightest light thrown upon the physiology of digestion up to that time. An accident of rare and happy outcome gave him the opportunity to observe in the living body the appearance, action, and digestion by the healthy human stomach. Although without a medical degree, Beaumont was blest with an inquisitive spirit, a clear mind, the powers of concentration and perseverance. Alexis St. Martin's accident afforded him the means for making observations of great importance, and his clear understanding and lucid style enabled him to relate most interestingly what he had observed. Before him the subject of digestion was almost pure speculation. Even Spallanzani, whose observations and experiments were the most important prior to Beaumont's, failed to recognize that the gastric juice was normally acid. Prout isolated free hydrochloric acid from it in 1824, but no one knew the story as Beaumont told it.

Beaumont drew 51 inferences from his observations, all of them new to most medical men, and it may be said that more than 90 per cent of them are valid today and are among the fundamentals of the physiology of digestion. His most striking mistake was the belief that "every species of aliment produces the same kind of nutrient principles," which he called, for convenience of illus-

tration, a *gastrite of aliment*, as one might speak of a *nitrite of sodium*.

Next in scientific importance, and of about the same time, was the Medical Department's system of weather reports, instituted by Surgeon General Lovell and sent in from all posts. These were the beginning of the weather bureau service. In 1844 the first weather maps were made in the Surgeon General's Office. It was not until 1870 that the weather reporting was transferred to the Signal Corps, which in turn transferred it to the Weather Bureau in 1890.

During the Mexican war our contribution was valor and hard work, little else. In the 1850's the Pacific railway surveys were made and many medical officers contributed interesting and useful observations on the fauna, flora, ethnology, and archeology of the regions traversed. Most interesting were Dr. George Suckley's reports as surgeon of the party exploring the Northern route.

Another type of contribution to civilization, that of the hardy, fearless Indian fighter, is revealed in Surgeon J. B. D. Irwin's of Apache warfare experiences in 1858. Irwin and his like were contributors of the type of Daniel Boone and Kit Carson. Bravery, resourcefulness, initiative, and responsibility were their characteristics.

The greatest contribution from the Medical Department in the Civil War lay in the organization, systematization, and co-ordination of medical work, especially in the removal, transportation, and subsequent care given the wounded. This excelled anything of the sort previously done. It served as the model from which were built the systems of evacuation and hospitalization used in the World War. For this great contribution we are indebted principally to two men, Surgeon General William H. Hammond and Surgeon Jonathan Letterman, the two great medical officers of that great time. The story of their work is romantic, that of Hammond melodramatic. To his initiative and his orders we are indebted for the material for the Army Medical Museum and the *Medical and Surgical History of the War of the Rebellion*. I suspect that his "Calomel Order," Circular No. 6, 1863, was truly a great step in freeing us from blind subjection to the systems of the past, particularly the teachings of Benjamin Rush. Recall that James Tilton said that "besides syphilis, itch, etc., without fever, it is regarded as specific in smallpox, measles, scarlatina, influenza, yellow fever, etc., and is found to be not less successful in the early stages of jail fever. Hence it is that in yellow fever, remitting or any other fever, if we can only touch the patient's mouth with mercury, we regard him as safe."

The same belief obtained to the time of the Civil War, and inspectors reported "innumerable" instances of salivation and very many of mercurial gangrene. Hammond thereupon ordered the drug stricken from the supply table. The row caused was immense, but the order stood and it must have had the effect of causing men to search their memories and their experiences. It was about as definite a break from an evil past as was possible.

The professional work of the Medical Department in the Civil War is preserved in the great Medical and Surgical History, still a mine of most valuable information for the man who is not too busy to read the medicine and surgery of 60 odd years ago. The impression it made upon the scientific world of the time was expressed by Virchow. "Whoever takes up and reads the extensive publications of the American Medical staff will be constantly astonished at the wealth of experience found therein. The greatest exactness of detail, careful statistics even about the smallest matters, and a scholarly statement embracing all sides of the medical experience, are here united in order to transmit to contemporaries and posterity in the greatest possible completeness the knowledge purchased at so vast an expense."

The principal compilers of this great work were Surgeons J. J. Woodward, G. A. Otis, and D. L. Huntington. Woodward was also an American pioneer in photo-micrography.

While the *Medical and Surgical History* was being published the *Index Catalogue* of the Surgeon General's library was also going forward under John S. Billings. I have no doubt that it is now the greatest medical bibliography ever prepared. It is used throughout the world.

But Billings' work was by no means limited to that. He was a prolific writer and a man of great breadth of vision. In 1870 he was detailed to make a survey of and recommendations for the improvement of Marine Hospital Service, then the football of local politics in the various ports of the country. He took two years for the work and made recommendations which led to immediate improvement and started the growth which has resulted in the splendid Public Health Service of which we are all proud today.

Billings also planned the Johns Hopkins Hospital Medical School and brought together the group of great men whose individual and team work placed it just where he had planned, in the forefront of medical teaching in the world. After his retirement he continued library work, planned the building, the methods, the administration, practically made the New York City Public

Library. Few Americans, if any, have made four such worthy contributions to civilization as did Billings. You, who are writers and investigators and who know, will agree with me that American medicine is the richer and much better informed because Billings' mantle has fallen upon the shoulders of the erudite, indefatigable, and modest medical officer whose *Introduction to the History of Medicine* is a work of which American scholarship is proud. Colonel Fielding H. Garrison is still among us taking notes and making scholarship attractive.

In 1886, F. C. Ainsworth, an assistant surgeon, was put in charge of the Record and Pension Division of the Surgeon General's Office, then almost ten thousand cases in arrears and requiring an average of two and a half to three months to look up each case. In the following year the work was brought up to date. Ainsworth introduced the card index system into business, and I suspect that business men will agree that that was a contribution to civilization.

In this period of small things, many medical officers took up hobbies, with which they did interesting work. Some studied the classics, some music, some languages. Most largely useful were the branches of natural history, such as ornithology, ichthyology, mammalogy, and Elliott Coues, Edgar Mearns, Robert Shufelt, and others made notable and important contributions to the knowledge of American fauna and flora.

Real and effective control of most infectious diseases other than smallpox we now know could be expected only after the rise of bacteriology and modern hygiene.

It is interesting that Assistant Surgeon A. C. Girard was one of the early American supporters of Listerism of antiseptics and that, as a result of an article of his, published in 1877, an antiseptic equipment with spray apparatus was issued by the Medical Department in 1878.

It was also in the 70's that George M. Sternberg began his work in bacteriology. He was the father of that science in America, and as such, one of the foremost men in public health work. Yellow fever was then a yearly menace to our commerce and our coasts and Sternberg did much work in efforts to elucidate it, and almost as much in proving the mistakes of others and less conservative men who from time to time announced that they had discovered the cause.

When the Spanish-American War left us with tropical possessions on both sides of the world General Sternberg promptly undertook the acquisition and dissemination through his Corps of knowledge in regard to tropical diseases. He

appointed boards for their study in Cuba, the Philippines, and Porto Rico.

Because of Sanarelli's announcement at that time of his *Bacillus icteroides* as the cause of yellow fever, the board in Cuba, consisting of Walter Reed, James Carroll, Jesse Lazear, and Aristides Agramonte, was directed to concentrate upon the subject of yellow fever. The result you all know. By a series of brilliant experiments the board showed clearly, definitely, and for all time that the disease was conveyed by the mosquito *Stegomyia fasciata* (now known as *Aedes aegypti*) and not by fomites or contact; that the mosquito can obtain the causative germ from a sick person only in the first two or three days of his disease; that an interval of about 12 days or more after its contamination is necessary before the mosquito is capable of conveying the infection; that the incubation period in the patient varied from 41 hours to five days and 17 hours; that a house is infected with yellow fever only when there are present in it contaminated mosquitoes capable of conveying the parasite; that the spread of yellow fever can be most effectually controlled by protection against mosquitoes; that the specific cause of the disease is filterable and undiscovered.

This was a truly magnificent contribution to civilization, for yellow fever had been definitely retarding it in all Central and South America and to a less degree on our own and the Mexican Gulf coasts. It was costing thousands of lives, was keeping commerce depressed, was preventing the influx of capital and enterprise, had prevented the construction of a Panama Canal by the French, it had kept and was keeping Latin America poor, ignorant, and backward.

All that was needed to start those countries on the removal of their disabilities was a large scale demonstration of the practicability of applying the board's findings. That also was furnished by a medical officer, my illustrious predecessor, William C. Gorgas. First in Havana and later in Panama, he applied the findings, got rid of yellow fever, greatly reduced malaria, and made places of happy residence of what had been pest holes and world menaces. The Panama Canal was built, commerce, wealth, and general welfare increased, and civilization took on new and healthy growth. This story of scientific investigation, prompt application of the knowledge gained, quick and beneficent results is scarcely paralleled in history, scarcely excelled in romance. All America and all medicine are proud of it.

Meanwhile, the other Tropical Disease Boards were not idle. That in Porto Rico, particularly Bailey K. Ashford, began the investigation of the

tropical anæmia which was so widespread and debilitating in that island, speedily determined that it was due to hookworm infestation, and undertook treatment upon a large scale, with good results. Similar and more complete campaigns are now going on in many parts of the world. This was a large gift to civilization, the full benefit of which came slowly, not with the dramatic promptness of yellow fever control. However, the complete elimination of hookworm disease would help more people than yellow fever control. This is also true of malaria, in the control of which our army has stood high.

The Tropical Disease Board in the Philippines early undertook work on plague, cholera, amœbic dysentery, animal parasites, and issued bulletins upon all these subjects which were of great value.

Meanwhile also the medical officer in the "bosque" with troops, living in a nipa shack, or an abandoned convent, was vaccinating natives by the thousands, was acting as sanitarian for native villages, towns, and provinces, was controlling epidemics of smallpox, cholera, bubonic plague, malaria, typhoid, tropical anæmia, was carrying the gifts of sanitation and health to thousands. This was surely a contribution to civilization.

You all recall our very unhappy experiences with typhoid fever in the Spanish-American War, due largely to our ignorance of its epidemiology, to a belief that it was only a waterborne disease. An army board (headed by Walter Reed but including Victor C. Vaughan and Edward O. Shakespeare, surgeons of Volunteers) investigated the camp epidemics and in a monumental report threw much light upon the manner of spread, although not recognizing the importance of human carriers in the kitchen and not enabling the British in the Boer War to escape experiences as unhappy as our own. Their experiences led the British to investigations looking toward immunization by means of bacterial vaccines. The work was not highly successful, but was sufficiently so to encourage further work in England, Germany, France, and India. In 1908, Major F. F. Russell, of our Medical Corps, was sent abroad to investigate the results of such research. After his return a board consisting of Surgeon General O'Reilly, six reserve officers (the first ever called to active duty), and Major Russell considered his report and recommended the use of bacterial prophylactic in our army. At the same time bacteriological examination of blood, stools, and urine of all cases, examinations for the detection of carriers, chlorination of water, and other advanced sanitary measures were instituted. The result was the

practical elimination of typhoid from the army, where it had been a scourge throughout all of our history. So striking were the results that the procedures were taken up by other armies and in civil life, and typhoid, once so common, is now a rare disease in this country and many others. Here was a great gift to civilization, a great accomplishment of medicine. The same measures, other than bacterial prophylaxis, which so reduced typhoid, also reduced dysentery, likewise a long time scourge to our army, formerly such to our country and still such in our tropical possessions. It is now relatively rare. Among the measures of general sanitation important in reducing these diseases, not only in the army but also in our cities and the cities of the world, it is probable that no single one is more important than the chlorination of water. This is applied in the field by the use of hypochlorite of lime, but that substance was difficult of application and uncertain in results when applied to the water supplies of great cities. To an army medical officer, the modest Carl R. Darnall, my office assistant, the world is indebted for the process of purification of water by the use of liquid chlorine and for the apparatus by means of which the treatment is effected. When I say that we are indebted for these things to Colonel Darnall I am not expressing a mere opinion. The patent offices of this and other countries recognized his priority by granting him basic patents and the United States Courts have upheld the validity and rightfulness of those patents. Here is a contribution to civilization which reaches into and benefits every urban home in America and in many other parts of the world.

The specific treatment of amœbic dysentery with ipecac was brought into prominence in our country by a medical officer, Colonel A. A. Woodhull, and the use of emetine followed the work of another, Colonel E. B. Vedder. Another officer whose work on dysentery and malaria has made him an authority on both is Colonel C. F. Craig.

A disease which was of primary importance in the Far East, several times as disabling to the Japanese army in the Russo-Japanese war as all communicable diseases combined, and very common among Philippine Scouts and in public institutions, was beri-beri. It had been investigated by British, French, Dutch, and Japanese workers, but again it was the American Army Medical Department which gave a large scale demonstration in practical control. The Tropical Disease Board in Manila recommended changes in the Scout ration which practically eliminated the disease in a few months. The same changes applied in the prisons, leper asylums, and Constabulary had the same

effects, with great saving of life and prevention of invalidism. To the Far East the control of beri-beri is as important as the control of typhoid in the western world.

Another disease which has afflicted its many thousands in our army and our country is dengue. Benjamin Rush certainly talked of it under the title of bilious remittent fever, and under that title it was long confused with malaria and yellow fever. Tropical Disease Boards in Manila shed such light upon it that it is now as well understood as yellow fever, to which it has many resemblances.

An interesting view of the results of preventive medical work of the army at the present time and almost a century ago is obtained by comparing certain figures relating to the year 1841 with those relating to 1927. In 1941 the mean strength of the army was 9,748, the admissions to sick report 38,559, or 3,960 per 1,000, and the deaths 387, or 39.8 per 1000.

In 1927 the mean strength was 132,901, the admissions to sick report 87,002, or 654.6 per 1,000, the deaths 531, or 4 per 1,000.

The admission rate had fallen to one-sixth, the death rate to one-tenth of the earlier figure.

In 1841 almost half of the army, a mean strength of 4,738, was in Florida. The admissions to sick report there amounted to 21,027, or 4,430 per 1,000, the deaths to 254, or 53.6 per 1,000.

In 1927 the troops in Panama numbered on the average 7,179. The admissions to sick report were 6,185, or 861.54 per 1,000; the deaths 29, or 4.04 per 1,000. The sick admission rate in Panama in 1927 was but one-fifth that in Florida a century earlier, the deaths less than one-thirteenth.

Even more striking are the death rates from certain groups of diseases, as follows:

| Diseases | Death rate per 1000 | |
|-----------------------------|---------------------|---------|
| | in 1841 | in 1927 |
| Fever— | | |
| Typhoid..... | 9.1 | .05 |
| Typhus..... | | |
| Malaria..... | | |
| Yellow..... | | |
| Dysentery..... | 14 | .04 |
| Diarrhoea..... | | |
| Pulmonary Tuberculosis..... | | |
| Phthisis..... | 3 | 0.2 |
| Hæmoptyses..... | | |
| Pneumonia..... | 1.2 | .31 |
| Peritonitis..... | | |
| Appendicitis..... | 2 | .15 |
| Typhlitis..... | | |
| Alcoholism..... | | |
| Intemperance..... | 1.2 | .05 |
| Delirium tremens..... | | |

It is obvious at a glance that our great savings of life have been in the groups of fevers, diarrhoea,

and dysentery, but it is greatly heartening also to observe the notable saving from those great respiratory killers, phthisis and pneumonia.

Pneumonia we are apt to think of as being as deadly as ever; appendicitis causes the laity to wonder why our ancestors did not have it; and prohibition has given deaths from alcoholism such news value that we see more reports of them in the newspapers than we saw years ago. The figures here quoted show that deaths from all of these are now rare as compared with 1841.

There is much of which I should like to tell you as showing the progress of medicine and of the Medical Department, but I may not take the time. But allow me to remind you that the official history of the *Medical Department in the World War*, a work comparable to the *Medical and Surgical History of the War of the Rebellion*, is now complete, the last volume in the hands of the printer, and that I hope and believe it will prove as great a mine of useful information as did the last named work.

I can not close this much condensed account of the work of the Army medical service without expressing my great satisfaction that the Department no longer, as through the greater part of its history, consists solely of medical officers. Not only has it its own enlisted personnel, but it includes the Dental, Veterinary, Medical Administrative and Nurse Corps, and by virtue of that fact its usefulness in the future promises to be greater than in the past.

Nor can I withhold my appreciation of the happy relations it now has with the great medical services of the Navy, the Public Health Service, and the splendid civil profession upon which it has called and will call, and never call in vain, for help in time of trouble. Most of you were with us in person in the late war, all of you in spirit. The honor you have done me is a gesture of good will which I and my Department appreciate most gratefully, a guarantee of co-operation and perhaps guidance in our next great task, the control of the respiratory diseases.