# Century's Progress in The Art of Healing

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In all the history of mankind there has been no movement at once so widespread, so single hearted, so fraught with importance to humanity, as the advance in scientific discovery made by the doctors of medicine during the last quarter of the present century.

At all times since medicine became an art there have been men of unselfish purpose ready to devote their energy, their health and even their lives to the advancement of their profession, but where one such existed in older days there are now a thousand. The whole plane of professional thought has been elevated. The vast mass of the regular practitioners no longer look upon their calling as a mere method of livelihood, but rather as a means by which they may aid in the divine task of bettering the human race.

To this end every one, in a greater or less degree, has become a discoverer or at least an explorer in search of discoveries. The merest student, like one of Napoleon's soldiers, realizes that the baton of fame lies to his hand, and longs for the day when he may add something of value to the store of knowledge which has been heaped up around him. This lust for discovery increases in the individual from year to year and, while many failures are recorded, the number of successes has gone far during the past twenty-five years to raise medicine to the plane of an exact science.

CYRUS EDSON, M. D., FROM HIS LATEST PHOTOGRAPH.

Physicians who practiced at an earlier period look back to it as men remember their childhood, in wonderment at their former ignorance, and the men and women who submitted to the treatment of those days are sometimes lost in amazement at the feats accomplished by modern practitioners.

**Advance In Surgery.**

There is nothing perhaps that appeals to the lay mind so strongly as the advance in surgery. This has largely resulted from the discoveries of Lister, who was the first to realize fully the danger of germ poisoning in wounds, and the principles of whose antiseptic treatment govern surgery to this day. The absence of such treatment was one of the causes of the tremendous mortality of the civil war and of former wars, and its absence rendered fatal a large class of operations which are now regarded as safe. Among these the most important are those affecting the abdominal cavity.

In the older times only 1 or 2 per cent of such operations were successful, but today less than 1 per cent are fatal. The removal of a tumor or a cancer has become a matter of comparatively trifling moment, while the excision of part or all the stomach, of part of the intestines, or of part of the liver, or a kidney is no longer regarded as occasion for astonishment. It is possible, however, that the most beneficent result of modern surgery is seen in cases of appendicitis, a disease which, while still unrecognized, carried off its tens of thousands and hundred of thousands, whose death was charged to inflammation of the bowels. The percentage of deaths from appendicitis is now figured at 4 to 6 per cent. This may almost be regarded as a reduction of from 80 to 90 per cent, for when the disease is once developed it becomes practically incurable in the absence of surgical treatment.

Other important factors in the advance of surgery have been the improved methods of anaesthesia made possible by the discovery of cocaine and the more intelligent use of chloroform, ether and nitrous oxide gas. These methods, by rendering the subject motionless, have made the work of the surgeon comparative easy, while they have saved an infinity of pain to the afflicted which can only be appreciated by persons who suffered under methods now happily discontinued.

Another discovery, which, while facilitating the work of the surgeon, has also lessened the suffering of the subject, is that of the Roentgen ray. This, taken with the Edison fluoroscope, enables the surgeon to make a quick and thorough examination of any injury to the bones or of gunshot wounds, and afterward to avoid an amount of manipulating or of cutting which would materially increase the patient's affliction.

**Wonderful Changes in Living.**

But while the feats of surgery are more spectacular, so to speak, than those accompanied by the physicians, the feats of the latter are more far-reaching in the good they have done. It is possible that the best results have arisen from improved methods of living, and these improvements are nowhere so plainly to be seen as in New York. Twenty years have wrought wonderful changes in the city at the Hudson's mouth. Drainage is better, the water supply is improved, plumbing is more perfect, the pan closet has almost disappeared and cesspools no longer exist. Personal cleanliness is growing more common and these changes are even more evident in the tenements than in the private houses which are not under public supervision.

There are today no such slums as those which disgraced New York in the '70s. Suburban trains and the Brooklyn bridge have thinned the population and Manhattan is no longer crowded as in former days. The vast fruit-raising industries of the south, the increased grain output of the west, the meat packers of Chicago and the truck farmers of New England have created a food supply such as our fathers never dreamed of. The people know better what to eat and how to cook and eat it. They wear better clothes. Their whole plane of living has been raised, and in the great work of education and enlightment which has made this possible the magazines and the daily press have had an honorable share. Attention to the facts and opinions given out by the physicians and carried broadcast by the newspapers, as well as the more material changes, have done much to make New York one of the healthiest great cities in the world.

Under the benign influence of enlightenment and cleanliness a considerable class of disorders known as zymotic, or filth disease, have been almost wiped out of existence. Typhus fever, for instance, is as extinct as the great Auk, and there are few physicians in practice today who have ever seen a case of it. Many years have passed since there has been a serious outbreak of cerebro-spinal meningitis. La grippe still exists, as most of us have reason to know, but only in a very modified form. It no longer devastates whole cities as in the days before King Filth was dethroned, and only occasionally and gently reminds us of the ravages of which it was once capable.

**The Microscope a Factor.**

The advance of the medical art proper, although so rapid in itself, has been slow compared with that of other sciences, but this is owing, not to any lack of enthusiasm in its devotees, but to the mysteries of the processes of life which are so difficult of solution, and also to the fact that medicine necessarily develops in the wake of the allied sciences, being dependent upon them for its eyes, its hands and its ears. Perhaps the most potent factor in the advancement of medicine has been the microscope.

Prior to its perfection we only guessed in a general way at the causes of disease. The germ theory was a mere speculation, accepted by a few and scouted by many. The world of infinite littleness was as difficult of mental grasp as that of infinite greatness. Little by little, step by step, the patient lensmaker, calculating his angles, working on bits of glass smaller than wheat berries, evolved an instrument that pierced the darkness and revealed to thousands of eager eyes the long-looked-for secrets of the germ world. Today the perfected microscope magnifies more than 75,000 times, but those figures do not convey any realization of the vast multiplication of areas that are actually compassed. Some idea may be given, however, by saying that a common fly an eighth of an inch tall and a quarter of an inch long would be magnified into a monster thirty-six feet in height and seventy-six feet in length. A lens which would magnify like this could show only a portion of the fly's body at one time, however, and to explore the whole surface a skilled microscopist would be obliged to work for three days, of ten hours each.

The wonders which now unfolded themselves to the eyes of science seemed almost beyond belief. Bacteria were found everywhere—in the earth, the air, the water. They were seen abounding in all putrient and fermenting substances in which organic matter existed, and were soon recognized as the prime cause of putrefaction. In proof of this it was learned that organic matter when exposed only to sterilized air never putrefies, and that if bacteria could be excluded from wounds the latter would heal without suppuration.

**Study of Bacteria.**

From the mere discovery of bacteria to their identification and classification was comparatively but a step. It was found that they could be cultivated artificially. It was only necessary to immerse a needle in any substance containing bacteria and then thrust it into some culture media such as soup, jelly, cornstarch or coagulated blood. In such a base the bacteria would be deposited in the more congenial soil, and multiply so rapidly as soon to provide the investigator with ample material for his experiments.

It was to Prof. Koch's book on "The Etiology of Anthrax," published in 1878, that the world was indebted for the placing of bacteriology upon a solid scientific basis. This frightful disease caused the death of sheep worth $1,500,000 annually in France alone. It was so malignant that animals feeding above the graves of former victims were infected and died. People who handled the hides and wool of diseased sheep acquired the infection and even bone dust used as manure communicated the poison to human beings and to the animals which partook of the ensuing vegetation. The resistance of Anthrax bacilli to destructive agents seemed beyond the power of science to overcome. After eleven years of life they were found still active and five months' immersion in alcohol seemed rather to stimulate their activity than to lessen it. When introduced into the body they multiplied with extraordinary rapidity, consuming the oxygen in the blood faster than the lungs could supply it. After death the capillaries were found absolutely stuffed with compact masses of bacilli in numbers beyond the possibility of computation.

The study of this disease and of others which were traced to bacterial sources led to the discovery that germ diseases in general were self-limiting—that they ran a specific course which in the majority of cases ended in recovery. This led to the inference that germs form and excrete some poison which is fatal to themselves, and this was proved to be the case by the fact that when the germs of certain diseases were placed in suitable culture media they developed for only a limited period and then died; at the same time it was noticed that the action of the germs upon the culture media transformed the latter into new substances. The yeast germ, for instance, acting upon cornstarch, produced alcohol and carbonic acid, while certain disease germs produced the substances now widely known as toxins.

**Serum and Inoculation.**

The germs themselves in some cases were used to inoculate healthy animals, and the germs taken from them were used upon other animals. After passing through a certain number of beasts the germs were found to have become so weakened that when inoculated in healthy individuals they would cause an attack of the disease, harmless in itself, but sufficient to prevent a recurrence of the trouble. It was in 1880 that Pasteur announced his ability to prevent chicken cholera by this means, and the announcement of a virus for the cure of Anthrax soon followed. Two years later Koch announced the discovery of the bacillus of tuberculosis, now known as the hyphen bacillus, and later the identification of the comma bacillus, as the cause of Asiatic cholera. It may be well to explain at this juncture how the presence of these germs can be detected.

In suspected cases of cholera, for instance, a needle is dipped in the excreta of the patient and then thrust into a test tube containing a sterilized culture medicine.

Almost immediately the bacteria attack and destroy this medium along the sides and at the bottom of the needle thrust, until at last the excavation which they make resembles a turnip in outline. The comma shape of these germs together with their peculiar form of attack render their identification sure. With the germ of tuberculosis the method is different. In this case a drop of sputum is dried upon a glass slide and then treated with a solution of methylene blue. Then, when the blue has been roughly washed off, the tubercle bacilli are found to have been stained with it, while all other bacilli are left stainless. It is true that the plasmodia or germ of malaria and other germs also take a blue stain, but as they are never present in sputum, and, moreover, are differently shaped, there is no danger of confusion. These two instances will suffice to indicate, in a general way, the methods of identification in use.

In 1890 Koch announced the discovery of a lymph for the cure of consumption, but did not succeed in demonstrating its usefulness. This was followed two years later by the production by Roux and Behring of an antitoxin for the cure of diphtheria. These gentlemen ascertained that when certain animals, preferably horses, were inoculated with gradually increased doses of toxins, made from the Klebs-Loffler bacilli, they became immune to diphtheria, and the serum of their blood was converted into a specific which proved to be an almost certain cure for that formidable disease. At first the cost of this serum was very great, but of late years the municipality of New York has placed it within the reach of the poorest person and the results of its use have been in the highest degree satisfactory.

I refrain from going into the complete statistics at hand which would prove this statement, but merely call attention to the fact that for ten years preceding the use of anti-toxins the death from croup and diphtheria averaged in Paris 1,463 and in Berlin 1,419 annually, whereas during the anti-toxin period, 1895 to 1899, they averaged 383 and 686 respectively, or less than one-half. In New York the deaths formerly averaged 2,654 a year, while since the introduction of anti-toxin they have averaged only 1,563 and in 1898 they numbered only 923. I may add that during the year 1898-9 the percentage of deaths in persons who received the anti-toxin treatment was no more than 7.7. This record in the cure of a disease formerly regarded as dangerous in the extreme and the mortality which was from 25 per cent to 40 per cent is certainly remarkable.

CYRUS EDSON, M. D.

## A Political Episode

Atlanta Constitution: A Billville candidate who had but a slim chance of election received this note from one of his faithful allies:

"John, I fully expected to be able to whirl in an' help you win your fight for coroner, but I'm laid up with the rheumatism, an' can't move hand or foot. But I've done give Silas (you know Silas, don't you?) 40 cents and a plug of tobacco to disable your opponent an' keep him from stump speaking, an' he has just told me that he has shot him in the left leg—by accident, as you might say—an' he has called in his dates an' two doctors. So go ahead now, an' make hay whilst the sun shines, an' you kin pay me back the 40 cents an' the plug of tobacco when you're in office safe an' sound. Though I'm on my back, John, you will see by this that I'm still your friend an' well wisher. Go in an' win!"

BEATRICE CHAUTAUQUA—AROUND THE PAVILION.

BEATRICE CHAUTAUQUA—REFRESHING SHADE TREES.

BEATRICE CHAUTAUQUA—AMONG THE COTTAGES.

BEATRICE CHAUTAUQUA—TENTING IN THE GROUNDS.