

THE EVOLUTION OF PUBLIC HEALTH

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Through the Ages one increasing purpose runs.

I

MAN has ever contended against the agents that seek his destruction. That he emerged into the open, where he has had some chance for development, is a tribute to his fighting powers, and perhaps more to his having been given an intellect along the way. Without this instrument he must inevitably have perished. With it he became supreme over the beast creation. The subtle judgments of this new reasoning animal were more than a match for the ferocity of the mammoth brutes, which dragged one another in the slime and would quickly have wiped out the last trace of this new challenger of physical force. Man's victory was assured, but it was not complete. Many of the animal creation could be turned into allies; others were harmless; but there were multitudes which retained their malignity and set about to do by stealth and subtlety what their big brothers had failed to accomplish by physical strength. These were the unseen animals, or, as they are now known, the germs of disease. It took man's intelligence a long time to grasp the character and might of this unusual enemy. In the wrecks about him, where Death seemed often to stalk unhampered, he read the existence of a cause, but could not discern its nature. He invented hypotheses to explain his data, and naturally the simplest and easiest of comprehension became the vogue of the time. Hence primitive people laid their affliction at the door of their deities. Disease was the scourge of the gods for the sins of the people. The form of cure depended on the religious tenets and practices of the sect afflicted. It might be offering of sacrifice, or an extravaganza of propitiation, designed to flatter and cajole into benevolence the particular god invoked. Many of the numerous superstitions of medicine had their origin in this way. Naturally they took many shapes. Evil spirits, witches, fairies, devils—all came into the field as the causative agents in disease. Man's insatiable hunger for finding a reason for phenomena had to be satisfied somehow, and, the evidence of

the senses having failed, mystery must be explained by mystery. Whoever has a rabbit foot tucked away in his clothing to protect him from disease and bring him good luck, quite unconsciously reflects a type of preventive medicine thought good in those times. To-day, there hover about the medical profession groups of monte-banks and fakirs who claim to cure or prevent disease by using fantastic methods. These are the professional descendants of the witch-charmers and dung-eating therapeutists of a fairly remote antiquity. Their methods are more modern and plausible, but their ignorance is equally profound. The old time medical plagiarist had often the sincerity of unattainable knowledge. The modern charlatan has the sophistry which distorts true knowledge and the avarice to turn the practice to monetary gain.

Throughout the long evolutionary process there were always outstanding searchers after the truth. The crumbling of civilizations and the social and political upheavals therefrom made some wide gaps between the torchbearers of medical knowledge, but they never lost sight of one another. Garnering the good, eliminating what experience proved useless, went on with a steadfastness and an erudition which showed that the greatest minds were bent to the task of plucking out the mysteries of disease. Hippocrates and his school laid down as fundamental the observation of phenomena and the study and interpretation of data, generalization and the building of principles from the process.

Thus began and thus grew the method of inductive reasoning to which science owes all it has. It is the proud boast of medicine that induction had its birth and its application in the minds and hands of men who were endeavouring to understand the ills that flesh seemed heir to, and bring their skill and intelligence to repair broken bodies, to save life and alleviate the sufferings of mankind. This work, begun four centuries before Christ, never lost its essential beauty. It was the medical Ark of the Covenant, and while the centuries have wrought many alterations in its structure, changed its appearance by many additions and embellishments, it harbours still the great soul of the healing art. Whispers may still be heard in such words as Sir Astley Cooper's: Nothing is known in our profession by guess; study of data from whatever source available, and wise interpretation, are the only true basis of legitimate theory or justifiable action.

Evolutionary processes waste no time watching the clock. It is a long call from Hippocrates to Pasteur and Lister—about twenty-three centuries. But the latter were offsprings of the Hippocratic system, appearing perhaps long after the time was

ripe. Their coming was inevitable, if tardy. They were not the sons of the bond-woman, but of the free parents of scientific endeavour; and they changed the whole outlook of medicine and the human race. They found disease to be for the most part the result of the efforts of the lower forms of animal life to destroy the higher ones. Man's intelligence had subdued the visible brute creation, but till now had no knowledge of the invisible. Pasteur plodding steadfastly on, experiment after experiment, began to weave a net about the hidden foe and, with the aid of the much improved microscope, gradually decoyed him into the field of vision. Human eyes then looked for the first time on the germs of disease. The old masters' dicta of observation and experiment were justified at last. A great truth had been born to the world, which would be to all the people. Lister followed up with the application of the new discovery to surgery. One disease after another yielded its causative germ to the prying eyes of investigation. The list is a long one, and the end is not yet. A great department of biological science arose from this discovery, and the saving of human life is quite beyond reckoning. Lord Moynihan estimates that Lister's and Pasteur's discoveries have saved more lives than "all the wars of all the ages have thrown away." Late in coming, this great truth was pursued through the centuries. Observation on communicable diseases brought scientific men close to the secret. The pillar of light through the long shadows was observation and investigation. Often dimmed, entirely lost sometimes, it reappeared again as some new discovery or invention brought encouragement and inspiration. Even what we now know as preventive medicine began to assume some form before the little army of microbes was marched up to defend and stabilize it. These efforts in prevention of disease were necessarily weak on account of the lack of essential knowledge of the malady itself. This was evident in the futile attempts made to stem the tide of the plagues which more than once overran Europe. Some fairly good sanitation was practised, however, wherever general intelligence prevailed, and even among the Israelites, who were not noted for scientific achievement, we find the health laws laid down by Moses during the exodus are models in many ways of sanitary common sense. Probably his previous attainments in the wisdom of the Egyptians served him well in guarding the health of a whole nation on a forty-year march. Compared to the work of Lister and Pasteur, however, all the discoveries and advancement preceding were

.....but seed,
Of what in them is flower and fruit.

II

The gap between Hippocrates and Lister was about twenty-three centuries. Between Lister's first application of the new truth to surgery and this present year of grace is a period of about sixty-five years. Comparisons are said to be odious, and an appraisal of the achievements of these years might give the creations of the wide stretch of centuries a shabby look. Besides, it would draw one well beyond the scope of this article. Art is long and life is short. Scientific and social progress move forward on its whole front; and until all the constituent units are doing their part, there is sure to be delay. Whether civilization has now a united front and is keeping step, may be debatable; but there is little doubt that the advancement in medicine and its application to public health and to the whole course of social legislation since Lister's day has had nothing to approach it in the history of the human race. Only in these years has the world shaken off the old philosophy of medicine which accepted disease as inevitable and its cure as the only concern worth while. How could they set up defence work against an enemy whom they could not see, and whose habits and fighting methods they could not understand? Their preventive measures were, therefore, built upon the broadest inferences, and, while useful and salutary, they fell sadly short when real emergencies arose. Again, one wants to acknowledge that a few real prophylactic discoveries had been made. Jenner made the simple enough observation that the dairy-maids who had had cow-pox did not take small-pox, or, if they did, only in a very mild form. From this came vaccination, and the control for ever of this most virulent disease. Other similar observations on the habits of certain diseases brought useful results in their treatment. It is only, however, since the discovery of micro-organisms that the scientific rationale of those procedures have been fully understood, and the relation of cause and effect placed on a permanent basis. The medical world was well versed in the observation and study of the symptoms of disease. What doctors call clinical methods had about exhausted themselves. A great array of observed phenomena and pathological data had to be linked up with their essential causes, and the entrancing call of a new world where many things would be made clear, drew investigators from the ends of the earth. Some, who at the beginning scoffed, remained to pray and labour in the new field. One discovery after another was almost greedily snatched up, and a new literature on the science and art of medicine, curative and preventive, was placed at the service of mankind.

Research, a term of comparatively recent times, has become the watchword of every modern pilgrim in scientific endeavour. Everywhere over the world, the silent untrumpeted searcher reaches further and further into the mysterious realm beyond the ordinary ken, meets face to face the myriad hordes which have so much to do with the ailments of the flesh, appraises their capacities for good or ill, determines the agencies that can curb them in their worst moods, and brings back to the world of men the dominant power of knowledge and the sword of the spirit of scientific truth.

Research, too, is giving us an ever increasing knowledge of the chemistry, normal and abnormal, of the body cells. The unit of life, the cell, is therefore pretty carefully scrutinized, and has yielded many secrets which are of much value in studying the habits of disease. Its great mystery, that of life itself, it still guards jealously, and within its fastness it will probably continue to observe the speculation and theories of men who seem to have reached a barrier they may not pass.

What we call public health to-day is the direct offspring of our fuller knowledge of the cause and spread of disease. Preventive medicine, not much more than a pious wish with the ancients, now rests on proved data, and its usefulness reaches the people through many channels. The doctors, while engaged in the business of curing disease, could keep their secret rites within their cult with some warrant. When research showed them what many of these diseases were and how they could be prevented, a new era dawned. The application of new preventive measures depended upon the co-operation of the general public, and this in turn upon an intelligent conception of the why and wherefore of their actions. They were not likely to boil the water which was infecting them with typhoid fever, if they did not know the germ of the disease was probably present there. They were not going to bother about protecting themselves from pulmonary tuberculosis if they did not know a living germ was the cause and could easily be transmitted to themselves. Legislation, the crystallization of public opinion, could not be effective until the men and women of the nation could think in the terms of the new doctrines of health. Education was, of course, the agency to prepare the way for the coming of public health laws, and the numerous organizations that are now active throughout the length and breadth of the land.

Over the whole world the dissemination of knowledge of public health since Lister's day has been striking, although eminently logical and inevitable. The democracy of education, the widespread power of the press, the public platform and the numerous organiz-

ations of both Church and State, which the new truths quickened into being, carried the word of preventive medicine to all the people. Governments began to feel the impelling force of an awakening that came from the intimate life and homes of the town and countryside, and breathed the spirit of a mighty truth. The old horrors of hospital gangrene from infected wounds (rotting) had gone; child-birth fever, which had so often closed the eyes of the young mother to her offspring and her new happiness, was banished for ever as the accursed thing it was. Surgery, strong in a security it never knew before, went forward to save millions of lives. Medicine laid aside much of its old and useless therapeutics, and, moulding the new truths to its use, not only placed curative methods on a rational basis, but practically wiped out a number of diseases which formerly took a big toll of human life. Dr. Gorgas went down to the fever infested zone of Panama, and there performed the miracle of changing a land that reeked with pestilence and death into a veritable health resort. The erstwhile invisible enemy was dragged under the microscope, its secrets were disclosed, and effective measures were taken to guard the human species from attack. President Roosevelt's engineers and his army of workmen followed in the wake of this strange new light, and the great canal became a fact. The bones of the French workmen, who in less enlightened days essayed the same great undertaking, bore testimony to the tragic contrast between the old empirical methods of guarding public health in the tropics and the new ones based on scientific research. Such striking examples of the new sanitation made a profound impression on the public mind. Governments began to establish health departments and encourage research. Voluntary organization sprang up in all directions. Economics came into the picture, and the dictum that *a nation's health is a nation's wealth* began to have a real meaning. The old order had changed; the new had succeeded; and God had indeed fulfilled Himself in beneficent ways.

While to-day in every civilized country there is activity in the control of all diseases, it is to the so-called communicable ailments that the most persistent efforts are directed. They come into our every-day life, and are more susceptible to control by health laws and regulations. One of the familiar examples is tuberculosis of the lungs, or what was called consumption before we knew the causative germ, *the bacillus tuberculus*. As consumption, it was almost invariably fatal to the person attacked, and among the members of a household almost as certain to spread. Ignorant of the living germ, ignorant of the value of fresh air and sunshine,

they closed their windows tight, drew down their blinds creating inside an incubator for the propagation of this white plague, and within the memory of many of us, one brother or sister followed another until the tragedies were told in the increasing graves of that household:

The pity of't, Iago; Oh Iago, the pity of't.

We can cure many now, and with sufficient equipment we can control the spread of this disease. In our own country it is the biggest job of both government and voluntary departments of health. Governments no longer close their eyes to their responsibilities, and the public health budget is an ever increasing one. The medical profession, more than at any previous time in its long history, is co-operating with public health bodies. Research is almost every year placing some new agency in the hands of our health officers to increase their effectiveness in the field. It has much to do still, for there are yet mysteries to unravel. Cancer is not solved, and there are others too. But the future is bright with promise. We must go on, because, in our complex civilization, a reasonable control of disease is fundamental. It is vital and national, and in its close analysis goes to the root of our best conception of democracy.

III

While it is quite true, as Oliver Wendell Holmes observed, that "our fairest forms are never reached", yet health departments are entitled to ideals, and the one that best expresses their summum bonum is that the full benefits of modern medical science, curative and preventive, should be easily accessible to every man, woman and child in our country. Short of this, there is work to do. Two powerful enemies of this consummation in our Dominion are geography and poverty. The latter has no geographical boundaries, and has to be reckoned with throughout the world; the former obtrudes itself most stubbornly in the newer countries like Canada where the frontiersman still has his work to do, and where the ever widening and thinly spreading colonization of our broad tracts of prairies and wilderness must continue to create perplexing problems of a social and economic character. Even in our own sea-girt Nova Scotia we have far too many villages and settlements which are receiving but a tithe of what modern medicine has to offer. They are the places remote from the medical centres. They have both the factors mentioned to contend with. Many of the people in these villages are poor, and only in severe illness are the services of a doctor sought. A thirty or forty mile trip

of a medical man costs money, and under our present system he has no source of income other than his fees, for his own and his family's support. Making all allowance for the traditional and very real charity of the medical profession, it is too much to expect that such service can be more than a partial effort while both doctor and patient suffer from an economic inhibition, the one disturbed by big inroads into his professional time with at best but the hope of inadequate remuneration; the other fearful of the financial stress this unexpected and unprovided expense is sure to cause the family, resulting too often in a long put off call when it is too late to do any good. Travelling clinics and Government subsidized doctors are to some extent meeting such conditions in the eastern provinces, where, of course, the great distances from the centres accentuate the problem of adequate medical service. Red Cross and other organizations do their part, and do it well. Government medical health officers and nurses cover what ground and labour their number and physical resources will permit; but, with it all, one is obliged to recognize that there are still many of our people who are not getting the service modern medicine and surgery have to offer. State medicine has been suggested as a remedy, and there is much to be said for combining a modified State service with private practice, the one being supplement or complement of the other. In fact, government health departments, as at present constituted, are capable of development in the direction of State medicine. For instance, in Nova Scotia the pathological laboratories belong to the province and their two departments, each under a skilled expert, render a free service to the whole province. We have, therefore, a modern scientific centre closely linked with the hospitals and doctors. Tissue examination, the last to go on the free list, is designed to strike a blow at the increasing incidence of cancer by enabling doctors to make an early diagnosis. In communicable diseases the laboratories are a constant centre of appeal. It is here the hidden germ is isolated and studied, and here, too, are made the numerous vaccines and sera which research has proved useful in curing and combating these diseases. Clinical data coming from the practitioner in the towns or countryside are linked up with the evidence of the microscope and the dicta of biological chemistry; and so far as human effort can contrive, the patient is given his best weapons of defence and cure. In a word, public health organization unites the powers of the clinical and the strictly scientific, and focusses them on the patient himself. We can find no more striking example than this of public health organization working at its best.

More than half the efforts of health departments have to do with prevention of disease, or what we call preventive medicine. It is the offspring of the discoveries of Lister and Pasteur. In many ways it is the most vitally significant activity in our modern life. It has placed the medical art on an elevation it never knew before, because it is more blessed to prevent than to cure. Here it is often true that the patient must minister to himself. He must know something of the subtleties of diseases, that he may learn to avoid them. He must know of the part sane living, hygiene and a proper adaptation of the mental and bodily forces bear to the various phases and exigencies of life. He must know that without good health there is no happiness, and without this element, community and national life become a dreary and purposeless business, a suitable breeding ground for those social disorders which like rank weeds spring from the unhealthy soil of a decadent nation. He must know, finally, that he is practising a high type of patriotism when in his community he maintains by precept and example the highest standards of public health. And the health departments must help him to do all this. Their job is to lead the way by advancing health education, and by placing within the people's reach those agencies which science and economics have evolved and perfected to prevent the spread and virulence of disease. They may approach the many sided problems in as many different ways, for methods must vary often to meet the relentless demand of circumstances; but the obligation itself is fixed and definite, and its execution alone is the warrant for the efforts of Governments in creating effective health machinery at the public expense.

Health and Education, as departments of government, must start hand in hand and travel a goodly part of the way together; in fact, they should always be within calling distance, with the universities and schools sending out their latest discoveries to help to illumine the way. Health education properly woven into the work of the common school will do more in moulding a practical and effective community interest in the things that make and keep people well than any amount of effusive and, as it often is, extravagant propaganda. And I am far from frowning upon public platform instruction, so long as it is well measured, simple and practical. Mental indigestion and morbophobia may be more serious than german measles or infected tonsils and, therefore, such simple language as that used in the Sermon on the Mount is more fitting on the health rostrum than thundering eloquence or highly embellished illustration. Prince Edward Island has combined public health and education under one Ministry, and in so small a province

the fusion of the two is as logical as it is economical. Health bureaus over the continent keep a pretty constant stream of literature going. Radio health talks by men devoting their lives to this work, and the innumerable demonstrations promoted by various clubs and other organizations, must surely be playing an important part.

Much of the force of preventive medicine is expended in devising and enforcing methods of starving off disease micro-organisms. Feed them well, they prosper; and birth control does not enter the calculations of those tiny mischief makers. They multiply with a rapidity which would speedily settle the matter of filling the earth, were their fecundity ever to reach the paragon of animals himself. Their increase of appetite, as in Hamlet's taunt, "grows by what it feeds on." Consequently we have epidemics, and the world has often stood aghast at the terrible havoc wrought. The influenza epidemic of 1918 is the nearest to our time, and it was a mild affair to some of the widespread scourges of communicable diseases recorded in history. We may still have epidemics, for there are a few diseases yet whose subtleties we do not fully understand, but we are gradually starving them down and weakening their virulence. And we are doing this by isolation and the use of vaccines and sera. A lot of the machinery of public health has to do with isolation; all our quarantine laws and regulations are directed to this end, and both our federal and provincial health departments are exercised to the full to make this effort a vitally national one. The disease is tied up at our ports of entrance; wherever it appears, a cordon is thrown about it in the way of a rigid quarantine and its activities, thus baulked and limited, become feeble and are finally under control. Organization working in every detail means as much in such a crisis as that which makes available the physical resources of a country to repel the invading enemy.

The present war on tuberculosis has nothing more effective than isolation. We have no drug remedy, and vaccines and sera up to the present have been practically negative. As far as cure goes, there is little more to rely on than nature's resources of fresh air, sunlight and good food, and of course, the regulation of the patient's life by competent nursing and medical supervision. Surgery helps in certain cases. We can cure some patients and improve a great many, and this is all worth while; but if it were all our public health efforts could accomplish, we should be only marking time, picking up the wrecks and endeavouring to repair them, while the vicious agents which caused them went rampant through the land increasing their fury and adding to the toll of victims. But we can do more.

Treating and curing the infected person is good, but preventing him from transferring the contagion to others in the home or in the community is better. Many cases cannot be cured, but they can all be isolated and controlled so that the insidious germ may find no new soil for further growth. It must therefore be starved out by cutting it off from its fresh supplies, and herein lies the biggest job of our public health organizations. Co-operation of the public is essential here, with all that lie behind it in the way of education, good sanitation and intelligent zeal. Governments supply certain essential machinery when they build and equip sanatoria and tuberculosis annexes, but despite these provisions many patients must be cared for in their homes, and the services of trained medical clinicians and nurses are a necessary part of the organization.

IV

Of the utmost importance in the provincial organization is the local general hospital. They have sprung up all over the Dominion, and we have in Nova Scotia, apart from the three distinctly Government hospitals, some twenty-three of them. They are the response of the public to the conviction that sick people are likely to be more comfortable and have a better chance of getting well when placed in environment specially designed for the purpose and under the care of persons whose training and wisdom fit them for the work. Many of these hospitals came into being as the result of much effort, and even sacrifice, and they may thus be said to represent the very best type of Christian and humanitarian sentiment in their constituencies. They rank among the most encouraging signs of our times, standing as they do for a consciousness awakened to the call of advancing science as applied to disease, and a deep seated impulse to help those who are unable to help themselves. These hospitals have done well so far, but they are capable of further development. The hospital should become the health centre for the community it represents. Its graduates are peculiarly fitted to meet all the requirements of nursing service in the district. Free clinics, including dentistry, should have their base of operations just here. No ailment need be lost sight of in the scope of the community hospital.

One's judgment is that, potentially at least, they are the most important health units in the province. They have not all as yet developed a provincial or national consciousness which would link them together in a great chain of units devoted as much to prevention as to the cure of disease. There is little doubt that this

is coming. Already some of the hospitals are giving practical evidence of an awakening in the building and equipping of accommodation to take care of their own tuberculous patients. The idea once grasped by the local general hospital, that it is a real vital part of the whole system of public health, will give it a deeper inspiration and a wider vision of usefulness, without disturbing in the least its present measure of service. Its claim on Government funds, too, would be greatly strengthened. Such an awakening is indeed a "consummation devoutly to be wished," particularly in Nova Scotia, where our limited revenue will stand only a certain strain, and where, therefore, the avoidance of overlapping and the adoption of the wisest co-operation of all public health resources, voluntary and governmental, are essential to any worthy measure of success.

Both federal and provincial Governments are entrusted with the administration of public health. The Department of Pensions and National Health at Ottawa has broadly to do with such health matters as touch the Dominion as a whole. Hence national quarantine regulations, national research laboratories, and the like are the distinct function of the federal department. The regulations and enforcement of international health laws and the inspection and care of immigrants are also a part of the department's function. But the most intensive health work, as in education, comes under the provincial Governments. The official machinery seems to be reasonably ample in the provinces. Keeping them all working to the best advantage is a bigger problem perhaps than the creation of new units. From the Minister of Health to the Municipal Health Officer in the towns and country there is a sequence of interest and duties that never allows them to get far apart. The Government and municipal health officers, including the public health nurses and municipal boards, are the advance corps. They must keep well to the front, in actual touch with realities, and see that the health laws are being observed. The Minister's department has the responsibility of endeavouring to co-ordinate the various health activities in the province. The Government and local hospitals are his concern, as well as inspecting and reporting on the sanitary conditions of the jails and prisons. The whole system is well designed to reach to the haunts of disease and its causes, and perhaps is as good as can be devised.

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From even such swallow-flight observations, back through the years, it is easy to see how well equipped our generation is over all

its predecessors for carrying on the only war civilization should permit, namely, the war on disease. Wisdom may still lag behind knowledge, as the increasing incidence of venereal diseases in our time seems to suggest. But sooner or later, they will go hand in hand and the world will be the gainer. There is more beauty in the victories of peace than in those of violence. There are better ways of utilizing the glorious things of science than choking human beings with poison gas and blowing their bodies at the moon with high explosives. Surely the "common sense of most" must ultimately prevail. If we must fight, let us set our faces against the three arch-enemies, disease, poverty and squalor; against those conditions in our social and economic life which breed misery and discontent, and against the things which beset and hamper the full mental and physical development of the baby born to the poorest and most obscure parents in the land. His arrival in this world involves the obligation of nature and society to see that he has a fair chance. We were never so well equipped as now to make our pilgrimage a brighter and better matter. Governments have grave responsibilities in this great endeavour, but their currents flow from the people, and the stream rises no higher than its source.