

## PHYSIOLOGY,

### In its More Public Relations.

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The January number of the *Sanitarian* contains an important article by Dr. Allen of this city. This magazine—published monthly in New York—is the principal organ of sanitary science in this country and has a large circulation. The topics discussed in this essay contain facts and suggestions of a very practical nature. It seems, by the account here given, that a great saving of health and life is made in Great Britain by means of sanitary agencies.

It is a pity that the benefits of this science can not be made more available in our country and especially in our own city. It is a fact well established, that Lowell in point of health ranks among the lowest cities in the state; but, if its rate of mortality could be reduced to that of Lawrence, or Haverhill, or Lynn, more than one hundred lives might be saved every year—to say nothing about the improvement in health of the rest of the population. There is surely a great responsibility in this matter resting upon somebody.

As boards of health in cities constitute the principal agency for promoting sanitary science, the law provides wisely for their appointment. Instead of being chosen by ballot, as most city-officers are, the law directs that the mayor nominate the members of this board, presuming that where the health and the lives of the people are so largely involved, he would appoint the most competent men to be found, regardless of personal favoritism or party-policy. The health and lives of people are too valuable to be bartered away for such considerations. But this reasonable theory of the law is too often disregarded.

The discussion in this article upon "the family-institution" and "true civilization," present these topics in a new light. If the views here taken are correct, too much importance can not be attached to their bearings upon the family, as well as the highest welfare of mankind in general.—From the *Lowell (Mass.) Vox Populi*, April 4, 1885.

The study and application of physiology in its relations to public health and human welfare are of modern origin. It is only about half a century since inquiries in this direction attracted much of attention, and within twenty or thirty years most surprising advances have been made in this field. As far as practical applications on a large scale are concerned, physiology is yet in its infancy. A distinguished teacher of the science, after enumerating what it has done, declares that "richer harvests await its votaries," and that "it is destined to attain proportions much more gigantic than it now presents." This language to some may seem too strong, but we believe its truth will, in process of time, be abundantly verified.

We believe it may be safely asserted, that by no other science or branch of knowledge can so much good be accomplished for mankind as by the principles of physiology. They may be made to apply to every human being now living, or who shall hereafter exist. Further, we would add, after more than forty years of careful study and observation, we believe there are laws here involved which, when developed and applied, will surpass, in extent of influence and amount of usefulness, any discovery or invention which has ever been brought to public notice. And in no other field of research are the attractions, in our opinion, so inviting, or where the results would be followed by richer rewards. It is the duty and privilege of the medical profession to enter into and cultivate this field, "which is already white for the harvest."

The field is so large, and these relations are so complicated one with another, that we propose to confine our remarks to four distinct heads, viz.: 1. *Public Health*. 2. *Physical Culture*. 3. *The Family Institution*. 4. *True Civilization*. All that we can do in the present paper is simply to glance at these topics, or make a few suggestions from different points of view. A volume upon each head would be very far from exhausting the subject.

1. *Public Health*—It is not fifty years since the first systematic and vigorous efforts were made for the promotion of public health. They started in Great Britain, connected with the establishment of the Registrar-General's office, from which annual reports of births, marriages and deaths were issued. These reports furnished the material for a better classification of diseases, and made known the rates of mortality in different places. This led to a more thorough inquiry as to the causes of disease, and what made the difference in the death-rate between one locality and another. As one of the results, the fact was very soon established, that there were a large class of diseases which, in a great measure, could, by proper means, be prevented.

It was found that this class—called the zymotic diseases—occasioned about one-fifth of the mortality. It was also found from an imperfect application of sanitary science in certain places, that more than half of this mortality was prevented. We learn from Mr. Edwin Chadwick, the highest living authority on "vital statistics," these facts: From 1840 to 1870 the death-rate of England and Wales remained almost stationary, but from 1871 to 1880 it fell off four and one-half per cent. during these ten years, and there were no causes to account for it, except the application of sanitary-science. He estimated that 250,000 persons during these ten years were saved from death, who otherwise would have died, had the death-rate of previous years been continued. If twelve cases of serious but non-fatal illness be reckoned for every death, it fol-

lows that 3,000,000 persons have in the same time been rescued from a sick-bed. While the amount of suffering, care and anxiety can not be expressed in language, the material value saved from the expenses of sickness and funerals, as well as from lost time and labor, would amount to many millions of pounds. The benefits of sanitary-science are strikingly illustrated in localities where its principles have been faithfully applied. In towns and cities in which the death-rate had been for a long time 25 to 27 in a thousand, it has been reduced to 17, 18 and 19, in a thousand. One fact is well established, that by a faithful application of sanitary-agencies, sickness and mortality can be reduced from one-fourth to one-third. But this great saving of health and life has not been accomplished without immense work. The medical profession has taken the lead in it. Parliament has always encouraged it by numerous acts and liberal appropriations. In fact, this great reform has become a part of government-machinery. Many years since, the whole kingdom was divided into some fifteen hundred sanitary-districts, and an inspector appointed to each, who is obliged to make the government an annual report. The press and public opinion have been strongly committed in favor of this reform. Books, journals and newspapers are filled with instructive reading on the subject. No one questions its vast importance.

Why should there be so much greater interest and improvement in sanitary-matters in Great Britain than in the United States? Judging from its past history and present state here, it will take fifteen or twenty years to reach in the United States the same advanced state of the science that is now found in England. It may be said that a monarchical government has advantages over a republican in appointing and retaining the most competent men in office, so that reform and improvements can be better and more permanently carried on. There might be some truth in this if our national, state and municipal authorities were waked up enough to provide for and make such appointments.

As a matter of fact there is a most surprising apathy or want of appreciation of the blessings of health and value of life, on the part of nearly all persons holding governmental positions in this country. In some discussions on this subject in our national congress, within a few years, we have had strong demonstrations of this fact. The same thing has been exhibited in almost every state, in the indifference or opposition to the formation of boards of health.

It is true we have a National Health association, and a large number of state and municipal boards of health, but the work is carried on mainly by a few individuals, and most of it is volunteer work, performed at the expense of individuals. The appropriations on the part of states and cities for health-purposes are meagre, especially when compared with the great interests involved. If a careful inquiry was made as to how many laymen holding official positions or occupying prominent places in society were intelligently interested in this reform, the number would not be very large. Let the inquiry also be made as to what proportion of the medical profession were personally and heartily engaged in this reform, and we believe the proportion would be found small. It is true that in some localities great improvements have been made in sanitary-matters, but the work has been performed by a few individuals. If the great body of the profession were heartily interested in sanitary-science, and were ready to advocate the reform at all times and under all circumstances, the community would become better enlightened upon the subject. This reform would soon find favor in government boards and legislative bodies, and liberal appropriations would be made to carry on the work.

One of the tests of the interest in, or appreciation of a work, is the amount of sacrifice or contribution which is made in its behalf. Now, is it not a fact, that nearly all government-authorities, having the vital welfare of the people committed to their charge, treat the subject of health almost with indifference, or appropriate as little money as possible to advance its interests? On the other hand, how few physicians stand ready to make sacrifices in this cause! It should be borne in mind, that it is a double sacrifice on their part—it takes away their business. The primary object of the medical profession has always been to cure disease, but not to prevent it. To do this requires a high plane of motive and action—higher than it can reasonably be expected a majority of the profession will adopt. The success of this reform depends upon the joint action of the medical profession and the community at large. No question has ever come before the public so important in all its bearings, involving to a large extent the health and lives of the people, as this question of sanitary-science.

2. *Physical Culture*.—This, in one sense, is sanitary-science applied directly and specifically for improving the different parts of the body. This is composed of tissues, which by the law of exercise and nutrition can be materially changed, especially in early life. No human being was ever born into the world with a perfect body. Generally there are some parts too weak and others too strong, or, in other words, there is a want of harmony and balance.

There is such a thing as a normal standard of physiology throughout every organ in the body, but this perfect standard is never found, only approximates toward it, and the nearer it is approached the more valuable the organism. There is no question but one form or kind of organization is better than another; and if so, there is a form or standard better than all others. What is that form or standard, then, so desirable? We maintain that it is this normal standard, where all the organs are perfect in structure, and each performs its own legitimate functions. In all our discussions on this subject, it is highly important that this normal

standard should be kept constantly before the mind.

In the making up of all parts of the body, there is a point of very great importance which is not taken into account as it ought to be—that is, *harmony or balance*. If all the organs are evenly balanced, and each performs its own functions without disturbing the others, it will be seen at once that such an individual will have better health, greater power of endurance, and longer life will follow. In some respects the human body may be compared to a complicated machine, made up of many parts. Now, the more thoroughly constructed is such a machine, and the greater the harmony in all its operations, where the "wear and tear" will come properly upon all the parts, the less likely will that machine be to get out of order or need repairs, and it will be easily kept in good working order. It is so with the human body. Keeping in mind what constitutes a normal standard of physiology, and the importance of harmony or balance in organization, the weak or defective parts in every individual's constitution can be found out. Thus, by means of this knowledge, the weak parts can be strengthened so as to improve health and prolong life.

As the most favorable time for improving physical organization is in early life, it is important to direct attention to that period. With the increase of wealth and the powerful influence of fashion, together with the pressing claims of education, there is great danger that the vital interests of the body will be sacrificed. In this state of things it becomes the duty of physicians to point out the danger and urge more than ever the necessity of physical culture.

Throughout our whole educational system; as now conducted, from the primary school to the university, the leading tendency is to develop the brain and nerve-tissue at the expense of the muscles and other parts of the body. The fact that all mental acquisitions are very dependent upon strength and health, the physical system is too much overlooked. Another fact should be better understood—that no one thing contributes so much to success in any kind of business, or in professional pursuits, as a sound, healthy body. All experience of the past and knowledge of the present state of society confirms the truths of these statements. Notwithstanding this, most educators, in their zeal for mental acquisitions, pay little or no attention to physical development.

In a school-system where children, from five to fifteen years of age, are confined to study most of the time, great pains should be taken that the body is not injured, nor in any way stunted, but that every possible facility be afforded for its healthy growth and development. This caution is more necessary in cities, where the leading tendencies among the young are to a state of physical degeneracy.

In New England, all grades of schools are established more extensively than in states at the West or the South. In a few of these schools provision is made for regular and systematic exercises by gymnastics or some other means. Whenever this practice has been continued for any length of time, a decided improvement has been found in the physical health and scholarship of the pupils. But only a few school-boards or teachers have availed themselves of this sanitary provision.

Within a few years there has been a great increase of interest in physical culture in some of the colleges, and also in athletic sports outside of institutions. In two of them—Amherst College and Harvard University—the changes have been so great that they demand special notice.

It is almost twenty-five years since Amherst College introduced a regular system of gymnastics, compelling all the students in classes to practise these exercises half an hour or more every day. A thoroughly educated physician—Dr. Edward Hitchcock—was placed in charge of this department, who gives also lectures upon physiology and hygiene. These physical exercises are considered as important as lessons in the classics or mathematics, and improvement and deportment here are reckoned in the rank and merit-roll of every student. Since the introduction of these exercises there has been a marked change in the health and the physique of the students. President Seelye recently stated that the health and constitution of students improved every year—that there was less sickness and leaving of college on account of illness than formerly, and, what affords still stronger evidence, the Sophomores have better health than the Freshmen, the Juniors better than the Sophomores, and the Seniors better than the Juniors.

From careful measurements of every part of the body taken of students upon entering college, and again, after four years, upon their leaving, decided changes are found to have taken place for the better in the growth and development of the body.

The physical training at Harvard is different from that at Amherst. It is not compulsory, but voluntary; it is not carried on by classes, nor at set hours. While a large number of students exercise in the gymnasium, they do it at their own convenience, and engage in such exercises as they think will do them the most good. A highly educated physician, Dr. D. A. Sargent, has charge of the gymnasium, and makes a specialty of advising what particular kind of exercise is best adapted to improve the health and strength of individual cases. Thus, if among the students entering the University some are found suffering from certain physical weakness or defects, they are placed under his training, and in process of time are greatly benefited. Within a few years there has been a great increase of interest as well as improvement at Harvard in sanitary matters, to which the new gymnasium and its superintendent have very much contributed. In a recent address before the alumni, President Eliot stated that the more he saw of the men graduating from the University, who had gained distinction in life, or eminence

in the learned professions, the more he was convinced that the basis of their success depended much upon the vigor of the body and a sound constitution.

3. *The Family Institution*.—The relations of physiology to the family are fundamental and of the very highest importance. Unfortunately the subject has generally been discussed with reference to one single point, the *sex relation*, and that mainly upon too low a plane. Though this relation stands out prominent and foremost, there are others incidental and more remotely connected with it of vast importance. The very foundation, the primary object of the family—the propagation of the race—constitutes a part and parcel of physiology.

The principles of this science, we believe, ought to be brought to bear more than they ever have been, in the guidance and management of this institution. It has been stated, that this science is in its infancy as far as some practical relations are concerned. At the late meeting of the British Medical association, Dr. P. Redfern, Professor of Physiology in Queen's College, Belfast, in a lecture, after noticing the discoveries and great progress made in this science within fifty years, says, "All we now know may appear very insignificant in the estimation of our successors of the next generation." May it not be that there are here some new discoveries or applications of this science to be made to the family, which will have a powerful influence upon the character and permanence of the institution? May there not be certain physiological laws, virtually new discoveries, which will place the family relations in a new light, and which should surely be understood? We venture to make some suggestions on the subject, which would indicate that there were here laws of the greatest magnitude.

It is almost one hundred years since Malthus discovered what he supposed certain principles that regulated population, or human increase. His theory was based upon objects or causes external to the body, as though physiology had little or nothing to do with it. Malthus' views had great influence for half a century or more, but for many years they had been discarded by medical and other writers of the highest authority. There must be in the nature of things a great general law of propagation, and that, too, must have its basis in physiology. May it not consist in the perfection of structure and function, or in the normal standard which anatomy and physiology have established?

Though this perfect standard is not found in nature—only approximations to it—still it may constitute the true law of propagation, and it may be followed with all manner of deviations. Here comes in another subject of great importance, viz.: heredity or inheritance. Facts innumerable of every description and character have been collected, which demonstrate a most intimate relation between the parent and child, between one generation and another, but these facts can never be classified, or satisfactorily explained, without some general law of propagation. Neither can they be utilized to much advantage.

These two fundamental principles, though one is a sequence of the other, are really the most important laws in the universe. It could not have been the intention of the Almighty that His creatures should always remain ignorant of these laws. While man was created a free agent and placed in a probationary state, he should certainly understand the laws that govern his own being and destiny. It will be seen at once that the two laws alluded to enter largely into the family, showing the relation which physiology sustains to this institution; but there is another view of great importance which we will present in a few words as possible.

The origin and foundation of the family have always been treated as based alone upon Scripture authority. Thus the commands and instructions pertaining to the family, as well as the blessings attending this relation, are all taken from the Scriptures. But we believe their counterparts are found in Nature, or in the physiology of man, and, when this science is fully and correctly understood, that the necessity of such an institution can be proved from this source independently of Revelation. As in natural history, in astronomy, in geology and other natural sciences, so in physiology, Nature and Revelation, when correctly interpreted, must agree.

What are the teachings of Revelation in regard to the objects of the family? What are the teachings of all Christian denominations, Protestant and Catholic? These may all be summed up under three heads: 1. The continuance of the race; 2. Preservation of chastity; and 3. Mutual help and company. It may be proved under the first head, we believe, that the race can not be continued in its best estate for generations, without the monogamic family, and that the three objects here named can be secured only by a strict observance of physiological laws.

The perpetuation and permanence of the family must depend very much upon the extent to which these several objects are secured. If there is a failure in any one of these, it weakens the family just so much.

Such is the status of the family at the present day, that it needs all the lights and supports which it can possibly obtain.

In some parts of the country the marriage-rate is steadily declining, and divorces are multiplying. There are other causes at work that threaten the stability and even existence of this institution. When the functions of all parts of the body, especially those of the brain, are better understood, it will be found, we believe, that there are certain relations strictly physiological, which have a far more powerful influence upon the domestic and family interests than have hitherto been considered.

Why should it not be so? The family is the most important institution in the world. The exact and complete relations of physiology to it have never, we believe, been truly discovered or applied. If there

is a great general law of propagation, and as a sequence a general law of inheritance when these laws are correctly understood, they will shed a flood of light upon the family. The field of inquiry is new, but this fact affords no reason or argument that it is not true. The discovery of new truths here is no stranger than many other discoveries that have been made. Here is a work for the medical-profession, the importance and magni ude of which can not be expressed in language. What work could exalt more the laborer, or yield a richer harvest in all coming time?

4. *True Civilization*.—The first impression might lead one to suppose, that such a subject as civilization would have little or no connection with the human system. But upon a careful investigation, it will be found that the vital forces and the laws that govern the body sustain most intimate relation to true civilization. The very term *civilise* means to reclaim man from a savage state, to teach him the arts and all kinds of useful knowledge, to refine his manners, improve his habits and secure for him the greatest possible amount of comfort and happiness.

Now, the most important agent and object in all these changes is man himself. His nature or the laws that govern every part of his body must be more or less affected by these changes. Whatever goes to make up civilization, or whatever changes are brought about by it, these should harmonize with the nature of man. There can be no permanent or true civilization, unless it is adapted to develop the whole nature of man. After a most careful analysis of all the elements of civilization—what it has been in the past, what it is at the present day, and what it should be—we shall find that its true foundation must be based upon the nature of man in developing his physical, mental, and moral nature, each in harmony with the other, and all to their highest extent. This grand idea or plan has, we believe, never been attempted, much less accomplished.

The Greeks and Romans made advances in this direction, in developing the body and cultivating the mind, but failed in the moral element. We have at the present day certain types of civilization, which would be considered by some superior to any in the past, and by others, not easy hereafter to be surpassed. But before we can determine what is true civilization or before there can be a general agreement upon it, we must have some standard by which it can be tested. This must be the highest possible development of man's whole nature, the animal and intellectual obeying the moral and religious. Then, true merit and real worth would receive its just reward.

Every organ in the body is governed by its own law, and all parts of the system sustain certain relations to other parts as well as to external objects. As the brain is the crowning organ in the body, it is of the highest importance that all its functions should be properly and harmoniously exercised, and that to the fullest extent of which they are capable in a normal state. Such a development would constitute a normal state of physiology, and the central point toward which all civilization should be directed.

Until some such state of society is brought about, there can be no true or permanent civilization. Its type must be artificial, and to a great extent unnatural and unhealthy. As long as it rests upon such supports, it must be unsatisfying and constantly changing. It partakes very much of this character at the present day. A distinguished writer, in characterizing it, maintains that wealth, fashion and show are its principal supports. This criticism might at first seem severe and unjust, but after all there is too much truth in it. One thing is certain—there is no general standard or agreement, and it would be difficult to decide in what direction progress is leading us.

The fact is, that in all the discussions on this subject, scarcely any reference is ever made to the body. The most voluminous writer on civilization, Guizot, speaks of the domestic affections, the intellectual powers, and the moral forces, but never discusses the relation which these classes sustain one to the other, or whether they have any connection with the body or the brain, or whether there can be any change in the physical system, or whether the organization of individuals or races makes any difference.

Almost the only writer who has attempted to apply physiological principles to illustrate changes in history and state of society, is the late Dr. John W. Draper of New York. His work, "History of the Intellectual Development of Europe," is not only a monument of thought and research, but an honor to the medical profession. Says Dr. Draper, "Social advancement is as completely under the control of natural law as is bodily growth. The life of an individual is the miniature of the life of a nation." What we want is a practical application of these two propositions to the present state of society.

But this paper, already extended beyond its original design, must be brought to a close. If the positions taken are correct, it will be seen that a most important field is here laid open to the profession for study and research. The field is large—it embraces the whole human family—and is ripe for the harvest. It appeals emphatically to the members of this profession, as the body is peculiarly entrusted to their care and treatment.

It may be thought by some that the suggestions in the latter part of this paper are visionary and unworthy of thoughtful consideration, but such will not be the verdict of posterity. In reviewing the history of physiology, who will assert that there can be no new discoveries in this science, or new application of its principles? What is the testimony of its teachers and professors—the highest living authority on the subject? Is it not that richer rewards await the votaries of this science—that the human family are to reap here golden harvests? History teaches that the great truths of Nature are slowly brought to light at different periods and by a variety of agencies.

