

a manual training school does not consist with success in academic studies; and that a dunce in mathematics and grammar must be good in the shop. The best all-round scholar is always a good workman; and the good all-round workman is always a good scholar. But not every boy is capable of high scholarship, and on the other hand, not every boy has capacity for mechanical skill. This, however, is true: every boy with a healthy normal brain has capacity for good scholarship and for good workmanship. There are dunces in all departments, but real dunces, like loafers and shirks, have a hard time in a manual training school, and their sojourn therein is not long. It takes brains to make and read a good figured drawing; and it takes a clear head and a high degree of intelligence to use and not abuse a Universal milling machine.

Doubtless there are other incorrect and inadequate conceptions of manual training which only an actual trial of it under good conditions can remedy. The manual features occupy less than one-third of the time devoted to study, recitation, and laboratory work. Science, mathematics, and language work still occupy the chief parts of the daily programme. The all-round effect of the combination is fine. Professor William James of Harvard University says: "The most colossal improvement which recent years have seen in secondary education lies in the introduction of manual training." And Dr. Stanley Hall says: "No kind of education so demonstrably develops brain as hand training."

THE IMPORTANCE OF ELEMENTARY INSTRUCTION IN PHYSIOLOGY.

BY

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THE chief ground upon which I venture to recommend that the teaching of elementary physiology should form an essential part of an organized course of instruction in matters pertaining to domestic economy, is, that a knowledge of even the elements of this subject supplies those conceptions of the constitution, and mode of action of the living body, and of the nature of health and disease, which prepare the mind to receive instruction from sanitary science.

It is, I think, eminently desirable that the hygienist and the physician should find something in the public mind to which they can appeal; some little stock of universally acknowledged truths, which may serve as a foundation for their warnings, and predispose towards an intelligent obedience to their recommendations.

Listening to ordinary talk about health, disease, and death, one is often led to entertain a doubt whether the speakers believe that the

course of natural causation runs as smoothly in the human body as elsewhere. Indications are too often obvious of a strong, though perhaps an unavowed and half unconscious, under-current of opinion that the phenomena of life are not only widely different, in their superficial characters and in their practical importance, from other natural events, but that they do not follow in that definite order which characterizes the succession of all other occurrences, and the statement of which we call a law of nature.

Hence, I think, arises the want of heartiness of belief in the value of knowledge respecting the laws of health and disease, and of the foresight and care to which knowledge is the essential preliminary, which is so often noticeable; and a corresponding laxity and carelessness in practice, the results of which are too frequently lamentable. . . .

I am not sure that the feeling, of which the doctrine to which I have referred is the full expression, does not lie at the bottom of the minds of a great many people who yet would vigorously object to give a verbal assent to the doctrine itself. However this may be, the main point is that sufficient knowledge has now been acquired of vital phenomena, to justify the assertion, that the notion, that there is anything exceptional about these phenomena, receives not a particle of support from any known fact. On the contrary, there is a vast and an increasing mass of evidence that birth and death, health and disease, are as much parts of the ordinary stream of events as the rising and setting of the sun, or the changes of the moon; and that the living body is a mechanism, the proper working of which we term health; its disturbance, disease; its stoppage, death. The activity of this mechanism is dependent upon many and complicated conditions, some of which are hopelessly beyond our control, while others are readily accessible, and are capable of being indefinitely modified by our own actions. The business of the hygienist and of the physician is to know the range of these modifiable conditions, and how to influence them towards the maintenance of health and the prolongation of life; the business of the general public is to give an intelligent assent, and a ready obedience, based upon that assent, to the rules laid down for their guidance by such experts. But an intelligent assent is an assent based upon knowledge, and the knowledge which is here in question means an acquaintance with the elements of physiology.

It is not difficult to acquire such knowledge. What is true, to a certain extent, of all physical sciences, is eminently characteristic of physiology—the difficulty of the subject begins beyond the stage of elementary knowledge, and increases with every stage of progress. While the most highly trained and the best furnished intellect may find all its resources insufficient, when it strives to reach the heights and penetrate into the depths of the problems of physiology, the elementary and fundamental truths can be made clear to a child.

No one can have any difficulty in comprehending the mechanism of circulation or respiration; or the general mode of operation of the organ of vision; though the unravelling of all the minutiae of these processes, may, for the present, baffle the conjoined attacks of the most accomplished physicists, chemists, and mathematicians. To know the anatomy of the human body, with even an approximation to thoroughness, is the work of a life; but as much as is needed for a sound comprehension of elementary physiological truths, may be learned in a week.

A knowledge of the elements of physiology is not only easy of acquirement, but it may be made a real and practical acquaintance with the facts, as far as it goes. The subject of study is always at hand, in one's self. The principal constituents of the skeleton, and the changes of form of contracting muscles, may be felt through one's own skin. The beating of one's heart, and its connection with the pulse, may be noted; the influence of the valves of one's own veins may be shown; the movements of respiration may be observed; while the wonderful phenomena of sensation afford an endless field for curious and interesting self-study. The prick of a needle will yield, in a drop of one's own blood, material for microscopic observation of phenomena which lie at the foundation of all biological conceptions; and a cold, with its concomitant coughing and sneezing, may prove the sweet uses of adversity by helping one to a clear conception of what is meant by "reflex action."

Of course, there is a limit to this physiological self-examination. But there is so close a solidarity between ourselves and our poor relations of the animal world, that our inaccessible inward parts may be supplemented by theirs. A comparative anatomist knows that a sheep's heart and lungs, or eye, must not be confounded with those of a man; but, so far as the comprehension of the elementary facts of the physiology of circulation, of respiration, and of vision goes, the one furnishes the needful anatomical data as well as the other.

Thus, it is quite possible to give instruction in elementary physiology in such a manner as, not only to confer knowledge, which, for the reason I have mentioned, is useful in itself; but to serve the purposes of training in accurate observation, and in the methods of reasoning of physical science. But that is an advantage which I mention only incidentally, as the present conference does not deal with education in the ordinary sense of the word.

It will not be suspected that I wish to make physiologists of all the world. It would be as reasonable to accuse an advocate of the "three R's" of a desire to make an orator, an author, and a mathematician of everybody. A stumbling reader, a pot-hook writer, and an arithmetician who has not got beyond the rule of three, is not a person of brilliant acquirements; but the difference between such a member of society and one who can neither read, write, nor cipher is

almost inexpressible; and no one nowadays doubts the value of instruction, even if it goes no further.

The saying that a little knowledge is a dangerous thing is, to my mind, a very dangerous adage. If knowledge is real and genuine, I do not believe that it is other than a very valuable possession, however infinitesimal its quantity may be. Indeed, if a little knowledge is dangerous, where is the man who has so much as to be out of danger?

If William Harvey's life-long labors had revealed to him a tenth part of that which may be made sound and real knowledge to our boys and girls, he would not only have been what he was, the greatest physiologist of his age, but he would have loomed upon the seventeenth century, as a sort of intellectual portent. Our "little knowledge" would have been to him a great, astounding, unlooked-for vision of scientific truth.

I really can see no harm which can come of giving our children a little knowledge of physiology. But then, as I have said, the instruction must be real, based upon observation, eked out by good explanatory diagrams and models, and conveyed by a teacher whose own knowledge has been acquired by a study of the facts; and not the mere catechismal parrot-work which too often usurps the place of elementary teaching.

PHYSICAL TRAINING AND ATHLETICS IN THE SCHOOLS.

BY

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NO indoor training is to assume to take the place of open-air play in the elementary schools. Calisthenics are unobjectionable, but with little people they are no substitute for natural play. Playgrounds may cost more, but they are worth more. No matter what they cost, it is the public business and function to provide them. Happy is the town which does it early, when it may do it well.

If the buildings are hygienically pure, if there is sufficient air space and sunlight, if the mechanical appliances and the possibility of their refusing to work are kept at a minimum, if the grounds are ample and dry, and if teachers are sane about the relations of work and of freedom in children, there need be no fear for physical training in the elementary schools.

This is not saying that special teachers, who will quickly see the special needs of multitudes of children in the city schools and who

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