

**MANUALS OF THE SCIENCE AND
ART OF EDUCATION,
ADVANCED SERIES- NO. IV: HOW
TO TEACH ANIMAL PHYSIOLOGY**

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VARIOUS

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ADVANCED SERIES—No. IV.

HOW TO TEACH ANIMAL PHYSIOLOGY



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The wide circulation of the National Society's Manuals on the 'Science and Art of Teaching,' has induced the Literature Committee to undertake another series of Manuals on more advanced subjects, which they trust will be useful not only to Teachers in Elementary Schools and Students in Training, for whom they are primarily intended, but also to Teachers in Secondary and Higher Grade Schools.

The Manuals of the present series—like those which have preceded it—have been written by men of distinguished reputation in their various subjects, and who have had large experience as teachers and examiners. They include all the subjects in Schedule 4 of the Education Code with the exception of Mathematics, which is fully treated in the 'Pupil Teachers' Course of Mathematics,' published by the Society. The Manual on Teaching Languages has been planned to comprehend the teaching of German and French as well as Latin. In addition to the subjects under Schedule 4, the present series includes a Manual on the Training of Pupil Teachers, by a very successful Lecturer on Method in one of the larger Training Colleges.

In order to obtain greater clearness and precision, each subject has been treated independently, and is complete in itself.

ANIMAL PHYSIOLOGY.

CHAPTER I.

CLAIM OF HUMAN PHYSIOLOGY TO ATTENTION.

1. Past neglect and present prejudice.—No one science is of more value to us as human beings, perhaps none is of so great value, as Physiology, when we consider of what that complicated sum-total which we call 'human happiness' consists. Yet no science has received less attention in the past, and against none is there so great prejudice in the present. These two facts, taken together, however, give little or no cause for regret. The past universal neglect sprang of ignorance of the subject, strengthened and maintained by that preference of the ornamental before the useful, so characteristic of mankind; whilst the present contention marks the second stage in the growth of all human knowledge, that of enquiry. We may, therefore, logically look forward in the future to a period when unanimity will once more be established, but the unanimity of regard, not of disregard.

The existing prejudice against Physiology lies, not in its truths, but in the way and spirit in which those truths have been propounded: in other words, the origin of the prejudice must be sought, not in the science, but in certain exponents of that science. The disappearance of this pre-

judice, therefore, is only a question of time, and he will do good service who shortens that period.

2. Its rational claim.—Nothing would seem more rational than that human beings should be prepared for 'the battle of life' by being carefully taught all that is certainly known of the nature and use of the weapons with which that fight must be fought. Indeed, if the question were to be settled by reason, and reason only, there could be no doubt of the decision. 'The proper study of mankind is man.'

Who would hope to become a mechanic without serving an apprenticeship, during which he would acquire such special knowledge of the materials with which he worked, and of their properties, as would enable him to turn them to profitable use? Yet human beings are supposed to be fitted for life by an education that finds in it no place for Physiology! Our youths are expected to become acquainted with, at least, the outlines of the geography of their native land, and some knowledge too of their race is expected:—room can be, and is, found for geography and history, but none for Animal Physiology! To know anything of the landmarks of one's own system, or how the simplest and most necessary function of the body is discharged, or the history of any secretion, however frequent and important its use, is deemed quite unnecessary by the great mass of both parents and teachers.

An engineer must know something of a steam-engine, and of the physical laws in virtue of which it does its work, yet men and women are supposed to be able to educate children without knowing anything of the structure of those children, of the laws of human life, of the order in which human powers are developed, or of the nature and uses of those powers.

Now, although *habit* and *fashion* are stubborn opponents, yet this state of things brings such abundant disastrous consequences, and is so irrational, that it cannot continue. Ere

long it must certainly be demanded of all who claim the title 'TEACHER,' that they shall know something of the human subject whose development they are to aid, and whose future welfare, both in this world and the next, depends to so large an extent upon the treatment received at their hands.

3. Consequences of neglect of Physiology.—

Let us glance at some of these disastrous results. We shall find them everywhere ; in our homes and in our schools ; affecting teachers and parents, as well as children.

We value wealth ; we value power ; we act as though we did not value life and health. We take great pains to secure the former, the latter are disregarded. Yet what would one give for health when gone, and how little, given at the right time, would save it ! Often the most trifling physiological knowledge would have saved health irreparably ruined, and have handed on to children unimpaired constitutions.

Our children are not cared for nearly so well as many other of our worldly possessions. This is mainly because we make no more effort to understand child-life than we do to understand our own.

(a) *Intellectual*.—A little thought will show that the laws of life must underlie all bodily and mental processes, and a knowledge of them must therefore be of the highest importance. In spite of this the school-life of a child has been almost wholly artificial, being hedged about in all directions by fences and notice-boards giving warning that 'trespassers will be prosecuted.' These barriers and prohibitions were frequently placed directly across natural paths, for example, across that *childish inquisitiveness and restless activity*, which by those 'gateways of the mind,' the senses, open so soon communication with the external world.

During the last few years many of these fences have been rooted up and notice-boards removed, and so school

life has become much more natural and, therefore, more healthy and moral than it was ; but before all these artificial restraints can disappear the laws of physiology and of psychology must be more perfectly known and acknowledged than at present, both by parents and teachers. School life must be an unbroken and unchecked continuation of those first and wonderfully successful five or six years of child life that give a language and no mean acquaintance with natural objects and natural phenomena.

Ignorance of the laws of life leads us to thwart much natural child effort after knowledge, often at the cost of a large expenditure of effort on our part. So there is a double loss of energy, a loss both on the side of the child and on that of parent or teacher.

(b) *Physical*.—And not only in this direction is evil being wrought, but physical ill-consequences are woefully abundant. The seeds of future life-long weakness or disease have frequently been sown in a dirty, ill-ventilated, imperfectly warmed, badly lighted, inconveniently seated, and wholly unadorned schoolroom ; or have originated in studies too prolonged, too little broken or relieved, or undertaken too soon after a heavy meal, at a wrong age, or under wrong conditions ; or have proceeded from improper methods of work, or still more improper modes of punishment. Herbert Spencer¹ says :—

‘If any one doubts the importance of an acquaintance with the principles of physiology as a means to complete living, let him look around and see how many men and women he can find in middle or later life who are thoroughly well. Only occasionally do we meet with an example of vigorous health continued to old age ; hourly do we meet with examples of acute dis-

¹ *Education: Intellectual, Moral, and Physical*. By Herbert Spencer.

order, chronic ailment, general debility, premature decrepitude. Scarcely is there one to whom you put the question who has not in the course of his life brought upon himself illnesses which a little information would have saved him from. Here is a case of heart disease consequent on a rheumatic fever that followed reckless exposure. There is a case of eyes spoiled for life by over study. Yesterday the account was of one whose long-enduring lameness was brought on by continuing, spite of the pain, to use a knee after it had been slightly injured. And to-day we are told of another who has had to lie by for years because he did not know that the palpitation he suffered under resulted from over-taxed brain. Now we hear of an irremediable injury which followed some silly feat of strength; and, again, of a constitution that has never recovered from the effects of excessive work needlessly undertaken. While on every side we see the perpetual minor ailments which accompany feebleness.'

(c) *Moral*.—Moral ill-consequences are equally numerous in any system of education that does, or attempts, violence to the laws of life. Those artificial fences could not stop all; some, and those of the best, would be irresistibly compelled to get *over* or *under* them, and with what damage to their morals is easily conceived. In fact, the moral results, under such circumstances, must necessarily parallel the physical.

The extent of all these evils, physical, intellectual, and moral, can scarcely be exaggerated. Physiology supplies the remedy so urgently needed.

4. Partial acknowledgment of claim.—Happily schools and school life have, of late years, lost much of their