

The book is a useful addition to the library of the laboratory, the water analyst and the amateur microscopist. CHARLES A. KOFOID

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Habit-Formation and the Science of Education. By STUART H. ROWE, Head of the Department of Psychology and Principles of Education in the Brooklyn Training School for Teachers, and Lecturer on Educational Psychology in Adelphi College, Brooklyn, New York. Pp. xvii + 300. New York, Longmans, Green & Co. 1909.

Educational doctrines, so far as they find expression in school practise, have been unseemly erratic. This is due to the fact that the scientific method has never been employed in solving school problems. Education is still an art, managed pretty successfully by those whose instincts are adapted to it, but wretchedly bungled by all others. The schools, like other social institutions, have followed the line of least resistance. During the colonial period, when the body of knowledge was comparatively small, when books were few, and society less complex, children were thoroughly drilled in the few subjects which they studied. With the rapid growth in knowledge and in the industries, during the latter part of the nineteenth century, new demands were made upon the schools. The three R's no longer met the social needs, and, with the enlargement of the curriculum, the drill master disappeared. The unscientific feature in this change is the entire absence of accurate analysis of the problem. A method that has been followed is not necessarily bad because of its age, nor is the new, because of its youth, good. It is this uncritical, mad dash from one method to another, during a time of prevailing scientific investigation, that has brought education into disrepute. Any book, therefore, that critically examines one of the educational problems, is a contribution to education. And this is what Rowe's "Habit-Formation" does. The teacher, Rowe maintains, interferes too much in the learning process of her pupils. She neglects "all the automatic (both natural and acquired) ways of learning which the child has, and insists

that he work out everything systematically and under guidance." This is not only a useless waste of teaching energy, but, in addition, it disturbs the course of development. Every child has his own way of responding to his environment, because of his organic structure, and forced departure from this individual mode of reacting must be decided upon only after the most careful examination of the situation. Motor, visual and auditory minded children illustrate the need of care. Rowe discusses the manner in which experience is organized, and emphasizes the distinction between habits and ideas. "Determine whether the habit is an automatism which will be hit upon by the child as a result of his own initiative and experimental efforts, or implies a definite idea which must first appear in consciousness before it can be transformed into a fixed automatic process." In other words, the teacher is to adapt herself to the situation. She is to "analyze the subject-matter and determine what elements in it are to become habitual." The way in which habits are established, the manner of securing practise, and the method of evoking initiative, are treated in separate chapters. Initiative is to be developed through appeals to the instinctive activities, the emotions, and to specialized motives. Appeals to the child's reason are appeals *through* reason to his instincts, emotions or motives. Practise is to be secured by making "all the conditions such that the reaction will take place as naturally as possible." Teachers have been too willing to work against the resistance of the instincts and emotions. This is because, at the outset, it is the line of least resistance, and failure to analyze the situation causes them to overlook the fact that later it becomes the line of greatest resistance. One of the purposes of education is to establish mental attitudes toward the various subjects of study and toward work in general, and Rowe deals at length with the various kinds of drill in relation to this purpose. The difficulty with the book for teachers who are unskilled in psychology is that it lacks concreteness. Illustrative examples are not as numerous as they should be, but this is a less serious objection

than it would have been a few years ago, and altogether the book is a valuable contribution to the science of education. A useful bibliography is appended.

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NOTES ON THE TEACHING OF ZOOLOGY
AND PLANS FOR ITS IMPROVEMENT

Few Elect Zoology.—Although for some time the writer has been under the impression that a good many more students elect botany than zoology, both in the high schools and academies and in the college; yet in glancing over our (Kansas) "High School Manual" I was somewhat surprised to find that almost *eight* times as many high school pupils were last year enrolled in botany as in zoology—to be exact, 2,669 in botany and 346 in zoology. Another table in this manual reveals the fact that while 177 of the accredited high schools claim to be equipped for botany, but 33 claim any equipment for zoology, and the latter is usually estimated at a lesser value. I can quote figures from one other state only. In Minnesota,¹ starting with a ratio of 4 to 1 in 1894, zoology has steadily gained till last year it stood 9 to 7 in favor of botany. The fact that neither St. Louis, Mo., nor Tacoma, Wash., offers any zoology in its high schools leads me to suspect that similar disproportion exists in other states, at least in the middle and far west.

We teachers of zoology can not avoid asking, Why is this so? It is surely not because animals with their free movements and their intelligence are less interesting than plants. Where is the child or grown-up (aside from the specialist) who will not leave the prettiest bed of flowers to watch the cage of playful monkeys? The moving object, particularly the automatically moving one, attracts all of us. Nor can it be that the school authorities regard zoology as less practical than botany. To know the ravaging insect is just as important as to recognize the medicinal plant. To name the

brilliant song bird properly is just as desirable as to classify the fragrant flower.

According to my thinking, at least three causes can be cited which operate to bring about such a disproportion between the subjects.

The first one is the lack of properly prepared teachers. Few of the instructors in the high schools are prepared to teach either of the two sciences. When called upon to teach one, a majority will choose botany instead of zoology. They probably had a course in elementary botany and not in zoology. Besides, plants are simpler and they feel that they can manage a course concerning them better than the more complex and larger group of animals.

A second and probably a more potent cause is the fact that many of our children are taught by their parents from early childhood to avoid and fear the animals—the creepy worms, the biting spiders and the dreadful mice. In "nature study" in the grade schools (taught by women) this view of the animals is farther inculcated. As a result, when the young people get into the high school and are to select a biological science they naturally choose botany.

The third cause is a greater one, at least a more real one. It is the difficulty of securing plenty of good material for the course in zoology. While the botanist has all his important phyla represented in almost any inland region, the zoologist has three important phyla practically limited to salt water. This necessitates the securing of a good deal of material from the seashore. And of the material that is in the vicinity it is so much easier for the botanist to secure what he wants—to pick the flower on the bank of the brook than to catch the cray-fish in the dirty water. The flower will surely be found on the first "tramp," provided it is made at the right time and to the right place. To secure the cray-fish, in addition to choosing the right season and the proper locality, the necessary seine or other paraphernalia to catch the desired specimen must be taken along. Sometimes it means the employment of help to handle the apparatus. To secure some species requires a different set of tools, and they are even harder to get than

¹ *Bulletin of the University of Kansas*, 1908.

² Fifteenth Annual Report of the Inspector of the State High Schools. State of Minnesota, 1908.