ten months after the cyanide had been put into it. FERNANDO SANFORD

QUOTATIONS

THE ORGANIZATION OF SCIENCE

JUST before the beginning of the war much fruitful discussion was going on in the columns of *Nature*, the *Morning Post* and *Science Progress* on the subject of the encouragement of science; and those who are interested in the theme should read Dr. R. S. Woodward's address on the needs of research, delivered on the occasion of the dedication of the Marine Biological Laboratory, Woods Hole, Massachusetts (SCIENCE, August 14, 1914).

Dr. Woodward begins by exposing some of the popular fallacies regarding research—that it "is akin to necromancy"; and that "the more remarkable results of research are produced not by the better balanced minds, but by aberrant types of mind popularly designated by that word of ghostly, if not ghastly, implications, namely 'genius.'" He has also exposed the absurdity that research institutions should busy themselves in soliciting suggestions from the amateur public outside, that is "in casting drag-nets in the wide world of thought, or in dredging, as biologists would say, with the expectation that out of the vast slimy miscellanies thus collected there will be found by the aid of a corps of patient examiners some precious sediments of truth." He thinks that "important advances in knowledge are far more likely to issue from the expert than from the inexpert in research."

Dr. Woodward traverses the idea "that research is a harmless and a fruitless diversion in the business of education"; and gives some figures as to the comparative expenditure of the United States on education and research respectively.

> The number of higher, or degree-giving, establishments in the United States is now upwards of six hundred; the aggregate annual income of these is upwards of one hundred millions of dollars; and the number of officials connected with them is upwards of thirty thousand. On the other hand, the number of independent research organizations in the United States is less than half a dozen; their aggregate annual income is less than two million dollars; and the number of officials primarily connected with them is less than five hundred.

Something very like this holds also in Britain, and indeed throughout the world. Men can not be made to understand, even with the astonishing results which investigation has placed before us, the supreme importance of such effort. They still conceive that it is more important to teach boys how to do things than actually to get the things done.

The war now raging will at least demonstrate one thing to humanity—that in war, at least, the scientific attitude, the careful investigation of details, the preliminary preparation, and the well-thought-out procedure bring success, where the absence of these leads only to disaster. So also in everything. After all, the necessity for research is the most evident of all propositions. But the question (which I hope will receive still more careful attention when the war is over) is, What can the state do to make the machinery of investigation the most efficient possible? The mere citing of popular misconceptions is not enough; we need to have specific programs. The October number of *Science Progress* contains one such program, which I hope will receive the attention of men of science. Whether all the items are accepted or not remains to be seen; but until the discussion is earnestly undertaken, we can scarcely hope that the state will give more help than it has done hitherto. Dr. Woodward puts his finger upon a weak point in men of science as a body. "We are," he says, "as a class of too recent monastic descent to fit comfortably in our present social environment." That is just it. We are not strong enough in making our demands heard; and, in my opinion, this is not a virtue, but a neglect of duty.—Sir Ronald Ross in *Nature*.

SCIENTIFIC BOOKS

Fauna Ibérica. Mamíferos. By ANGEL CABRERA. Published by the Museo Nacional de Ciencias Naturales, Madrid, September 25, 1914. 8vo. Pp. xviii + 446; 143 figures in the text and 22 colored plates.

This work is the first thoroughly accurate and complete catalogue of the mammals of the Iberian peninsula and the Balearic Islands which has been published. It properly includes the marine mammalia of the surrounding seas, which, as the author justly remarks, "are as much entitled to be regarded as forming a part of the mammalian fauna of the region as the marine birds and birds of passage are entitled to be reckoned as belonging to its avifauna."

The author also includes under the Primates an account of the ape of Gibraltar, *Macaca sylvanus* (Linné), stating with excellent logic, that, whether these animals were originally introduced from Africa, as contended by some, or whether existing as survivors of their race, which once was widely spread over Europe, as is testified by paleontological evidence, they have been from time immemorial domiciled upon the Rock of Gibraltar, and are therefore truly a part of the peninsular fauna.

The appearance of Mr. Gerrit S. Miller's "Catalogue of the Mammals of Western Europe," recently published by the trustees of the British Museum, occurred when the work we are reviewing was about half-written, but as Miller's book is in English, and only gives the terrestrial species found in Spain, in many cases simply citing them as occurring on the peninsula, the writer has not felt himself deterred by the more extensive Catalogue of his learned American friend from issuing the present work.

Investigation of the pages of this book shows that there are one hundred and twenty-two species or subspecies of mammalia, which occur in the feral state on the peninsula. They are distributed as follows:

Orders	Genera	Species and Subspecies
Insectivora	7	17
Chiroptera	9	21
Carnivora	14	24
Primates	1	1
Rodentia	11	35
Artiodactyla	6	12
Cetacea	11	12
Total	59	122

From the foregoing it is plain that the peninsula possesses a relatively extensive mammalian fauna. The area of Spain, Portugal and the Balearic Islands somewhat exceeds the area of New England, the Middle States, Maryland and Virginia combined. The number of species of mammals occurring in the Iberian region indicates almost as rich a fauna as that occurring in the northeastern portion of the United States. One reason for the relative richness of the mammalian fauna of the peninsula is found in the extremely diversified character of its surface, in which there is the greatest variety of climates, ranging from that of the alpine summits of the Pyrenees and Sierras to the hot subtropical valleys of the south and east. Another factor is the probable survival in portions of this region of species elsewhere extinct in Europe and allied to those of north Africa. The genera *Macaca, Genetta* and *Mungos* may, it is true, be due to immigration from north Africa, but are regarded by Trouessart and others as probably representing survivals from a Tertiary fauna, which elsewhere in Europe has become extinct.

A very interesting feature of the Iberian fauna is the fact that through long isolation many forms have become subspecifically differentiated. The ibex and the chamois of Spain are distinctly different from those of Switzerland and the Alps of Italy, and analogous differences in pelage, and even in form, are revealed in other genera. This fact is interestingly set forth in the pages of the work before us.

For Spanish readers and for those in other lands who desire to acquaint themselves with the mammalian fauna of Spain and Portugal this book is especially to be commended. Written in a singularly lucid and agreeable style, embodying the results of the very latest studies, and beautifully illustrated by the author himself, who is not only a learned zoologist, but a most skilful artist and draughtsman, the work leaves a most charming impression upon the mind of the student. It is in its way a model, and signalizes the great ad-

vance along the lines of scientific investigation which is being made in Spain under the wise and intelligent guidance of its enlightened sovereign. There was a time, not so long ago, when we did not look to Spain for advanced information along purely scientific lines; but that day has passed, and there has arisen in her institutions of learning a generation of young men trained in the most modern methods of observation and research, who are destined to give this noble people as high a standing in the realms of science as has been achieved by the students of other lands. Among the young men who are working successfully in this direction none stands higher than the indefatigable and talented author of the work before us.

W. J. Holland

Carnegie Museum,
December 28, 1914

The Modern High School: Its Administration and Extension. Edited by Charles Hughes Johnston, Ph.D. (Harvard), Professor of Secondary Education in the University of Illinois. New York: Charles Scribner's Sons, 1914. Pp. xviii + 847.

The present work is a companion volume to "High School Education" which appeared two years ago under the editorship of Professor Johnston. The earlier book deals with the evaluation and organization of high-school studies; the present with the social administration of the high school. A third volume is announced which will treat the problem of supervision, especially that of class teaching.

In the volume under review, the editor has sought to make the cooperative plan of treatment yield a well-organized body of material bearing upon the chief problems of high-school administration. He frankly takes the position that the primary purpose of the high school is utilitarian and social: in a democracy like ours, high-school education is a necessity and not a luxury. Even the secondary functions, such as the cultural, esthetic, moral and religious, must be worked over in the light of modern social needs and social ideals. The conscious purpose of the editor, therefore, has been threefold: first, to establish more firmly the idea that the aim of the high school is social; second, to determine the relation of the high school to the other educational agencies of a democracy; and, third, to show, largely through the interpretation of concrete examples, how the work of students might be so administered that it would have the maximum socializing effect upon them. The thirty chapters are written by twenty-eight different authors, representing the various groups of specialists interested in high-school problems.

Part I. deals with "The Institutional Relationships of the High School." A chapter here is devoted to each of the following topics: the high school as a social enterprise; the legal status of the high school; business efficiency in high-school administration; the relation of the high school to the elementary school, to the college, and to the industrial life of the community. The contributors of these chapters are Dr. Snedden and Mr. Kingsley of the Massachusetts State Board of Education; Mr. Hanger, superintendent of schools, Rossville, Kansas; Mr. Josselyn, associate professor of school administration, University of Kansas; and Dr. Carlton, professor of economics and history, Albion College. In the discussion of the second and third topics, the need of expert service in both state and local school administration is forcibly brought out. Mr. Josselyn's treatment of the articulation of the high school to the elementary school is based upon the idea that waste must be eliminated in the lower grades and that the upper grade work must be differentiated so as to integrate with the different lines of work now being offered in the high school. His charts upon the latter point are suggestive. Mr. Kingsley's discussion of the relation between high school and college contains one interesting suggestion; namely, that the high school ought to help the students select their colleges or universities and then guide their election of studies to this end. Perhaps the most difficult relationship of all, that of the high school to the industrial life of the community, receives but twenty of the two hundred and eight pages in this part. However,