to obtain this minimum. I have known of engineering students who believed that the child is born through the umbilicus. I have sat opposite to an astronomer who refused to finish a glass of dark beer when he learned that in passing from his mouth and stomach to his kidneys the black and foaming fluid in the glass in front of him would have to go through his heart.

I am inclined to agree with Professor Nichols that general biology, as given by zoologists, is a course which is suited primarily to introduce students to animal morphology. But I doubt whether a course of this sort half as long, followed in February by an exactly similar course by botanists and introducing students equally to plant morphology, would be a better arrangement.

To my mind neither the zoologists nor the botanists should give the initial course, for if either or both have a hand in it, it will have the emphasis of a specialist. It will deal primarily with morphology plus a single function, that of reproduction.

The initial course should be a course in physiology. I may illustrate what I mean by speaking of zoologists as specialists, by quoting a distinction which I once heard a physicist give of the difference, as he saw it impartially, between zoology, or general biology, on the one hand, and physiology on the other. The former, he said, dealt with reproduction, the latter with all the other functions of life.

Now it is nice to know about amebæ and frogs and the germination of seeds, but a lawyer, or an engineer, or a journalist, or even a doctor, can get along and yet know very little of such matters. If, however, he has no notion of his own insides—of what purpose his food serves, and of why he keeps breathing—well, he simply is not an educated man.

Even for the student who is going far in zoology, or botany, I believe that the first great lesson should be in function, with structure included along with, but not emphasized above, chemical and physical basic facts.

The student should begin, therefore, in that field in which knowledge of function has been most highly developed, a field which has the most powerful appeal for a human being, the field of "human," that is, mammalian, physiology as presented par excellence in that marvelous little book, Huxley's "Lessons in Elementary Physiology."

It seems—at least some of us hope—that today we are about to see a displacement of the academic college course in favor of a junior college, which would give such general subjects as the languages, American history, elementary chemistry and physics, and the one or two other things that every one should have; to be followed in the senior college by groups of increasingly specialized studies, each group aimed to a definite end. If this is to come, neither the course in general biology which Professor Nichols condemns, nor the combined elementary zoology-botany which he favors, is entitled to a place in the curriculum of the junior college.

But a brief course in human physiology is. At least, so thinks a physiologist.

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SCIENTIFIC BOOKS

The Fauna of the Clyde Sea Area, being an attempt to record the zoological results obtained by the late Sir John Murray and his assistants on board S. Y. *Medusa* during the years 1884 to 1892. By JAMES CHUMLEY. Glasgow. Printed at the University Press. 1918. Pages vi + 200, 1 map and 3 figures in text.

The former secretary of the Challenger Office and of the Lake Survey of Scotland, Mr. James Chumley, for many years associated with the late oceanographer and marine zoologist, Sir John Murray, has compiled the data regarding the latter's explorations of the Clyde Sea Area in a "Fauna" of that region. The work has been financed by the Carnegie trustees for the universities of Scotland. The work contains brief account of the Scottish biological stations at Granton and Millport, which respectively preceded and succeeded the explorations which are here summarized.

The physiographic investigations made during this survey were published in the Transactions of the Royal Society of Edinburgh in 1892 and 1894 by Dr. H. R. Mill, but the zoological results had never been assembled for publication.

The region surveyed has an area of 1,160 square miles and includes the Arran Basin, the Great Plateau at its mouth, the Estuary of the Clyde, and a series of narrow locks or fiords of which Loch Tyne is the largest. These locks have about 95 per cent. of normal sea water and receive a mean tidal increment of about 4 per cent. of their total volume so that the habitat is typically marine in most essential particulars, but modified by restrictions on circulation and the resulting conditions in temperature typical of fiords.

The seven typical regions are treated separately in the faunistic summaries in which the species are arranged systematically from Protozoa to Vertebrata, with notes on localities, depths and frequencies. All groups are represented except parasitic ones and Protozoa other than Foraminifera, but somewhat unevenly and in the older nomenclatures in some instances. The records are based mainly upon the catches of the dredge rather than those of the plankton net. There are two full bibliographies arranged chronologically and systematically. A grand summary includes 806 species of which only 8 per cent. are found in all of the seven subdivisions. It is highly probable that further explorations will greatly increase the elements of the fauna common to the several subdivisions.

This faunistic study will be useful to American investigators of the North Atlantic fauna as well as to those who will frequent the newly established Bute Marine Laboratory at Rothesay in the Clyde Sea Area, which for research purposes replaces the Scottish Marine Laboratory at Millport, Isle of Cumbrae, which is now in the possession of amateur interests and in the service of more popular aspects of the biological sciences. It is to be hoped that the unparalleled service to marine zoology rendered by Sir John Murray may in time be recognized by a memorial on the shores of Scotland in the form of a marine biological and oceanographical research station whose equipment and work will be worthy of the name it should bear.

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THE ECOLOGICAL SOCIETY AND ITS OPPORTUNITY

Perhaps no other scientific body in this country has the opportunities for cooperation possessed by the Ecological Society. Its membership is made up of workers in zoology, botany and forestry; its field is no less than the relation of all life to its environment. Last summer five members of the Ecological Society, representing zoology, botany and forestry, camped together near the summit of Mt. Marcy in the Adirondack mountains of New York for the purpose of doing a concrete piece of cooperative research on the plants and animals at timber line, and to bring together into a list some of the problems in ecology. The persons and institutions cooperating were: Barrington Moore, president of the Ecological Society, Norman Taylor, for the Brooklyn Botanic Garden, George P. Burns for the Vermont Agricultural Experiment Station, Charles C. Adams and T. L. Hankinson for the New York State College of Forestry at Syracuse.

The results of the study at timber-line will be published elsewhere. The list of problems is given below. The list is by no means all inclusive, nor does it attempt to be thoroughly logical. It states general problems, with their subdivisions, and gives also a number of specific problems which in reality form parts of general problems. The purpose of this list is threefold: (1) to show gaps in our scientific knowledge, or subjects in which the fundamental facts needed for further human progress are lacking; (2) to show subjects in which cooperation is essential, subjects which a given science can carry only to a certain point and which must be taken up by one or more other sciences for solution; (3) to suggest specific problems for research workers and students.