

their careful documentation cannot fail to convince the reader that, in following the authors through the mazes of Egyptian and Babylonian belief and ceremonial observance, he has no uncertain guides. There will be few who will not learn from these volumes much detail of which they were previously ignorant, and many will derive from them their first clear conception of what was really believed in ancient Babylonia and of the sublime grandeur of that faith which during so many centuries was the spiritual stay and solace of the Egyptians.

FRANK REDE FOWKE.

HUXLEY'S SCIENTIFIC MEMOIRS.

The Scientific Memoirs of Thomas Henry Huxley.

Edited by Prof. Sir Michael Foster, K.C.B., M.A., LL.D., F.R.S., and by Prof. E. Ray Lankester, M.A., LL.D., F.R.S. In Four Volumes. Vol. II. With Portrait. Pp. xi + 612. (London: Macmillan and Co., Ltd.)

THE second volume of this valuable series will be welcomed by a large class of readers, and not alone by those who are professed biologists. The thirty-seven memoirs here collected together for the first time in one volume were published at dates ranging from 1857 to 1864, and, therefore, cover a period of strife and ferment which originated within the scientific world, but soon spread beyond it, that, namely, caused by the publication of Darwin's "Origin of Species" in 1859.

Naturally, we find amongst the writings, at this period, of one of the foremost champions of Darwinism, many memoirs devoted either to discussion of the problem of evolution as a whole, or to threshing out some special point in the evidence for or against the theory and its applications. Such papers will always possess an interest, even if only a historical one. Here we have, for instance, Huxley's famous controversy with Owen as to the alleged constancy of the "posterior horn of the lateral ventricle" and the "hippocampus minor" as characters distinguishing absolutely the brain of man from that of the ape, and of sufficient importance to rank man as a distinct sub-class of the mammalia. It is difficult to imagine any naturalist of eminence at the present day advancing such conclusions, even granting the correctness of the premises, which, as a matter of fact, Huxley was able to impugn without difficulty. Here, again, we find the well-known controversy as to whether the human remains from the Neanderthal were those of an ape-like man or of a "rickety Mongolian Cossack." And before leaving the subject of Darwinism, we may draw attention to Huxley's eloquent and impassioned appeal, in a lecture, "On Species, Races and their Origin," delivered before the Royal Institution, for consideration of the facts of the case without prejudice. In his peroration the clerical and other opponents of the progress of physical science are likened to "little Canutes of the hour, enthroned in solemn state," who bid the great wave to stay, but who, when forced to fly, learn no lesson of humility, and pitching their tents at what seems a safe distance, repeat their folly; and, in conclusion, he calls upon the people of England to cherish and venerate science. "Listen to those who would silence and crush her, and I fear our children will see the glory of England vanishing like Arthur in the mist." At

a time when colleges could be named in our great Universities whose authorities would prefer a "football blue" to a "research student," we may ask ourselves if we are not beginning to realise this prophecy.

It is not possible within the limits of a review to do more than indicate the many papers of interest collected in this volume, some of which laid the foundations of our knowledge, or marked an epoch in its advance, in not a few directions. Of great merit, but of interest to a more limited circle, are the numerous treatises upon fossil types, contributed to various geological periodicals; or anatomical memoirs, of which that upon the Nautilus may be taken as an example. Of more general interest are the two classical memoirs, "On the Agamic Reproduction and Morphology of Aphis," and "On the Anatomy and Development of Pyrosoma," in which Huxley made great additions to our knowledge, both of the theory and of the facts, of non-sexual processes of reproduction in both forms. From Pyrosoma he was led on to a discussion of the significance of the germinal vesicle of the ovum, which also forms the subject of a Royal Institution lecture deserving more than a passing notice.

At the present day it may be safely asserted that though much remains to be investigated and elucidated, yet a number of fundamental facts have been generally established with regard to the question of the nature of the sexual elements, and the process of fertilisation, in animals and plants. No instructed person now doubts that the ovum, whatever its size or peculiarities in a given species, represents a single cell set free from a many-celled organism, and that the germinal vesicle is the cell nucleus, which, after certain processes of maturation, unites in the process of fertilisation with the nucleus of the male cell or spermatozoon to form the so-called segmentation nucleus, the ancestor by repeated divisions of all the nuclei in the body of the future embryo. These are facts which now are taught to every student of biology in his first term, but in the early sixties it was not so. The details of fertilisation were unknown, except in so far that both ovum and spermatozoon were concerned in it, and the true nature of these two elements, in the light of the cell theory, was not understood. Many authorities believed that the germinal vesicle of the ovum and its contents disappeared, and had no direct connection with the cells of the blastoderm or future embryo. Huxley, on the contrary, was on the side of those who held the more correct view, that the cells and nuclei of the blastoderm stand in genetic relation to the germinal vesicle. His observations were, however, in so far erroneous, in that he believed he had seen in Pyrosoma the vitellus of the ovum disappear, and the cells of the blastoderm arising within the germinal vesicle.

In judging a mistake of this kind, the modern biologist will remember, in the first place, that the present state of our knowledge with regard to these matters has been attained by the gradual perfection of a technique more complicated than French cookery, and that to investigate or demonstrate these now well-known facts, a laboratory stocked with reagents and aniline dyes, with complicated machines for section cutting and other apparatus, is required. In the second place he will note, perhaps

with astonishment, that Huxley's observations upon *Pyrosoma* were "conducted upon thin sections (that is to say, cut by hand with a razor, and not with a pair of scissors) of a spirit specimen, rendered clear by glycerine."

When all this is borne in mind, we can but admire the accuracy of the observations, taken as a whole, which Huxley was able to make upon the anatomy and development of this remarkable form of life; while any impulse we may feel to criticise an error with regard to finer points of cytological detail will be checked by the thought that if, in the short space of forty years, biology can make such progress in the investigation of the most mysterious of vital processes, what judgments may the future not have in store for much of our work at the present day, even within the lifetime of many of us!

We have said enough, we hope, to prove how much interesting reading of the most varied kind is furnished by the collected works of one of our greatest scientific men, and we feel sure that many will look forward with pleasurable anticipation to the continuance and completion of this series.

E. A. M.

SCENERY AND GEOLOGY.

The Scientific Study of Scenery. By John E. Marr, M.A., F.R.S. Pp. xi + 368. (London: Methuen and Co., 1900.)

SO much has been done within the last thirty years in all parts of the world, and especially in America, to discover and interpret the varied forms of earth-sculpture, that the knowledge required to be summarised. Scientific surveys and explorations, the facilities for travel, and the use of the camera have largely contributed towards the accumulation of facts. One result, and by no means the most satisfactory one, is the increase of technical terms, for which our American brethren are largely responsible. To remember what is the Uinta type of mountain folding; what is meant by consequent, subsequent and obsequent streams, by inconsequent drainage and corrasion; and what is the difference between clouds of radiation, of inversion, of interfret, and of inclination, may tax the memory and patience of any one who is not constantly engaged in teaching. Here Mr. Marr comes to the rescue, describing and explaining in clear language all the leading types of scenery, and many of the minor and no less interesting features connected with it. He discusses the origin of hill and dale, of peneplain and nunatak, butte and zeuge; and, moreover, he gives in his work an index which will enable us to dispel our ignorance or refresh our memories when, as so often happens, we come across an unfamiliar or forgotten term. There was need for this concise handbook on the scientific study of scenery.

The author makes a praiseworthy attempt to please two classes of readers—the student and the "general reader." That his work will be appreciated by the student we are fully persuaded. That the general reader will steadily pursue the volume must depend upon whether he or she reads for the sake of solid instruction.

The author's brief introduction is fascinating, but we are plunged in the next chapter into "three envelopes," the lithosphere, hydrosphere and atmosphere, and into a consideration of anticlines, synclines and monoclines, and planes of foliation, cleavage and faulting: subjects necessary for the proper understanding of various types of scenery, but not readily dealt with in pleasing language. Here and there throughout his book the author enters into a little more detail than appears to be required to explain the relation between rock-structure and rock-texture and scenery; and the general reader may find it difficult to distinguish between the "Normal Fault" and the "Monoclinical Fault" figured on p. 66. When, however, the author speaks of his work as an "Introductory Treatise on Geomorphology," we feel not only that he intends it mainly for serious study, but that he has a very decided personal regard for technical terms. He shows how dependent the scenery is on the structure of the earth's crust, on the sculpturing agents, and on the character of the climate. The colours of the sky, the water and the rocks, the forms of cloud, and the influence of vegetation come in for appropriate notice in different parts of the volume.

Continents and ocean-basins, crust-waves and speculations on lines of uplift are duly considered, and so also are mountains and valleys, escarpments, volcanoes, deserts and plains, oceans and oceanic islands. The author writes with evident enthusiasm for his subject; and whenever he is free from detail, the labours of the conscientious reviewer become more pleasant. With Kingsley he can speak with eloquence of the beauties of the Fenland, and with Captain McMahon of the charms of the desert. He records his sorrow at "the mutilation of a district rich in natural beauty" by the operations of mining or quarrying, when such works are not, as was the case with the water-works of Thirlmere, "justifiable on the ground of necessity." We remember to have seen quarrying operations in the heart of the Cheddar Cliffs, perhaps the finest inland cliffs in England, and this is an instance where local rights should be compulsorily purchased at the public expense.

We are glad to find the author dealing, every now and again, with the sentimental aspects of the subject. Hugh Miller, jun., enlarged on such topics in his "Landscape Geology" (1891); while the more recreative aspects of scenery are charmingly portrayed in the Badminton volume on Mountaineering, by Mr. C. T. Dent.

The work before us is illustrated by an admirable series of plates, reproduced from photographs. The High Force of Teesdale and the Screes of Wastwater are fine examples; while others, equally good, exhibit mountain structure, glaciers and lakes. The origin of lakes is varied, but the subject has given rise to much controversy among geologists—a controversy mainly concentrated on the question whether rock-basins of any magnitude have been excavated by ice-action. On this subject Mr. Marr has his doubts, and he says

"that in order to prove that ice can excavate a basin, we must show, first, that the actual rock basin exists; and, secondly, that it cannot have been formed in any other way than by the erosive action of ice."

The question is one which is under investigation at the present time; but it may be observed that, in many a lake,