

my phenomenon," so that there must be at least one observer distinguished from what is observed. But in life and practice we all know, though we cannot prove, that there is a similar "I" behind many of the objects which we perceive, viz., our fellow men and women. How far there is anything similar to human personality behind the other animals and behind plants he would be a bold man who would say. So far, indeed, as this argument is valid, it is valid against physical science as much as against "mechanistic biology." The idealistic argument is followed by a long chapter, the object of which is to persuade us that there is something very mysterious and unchemical about the synthesis of carbohydrate by chlorophyll in the presence of sunlight.

We then reach the root of the matter, which is the impossibility of explaining on chemical and physical principles the growth of the organism through the embryonic stage from the egg. This, indeed, is the citadel of Driesch's position. We have to try to account for the fact that a portion of an egg or of a blastula of an Echinoderm is capable of giving rise to a whole organism, and Driesch has no difficulty in showing that there is no conceivable machine-like arrangement of parts which will account for this. But, indeed, one has only to read Weismann's hopeless attempts to explain the regeneration of limbs on his "determinant" theory to be convinced of this. The best answer to Driesch is this: "Suppose we admit that we cannot explain these phenomena by physics, what alternative explanation have you to offer?" Of course, we are all familiar with the answer: "Living beings are inhabited by 'entelechia,' which guide their activities towards pre-determined ends." But such an answer does not assist us. To put forward an unknown entity as the cause of phenomena which we cannot unravel is not to explain, but in reality to give up the attempt at explanation.

"Materialism," as known to practical biologists, is really only the modest and praiseworthy attempt to penetrate a little into the working of living things by *comparing* the processes which go on in them with chemical processes in inorganic nature. But if everything is due to an entelechy, very many insoluble questions arise. Allied species are believed to be genetically related to one another; how are their different entelechies related? Is there a possibility of entelechies being modified? Or, again, if by inverting a frog's egg in the two-cell stage we can cause it to produce a double-headed monster, how is it that the entelechy is so easily baulked of its purpose? If, however, we assume that there are in eggs

organ-forming substances—and in some cases we can prove this by direct observation, we may have to admit that these substances are very remarkable and unparalleled in inorganic objects, but at any rate we have hold of a concept with which we can work. For a substance can be divided into two, and it may be evenly distributed throughout an egg as in Echinodermata or localised as in Annelida and Mollusca, and thus we are enabled to understand why a portion of an Echinoderm egg will produce a whole organism, but why a part of a Molluscan egg will only produce a part of an organism.

Other instances of similar hypotheses could be mentioned which assist in binding together the facts observed in the behaviour of living things and in elucidating the laws which govern them. The use of such hypotheses may be regarded as neither vitalistic nor mechanistic, but as plain common-sense applications of the inductive method. In this way, and in this way alone, it seems to us, shall we ever make progress with "explanations" of the phenomena of life, for all "explanation" in the last resort consists merely in putting together similar things. When, however, we have finished with the explanations of Driesch, both as related by himself and as given by his admirer, Mr. Johnstone, we are left in a mental fog—no great guiding principles to bind together vital phenomena emerge, and the conviction grows that whatever be the right method of tackling the phenomena of life it is not that of Driesch.

E. W. M.

BRITANNIC GEOGRAPHY.

- (1) *The British Empire beyond the Seas: An Introduction to World Geography.* By Dr. Marion I. Newbigin. Pp. xii+351. (London: G. Bell and Sons, Ltd., 1914.) Price 3s. 6d.
- (2) *The British Isles.* By Dr. F. Mort. Pp. xi+231. (Cambridge University Press, 1914.) Price 3s.
- (3) *Argyllshire and Buteshire.* By P. Macnair. Pp. x+161. (Cambridge University Press, 1914.) Price 1s. 6d. net.
- (4) *Geological Excursions round London.* By G. MacDonald Davies. Pp. vi+156. London: T. Murby and Co., n.d.). Price 3s. 6d. net.

(1) MISS NEWBIGIN'S work is always lucid, and she brings the facts of geography into a happy correlation. The continental shelf of North America is thus connected (p. 110) with the accumulation of the Newfoundland Banks, and through them with the cod-fisheries. The size of Australian sheep-farms (p. 147) is explained by the peculiarities of the

rainfall. The climate of Cyprus is first discussed (p. 35) on account of its contrast with that of Mongonui in New Zealand. The world-wide view of phenomena is never absent, and a pupil who reads these pages will cease to regard the British Empire as so many isolated red patches on a map.

The various divisions of the Empire are arranged according to their climatic conditions. British Columbia is thus treated, as having a "maritime temperate climate," apart from Canada east of the Rockies, which "may be more justly compared with eastern Europe and temperate Asia." Agriculture and forestry are properly regarded as the fundamental industries that depend on climate, and many interesting statements are made as to the modes in which labour-difficulties have been met. The questions and exercises encourage further reading; we are, for instance, asked to consider the right food for our coolies, and what we should sell, as Egyptian peasants, in order to pay our taxes. We have noticed only one tiny slip; the question on p. 333, "Why do you think the islanders rejoice so greatly when this worm appears?" does not quite express the meaning of the author.

(2) Dr. Mort describes the British Isles in the modern manner that now appeals to secondary schools, and his references to the geological structure of the country are sufficient to lead the pupil to ask for more. In later work a school may well use the volume on the geography of its own county provided by the same educational press, and it will be found that Dr. Mort has laid a good foundation for more detailed local study. References to castles and the holding of gaps make us inclined to think that more might be made of the influence of structural features upon British history. No young mind that can appreciate the rise of the industries of Sheffield or of ship-building on the Clyde should remain unmoved at Port-naspania or the Roman Wall. The references to the Devon seamen (p. 133) are admirable. The illustrations are well selected to show varied types of scenery. The scarped plateau of Ben Bulbin (Fig. 79) is due to limestone, and not, as is stated, to Millstone Grit.

(3) Mr. Macnair's acquaintance with the geography as well as the antiquities of his country makes him an excellent guide to the mountainous lands of Argyll and Bute. This volume of the Cambridge Geographies is issued with rounded corners, and is thus all the better as a companion for the numerous travellers who start from Glasgow for the sea-lochs and the isles. General considerations are introduced in the earlier pages, and we notice that the author, while laying stress

on glacial erosion, points out that the fiords have been developed "along the geological grain of the country," and sometimes across this grain. He does not, however, refer to the probability of the weakening of the land by cross-fractures before the ice-action set in. We are glad to see an Oligocene rather than an Eocene age assigned (p. 22) to the Cainozoic lavas. The account of the geology of Arran is also well brought up to date. In the index to the geological map, however, the word "chalk" should be "Cretaceous"; and should not "ferriferous," on p. 59, be "ferrous"?

The diminution of the highland population through the attraction of other fields is strikingly seen in the fact that Argyll, on the edge of the prosperous Central Valley, has lost 30 per cent. of its population since 1831. The county was long a battle-ground, owing to its position between the lowland and the western isles, and the author well remarks that perhaps the greatest date in its history was the arrival of Columba at Iona in 563.

(4) London remains the home of sincere amateurs in natural history, and the quiet woods and byways on the edges of its basin in these days tempt the walker more and more. Mr. Davies guides us from convenient railway-stations to view-points or famous sections where we may appreciate the structure of the hills. A good coloured geological map is given as a frontispiece, and this handy book should soon become known to London students, and also to visitors from the Continent.

G. A. J. C.

NATURE STUDY FOR SCHOOL AND HOME.

- (1) *A First Course in Plant and Animal Biology.* By W. S. Furneaux. Pp. viii+232. (London: University Tutorial Press, Ltd., 1914.) Price 2s.
- (2) *A First School Botany.* By E. M. Goddard. Pp. xiii+191. (London: Mills and Boon, Ltd., 1914.) Price 2s. 6d.
- (3) *Pond Problems.* By E. E. Unwin. Pp. xvi+119. (Cambridge: University Press, 1914.) Price 2s. net.
- (4) *Wild Life in the Woods and Streams.* By C. A. Palmer. Pp. xv+206. (London: A. and C. Black, 1914.) Price 3s. 6d.
- (5) *The English Year: Summer.* By W. B. Thomas and A. K. Collett. Pp. viii+341. (London: T. C. and E. C. Jack, 1914.) Price 10s. 6d. net.

TO-DAY the junior student of biology has his attention directed to function and behaviour, rather than to those structural features which claimed almost exclusively the interest of