

neous interpretations, are quoted with simple faith by Dr. Packard; so, too, are the same author's observations on Gasteropod development.

Page 105.—A serious error is here revived as to the identity of the velum of the Gasteropod larva, and the wings of such Pteropods as *Styliola*. The older observations of Gegenbaur, and the later ones of Fol, have shown that the velum co-exists with, and is quite distinct from, the expanded wing-like foot-lobes of the Pteropods.

Page 117.—The mode of development of Grenacher's Cephalopod is not, as stated by Dr. Packard, "totally different" from that of the common cuttle-fishes. It differs only in the somewhat smaller size of the nutritive yolk. The marginal cilia have no significance.

Page 120.—"Peripatus has been proved by the researches of Mr. Moseley to be a tracheate insect, for in the young genuine tracheæ exist, though they disappear in the adult, or at least have not been discovered." We should have expected to find Dr. Packard less inaccurate in what relates to the Arthropods. The above is altogether misleading; what Mr. Moseley found was that the adult *Peripatus* is richly supplied with tracheæ. He did not find tracheæ in the embryos, but he found still more important evidence of Arthropod character, namely, the presence of a pair of foot-jaws, the first post-oral pair of appendages becoming modified in the course of development, so as to function as mandibles.

Page 207.—*Amphioxus* is said to possess "primitive kidneys like the segmental organs of Worms." Of all the varied attempts to fix upon renal organs in *Amphioxus* there are none which quite warrant this statement. The fact is that nothing corresponding to the segmental organs of Worms has ever been described in *Amphioxus*, excepting the "pigmented canals." Though sometimes one epithelial area and sometimes another is declared for the time to be "renal," functionally if not morphologically, the truth is that no renal organs at all are known to exist in *Amphioxus*.

Notes like the preceding might be multiplied were it worth while. Though such inaccuracy of statement does somewhat lessen the value of Dr. Packard's book, it is nevertheless one which is really welcome, and serves very well the main purpose for which it was designed, viz., that of conducting the commencing student over the recent literature of that young giant, Comparative Embryology.

E. RAY LANKESTER

#### OUR BOOK SHELF

*Descriptive Catalogue of a Collection of the Economic Minerals of Canada, and Notes on a Stratigraphical Collection of Rocks.* Exhibited at the Philadelphia International Exhibition. (Montreal, 1876.)

THE geological survey of Canada, under the direction of Mr. Selwyn, F.R.S., has placed in the Philadelphia Exhibition a collection of minerals and rock specimens of much interest, as they very fairly represent the geological productions of the Dominion, as far as the operations of the survey have extended. The descriptive catalogue of these "exhibits" (we regret the use of this new-fangled Americanism in a Canadian work) has been ably drawn up by the Geological Corps of Canada under the following heads:—I. Metals and their ores. 2.

Materials used in the production of heat and light. 3. Minerals applicable to certain chemical manufactures, and their products. 4. Mineral manures. 5. Mineral pigments and detergents. 6. Salt, brines, and mineral waters. 7. Materials applicable to common and decorative construction. 8. Refractory materials, pottery-clays, and pottery. 9. Materials for grinding and polishing. 10. Minerals applicable to the fine arts and to jewellery. 11. Miscellaneous minerals. This catalogue is sufficiently comprehensive, while the arrangement is well adapted for easy reference.

Along with the descriptions of the specimens under each head we frequently find a condensed account of the origin and progress of various industrial pursuits. Thus under the head of Class 2, "Materials used in the production of heat and light," we have short notices of the more important collieries in the eastern provinces of Canada, together with observations on the origin of the petroleum springs of Ontario. The region in which the petroleum beds occur is situated in the western part of Ontario, around the town of Petrolia, occupying about eleven square miles of level ground, covered to a depth of about 100 feet with bluish clay. The oil is tapped by borings, which penetrate a series of bluish dolomites, shales, and marls to a depth of 380 feet under the clay, when a productive stratum is struck, and the oil, accompanied by sulphurous saline water, flows into the bore-hole, or well. The strata penetrated in boring the oil-wells, belong apparently to the "Hamilton," "Chemung," and "Portage" groups, representing according to Sir W. Logan, the upper portion of our Devonian beds,<sup>1</sup> but the petroleum itself is believed to originate in the lime-stones of the "Corniferous" formation which lie underneath; the strata occur in the form of a flattened dome. Another source of petroleum is the "Trenton" group, much lower down in the geological series, and referable to the Lower Silurian period. The geological position of the petroleum beds, as well as cases of actual observation, all go to show that the source of the mineral oil is animal, not vegetable. The limestones of the Corniferous, Gaspé, and Trenton groups are more or less coralline, and from the observations which Sir W. Logan records, it would appear that the oil is derived from the decomposition of the animal matter which originally filled the cells of the coral-rock. In such a position the oil has been observed, where these palæozoic limestones crop out at the surface, and where the limestone is overlaid by sandstone, as in the United States, or by shales or other materials, as in Canada. The animal oil has saturated these latter to such a degree that they have become underground reservoirs which can be made available by artificial means.

The notes by Mr. Selwyn on the collection of rock-specimens suggest several points on which we should like to dwell, did space permit. We shall only, however, refer to the remarkable case of metamorphic action to which he calls attention; namely, that to the south-east of the Valley of the St. Lawrence the formations are highly metamorphosed, their representatives to the north of that river being in their unaltered condition. This change takes place along a great line of dislocation ranging from Lake Champlain to Quebec and Gaspé, as described by Dr. Sterry Hunt. The change in the condition of these beds, none of which are probably older than the Devonian period, is so great, that the hand-specimens are undistinguishable from others collected in Eastern Canada or Ontario of undoubted Laurentian age. That metamorphic rocks may be of any geological period is a fact of which students of geology should be reminded; for we have recently had evidence before us, that some of the rising generation of geologists are still instructed in the exceedingly erroneous view that there is a "metamorphic system" of rocks forming the base of the general series.

E. H.

"Geology of Canada," p. 20.