vegetable kingdom long before it becomes obvious morphologically.

In the final chapter, which is entitled "Results, Phyletic and Morphological," some of the conclusions may be quoted, as "Both Mosses and Liverworts may with probability be held to be blind branches of descent, which illustrate nevertheless phyletic progressions that illuminate the origin of sterile tissues from those potentially fertile, and the establishment of a self-nourishing system in the sporophyte." "The phyletic relationship of the *Sphenophyllales* and *Equisetales* has undoubtedly been a very close one; the distinguishing features are not to be found in the primary plan or construction of the shoot, so much as in the secondary modifications of number and relation of the appendages, and of their branching, together with changes in the originally protostelic structure of the axis. Such considerations support the conclusion that the Sporangiophoric Pteridophytes constitute a brush of naturally related phyletic lines." "The Filicales appear as the most divergent phylum of homosporous Pteridophytes." Speaking of the vegetative system of the sporophyte in higher plants the author says: "Taking an evolutionary course of its own it diverged more and more in character from the propagative system. The final result is seen in the Angiosperms which are now dominant: here the flowers differ widely from the vegetative shoots, though the plan of each resembles that of the primitive shoot from which both sprang. But whatever the modern complications may be, comparison along lines which have been pursued in this volume indicates that the sporophyte, which is the essential feature in the flora of the land, is referable back in its origin to post-sexual complications: it appears to have originated as a phase interpolated between the events of chromosome-doubling and chromosome-reduction in the primitive life-cycle of plants of aquatic habit."

It merely remains to say that the publishers have brought out the book in a style befitting its importance—paper, type, presswork and illustrations, all being good and pleasing to the eye. The illustrations, of which there are 361, are plain, and while no attempt has been made to secure artistic effect, they do what they were intended to accomplish—namely, they help to explain the subject-matter. It is in all ways a thoroughly satisfactory book.

CHARLES E. BESSEY
THE UNIVERSITY OF NEBRASKA

Monographie des Onychophores. By E. L. BOUVIER. Extracted from *Annales de Sciences Naturelles, Zoologie* (1907), pp. 383 + 318, Pls. XIII.

The splendid monograph of the Prototracheata recently published by Professor Bouvier of the Paris Museum deserves a rather extended notice, because of the great interest attaching to the group of which it treats, and the fact that the work, owing to its place of publication, is very little known to American naturalists. A most interesting preface is headed by an appropriate motto, taken from Albert Gaudry: "Vieux habitants de la terre, apprenez-nous d' où vous êtes venus." A section follows, containing a general account of the morphology of the animals, with no less than 44 new and admirable text-figures. The bulk of the book is, of course, occupied with the detailed descriptions of the genera and species, while at the end are a complete bibliography and a check list. Everything is worked out in the most complete manner possible, and the history of each species is fully narrated; in its careful attention to detail and arrangement, the monograph may be classed with Scudder's great work on the butterflies of New England and Taylor's "Monograph of the British Land and Freshwater Mollusca."

The history of the classification of the Prototracheata is interesting. Up to 1894, all the known species were referred to the genus *Peripatus,* but in that year Pocock, in spite of opposition, recognized three genera, two proposed by him as new. This was thought revolutionary at the time; but to-day Professor Bouvier describes two families and seven genera, with excellent characters! The number of species has been increased from a mere handful to fifty, nineteen of them described by Professor Bouvier. The group remains as

isolated as ever, and its distribution is still disconnected, indicating great antiquity and partial extinction. The Peripatidæ include two genera, *Peripatus* and *Eoperipatus*. The former is neotropical, with the exception of a single species (*P. tholloni*) found in the French Congo. The latter consists of three species, two from Malacca, the other Sumatran. Thus the distribution is not unlike that of the tapirs, and we should look for fossil remains in the Tertiary beds of the Palæarctic and Nearctic regions, were not the preservation of *Peripatus* in this manner so unlikely. The African species may possibly be explained by an accidental passage (*e. g.*, on a floating tree) across the Atlantic, rather than as indicating an ancient land-bridge, or a long migration via Asia or Europe. It is noteworthy, however, that in certain respects it approaches the Malayan *Eoperipatus*, so that it would be possible to regard the latter as having reached Asia by way of Africa, the *Peripatus* of the latter continent remaining as a relic of a very ancient route of migration.

The genus *Peripatus*, as now understood, is divided into three groups or subgenera, as follows:

(1) *Oroperipatus* n.n.; "Péripates andicoles." 12 species. Type *P. lankesteri* Bouvier.

(2) *Peripatus* s.str.; "Péripates caraïbes." 17 species. Type *P. juliformis* Guilding.

(3) *Mesoperipatus* Evans; "Péripates africains." 1 species. Type *P. tholloni* Bouvier.

Professor Bouvier does not use any subgeneric names; I have ventured to supply one for the Andicolous group. This appears to be the most primitive of the three, and might better be considered typical *Peripatus*, had not the name been first applied to a Caribbean species.

The distribution of the two neotropical groups is exceedingly interesting, one being characteristic of the Andean chain, the other of the more eastern regions and the West Indies. *Oroperipatus* has three species in Bolivia, six in Ecuador, one in Colombia, and finally enters Mexico on the *west* side, getting as far north as Tepic (*P. eiseni* Wheeler). The subgenus *Peripatus* has nine species and subspecies in the West Indies, two in the coast region of Brazil, five in the Guianas, three in Venezuela, one each in Costa Rica and Nicaragua, and reaches Mexico on the *east* coast, extending to Vera Cruz. If we think of the two subgenera as reaching Central America by way of the isthmus of Panama, it is not at first apparent why they should have carefully kept to the same two sides of the country they occupied in the southern hemisphere. It is to be remarked, however, that *P. eiseni* is a mountain species, occurring at an altitude of 4,000 feet, and so its ancestors doubtless followed the Andean chain; whereas the Caribbean types probably clung to the coast line, and consequently to the east. Whether through Tertiary time these animals were widely distributed over North America, or whether they reached that continent only at the time when the isthmus rose above the sea and permitted the ingress of various well-known neotropical genera, must for the present remain uncertain.

The details of the distribution of the West Indian species are worth investigating. There are apparently no species in Cuba and the Bahamas, and none have been described from Hayti, though they may be expected there. The lesser islands are populated by various forms of the *P. juliformis* type, and Professor Bouvier has shown that the Jamaican forms, which I formerly regarded as variations of a single species, really represent two, the so-called *P. jamaicensis swainsonæ* Ckll. being in fact a member of the *juliformis* series. It is indeed so close to *juliformis* that Bouvier makes it a variety of that species, though in view of its isolation I should prefer to treat it as a species, *P. swainsonæ*. It is practically certain, no doubt, that *P. swainsonæ* reached Jamaica from the east, along the chain of islands; but it seems probable that the other species, *P. jamaicensis*, reached the island (along with *Capromys* and other animals) from Central America, by way of a land bridge or chain of islands now represented by large areas of shallow water. Professor Bouvier, to whom I communicated this suggestion, agrees with me that it is probably correct; it has the advantage of accounting

for the absence of any close relatives of the very distinct *P. jamaicensis* in the other West Indian islands.

The Peripatopsidæ, with five genera, are no less interesting. They are confined to the southern hemisphere, with the following distribution:

Paraperipatus Willey. 1 species. New Britain.

Peripatopsis Pocock. 6 species. S. Africa.

Opisthopatus Purcell. 2 species; one Natal, the other Chili!

Peripatoides Pocock. 4 species; two in New Zealand, two in Australia.

Ooperipatus Dendy. 4 species; one in New Zealand, one in Tasmania, two in Australia.

The case of *Opisthopatus* is most remarkable, though similar instances are known among insects. The Chilian *O. blainvillei* may be imagined to represent the last relic in America of the Peripatoid fauna of von Ihering's Archhelenis, a continent supposed to have once connected Africa with South America. This would mean that the genus *Opisthopatus,* though severed into two widely-separated parts, has retained its essential characters throughout Tertiary time.

The classification of the Australian and New Zealand species is not quite satisfactory. Professor Bouvier shows, or at least gives very good reasons for believing, that *Ooperipatus oviparus* is not genetically related to the other three species of the genus, but represents an independent development of oviparity from *Peripatoides* stock. Hence it would appear necessary to make *O. oviparus* the type of a new genus, to follow *Peripatoides* in the list. The Tasmanian species is called by Professor Bouvier *Ooperipatus insignis* Spencer and Dendy; but since it is not the earlier *P. insignis* Dendy, it must have a new name.

T. D. A. C.

SCIENTIFIC JOURNALS AND ARTICLES

IN *The American Naturalist* for January T. H. Morgan describes some "Experiments in Grafting" undertaken primarily with a view to finding out whether or not it is possible by artificial means to induce regeneration in a part that does not ordinarily regenerate. For example, a part of a lizard's tail was grafted on the stump of a leg, the idea being that the stimulation of the tail portion, which does regenerate, might induce regeneration in the limb. The results, however, are so far negative. Charles A. White discusses "The Phenogamous Parasites" and C. William Beebe gives a "Preliminary Report on the Investigation of the Seasonal Changes of Color in Birds," noting the influence of warmth and moisture. A. H. Wright and A. A. Allen have "Notes on the Breeding Habits of the Swamp Cricket Frog, *Corophilus triseriatus* Wied," and Adam Hermann describes "Modern Methods of Excavating, Preparing and Mounting Fossil Skeletons," methods which have probably reached a higher degree of perfection in this country than in any other and which Mr. Hermann himself has done so much to develop. John T. Gulick considers "Isolation and Selection in the Evolution of Species: The Need of Clear Definitions," pointing out that the above terms, as well as environment and even evolution, are used by different writers in a varying sense.

The Museums Journal of Great Britain for February opens with an article by James Duncan, on "Experience of Sunday Opening at Dundee," the matter being deemed of special importance because it is the most northern museum in "Sabbath-keeping" Scotland to open its doors on a Sunday. The results have been eminently satisfactory. There is a brief description of "The Royal United Service Museum" and, under "Museum Notes," F. W. Fitz Simons suggests that the round, perforated stones from Africa, known as Bushmen's stones, may have originally been symbols of Phallic worship.

The American Museum Journal for March has as frontispiece a reproduction of Eastman Johnson's portrait of the late Morris K. Jesup, taken in 1892. It is noted that a special publication will give an account of Mr. Jesup's life and service to the museum. There are articles descriptive of the "Bismarck Archipelago Collection," the "South American Blow-gun" and the "Exhibition showing the Congestion of Population in New York City."