clinical evidence led to an investigation of the occupational histories of the patients now in our clinic with myeloid metaplasia.

All the 6 available for study gave a history of exposure to certain industrial solvents including benzol and carbon tetrachloride. Case 1 worked for 5 years with benzol in a shoe factory. Case 2 cleaned mesh machines with benzol for half an hour a week for 16 years. Case 3 washed bearings in "high test gasoline" for 20 minutes 4 times a day for 26 years. Case 4 was exposed to the fumes of carbon tetrachloride for an hour each day for 8 years. Case 5 used large amounts of paint remover for 1½ hours a day for 15 years. Case 6 was exposed to a paint remover containing benzol intermittently for a period of many years.

These facts suggest that exposure in some individuals to certain fat solvents may result in the clinical picture previously described as agnogenic myeloid metaplasia. It is quite likely that some patients with this syndrome will give no history of such an exposure, and it is reasonably certain that many so exposed will escape unscathed.

Further work on this subject is being carried out.

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THE OPOSSUM, *DIDELPHIS VIRGINIANA* KERR, A NEW HOST FOR PARAGONIMUS IN TENNESSEE

IN the early fall, 1940, Mr. Malcolm V. Parker, a graduate student at Northwestern University, forwarded the writer a box of twelve mounted and a vial of eight preserved specimens of a lung fluke he had removed from the lungs of a single opossum, *Didelphis virginiana* Kerr, while in residence at the Reelfoot Lake Biological Station in Tennessee during the summer. The host was taken by Mr. John B. Calhoun, another graduate student at Northwestern University, while working on the food habits and distribution of mammals in the vicinity of Reelfoot Lake. Although several specimens of the opossum had been taken during the summer, not more than six of these hosts had been searched for their parasites. The writer spent six weeks at the station, but had opportunity to examine only three of the opossum hosts from the region. Only the single host harbored the lung fluke.

The fluke has been identified tentatively as *Paragonimus westermani* (Kerbert, 1878). Recognizing the uncertainty of the taxonomy of the members of the genus *Paragonimus,* the anatomy of the present form has been worked out in considerable details, and the writer is of the opinion that but one species exists. In so far as is known the opossum has not been reported heretofore as a host of *Paragonimus,* although, as pointed out by Hall,[1] much work has been done on this fluke by Japanese workers and it is just possible that the opossum host has been included. However, there is some evidence to indicate that the American opossum is refractive to an infection with this fluke. Ameel[2] found no infection in 109 of this host from an endemic area in Michigan and failed to produce an infection when the opossum was fed large numbers of viable cysts of *Paragonimus.* No infection has been found in over thirty opossums autopsied in Georgia.

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SCIENTIFIC BOOKS

CAMPBELL ON THE EVOLUTION OF THE LAND PLANTS

The Evolution of the Land Plants (Embryophyta). By DOUGLAS HOUGHTON CAMPBELL. 731 pp., 351 figs. Stanford University Press. 1940. $6.50.

THE book before us scarcely measures up to its title, "The Evolution of the Land Plants," or the promises of its Introduction. What it really turns out to be is a very valuable summary of the present state of knowledge of development from Bryophytes to Angiosperms. That this is extremely well done goes without saying to any one who knows anything of Campbell's own original work, especially on the Bryophytes. One looks in vain, however, for an equally comprehensive discussion of the various hypotheses of origins and relationships that have been put forward. The author is obviously aware of these, but there are no reasons given for his acceptance of one or rejection of another. When one has led such a long and fruitful life, as has the author, and has been so close to the firing line of his science, his friends and colleagues and those of the younger generation of botanists who come under his influence naturally expect, whether they have a right or not to such an expectation, that out of his experience and wisdom he will state why he *e.g.* accepts Wettstein's system and rejects that of Parkin and Arber regarding the evolution of the flowering plants.

That this is not merely carping criticism is, I think, shown by the feeling of approval which the reviewer would accord to Campbell's judgment in the cases mentioned. The book itself consists of twenty-seven chapters of which four are devoted to Bryophytes, eight to the Pteridophytes, as they are called in the text, but

[1] *Jour. Parasitol.,* 11: 227–228, 1925.
[2] *Am. Jour. Hyg.,* 19: 279–317, 1934.

not in the chapter headings, four to the Gymnosperms, and five to the Angiosperms. The remaining chapters are devoted to an Introduction and discussions of the Gametophyte, the Sporophyte, the First Vascular Plants, and Heterospory and the Seed Habit.

As might be expected the first section of the book, that devoted to the Bryophytes, is in my judgment, the best, even though one seems to be turning the pages of Campbell's classic "Mosses and Ferns." The chapters on the vascular plants do not seem so fresh or based on first-hand information.

Campbell follows Engler in dividing the plant kingdom into two main divisions—Thallophyta and Embryophyta, which is quite as justifiable as dividing animals into Vertebrates and Invertebrates. He considers the Thallophyta as highly unscientific, which of course it is, but says there is abundant reason for Embryophyta, this being in the main the essential similarity in the reproduction of what he calls Bryophytes, Pteridophytes and Spermatophytes. Campbell believes that land plants were derived from some freshwater green alga, perhaps some form like Coleochaete among the Ulothricales.

He attaches great importance to the fact that the spermatozoids are biciliate in bryophytes and lycopods and polyciliate in the remaining pteridophytes, but doesn't go as far as Lotsy did in formally classifying the extinct Paleozoic groups on this basis. He regards Pteridosperms as an order rather than a class or phylum, and as representing the most advanced Filicinae or the most primitive gymnosperms.

The section of the book devoted to vascular plants may well be considered to mark the end of a morphological era which began with Hofmeister, of which it may be said that although it inspired a truly prodigious amount of investigation and publication, the garnered crop hardly fulfils the expectations of the cultivators. It seems to me that plant morphology has always been greatly handicapped by the fact that it was formulated almost wholly on the living flora at a time when ideas of phylogeny scarcely entered the minds of taxonomists, and when the concept of the flower was a mystical thing compounded of design in Nature and a pentateuchal cosmogony. These concepts were, in the main, those of morphological entities as fixed as the pieces of a jigsaw puzzle and almost wholly divorced from function (conduction, support, photosynthesis, etc.). These fixed morphological units, as rigid as the pre-Linnean concept of taxonomic species, were then carried back into the more primitive plant world of an enormous past. In other words, morphological units based upon the living flora might better be considered to have a phylogeny as well as an ontogeny and to be end products of an evolution just as truly as the so-called species of the systematist. This may have been envisaged in the author's frequent use of the word Homoplasy, but judging by the results this seems to be merely lip service to the idea.

Pilger's conclusion regarding the nature of the cone in the coniferales is a good illustration of my contention of the importance of function. Incidentally if, as contended, the ovular scale of the Pinaceae, epimatium of the Podocarpaceae are adaptations for the protection and nutrition of the ovules it follows that the Araucariaceae are more ancient than the Pinaceae. Campbell seems to consider a relationship between Araucariaceae and what he calls the Paleozoic Lycopodineae, but he is very cautious, and states the conflicting views without coming to a conclusion. What, other than tradition, can countenance our maintenance of Monocot and Dicot as the two classes of flowering plants, or calling the Caytoniales of the Jurassic Angiosperms, or considering the Devonian Psilophytales as Pteridophyta, or even the acceptance of the notion that the Filicales are of equal rank with Equisetales and Lycopodiales. With regard to the possible ancestors of the Angiosperms both the Gnetales and Bennettitales are discarded and Campbell, following Engler, favors a purely hypothetical group of protangiosperms.

As I hinted at earlier: When morphology shall have become wedded to function or adaptation, morphologists will be free of worry about telomes, caulomes, phyllomes, rhizomes and trichomes; we need no longer puzzle over whether the alternation of generations is antithetic or homologous, and, I believe, it will be a better world.

I can well imagine that the present work would be a wonderful text for advanced classes in comparative morphology since it is clear, inclusive, eminently scholarly and critical. That the book contributes anything beyond this to the evidence of the evolution and classification of plants is more doubtful.

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VETERINARY BACTERIOLOGY

Veterinary Bacteriology. By I. A. MERCHANT, D.V.M., Ph.D., C.P.H., associate professor of veterinary bacteriology and hygiene, Iowa State College. pp. 628. Ames, Iowa: The Iowa State College Press. Postpaid, $7.00.

THIS is a text-book written for students of veterinary medicine, but any who desire to have up-to-date descriptions of the principal organisms which affect the domestic animals will find the book useful and reliable. The writing is lucid, the arrangement is logical and systematic, and the subject-matter shows that the author has combed the literature recently and well. The publication date was in October, 1940, yet