and Lütken believed. Jungersen has shown conclusively that these early findings were based upon immature specimens. I know of no trustworthy evidence that the whale-shark "realizes the length of some seventy feet": it probably does not exceed fifty feet or thereabouts. There is, as far as I am aware, *no* "embryological evidence that the hyomandibular element in *Holocephala* has fused with the skull." The early forms like *Pterichthys* are not, I am convinced, separated from Coccosteids on the grounds which are instanced, pp. 260–261, though this is a matter upon which opinions of specialists may differ. "*Palæospondylus* can not be a larva on account of the centra present," but it is none the less a fact that larval forms, fish or amphibian, are not uncommon in which well-grown centra are present. Goodrich again assumes a "pineal eye" in petromyzonts, though it is only fair to admit that this organ may not *sensu stricto* be an eye at all, perhaps it is a temperature-appreciating organ, for one can hardly call an organ an "eye" in which a dense screen of pigment separates the image—if there be an image—from the sensory cells. On page 125 we read that "the main lateral line of the trunk runs forward on to the head": a better reading perhaps would have been that the main lateral line runs backward from the head, in view of the development of this organ. It is stated that the "yolk-sac of the Selachian protrudes from the ventral surface of the embryo often after birth," a condition which, I believe, does not normally occur. At least I have observed that in six species (in three different families) the young show at birth nothing more conspicuous than a scar to mark the disappearance of the sac.

In several details of terminology I am not sure that Goodrich has lessened our troubles. In certain cases he has created a series of popular names for groups whose technical names are already widely accepted, in some cases classic. Thus why should we adopt "Petromyzontia" and "Myxinoidea" for the well-known Müllerian names Hyperoartia and Hyperotreta? Nor is he consistent in his effort toward popularization, when he devises complicated technical names where simpler ones seem adequate. Thus in the matter of the fin supports of fishes he usually discards the well-known "radials," "basals" and "actinotriches" (or plain "dermal rays," to distinguish them from obvious skeletal rays), for such new names as "dermoptrichia," "somactidia," "lepidotrichia." Indeed it is not quite clear that these terms are as specific as the author implies. We query whether the criterion of their homology is to be based upon the details of structure instanced, for we recall that the homology of the bones of teleosts can not be determined on such finely-spun histological distinctions. Indeed, Goodrich himself reverts to the homely "radials" and "basals" when he is not on his guard (p. 302). He occasionally uses names for various structures which are far more questionable in point of homology than the fin supports noted above. Thus he refers throughout to "clavicle," "coracoid" and "scapula" in fishes, although specialists by no means agree as to their homologies in the cheiropterygian girdle.

His treatment of the teleosts will not escape criticism. Certain it is that he has cut several of the Gordian knots in which the despairing phylogenist has been entangled. Thus, undaunted by convergence, he adopts numerous (about twenty) group-names ending in "formes"—Notacanthiformes, Perciformes, Beryciformes—and from this point of view gives us a very useful summary of the groups, perhaps the best of its kind. This mode of treatment has clearly the merit of convenience—too great convenience, perhaps, for we doubt whether it expresses adequately our present knowledge of teleostean interrelationships.

BASHFORD DEAN

A Hand-list of the Genera and Species of Birds. (Nomenclator Avium tum Fossilium tum Viventium.) By R. BOWDLER SHARPE, LL.D., Assistant Keeper, Department of Zoology, British Museum. Volume V. London, printed by order of the trustees. Sold by Longmans & Co., 39 Paternoster Row,

E. C.; B. Quaritch, 11 Grafton Street, New Bond Street, W.; Dulau & Co., 37 Soho Square, W., and at the British Museum (Natural History), Cromwell Road, S. W. 1909. All rights reserved. 8vo, pp. xx + 694.

The issue of Volume V. of this great work, late in 1909, brings to a conclusion an undertaking of the greatest importance to systematic ornithologists. The first volume appeared in 1899, the second in 1900, the third in 1901 and the fourth in 1903, the whole comprising about 1,700 pages. The work is similar in plan to the late C. R. Gray's "Handlist of Birds" (3 vols., 8vo, 1869–71, British Museum), being a list of not only the genera and species, but of the higher groups, in systematic sequence. The classification followed is that proposed by Dr. Sharpe in 1891. No one could have had a better equipment for the preparation of such a work than its lamented author,[1] who wrote the greater part of the British Museum "Catalogue of Birds," and under whose supervision the whole (27 vols., 1874–98) was prepared and published, and whose knowledge of the external characters of birds and the literature of ornithology was doubtless unequaled by that of any ornithologist the world has yet seen. His "Handlist" is thus superior, in both method and detail, to any of its predecessors in the same field.

Under the genera references are given to preceding works where the group is monographically treated, and under the species to the British Museum "Catalogue of Birds," where full descriptions and citations of the principal references are given, or, in the case of species published since the appearance of the "Catalogue of Birds," to the original place of description; there are also often references in footnotes to authorities who have recently expressed opinions regarding the status or proper nomenclature of certain forms different from those adopted in the text. In order to secure the greatest degree of completeness and accuracy attainable, Dr. Sharpe sought the cooperation of leading authorities throughout the world, to whom he sent proof sheets of the work for revision. These correspondents numbered nearly thirty, of whom more than a fourth are residents of the United States. The work thus carries a degree of authoritativeness that could have been obtained in no other way, in respect at least to its minor details.

In judging a work of this character, it is important to know the view point of the author, especially with reference to the nomenclatorial standpoint and the species question. Unfortunately Dr. Sharpe was one of the few ornithologists of the older school who were unable to accept the modern idea of subspecies, and hence all the forms he has seen fit to recognize are catalogued as full species, the binomial form of names being strictly adhered to throughout the work. Hence many forms originally proposed as subspecies, and so recognized by later authorities, together with many discarded even by their proposers, are here catalogued as full species and stand on an even footing with forms of far higher taxonomic value. Their real status and relationships, or even the real worthlessness of many, are thus concealed from all but experts on the particular groups to which such forms respectively belong. While Dr. Sharpe thus catalogues "18,939 species," this number, it should be remembered, includes all currently recognized "forms" of birds, but many of them are not "species" in the commonly accepted sense, which probably do not exceed 13,000.

The nomenclature adopted is also, unfortunately, not in accord with the requirements of now commonly accepted rules. At the time when the early volumes of the British Museum Catalogue of Birds was prepared, the British Association Rules of Nomenclature, promulgated in 1842, were the only rules then in vogue, so far as rules of nomenclature were then respected. These rules provided that zoological nomenclature should date from 1766, or from Linnæus's twelfth edition of his "Systema Naturæ." Later the tenth, or 1758, edi-

[1] Dr. Sharpe died on Christmas Day, 1909, after a short illness, from pneumonia, at the age of sixty-two years.

tion of this work gradually became the generally recognized starting-point, and of late years has become officially so recognized in all modern codes of nomenclature. In the meantime the British Museum Catalogue had reached completion on the old basis, and a strongly grounded spirit of conservatism compelled adherence to the practises of earlier days. Hence we have in the "Hand-list" a work that, while of the highest utility as a catalogue of the genera and "species" of birds, is out of touch at many points with modern ways; but, with this fact in mind, the specialist can easily avoid the pitfalls. It should hence be remembered (1) that names, generic or specific, founded before 1766 (except Brissonian names) are here ignored; and (2) that emended forms of names are employed where a name as originally propounded is believed to have been incorrectly constructed.

It is with the greatest regret that, in reviewing the "Hand-list" from the present generally accepted standpoint of nomenclature, these criticisms seem necessary. No one can have a greater admiration for Dr. Sharpe's work in systematic ornithology than the present reviewer, who regards him as without a peer in his special field of activity, and his "Hand-list" as a fitting close to a long series of monumental works in ornithology.

J. A. ALLEN

Anfangsgründe der Maxwellschen Theorie verknüpft mit der Elektronentheorie. By FRANZ RICHARZ. 8vo, pp. ix + 245. Leipzig, Teubner. 1909.

This book, developed from a course of lectures to teachers, assumes on the part of the reader a knowledge of elementary experimental and theoretical electricity, as well as some acquaintance with analytical mechanics, potential theory and differential equations. It is not intended as in any way a complete exposition of electrical theory, but aims, and with success, to treat clearly and with precision a number of fundamental subjects, ranging from simple problems in electrostatics to the electromagnetic theory of light in media at rest. The treatment, while exact and of necessity involving many equations, is physical rather than mathematical. In the opinion of the reviewer it would be improved by making less use of potentials. Considerable use is made of dynamical and thermal analogies, and the electron theory is in evidence throughout, contributing much to the interest of the work. But few statements in the text are in need of correction. According to one of these *true* magnetism (div μH) corresponds to the magnetic pole strength of experimental physics, although a virtual modification of this statement occurs a little later. Also the electromotive force of a generator supplying power is referred to as the potential difference between its terminals on open circuit—an old error of remarkable vitality. The reviewer often wonders what one who defines the electromotive force of a generator in this way thinks about a series dynamo, for example, whose electromotive force for normal current may be thousands of volts, while its terminal potential difference on open circuit is practically nothing. According to another statement of the author, no direct experimental proof had been given, when the book was written, of the development of an electric intensity in an insulator by a changing magnetic field—the converse of the Rowland effect. It will be remembered, however, that such a proof was given some years ago by the experiments of Crémieu, as correctly interpreted by Larmor and H. A. Wilson. With only a few oversights in need of attention, the work as a whole is very free from errors. The printing is excellent.

S. J. BARNETT

SCIENTIFIC JOURNALS AND ARTICLES

THE opening (January) number of Volume 11 of the *Transactions of the American Mathematical Society* contains the following papers:

H. F. Blichfeldt: "Theorems on simple groups."

Virgil Snyder: "Infinite discontinuous groups of birational transformations which leave certain surfaces invariant."

E. B. Lytle: "Proper multiple integrals over iterable fields."