with even more force to the topic of acetylene. Strangely enough, no directions are given for the photometric testing of gas (save for street testing), so that for this important measurement recourse must be had to another book. From a typographical standpoint too, the book leaves something to be desired; several of the cuts, for example, Figs. 43, 204, 207 and 211, are not clear.

The work in the main is excellent and should be in the library of every one interested in the subject of gas.

AUGUSTUS H. GILL.

Lehrbuch der vergleichenden Anatomie der Wirbellosen Thiere. Von ARNOLD LANG. 2te aufl. 1ste lief. bearbeitet von DR. KARL HESCHELER. Jena, Gustav Fischer. 1900. Pp. viii + 509, mit 410 abb.

In this volume is included the molluscan part of Lang's well-known and useful work, enlarged, revised and additionally illustrated.

The difference between the original or the excellent translation of Bernard (Macmillan, 1896, pp. 283, ills. 222) is not so great as the figures seem to imply, and is largely accounted for by the increased size of the type and the addition of 188 new cuts. A brief summary of the chief additions may be useful.

In the 'systematic review' we find the sequence of the orders changed in the Gastropods, and, in the Pelecypods, a number of suborders introduced; while the unnatural and illogical orders of the Pelseneerian classification, and his jumbled-up collocations of families under them, are still retained, though a synopsis of later views is included. In the review of 'superficial organization' the Amphineura are recognized as a class and a short chapter on the Cephalopod shell is added.

Under 'pallial complex,' reference is made to the discovery of gills in certain fresh-water pulmonates which is further enlarged on under 'Respiration,' and the characters of the Janellidæ, not referred to in the first edition, are discussed. The chapter on respiration is enlarged and a general summary appended.

A few remarks on *Spirula* are added under 'Musculature,' and under 'Asymmetry' new information is added and the author's theory discussed in the light thus thrown on the subject, with a reference to the bibliography for the opinions of others on this topic.

The phosphorescent organs form the subject of an appendix to the 'sensory organs,' and, under 'alimentary canal,' additional information is given on the proboscis in *Conus*, *Terebra*, *Cassis*, *Dolium* and *Pyrula*.

The general discussion on the intestinal region, stomach and hepatic glands is somewhat enlarged. The asserted absence of endothelial investment in the alimentary canal and digestive glands is alluded to, and the general discussion of the nephridia has been enlarged.

Under 'Reproductive Organs' we find additional matter in the general discussion, and also relating to the Ascoglossa and Holohepatica, among the Nudibranchs, and the Stylommatophora among the pulmonates.

The chapter on the 'Parasitic Gastropods' has been expanded and notes on *Thyca* and *Mucronalia* added.

Under 'Ontogeny' we note additions in connection with *Ischnochiton*, *Vivipara*, *Limax*, *Dreissensia*, *Yoldia* and *Loligo*, and the entire portion relating to Cephalopoda seems to have undergone amplification and revision. Much-improved indices and enlarged bibliography are subjects for gratitude.

The summary of facts in relation to molluscan anatomy included in this work is rich, and may be consulted with profit by those interested, though entering less into detail than the work of Simroth in the new edition of Bronn's 'Thierreichs' which is not yet complete.

Whether the training which most anatomists get is of a kind which impairs their faculties for generalization is a question difficult to answer; but it is certain that most of the younger contributors to anatomy in mollusks have not much advanced the science by their simultaneous hypotheses bearing on classification. The cause seems to be that they do not realize the vastness of the untrodden field in the molluscan subkingdom and generalize on too limited data. Furthermore, other animals are often so much easier to handle and require so much less labor in investigation to afford tangible results, that it is not remarkable that most instructors turn to animals of smaller size and simpler organi-

zation to obtain subjects for their pupils; and consequently the neglect of the mollusca continues.

The work of Lang might have advantageously been supplemented by a chapter calling attention to the gaps in our knowledge and emphasizing the need of research and the rewards which will undoubtedly fall to the lot of him who decides to investigate patiently in a field where not one in a thousand species is anatomically known, and where a careful embryological study, as of the development of the gills in Pelecypods, will produce the most far-reaching results, if carried out with thoroughness.

When this student appears, he will find in the work of Lang a storehouse of facts and a record of hypotheses which cannot fail to be of the greatest service in his studies.

W. H. Dall.

Clays of New York, their Properties and Uses. By Heinrich Ries. Bulletin of the N. Y. State Museum, No. 35. Vol. 7. 1900. Pp. 450. Plates, 140.

Somewhat over ten years ago, the author of the work before us took up the study of the clays of the Hudson River region and the industries based upon them. The venture had all the charm of novelty, because up to that time it had not occurred to anyone to investigate these humble resources, which had apparently impressed all observers as possessing little of interest or of importance. And yet the investigation proved that the clays of the state were the raw material of the most important of all its mineral industries, and they had evidently been passed by, because of their ordinary and simple nature, because they did not appeal to the imagination. The experience is not unique, as will be seen from the following incident. While the writer was recently discussing the subject with a Russian friend, the latter remarked that he had discovered on the steppes, extensive deposits of china-clay, which, when worked up and sold, would bring $150.00 per ton. He had great difficulty in arousing interest, and yet had he found in any such quantity, gold ore worth $5.00 or $10.00 per ton the greatest excitement would have immediately broken out.

Ten years ago in America, scientific interest in clays was chiefly limited to those which supplied refractory materials. Our literature was small. The New Jersey Geological Survey prepared a valuable report in 1878, and in the later eighties the Geological Survey of Ohio published an important contribution, both reports being issued by States where the fire-brick industry was and is important, but except for these two contributions almost no attention had been elsewhere paid to clays by official scientific bodies. Conditions have greatly changed since then; the vitrified brick industry has sprung up; shales, once the most despised and neglected of rocks, are now utilized in enormous quantity; clays are purified and washed, and the ceramic arts have made great strides. It is but just to Dr. Ries to say that his writings have contributed in no small degree to the result and have brought within the reach of workers and readers alike, the possibilities of this invaluable raw material.

The present work is his most extensive contribution. To estimate it properly, it must be appreciated that it is intended as much for the practical workers as for the libraries and laboratories of institutions of learning. The balancing of theoretical investigations with descriptive matter has therefore been necessarily considered with care by the author, but it has been performed with discretion and in a way to attain the most useful result. The scientific reader, however, will be glad to know that all the author's results in the investigation of the physical properties of clays have not yet been published and that further contributions may be expected.

The work opens with the generalities of clays; their origin; mineralogy; properties; analysis; classification; geologic distribution in New York and in the United States.

The methods of digging clay and the geologic features of the deposits are then described, after which the brickmaking industry receives detailed description. This is followed by terra cotta, roofing tile, sewer pipe, hollow brick, etc.; floor tile, decorative tile, fire clays and pottery; each of which topics is treated at length. The properties and uses of shales are next taken up and with them feldspar is placed