of the American Institute of Electrical Engineers on Standardization. The inclusion of this matter is certainly to be commended, and it increases the value of an already valuable technical treatise.

The chapters on electric arcs and arc lamps will be found to embody the later knowledge and developments, such as have only appeared in separate scientific papers or technical publications. Likewise the section on incandescent lamps is fully modern, as could not fail to be the case, as it has been revised by Mr. John W. Howell, whose authority on the subject is beyond dispute.

The work has so much calling for commendation that it would be surprising if a few slips of the pen did not occur. In dealing with such a large amount of technical matter it is difficult to avoid occasional use of phrases a little crude, but if the meaning is clear no harm is done. Exception may be taken to some things stated as facts, which are still undetermined. For example, on page 322, 'the retention of the heat by the bulb' in inclosed arcs is involved to save this type of arc from inefficiency as compared with the open air arc. Also, just following, it is stated that "Evidently a large bulb will be less efficient than a small one and will *also tend to produce a carbon deposit by chilling the vapor on its cooler surface.*" This involves the inadmissible idea that carbon vapor can *exist* away from the arc flame as such, when in fact carbon would be condensed as soot unless burned before leaving the arc flame. If we deprive the inclosed arc too completely of air a small bulb is more rapidly rendered opaque by soot deposits than a large one.

There is a manifest inconsistency seen in comparing paragraph headed 'Current and Voltage,' page 312, with paragraph 'Efficiency,' page 325. Here the inclosed arc is made to appear by tests accredited to Freedman, at least as efficient as the open air arc, in contradiction to the opening sentence under 'Efficiency,' page 322. The fact is that there are other measurements of arcs extant which are far less favorable to the inclosed arc than those used in the book, and the former are probably nearer the truth.

The author has, in several instances, wisely availed himself of publications issued by the manufacturing companies, and many chapters are followed by references to papers and publications which have been consulted, though the chapters dealing with arcs and arc lamps are an exception. This brings to notice what may appear to some as a defect of the work. It is evidently not intended to be historical, yet names and sometimes dates are used, but there appears throughout no consistent policy in that respect. Names occur sometimes in connection with relatively unimportant suggestions, though in other more important connections they are omitted. Credit is even given, sometimes, to the same worker for certain things and withheld at other times, though the objects in the latter case may be of the greater practical value. Few instances appear to exist in which the credit given is misplaced, as with the transformer figured on page 174. Notwithstanding this, the work gives ample evidence of the ability and industry of its author, and must be welcomed as a valuable addition to electrical literature. It is well printed, admirably illustrated, and the figures are clear and well chosen.

ELIHU THOMSON.

Chemical Technology. Edited by E. CHARLES GROVES and WILLIAM THORP. Vol. III. *Gas Lighting*, by CHARLES HUNT. Published by P. Blakiston's Son & Co., Philadelphia. Large 8vo. Pp. 312. Price $3.50.

This work deals very fully and satisfactorily with the manufacture of gas for the purposes of illumination, the various forms of retorts, settings, condensers, scrubbers, governors, etc., being carefully and minutely considered. The methods of chemically testing and measuring the gas are clearly and concisely explained.

More than one-eighth of the book is devoted to oil and water gas, nearly every important process for their manufacture being detailed. The treatise closes with an excellent chapter on burners, all the principal ones being described; no mention is made of the 'bec Feron,' a French mantle burner of high power using a mixture of gas and air under pressure.

In view of the extended use of inclined retorts, the reviewer considers the treatment of this subject too brief; this remark applies also

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-