Methods of equipment of the lecture room with all kinds of power, and with water, gas, electricity, steam, etc., are fully discussed. Much information is given in regard to making rooms fire-proof and sound-proof; in regard to heating and ventilation; in regard to clocks, lighting, wardrobes, etc. All this is done with the utmost attention to details, and should prove of great assistance to architects, as well as to those responsible for the design and equipment of the laboratory.

In the chapter devoted to the description of the preparation room much extremely valuable information is given in regard to what may more strictly be called 'physical technique,' such as methods of working with leather and paper, glass-blowing, enameling, exposing and developing photographs, soldering of all kinds, and the use of various cements and waxes. This part of the book will, beyond a doubt, be of the most value to the worker in physics. Under suitable heads information of the fullest character is given in regard to the use of the lathe, of the forge, of the carpenter's bench, etc.

The fact that no detail, however insignificant, has been overlooked by the present editor of the book is shown by the inclusion in it of information concerning methods of tying knots, of pulling nails, of using even the simplest tools; and illustrations are given of such instruments as a crowbar, a hammer, a rubber glove and an oil-can. It may well be questioned whether such richness of detail is essential or advisable, but with a suitable index to the volume this ought to offer no serious objection. The need of an index, which is promised for the end of the first volume, is all the greater owing to the scanty information given by the table of contents, and to the fact that descriptions of many instruments are given in places where one would not expect to find them. Thus, under the heading 'Room for Delicate Work' is found the full description of Doleczalek's electrometer, of wire gratings and of the bolometer. These details may very well be given at this point of the book, as illustrations of the use of certain rooms in the laboratory; but without a complete index one might well search in vain for information.

The present edition of this great work is incomparably better than any of the previous ones. The illustrations are more numerous, and the letter press more detailed. Special attention is given to pieces of apparatus of recent design, and all the latest improvements are mentioned; references are made, when possible, to the historical development of various methods and instruments, but obsolete forms are not described. Full information is given as to places where every piece of apparatus mentioned, every tool and every machine, may be purchased, and the prices of both instruments and supplies are indicated.

The value of a work like the present one to every director of a laboratory, and to almost every worker in physics, is well shown by the fact that a seventh edition is now in demand, and so it need not be emphasized in this review. This present work is the most complete of its kind and gives the necessary information in the most convenient form possible. The only drawback to its general use comes from the fact that the publishers have seen fit to use German type instead of Roman.

J. S. AMES.

The Industrial and Artistic Technology of Paint and Varnish. By ALVAH HORTON SABIN, M.S., chemist for Edward Smith and Co., New York. New York: John Wiley and Sons. Pp. 372. Price, $3.00.

The work opens with two entertaining chapters upon the history and origin of varnish; these are followed by a description of the materials used in varnish and of its manufacture.

Especially noticeable are the parts treating of oils, paints and lacquers in China and Japan. The reviewer knows of no place where an equally interesting and instructive account of these Oriental arts can be found.

The specific value of the work consists in the attention paid to the protection of metals against corrosion and to water pipe coatings; these detail some experiments made upon large plates of steel and aluminum protected by various paints and varnishes when exposed to sea and lake water. These have not been

previously published and discussed in such a connected form, and are alone well worth the price of the book. Not less interesting and valuable are the portions devoted to antifouling paints, carriage and house painting and furniture varnishing.

Being a treatise on the industrial and artistic technology one scarcely expects to find much chemical information; there are, however, excellent chapters on the oils, particularly one on linseed oil by Dr. McIlhiney. It would have materially aided the chemist to have found an equally good and complete description of the gums used in varnish manufacture.

Throughout the entire work, one can not help being impressed with the wide practical experience of the author in the technology of paints and varnishes, and particularly with their applications.

The work should be in the hands of the architect, whether engaged in the erection of sky-scrapers or summer houses, of the civil engineer, having to do either with bridge or water works construction, of the naval constructor, and in fact of any one concerned with the preservation of wood or metal.

A. H. Gill.

GAUPP'S ANATOMY OF THE FROG.*

In preceding numbers of Science (Vol. VII., p. 463; X., p. 451; XV., p. 100) the earlier parts of this monumental work on the structure of the frog have received notice. The present part completes the whole, making a total of 1,738 pages, aside from preface, etc., entirely devoted to this one form. No other vertebrate, man excepted, has ever had such exhaustive treatment.

This concluding portion, 521 pages in all, is devoted solely to integument and sense organs, all treated in the same careful manner as the other systems, but, as would be expected, microscopic detail is emphasized here as in no other parts. Not only do we have a general account of the structure of the skin and its glands like that given in the first edition of the work (familiar in most laboratories in Hassal's translation), but we are given a good summary of the known facts, structural and physiological, of the color changes and details of the breeding-season changes in specific regions of the skin.

In treating of the sense organs each section is followed by a résumé of the development of each and an account of its functions. Thus in connection with the nose we have an account of the course of the air in the different parts of the nasal cavity, and the evidence to show that the frog is an 'air smeller' even when submerged. It is especially in the section pertaining to the ear that the largest proportion of new facts are given, since Dr. Gaupp has made certain parts of the otic region peculiarly its own.

In conclusion, we may say that the work is one which must be in every laboratory, and while we can hardly expect the whole to be translated we wish that at least certain portions, like that on the central nervous system, were more accessible to our students. Congratulations must be extended to the author on the completion of such a vast amount of work.

J. S. Kingsley.

* A. Ecker's und R. Wiedersheim's 'Anatomie des Frosches auf Grund eigener Untersuchungen durchaus' neu bearbeitet von Dr. Ernst Gaupp. IIIte Abtheilung, IIte Hälfte, pp. 441–961 + xi. Braunschweig, 1904.

SCIENTIFIC JOURNALS AND ARTICLES.

The opening (October) number of Volume 11, of the *Bulletin of the American Mathematical Society* contains the following articles: 'On Developable and Tubular Surfaces having Spherical Lines of Curvature,' by Professor Virgil Snyder; 'Addition to a Theorem due to Frobenius,' by Professor G. A. Miller; 'On Self-Dual Scrolls,' by Professor E. J. Wilczynski; 'The Opportunities for Mathematical Study in Italy,' by Dr. J. L. Coolidge; 'Vector Analysis' (Review of Henrici and Turner's Vectors and Rotors, of Kelland and Tait's (Knott) Introduction to Quaternions and of Fischer's Vectordifferentiation und Vectorintegration), by Dr. E. B. Wilson; 'The Mathematics of Insurance' (Review of Loewy's Versicherungsmathematik), by Dr. Saul Epsteen; Shorter Notices (Seliwanoff's 'Lehrbuch der Differenzenrech-