as the object, and, second, because of the wrong and foolish method of conversation employed — not necessarily by the child's parents — when talking to him. Such examples as "Baby kiss mamma," "Does Freddie love his auntie?" "Is little Mary cold?" etc., can hardly lead to an early conception of correct verbal expression. HOWARD LILIENTHAL, M.D.

New York, 43 East 29th Street, March 6.

Solidungulate Pigs.

THE "mule footed hogs" inquired about by Mr. Jno. H. Frick, in *Science* of Feb. 24, p. 107, are described and figured in my article entitled "On a Breed of Solid-Hoofed Pigs Apparently Established in Texas," Bull. U. S. Geol. and Geogr. Surv. Terr., Vol. IV., No. 1, Feb. 5, 1878. p. 295. ELLIOTT COUES.

Smithsonion Institution, Washington, D. C., March 1.

BOOK-REVIEWS.

Original Papers on Dynamo Machinery and Allied Subjects. By JOHN HOPKINSON, M.A., D.Sc., F.R.S. New York, W. J. Johnston Company.

THIS volume is a collection of the papers on electro-technical subjects which Dr. Hopkinson has published at various times during the last fourteen years.

It will be unnecessary to speak of the great value of these papers, for a number of them have passed into the text-books and form a part of the education of every technical student, and there is probably not an electrician in the country who has not found himself obliged to obtain the greater part of the remainder in some form or other. But a book of clippings from engineering journals is never so satisfactory as a bound volume, and the electrical profession will accord a warm welcome to this little book, the more so as it contains several papers which have hitherto been difficult to obtain. Of the eleven papers here collected, five are on electric lighting and dynamo-electric machinery, two on transformers and transformer tests, two on theory of alternating currents, one on an electrostatic effect in conductors carrying alternating currents, and one on electric light-houses. The first five contain the "epoch making" work on characteristic curves, and on efficiency tests of dynamos. (In passing, it may be noted that the paragraph on page 36, on the use of the characteristic to find the lowest speed at which a machine can be run and yet produce an arc, is given wrongly in Professor S. P. Thompson's "Dynamo-Electric Machinery." page 273.) But to technical readers the most interesting portion will be the papers on alternate currents and transformers, included in which is an account of the recent tests on the Westinghouse transformer, of importance as showing that the old accusation of poor all-day efficiency can no longer be made against the commercial transformer. These treat of the parallel and series running of alternators, the design of transformers, the effect of capacity in transformers, the power consumed in alternating current arcs, etc.

The advantage that this book has over the papers as originally printed is the fact that most of the errors and misprints have been corrected. A few yet remain, however. On page 155, 2μ should read 2π; *sine* $2\pi/T(t+\tau)$ should read *sin* $2\pi/T(t-\tau)$; the sign of the solution of the differential equation for H should be $-$ instead of $+$. On page 157, $e\gamma$ should read 2γ; through the whole of this part of the book H' is printed instead of $\dot{H}$. This would be objectionable if intentional, but it seems to be an accident, as on page 179 the dot is used instead of the stroke, but placed wrongly.

Electricity and Magnetism: Being a Series of Advanced Primers of Electricity. By EDWIN J. HOUSTON, A.M., Professor of Natural Philosophy and Physical Geography in the Central High School of Philadelphia. New York, W. J. Johnston Co.

FROM the preface we learn that this book is meant for the "general public" and the increased "number of those to whom a knowledge of the laws of electricity has become a necessity of every-day business life." While it is proverbially hard for a specialist to decide what the public want, it may be doubted if they will see much to choose between this and the scores of similar books which have been published. It is possible, however, that the name on the title-page may prove an attraction to many. On inspection the book is found to treat of the simpler theoretical principles, technical subjects, such as the dynamo, arc-lamp, etc., taking up about fifty lines out of the three hundred pages which comprise the book.

As in most books of the class, there are numerous inaccuracies; to mention a few: on page 23 a black surface is stated to be a worse radiator of light than a white one; whereas, of course, the reverse is the case; carbon is given as an exception to the rule that the conducting power of metals decreases with rise of temperature; the "conducting power of all alloys or mixtures of different metals" is stated to be "very much less than that of any one of the metals of which they are composed," in forgetfulness apparently of the fact that Matthiessen gives a long list of alloys whose conductivity is the mean of their constituents, etc.

The idea of giving references and extracts from books which should be read by those desiring a fuller knowledge of electricity than can be gained from the primers, can be considered a good one. It may, however, be questioned if the quotation from Professor Ayrton's book, "Practical Electricity," would give a reader the impression that it is a book on electrical laboratory work, and whether there is any necessity of quoting the author's "Electrical Dictionary" and "Physical Geography" so often among the selections from standard works, especially where, as on page 161, under "Extracts from Standard Works," the author quotes his dictionary as quoting Fleming, where the extract could, with no loss, have been made directly from the original. The chapter on Electrical Work is one of the best in the book, and the unscientific reader can hardly fail to understand the ideas treated of completely. R. A. F.

Contributions from the Botanical Laboratory of the University of Pennsylvania. Vol. I., No. 1.

Bulletin of the Scientific Laboratories of Denison University, Granville, Ohio. Vol. VII.

IN these days of enormous multiplication of books, magazines, journals, proceedings of societies, etc., there should always be reason for the establishment of a new serial. The avenues of publication are already so numerous that it is almost impossible to keep track of all. The agricultural experiment stations have vastly increased the amount of literature dealing with scientific results, and the comparatively new departure of universities, in issuing periodical publications, is one rather to be deprecated than encouraged. It would seem far better, for example, to do as Columbia College in New York, and Harvard University in Cambridge do, that is, to publish articles in established periodicals or scientific serials, rather than to originate new ones. Columbia College publishes the "Contributions from the Herbarium" in the Transactions of the New York Academy of Science, while Harvard University prints "Contributions from the Chemical Laboratory" in the Proceedings of the American Academy of Arts and Sciences.

These remarks are induced partly by the recent appearance of No. 1 of Vol I. of "Contributions from the Botanical Laboratory of the University of Pennsylvania" and Vol. VII. of the "Bulletin of the Scientific Laboratory of Denison University." Both of these are creditable publications. The former contains some valuable papers upon Dioncœa and other subjects, and the latter is a catalogue of the flowering plants and ferns of Licking County, Ohio. With the Philadelphia Academy, the Franklin Institute, and the American Philosophical Society, all issuing serials in Philadelphia, the *raison d'etre* for a new serial there does not appear. The case of the Denison University is not quite parallel, but most probably there would be little difficulty in arranging for the publication of such papers in other places.

In the University of Pennsylvania contributions we have the following papers: "A Monstrous Specimen of *Rudbeckia hirta*," by J. T. Rothrock; "Contributions to the History of *Dionœa muscipula*," by J. M. McFarlane; "An Abnormal Development of the Inflorescence of Dioncœa," by John W. Harshberger; "Mangrove Tannin," by H. Trimble; "Observations on *Epigœa re-*

pens," by W. P. Wilson; "A Nascent Variety of *Brunella vulgaris*," by J. T. Rothrock; and "Preliminary Observations on the Movements of the Leaves of *Melilotus alba* L. and Other Plants," by W. P. Wilson. Numerous new points are brought out by the studies of Dr. McFarlane on Dioncea. Among others he notes that two touches of the sensitive hairs are usually necessary to cause closure of the leaf. What he calls "memory power of the protoplasm," that is, response to a second stimulus when the first had no appreciable effect, he finds is sharply retained for from 30 to 45 seconds; and in from 55 to 60 seconds the effect of the first stimulus is lost. He also found that the hairs were not alone sensitive, although they were most so. But both outer and inner leaf surfaces show a marked degree of sensitivity. It was observed, likewise, that, although falling water, like rain, had little or no effect, immersion in water caused closure of the leaves as soon as the water touched the hair. Although three is the normal number of hairs on each blade of the leaf, our author has seen seven on one and six on the other half of a leaf; and he says leaves are frequently observed with from 8 to 13 hairs. "Such facts give countenance to the view that the sensitive hairs were once more numerous and diffuse in distribution, a condition still retained by *Drosera*." The hairs are jointed just above the base, and this seems to be the special irritable centre.

The epidermal cells of the leaves are stated to be admirable objects for observing the continuity of protoplasm. After proper treatment, the method being described, there are seen "along each side 18 to 30 protoplasmic bridges, which are slightly constricted on either side of the cellulose wall, and form a central swelling at the passage through the pore aperture. The transverse or oblique walls are traversed by 5 to 8 similar processes, so that the protoplasm of each epidermal cell is linked to that of neighbor cells by 50 to 75 fine connecting threads, and these again collectively are united with the cylinder of sensitive cells in the irritable hair." Various other subjects are considered, but they cannot be referred to here.

In the Bulletin of the Denison University, above mentioned, we have a catalogue of 945 species of plants occurring in Licking County, Ohio. Mr. H. L. Jones. the author, gives a list of the herbaria consulted, a short sketch of the county geology, and other facts. Among them are the times of flowering of the plants, and we note that in November 44 species bloom, in December 11, in January 14, in February 9, in March 17, and up to July 530. Thus no month of the year is without some flowers.

JOSEPH F. JAMES

Washington, March 1.

An Introductory Manual for Sugar Growers. By FRANCIS WATTS, F.C.S., F.I.C. London and New York, Longmans, Green & Co. 151 p. Ill. 8°.

IN the rapid extension of agricultural chemistry and scientific agriculture, a vast amount of tabular matter has been prepared, thousands of analyses have been made, and yet the results are neither satisfactory nor proportional to the work done. Professor Whitney has recently placed the position very clearly in saying, "There has been no satisfactory interpretation as yet of much of the work which has been done on the chemical composition of soils and plants, and the results of plat experiments have in most cases been very conflicting and uncertain." In this country the government experiment stations are issuing bulletin after bulletin of valuable and interesting reading; but even they, with all their superior advantages, have, as yet, fallen far short of their purpose. One reason for this is in the pre-eminence given to analysis and in the slighting of "condition," which latter feature forms a prominent part in the opening chapters of "An Introductory Manual for Sugar Growers," by Mr. Francis Watts, government chemist at Antigua, W. I. The first half of this interesting little book may be perused with profit by agriculturists the world over, presenting as it does a remarkably clear and intelligible dissertation on the elements of agricultural chemistry, treating first of soils, then of plant life and plant food, and finally of manures and fertilizers. The remainder of the work is devoted exclusively to the sugar industry, beginning with the planting and cutting of