Simple levers have been obtained to amplify the disc records accurately to three hundred times and compound levers to one hundred and twenty-five times. The latter is considered to be capable of much improvement. We are all sadly aware that it is one thing to note a precaution, and quite another to observe it; but so far as the technical side is concerned there are probably few psychological or linguistic problems of equal difficulty that have been approached with greater care.

The first chapter contains some studies of the vibratory movement of the diaphragms, mainly through optical means. The conclusion is reached that the nodal (Chladni) vibrations play an inconsiderable part in the distortion of the wave evident in the familiar "twang."

> The diaphragm of the sound-box, however, bends so that there is more or less yielding and motion of the air behind it . . . in both gramophone and phonograph the wave is distorted in the manner just described (p. 22).

The commercial instruments vary a good deal in quality; about one in a hundred, Dr. Scripture thinks, is suitable for experimental purposes (p. 17). Chapters II., III., IV. discuss the apparatus and methods of immediate analysis. Much of this material will be familiar to one who has followed Dr. Scripture's previous work. On pp. 53–4 is described a control apparatus by which any portion of a curve may be reproduced as a gramophone record so as to afford acoustic analysis for the ear. By this means, any curve possible to sketch may be reproduced in terms of its sound.

The ordinary student of linguistics will find more difficulty in following Dr. Scripture through chapters V.–VII. Their interest must for the present be considered physical and mathematical rather than philological or psychological. They are concerned with problems of harmonic analysis, and a new method for dealing with the disturbing factor of friction in the voice-producing apparatus. The two theories of vowel production are discussed in chapter VIII. The Willis-Hermann theory of the varying intensity of the glottal puffs and the vowel tones as inharmonics to the glottal tone, is confirmed in these studies.

The Helmholtz theory of hearing is interestingly criticized in chapter IX. Simple harmonic analysis is insufficient to give the tones corresponding to the resonating fibers; the inharmonic frictional analysis alone represents the facts of audition, and this is at present possible only for song. Chapter X. describes methods for the synthesis of vowel vibrations, and chapter XI. illustrates the mathematics of vowel analysis; it is intended as a guide to research. Perhaps the main objection to the work is that the correctness of the original gramophone records has been taken too much on faith. There need be no question of the accuracy of Dr. Scripture's reproduction of these curves; but there is room for considerable doubt as to whether the gramophone records themselves are faithful representatives of the spoken sounds they are supposed to record. The mere fact that they resynthesize them into understandable speech is not sufficient. A variant of the method mentioned on page 55 might be employed, a gramophone record *a* making another gramophone record *b* directly from itself. A visual comparison of the two might give an idea of the accuracy of the reproducer of *a* and the recorder of *b*. Otherwise there would seem to be no escape from the tedious method of nonsense syllables, noting whether the errors made in the perception of gramophone speech are analogous to those for normal spoken speech. Until something of this sort is done, there is ground for some caution in the acceptance of this material as representative of actual linguistic facts.

FREDERIC LYMAN WELLS
McLEAN HOSPITAL,
WAVERLEY, MASS.

SCIENTIFIC JOURNALS AND ARTICLES

The American Journal of Science for August contains the following articles: "Radio-Activity of Thorium Salts," B. B. Boltwood; "Wave-lengths and Structural Relation of Certain Bands in the Spectrum of Nitrogen," E. E. Lawton; "Tertiary Peneplain of the Plateau District, and Adjacent Country, in

Arizona and New Mexico," H. H. Robinson; "Heat of Combustion of Silicon and Silicon Carbide," W. G. Mixter; "Vanadium Sulphide, Patronite, and its Mineral Associates from Minasragra, Peru," W. F. Hillebrand; "Mineralogical Notes," W. T. Schaller; "Thermoelectromotive Forces of Potassium and Sodium with Platinum and Mercury," H. C. Barker; "Reaction between Potassium Aluminium Sulphate and a Bromide-Bromate Mixture," F. A. Gooch and R. W. Osborne; "Preparation of Formamide from Ethyl-Formate and Ammonium Hydroxide," I. K. Phelps and C. D. Deming; "Lower Middle Cambrian Transition Fauna from Braintree, Mass.," H. W. Shimer.

We learn from *Nature* that after the current year the *Journal of Anatomy and Physiology* will be issued in two independent parts, one to be devoted to anatomical, histological, morphological, and embryological subjects, and the other to contain papers on subjects of physiological interest (including physiological histology and physiological chemistry). The acting editor of the anatomical part will be Professor D. J. Cunningham, with whom will be associated Sir William Turner, K.C.B., Professor A. Macalister, and Professor G. S. Huntington. The acting editor of the physiological part will be Professor E. A. Schäfer, with whom will be associated Professors F. Gotch, W. D. Halliburton, C. S. Sherrington and E. H. Starling.

SOCIETIES AND ACADEMIES

THE SOCIETY FOR EXPERIMENTAL BIOLOGY AND MEDICINE

Twenty-first Meeting

The twenty-first meeting of the Society for Experimental Biology and Medicine was held at the College of Physicians and Surgeons, of Columbia University, on Wednesday evening, March 20. The president, Simon Flexner, was in the chair.

Members present—Adler, Beebe, Burton-Opitz, Carrel, Crampton, Crile, Emerson, Ewing, Field, Flexner, Gibson, Gies, Hatcher, Lee, Levene, Levin, Lusk, Mandel (J. A.), Meltzer, Murlin, Noguchi, Opie, Richards, Schwyzer, Shaffer, Torrey, Tyzzer, Wadsworth, Wallace, Wolf.

Abstracts of the Communications[1]

A Study of the Vital Conditions Determining the Distribution and Evolution of Snails in Tahiti, with Illustrations: H. E. Crampton.

It was shown that different valleys of Tahiti contain forms of the genus *Partula* that, on account of their more or less complete isolation, have come to differ in correlation with their geographical proximity or remoteness. Evidence was adduced showing that "mutations" have arisen at various recent times.

The Parathyroid Gland, with Demonstrations of the Effects of Hypodermic Injections of Parathyroid Nucleoproteid after Parathyroidectomy: S. P. Beebe.

It has been found that the symptoms of tetany following parathyroidectomy in dogs can be inhibited by the hypodermic injection of parathyroid nucleoproteid. The globulin from these glands has not been found effective. If the nucleoproteid is heated to boiling in an alkaline medium its inhibitive powers are destroyed.

Further Experimental and Clinical Observations on the Transfusion of Blood: George W. Crile.

Beneficial results were obtained after acute hemorrhage, after pathologic hemorrhage and in the treatment of shock and illuminating gas poisoning. Negative results were obtained in pernicious anemia, leukemia, carcinoma, strychnin poisoning and diphtheria toxemia.

A Preliminary Report on the Direct Transfusion of Blood in Animals given Excessive Doses of Diphtheria Toxins: George W. Crile and D. H. Dolley.

[1] The abstracts presented in this account of the proceedings have been greatly condensed from abstracts prepared by the authors themselves. The latter abstracts of the communications may be found in Number 4 of Volume IV of the society's proceedings, which may be obtained from the secretary.