book, but to use them the key to the abbreviations must be consulted, since the names of scientific journals are so much abbreviated that it is impossible to guess even the names of the best known among them.

So far, what has been said applies both to the original German and to the English translation. In the latter the language of the original preface and introduction has been condensed somewhat, but elsewhere the chief changes in substance seem to be additions, mostly a line or two here and there of additional statement, with perhaps additional bibliographical references. In some instances, however, whole paragraphs or pages have been added in order more fully to develop the subject or to bring it down to date. Dr. Cobb has used the translator's privilege to break up many of the long periodic sentences so characteristic of German style into shorter ones more agreeable to English-speaking readers, but the translation still reads like a translation. In many passages the language is not smooth and in some the author's thought is incorrectly rendered. However, for English-speaking readers the translation will be easier to follow than the original and, of course, more nearly abreast of recent developments. It may occasionally be convenient, however, to have the original at hand to refer to.

WALTER D. LAMBERT
U. S. COAST AND GEODETIC SURVEY

SCIENTIFIC APPARATUS AND LABORATORY METHODS

CORRUGATED RUBBER TAMBOUR DIAPHRAGMS

SINCE its invention and description by Marey the tambour has consistently held its place as one of the most widely used and one of the most serviceable devices for exploring behavior. Since the careful analysis of Frank its limitations are well understood. Certain errors due to transmission by an elastic medium are inherent in the system. Errors due to the mass and unfavorable leverage of the recording arm can be reduced in many instances to a negligible minimum but not without some sacrifice of sensitivity. Of the several suggestions for obviating the errors dependent on rubber diaphragms no one has proved satisfactory enough for wide acceptance. For experimental purposes we needed a diaphragm of greater permanence, increased sensitivity and closer proportionality between excursion and air pressure throughout the range of deformation. After trying several materials, including corrugated collodion and cellophane, we have to report a reasonably satisfactory corrugated rubber membrane. As finally made by Mr. Newton this compares favorably with the flat rubber diaphragms with respect to all three desiderata. Their durability is still under test, but the latex preparation that we use is reported by the makers to be very durable. The corrugated membrane tested over four and a half times as sensitive to air pressure as a fresh Harvard Apparatus Company diaphragm under usual tension. A pressure of 5 mm of Hg at a recording leverage of 4:1 gave average excursion amplitudes of 59.9 mm and 12.8 mm, respectively, for the corrugated and flat membranes. A cumulative step-wise series of air displacements of approximately .25 cc each gave the following amplitude steps:

Corrugated	Flat
2.52	2.10
2.49	2.03
2.38	2.02
2.50	1.95
2.59	1.89
2.90	1.85
2.62	1.75
2.83	1.65
2.72	1.68
2.90	1.57
Total ..... 26.45 mm	18.49 mm

Under both tests the corrugated membrane is the more sensitive. In the air displacement test both show changes in amplitude with increasing deformation of the membrane: the flat membrane becoming less sensitive, the corrugated becoming more sensitive, but changing less proportionately than the flat.

Obviously, the corrugated membrane is still in a state of development and must be carefully made to be satisfactory. A few membranes can, however, be supplied at low cost for experimental work. If Harvard tambours are sent to Mr. Newton available membrances will be mounted.

They can be furnished in three grades; average sensitivity, approximately like that on which the tests were made, extremely sensitive, and robust with more rapid recovery. A photographic record of the constants of each membrane in response to a pressure of 5 mm Hg can be furnished on request at cost of time and materials.

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A METHOD FOR THE DETERMINATION OF THE VELOCITY OF SOUND IN SOLIDS

RECENT developments in vacuum tube oscillators have made the velocity of sound in liquids far more accessible without adding materially to its significance

as property of matter. The velocity of sound in crystalline solids remains, however, almost as remote as before, although in this field a fundamental interpretation is at least possible. Any device for measuring this quantity should, therefore, be made known.

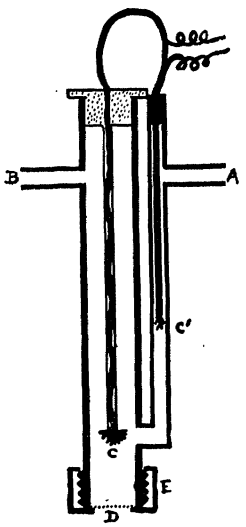

FIG. 1

The accompanying sketch illustrates an apparatus for the purpose which seems capable of development to the necessary precision. A brass tube with entrance A and exit B, through which a gentle stream of thermostated liquid is maintained, is fitted with a multiple-junction thermoelement CC'. The compound junction C is wound with celluloid cement and silk to cause it to absorb sound. A plane-parallel faced sample of the substance under investigation may be inserted at D and secured by the screw-cap E, or at D there may be placed a very thin membrane of cellophane, and the solid under investigation interposed in the path of the impinging sound.

The principle of the apparatus depends upon the work of Boyle and Rawlinson,[1] who have shown that a train of plane sound waves traveling with a velocity v in an infinite homogeneous medium of density ρ will be reflected, when incident normally upon an infinite parallel-faced partition of thickness l and density ρ, according to the relation

$$R = \frac{\left(\frac{v\rho}{v_1\rho_1} - \frac{v_1\rho_1}{v\rho}\right)^2}{4\cot^2 2\pi \frac{l}{\lambda_1} + \left(\frac{v\rho}{v_1\rho_1} + \frac{v_1\rho_1}{v\rho}\right)^2}$$

where v_1 and λ_1 represent the velocity and wave-length of sound in the reflecting medium and R is the ratio of reflected to incident intensity. Boyle and Froman[2] have demonstrated the experimental validity of this expression for ultrasonic waves in media of finite extension. Since this function becomes zero for integral values of $2l/\lambda_1$ it is apparent that the absorption of sound by the thermoelement, and consequently the convergence temperature of thermostated liquid and thermoelement, will vary periodically with the thickness of the interposed solid layer.

The apparatus has been tested roughly in this laboratory, and found capable of operation with sound intensities of less than 0.01 watt per cm.[2] It has the advantage that, apart from the frequency measurement, it needs no more precise apparatus than an ordinary micrometer. Its chief disadvantage is that it requires a plane wave-source.

This note is submitted in the hope that it may catch the eye of some investigator with time and inclination to develop the method. In its present form it can lay claim neither to originality nor to completeness.

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SPECIAL ARTICLES

SEXUAL VARIATIONS IN THE PELVIS[1]

INTERPRETATION AND PRACTICAL SIGNIFICANCE

IN this preliminary report we wish to show that male stigmata in the female pelvis tend to limit pelvic capacity; that the changed architecture resultant on the presence of these features can be appreciated by x-ray examination of the pelvis; that such knowledge is of considerable practical prognostic value to the obstetrician.

Studies in habitus and constitution are tending to isolate characteristic groups which indicate a predisposition to develop certain pathological states. During recent years such workers as Greenhill,[2] Cornell,[3] Davis,[4] De Lee[5] and Solomons[6] have stressed the obstetrical significance of these constitutional abnormalities. Of particular interest to the obstetrician is the so-called masculine type. These women frequently present a masculine physical make-up. They are rather prone to menstrual irregularities, late marriage, sterility, obesity and toxemias of pregnancy. Realizing the importance of the overlap of the sexual characteristics in the female, we have made an investigation on the form of the pelvis and on pelvic capacity

[1] *Trans. Roy. Soc. Can.*, 22: 55, 1928.

[1] From the Department of Obstetrics and Gynecology, Columbia University and the Sloane Hospital for Women, New York City.

[2] J. P. Greenhill, "The Dystrophia Dystocia Syndrome as an Indication for Caesarean Section," *Surg. Clin. N. Amer.*, p. 811, June, 1924.

[2] *Can. Jour. Research*, 1: 405, 1929.

[3] E. L. Cornell, "The Conduct of Labor in the Dystocia Dystrophia Syndrome Patient," *Surg. Gynec. and Obst.*, pp. 707–710, November, 1931.

[4] A. B. Davis, "Extra Peritoneal Caesarean Section in Presumably Infected and Mismanaged Cases of Prolonged Labor," *Amer. Jour. Obst. and Gynec.*, Vol. 7, pp. 373–383, April, 1924.

[5] J. B. De Lee, "Principles of Obstetrics," 1928.

[6] Bethel Solomons and Wentworth A. Taylor, "The Diagnosis of Disproportion Antenatal and Intranatal with a View to Treatment," *Jour. Obst. and Gynec.*, Brit. Emp., Vol. 36: 293–324, 1929.