Samples of medical drivers and screws have been treated to alter their hardnesses, and the amounts of transfer occurring with various combinations have been measured. The table shows the relative amounts of transfer observed. These figures should be regarded as approximate only, as the amount of transfer showed large variations. All the samples of orthopædic drivers and screws examined had hardnesses of about 150 and 380 V.H.N. respectively, and the transfer under these conditions has been taken as unity. Clearly, the transfer may be reduced appreciably by increasing the hardness of the drivers or softening the screws.

DEPENDENCE OF THE RELATIVE AMOUNT OF TRANSFER ON THE HARDNESSES OF DRIVERS AND SCREWS

	Steel driver, 150 V.H.N.	Steel driver, 360 V.H.N.
Steel screw, 380 V.H.N.	1	$\frac{1}{10}$
Steel screw, 133 V.H.N.	$\frac{1}{2}$	$\frac{1}{10}$

It does not necessarily follow, however, that the smallest electrolytic action will occur when a hard tool is used; although a hard tool will reduce the metallic transfer, it will cause increased mechanical deformation of the oxide layer on the screw and may thus affect the inertness of the metal. Further experiments would be necessary to determine the relative importance of these two factors.

These experiments again indicate that some attention should be given to the tools used in orthopædic surgery, as well as to the buried metal.

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A Modified Wedge Method for exciting Shear Modes in Isotropic Media

THE wedge method developed by Bhagavantam and Bhimasenachar[1] has been very useful in the determination of elastic constants of solids. But very often it is found to be difficult to excite and identify the shear modes for the transmission maxima, as they are very weak and are of the same order of intensity as the spurious frequencies of the wedge. However, it has been pointed out[2] that, if small thin specimens are used, shear modes could also be excited, although feebly, due to edge coupling. Recently[3], it has been reported that shear modes cannot be excited in rocks which are coarse-grained and heterogeneous in composition. The method presented here describes a simple modification of the wedge method for exciting and identifying easily only the shear modes in isotropic media and thus overcoming the difficulties inherent in the normal wedge method.

The experimental arrangement consists of the usual Debye–Sears equipment for observing diffraction due to transmission maxima of the section under investigation using an X-cut quartz wedge as a continuous-frequency source. The modification introduced is that the specimen under investigation is placed at an angle to the incident sound wave-front instead of in contact with the wedge as in the usual method. By keeping the plate at an angle, the component of the impinging force that contributes to the shear stress on the specimen will increase and hence the shear modes can be excited intensely. By adjusting this angle to be greater than the critical angle for total reflexion of longitudinal waves in the plate, only transmission maxima due to shear modes are observed with an intensity equal to that of the longitudinal modes for normal incidence. The frequencies at which transmission maxima are observed correspond to the fundamental or harmonic of the shear modes in the plate placed at the appropriate angle. The shear velocity V' in the specimen is determined by using Rayleigh's expression for the condition of maximum transmitted energy at oblique incidence, namely:

$$\sin^2 \varphi = (V/V')^2 - (V/2d \cdot n/\nu)^2,$$

where φ is the angle of incidence of the sound beam on the plate, V the velocity of sound in the liquid in the diffraction cell, d the thickness of plate, n the order and ν the frequency of observed transmission maxima.

Results thus obtained for the shear velocities in some common metals and rocks are given in the accompanying table along with the values obtained by some other methods. All the sections are placed at an inclination of 25°.

Specimen	d (mm.)	$\frac{\nu}{n}$ (Mc./sec.)	Shear velocity (m./sec.)	Velocities obtained by other methods
Aluminium	0·83	2·859	2,843	2,820 (ref. 4)
Brass	0·80	1·551	2,033	2,024 (ref. 2)
Granite	1·13	1·164	2,113	2,370 (ref. 5)
Syenite	1·08	1·414	2,315	2,754 ,,
Shale	0·97	1·463	2,217	2,270 ,,

The advantage of this method is that no difficulty is experienced in identifying shear modes, as they are excited very intensely and the longitudinal modes are eliminated. The accuracy of these determinations is the same as in the normal wedge method. However, the large breadth of resonance present, particularly in coarse-grained rock sections, may lead to slight inaccuracy. But where it is very difficult to excite shear modes at normal incidence, this method is definitely advantageous. The method is at present limited to isotropic media. Full details will be published elsewhere.

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