antam and Suryanarayana[9] are confirmed, and those of Voigt[10] shown to be incorrect. The values for lead sulphide do not agree with those of Bhagavantam[11]. The elastic constants of hexamethylene tetramine have been determined for the first time, and it is believed to be the first organic cubic crystal for which elastic constants have been measured.

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Interferometric Examination of Hardness Indentations on Tin

In an earlier communication in *Nature*[1] we have shown that the Vickers pyramid indentation on steel produces a symmetrical distortion surrounding the indentation, this being revealed by multiple-beam interference fringes.

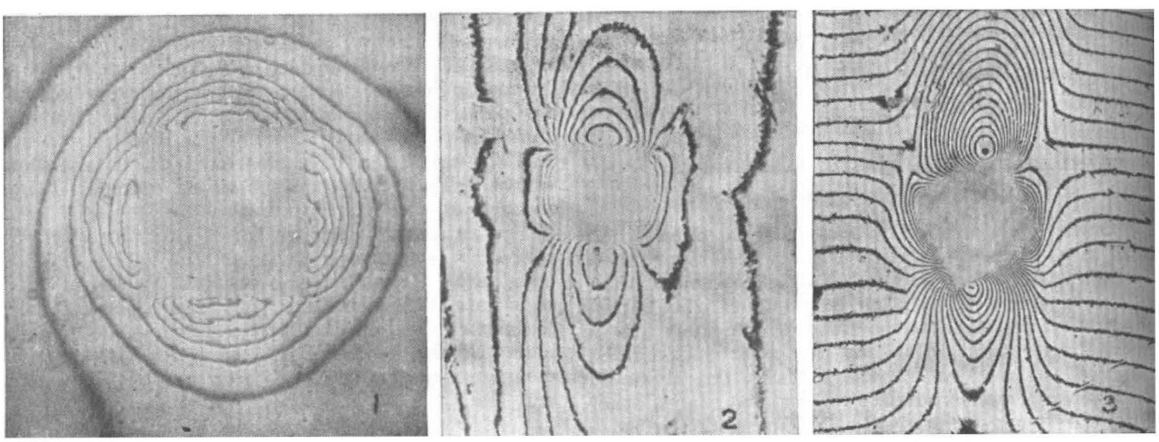
We have applied the same technique to indentations made on 'single crystallites' of tin, with results that are striking. The tin surface was produced by the following method: a piece of good-quality plate-glass was warmed on a hot plate to a temperature slightly exceeding the melting point of tin. A small quantity of tin was melted and poured on to this surface, and the whole allowed to cool. We find that the tin conforms to the surface of the glass and partakes of its natural high polish. The result of this casting is to produce, without any mechanical polish, a perfect state of optical finish, ideally suited to interferometric studies.

A convenient way of removal of the tin from the glass is to make a diamond scratch on the glass immediately behind the tin disk, and on breaking the glass, the tin is released. It is found that the tin shows large areas which are clearly surfaces of 'single crystals', and there is reason to believe, too, that there is some degree of regular crystal orientation. With the aid of a micro-hardness indenter (Vickers pyramid type) indents can be placed within single crystals, and it is found that these lead to surface distortion patterns which are highly asymmetrical. This is best shown by the accompanying photographs. Fig. 1 (× 100) shows a typical symmetrical distortion surrounding the indentation made with a 15 kgm. load on a steel *D.S.En.*22. The high degree of symmetry of the pattern is immediately obvious, and has already been commented upon. Figs. 2 and 3 show the patterns obtained on different tin crystals. In Fig. 2 (× 133), taken with a 50-gm. load, the asymmetry is beautifully shown. It is of interest to note that the extended wings are elevations, the shorter pair being depressions. Opposite the former the indentation sides are convex; opposite the latter, concave. Fig. 3 (magnification × 66) was taken with a 200-gm. load, and, of course, there is a good deal more distortion; but this indentation has been deliberately placed to show that the asymmetry of the distortion is only affected in a secondary manner by the relative positions of the corners and faces, for in Fig. 2 the 'wings' oppose the faces whereas in Fig. 3 they oppose the corners of the indentation.

It is thus quite clear that the asymmetry is a purely crystallographic phenomenon and has nothing to do with the orientation of the square of the indentation.

As a further refinement, attention may be directed to the marked slip or twinning lines in Fig. 3.

We are pursuing these investigations in greater detail, attempting to obtain tin crystals with specified faces of known orientation, on which indentations will be placed.



Since tin has tetragonal structure, the observed asymmetry is not unexpected, and it is our intention to attempt to relate the observations to other crystallographic data.

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