directions, the resulting beam will be unpolarized. It will, however, like all such monochromatic beams, contain harmonics of wave-lengths $\frac{1}{2}\lambda$, etc., if the plane (*hkl*) reflects in higher orders.

An advantage of the method is that the size of the sphere is immaterial, and it can be made to fulfil any requirements which may simplify the actual construction. To avoid unnecessary loss of intensity, a small sphere would probably be best.

The production of such a sphere for monochromatizing Cu $K\alpha$ divergent radiation would be relatively easy, because copper itself has a Bragg angle of 45° 5′ for the {311} planes for Cu $K\alpha$ radiation. This is quite a strong reflexion, and the integrating effect should in any case result in a comparatively powerful beam.

It is intended to construct such a device for several purposes, including measurements of absorption and extinction in diamond. Diamond gives excellent divergent-beam photographs of the Lonsdale type, and some specimens give no divergent beam pattern at all with the ordinary polychromatic divergent beam. A pattern of the Borrmann type, however, has never been observed for diamond, either by Lonsdale or by the author (Grenville-Wells, 1951) (or by Borrmann himself, though many specimens have been tried—private communication).

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Some X-ray measurements on single crystals of hamster carbonmonoxyhemoglobin.*

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The interpretation of X-ray photographs obtained from stationary crystals having large unit cells was first described by Crowfoot & Schmidt (1945) in their study of a derivative of tobacco mosaic virus. More recently the method was used by Carlisle & Dornberger (1948) in the examination of crystals of bushy stunt virus. In the present investigation this method was applied to the analysis of small-angle rotation photographs of hamster carbonmonoxyhemoglobin.

Crystals of carbonmonoxyhemoglobin were prepared from citrated hamster blood. The red cells were separated, washed, and hemolysed as described by Drabkin (1946),

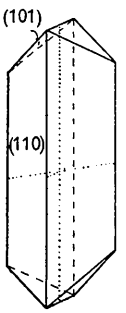

Fig. 1. The crystalline habit of hamster carbonmonoxyhemoglobin.

and the resulting hemoglobin solution was saturated with carbon monoxide. Crystallization was carried out at 4° C. by dialysis against a solution of half-saturated $(NH_4)_2SO_4$ solution adjusted to pH = 6·5. Within a few days prismatic crystals about 0·5 mm. across were obtained; their appearance suggested orthorhombic symmetry (Fig. 1). Selected wet crystals were sealed in thin capillary tubes and photographed at 4° C. with Cu K radiation, in a cylindrical camera of 5 cm. radius. The crystal was oscillated through an angle of 1·0–1·5°. The photographs were measured and interpreted by a modification of the method of Crowfoot & Schmidt adapted to cylindrical films. The calculations are analogous to those described by Carlisle & Dornberger.

The analysis of about twenty X-ray photographs gave the following crystallographic information:

Laue symmetry: D_{2h}–mmm.
Unit cell dimensions: $a = 123$, $b = 88$, $c = 60$ A.
Lattice type: Primitive.

Space group: the following planes were in position to reflect

(h00) Observed: 600, 800, 10.0.0, 12.0.0, 14.0.0, 16.0.0;
Absent: 700, 900, 11.0.0, 13.0.0, 15.0.0.
(0k0) Observed: 060, 080;
Absent: 070, 090.
(00l) Observed: 004;
Absent: 005, 006.

Probable space group derived from the systematic absences and from the stereochemical nature of proteins: $P2_12_12_1$.

It is interesting to observe that Boyes-Watson, Davidson & Perutz (1947) have described a form of horse methemoglobin which shows absences characteristic of the space group $P2_12_12_1$ and which has cell dimensions $a = 122$, $b = 82{\cdot}4$, $c = 63{\cdot}7$ A. From this similarity of space group and dimensions it might be inferred that there is some similarity between the arrangement of the molecules in crystals of this form of horse methemoglobin and in crystals of hamster carbonmonoxyhemoglobin.

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