structure having a period of about 14·4 kX. perpendicular to the kaolin layer, namely the stacking period of the layer (see Fig. 1(*b*)). Even when the continuous intensity distributions were considerable and the three-dimensional peaks were less defined, at least the existence of the (021) reflexion was always recognized.

This observation is of interest when contrasted with the current concepts of the kaolin group minerals as follows (Brindley, 1952; Davis, 1950). According to Bates's interpretation, the tubular habit is considered to be a criterion to identify a kaolin to the halloysite, which is characterized, according to X-ray studies, by such a poorly crystallized structure that it gives only a two-dimensional diffraction due to kaolin layers, except for (00*l*) reflexions corresponding to the inter-layer spacing. The stacking period mentioned above, which is twice as long as that reported for the kaolinite–halloysite series of the group, is now accepted only for dickite, a highly crystallized variety of the group, though it was once assumed for kaolinite by Gruner.

The existence of the three-dimensional structure for Hongkong and Spruce Pine kaolins was confirmed also by high-resolution electron-diffraction diagrams taken by Hillier & Baker's method and by X-ray powder diagrams taken with monochromatic radiation. The results and a discussion on the structure will be reported shortly in this column.

The authors wish to express their thanks to Dr M. Nakahira, Prof. S. Miyake, Dr K. Ito, Prof. C. Kawashima, Prof. T. Sudo and Dr S. Iwai for their interest and encouragement in the present work and their kindness in supplying good samples.

References

Bates, T. F., Hildebrand, F. A. & Swineford, A. (1950). *Amer. Min.* **35**, 46.
Brindley, G. W. (1952). *X-ray Identification and Crystal Structures of Clay Minerals*, chap. 2. London: Mineralogical Society.
Brown, J. F. & Clark, D. (1952). *Acta Cryst.* **5**, 615.
Davidson, N. & Hillier, J. (1946). *J. Appl. Phys.* **18**, 499.
Davis, D. W. (1950). Report No. 6 of the American Petroleum Institute Research Project 49.
Haine, M. E., Page, R. S. & Garfitt, R. G. (1950). *J. Appl. Phys.* **21**, 173.
Hillier, J. & Baker, R. F. (1946). *J. Appl. Phys.* **17**, 12.
Poole, J. B. le (1947). *Philips Tech. Rev.* **9**, 33.
Turkevich, J. & Hillier, J. (1949). *Analyt. Chem.* **21**, 475.
Warren, B. E. & Hering, K. W. (1941). *Phys. Rev.* **59**, 925.

Acta Cryst. (1954). **7**, 513

A construction giving the projection of the point $h00$ on to the $0kl$ plane in reciprocal space, for non-orthogonal axes.

By E. W. Radoslovich, *Crystallographic Laboratory, Cavendish Laboratory, Cambridge, England*

(*Received* 15 *March* 1954)

In the course of a three-dimensional structure determination on a triclinic crystal one frequently wishes to find the projection of the point $h00$ on the $0kl$ plane in reciprocal space, in order to use the $0kl$ reciprocal net as the hkl net. This point can be marked on the $0kl$ net by calculating its displacement from the point 000 using well known formulae (Bunn, 1945). It is, however, interesting to note that there is a very simple geometrical construction which gives the same result, as can be shown trigonometrically.

For a net containing b^* and c^*, with angle α^* between them the construction is as follows (see Fig. 1):

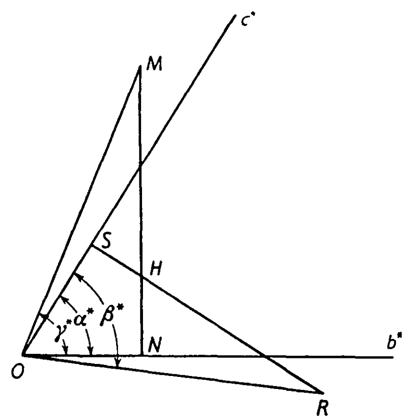

Fig. 1.

(i) Draw OM at an angle γ^* to b^*; make OM equal to ha^* in length, and draw MN normal to b^*.

(ii) Draw OR at an angle β^* to c^*; make OR equal to ha^* in length, and draw RS normal to c^*.

Then the intersection, H, of MN and RS is the projection of $h00$ on $0kl$. Usually one will put $h = 10$, say, and (having found the projection of 10,0,0) then divide the line OH into ten parts to give the projection of 100, 200, etc.

The fact that this construction does give the correct projection can be appreciated as follows:

Imagine a cone constructed around b^* with apex O, vertical half-angle γ^*. Then a^* lies in the surface of this cone. Likewise a^* also lies in the surface of a cone constructed around c^*, apex O, vertical half-angle β^*. The two cones will in general intersect along two straight lines passing through O. These are both a^*; they correspond to the two cases of right-handed or left-handed axes. The point $h00$ lies at a distance ha^* from O along the intersection of the two cones; we require its projection on the plane of b^* and c^*. We obtain this projection by making the sloping sides of the cones of length ha^*, drawing the cones in projection on the plane of b^* and c^*, and noting the point H where the projections of their respective bases intersect.

Reference

Bunn, C. W. (1945). *Chemical Crystallography*, p. 158. Oxford: Clarendon Press.