p. 135. $F\bar{4}3m$, $h+k=2n$ and $k+l=2n$:

Delete "As for $P\bar{4}3m$" and substitute "A and B as for $P\bar{4}3m$ (page 134), but with numerical factor 16 instead of 4".

$I\bar{4}3m$, $h+k+l=2n$:

Delete "As for $P\bar{4}3m$ (page 134)" and substitute "A and B as for $P\bar{4}3m$ (page 134), but with numerical factor 8 instead of 4".

p. 137. $F\bar{4}3c$, $h+k=2n$, $k+l=2n$, $l=2n$:

Delete "As for $P\bar{4}3n$ (1) (page 136)" and substitute "A and B as for $P\bar{4}3n$ (1) (page 136), but with numerical factor 16 instead of 4".

$F\bar{4}3c$, $h+k=2n$, $k+l=2n$, $l=2n+1$:

Delete "As for $P\bar{4}3n$ (2) (page 136)" and substitute "A and B as for $P\bar{4}3n$ (2) (page 136), but with numerical factor 16 instead of 4".

$I\bar{4}3d$, $h+k+l=4n$, $h=2n$, $k=2n$:

Delete "As for $P\bar{4}3n$ (1) (page 136)" and substitute "A and B as for $P\bar{4}3n$ (1) (page 136), but with numerical factor 8 instead of 4".

p. 138. $I\bar{4}3d$, $h+k+l=4n+2$, $h=2n$, $k=2n$:

Delete "As for $P\bar{4}3n$ (2) (page 136)" and substitute "A and B as for $P\bar{4}3n$ (2) (page 136), but with numerical factor 8 instead of 4".

p 140. $F43$, $h+k=2n$ and $k+l=2n$:

Delete "As for $P43$ (page 139)" and substitute "A and B as for $P43$ (page 139), but with numerical factor 16 instead of 4".

p. 142. $I43$, $h+k+l=2n$:

Delete "As for $P43$ (page 139)" and substitute "A and B as for $P43$ (page 139), but with numerical factor 8 instead of 4".

p. 144. $P4_33$, (6):

"$A=0$ if $h=0$; $B=0$ if $k=0$"

should read "$A=0$ if $k=0$; $B=0$ if $h=0$".

p. 158. $Pnnn$, formula for A:

"$h-l$" should read "$l-h$".

$Pban$, bottom line but one:

Delete "$=0$ if $h=0$ or $k=0$".

p. 162. $P4_2/n$, $h+k=2n$, $k+l=2n+1$:

Add "$A=0$ if $h=k=0$.".

p. 180. Sixth line:

At end of formula for A the group of brackets)} should be)]}.

p. 181. $Fd3c$, $h+k=4n$, $k+l=4n+2$, $l+h=4n$:

"$A=-32\{\Sigma \sin \sin \cos + \Sigma \cos \sin \sin\}$"

should read

"$A=-32\{\Sigma \sin \cos \sin + \Sigma \cos \sin \sin\}$".

I am grateful to Dr Helen Megaw for directing my attention to the first two of the above errata and thereby shattering my complacency in regard to the remainder of the text.

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Oriented growth of silver in silver halide crystallites.

By D. W. Pashley, *Physics Department, Imperial College, London S.W. 7, England*

(*Received* 16 *December* 1949)

In view of the footnote to a recent paper by Berry (1949), a preliminary account of some work in progress in this Department would appear to be of interest.

Berry reports that during the irradiation of a single crystal of silver bromide with a mercury-vapour lamp, oriented growth of silver occurs such that the (110) planes of the two crystals are parallel, but are rotated through 90° with respect to one another. It is also apparent from his work that there is no change in large silver bromide crystals, or in thin oriented layers of silver iodide, during the exposure of the specimens to the electron beam in the diffraction camera; this is in accord with observations by other workers (see, for example, Wilman (1940)).

During the course of an electron-diffraction investigation of completely oriented layers of silver bromide and silver chloride, formed by condensation from the vapour, it has been found, in contrast to the results of Berry and others, that the electron beam causes the halide to change gradually to silver, until only a very small amount of the halide finally remains. Crystal size has a considerable influence on the halide stability, since it is found that the thinnest layers studied, only a few Ångström units thick, change far more rapidly under the electron beam than do those of several hundred Ångström units thickness.

During the early stages of decomposition of the silver chloride, the silver grows in an orientation completely parallel to that of the chloride (both crystals being cubic), and as the process continues prominent streaks appear on the electron-diffraction patterns, parallel to the [111] directions in the silver crystals. These streaks seem to indicate either a growth in the form of thin (111) plates of silver, or some form of distortion occurring perpendicular to the silver (111) planes. Extra spots later appear on these streaks, indicating that the silver is twinning about all of its [111] axes.

During the decomposition of the bromide layers, parallel growth of silver also occurs, although more polycrystalline silver is formed than in the chloride case, and other weaker orientations of the silver also appear.

When the halide layers are formed by chemically attacking surfaces of silver single crystals, they are stable to the electron beam. Such halide layers have been reduced by means of a photographic developer, when much of the silver produced grows orientated parallel to the large silver crystals and is twinned about its [111] axes; this growth is independent both of the orientation of the surface of the silver crystal and of the relative orientations of the silver and silver halide. Similar growth also occurred during the prolonged exposure to sunlight of one of the bromide specimens.

These observations are of importance in connexion with the building up of silver on the photographic latent image, and have a direct bearing on the well-known Gurney–Mott theory of the latent image and on versions of this theory recently suggested by Mitchell (1949*a*, *b*).

The author wishes to thank Sir George Thomson, Dr W. Cochrane and Dr M. Blackman for their keen interest and helpful discussions during the progress of this work.

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Interpretation of the Patterson synthesis.

By C. A. Beevers and J. H. Robertson. *Dewar Crystallographic Laboratory, University of Edinburgh, Scotland*

(*Received* 19 *December* 1949)

During an investigation of the structure of strychnine hydrobromide, a brief note on which has recently been submitted to *Nature*, we have utilized the three-dimensional Patterson function in a way which, so far as we are aware, has not been used before. The method is not universally applicable, since it depends upon the presence of a heavy atom, and upon multiplicity in the space group, but it may find application in a variety of structure determinations.

Consider a crystal structure in which there is a heavy atom, W, whose position can be found, and a number of lighter atoms, $V_1, V_2, \ldots, V_n$, whose positions are unknown. Suppose the space group to be $P2_12_12_1$, with equivalent positions $(x, y, z), (\frac{1}{2}-x, \bar{y}, \frac{1}{2}+z), (\frac{1}{2}+x, \frac{1}{2}-y, \bar{z}), (\bar{x}, \frac{1}{2}+y, \frac{1}{2}-z)$. As an approximation the Patterson synthesis may be considered as consisting only of the vectors of the $W-V$ type, together with $W-W$. For any one atom V_r there occur four peaks $W-V_r$ in the unique volume of the Patterson projection, namely, at

(1) $(x_W-x_r, y_W-y_r, z_W-z_r)$,
(2) $(\frac{1}{2}+x_W+x_r, y_W+y_r, \frac{1}{2}+z_W-z_r)$,
(3) $(\frac{1}{2}+x_W-x_r, \frac{1}{2}+y_W+y_r, z_W+z_r)$,
(4) $(x_W+x_r, \frac{1}{2}+y_W-y_r, \frac{1}{2}+z_W+z_r)$,

where (x_W, y_W, z_W) is the position of the atom W, and (x_r, y_r, z_r) is the position of V_r. Now in these expressions x_W, y_W and z_W are known if the position of W has been found. Hence the location of V_r could be found directly from the Patterson peaks were it known which expression applies to each individual peak. This is not known, but it is easy to apply all four formulae to all the peaks, by four transcriptions of the Patterson synthesis with its origin transferred to the four equivalent positions of atom W. When this is done there will arise $16n$ possible atomic positions, of which $12n$ will be randomly spaced, and the remaining $4n$ will show fourfold coincidences on n points in space. These fourfold coincidences will enable almost certain recognition of the location of the sites of the lighter atoms.

Since this procedure is equivalent to locating in the Patterson synthesis sets of vectors which in the crystal structure converge upon single atoms, we refer to it as the 'Vector Convergence Method'. It can, of course, be used in the interpretation of Patterson functions in two or three dimensions, but it is likely to be much more effective in three dimensions. We think that it is of more value than the Harker method (Harker, 1936) and Buerger's 'implication diagram' (Buerger, 1946), which make use of vectors of an entirely different type, namely between equivalent points of the same atom. Peaks of this type, we find, are often masked by chance peaks which are of twice the weight of the true Harker peaks. Other advantages of the vector convergence method are that it uses the full symmetry of the space group, and also that it gives a three-dimensional result. Whether or not a multiplicity of 2 would be sufficient to ensure success can be tested only by experiment, but probably 3 and certainly 4 or 6 would allow the method to be used. In the case of strychnine hydrobromide, with a multiplicity of 4, the use of the bromine vectors gave clear evidence of the approximate positions of the 27 carbon, nitrogen and oxygen atoms.

References

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Notes and News

Announcements and other items of crystallographic interest will be published under this heading at the discretion of the Editorial Board. Copy should be sent direct to the British Co-editor (R. C. Evans, Crystallographic Laboratory, Cavendish Laboratory, Cambridge, England).

International Tables Commission

The *International Tables* Commission has co-opted J. S. Kasper (U.S.A.) and has appointed him editor of Vol. 2 in place of A. L. Patterson, resigned.

The Executive Committee has accepted a recommendation of the Commission that the tables should be entitled *International Tables for X-ray Crystallography*, and that they should be printed and published for the Union by the Kynoch Press, Birmingham, England. It is hoped that Vol. **1** (Theory of Crystallographic Groups) will shortly go to Press.

Arrangements for the distribution of the tables will be announced later.

Joint Commission on Physics Abstracting

The International Council of Scientific Unions has established a Joint Commission on Physics Abstracting. The International Union of Pure and Applied Physics is the 'mother Union' for this Commission, and other Unions have been invited to appoint representatives. The Executive Committee of the International Union of Crystallography has nominated as its representative A. J. C. Wilson (Physics Department, University College, Cathays Park, Cardiff, Wales) with whom crystallographers interested in the work of this Commission are invited to communicate.