that all the C_n structures have certain common properties in S^*, whether or not some or all the residues in the tetrapeptides are deleted (Wrinch, 1948a).

All the skeletons place the N, C, C atoms of their amino-acid backbones at points of a diamond network, typified by points with cubic co-ordinates $\overline{1}\overline{1}\overline{1}$, $00\overline{2}$, in the scale k: a reasonable value of the metric of the network, $a = k\sqrt{3}$, is c. $1\frac{1}{2}$ A. First we replace the atoms by point atoms; there result sets of 'weights' on the diamond network. As previous studies have shown (Wrinch, 1946), for any set of weights on a lattice L in 'atomic' space S, the transform T in S^* is periodic; its lattice is L^*, the lattice reciprocal to L. Choose for L the coarsest possible lattice, the body-centered cubic lattice (000, 111), and the finest possible lattice for T results; it is the face-centered cubic lattice (000, $\frac{1}{2}\frac{1}{2}$0) in the scale $k^* = 1/k$.

How then is it indicated in S^* that the atomic nuclei of the skeletons are further restricted, to the diamond network? The answer to the question emerges (Wrinch, 1946) when we remark the values of T at the *non-lattice points* $\frac{1}{4}, \frac{1}{4}, \frac{1}{4}, \frac{1}{2}, \frac{1}{2}, \frac{1}{2}, \frac{3}{4}, \frac{3}{4}, \frac{3}{4}$, namely, $\overline{p}_0 + ip_1$, $p_0 - p_1$, $\overline{p}_0 - ip_1$, where p_0 and p_1 are the proportions in which the total weight is divided between the two face-centered lattices with the common translation 220, L_0 with origin at, say, $00\overline{2}$, L_1 with origin at, say, $\overline{1}\overline{1}\overline{1}$. Such points are on the body-centered cubic lattice reciprocal to the face-centred cubic lattice (000, 220); hence the par values of the amplitudes of the p_0 and p_1 terms: the origins of L_0 and L_1 lie on submultiple lattice points with one-half and one-quarter the displacements; hence the periodicity of the phases of these terms only in larger cells, with displacements two and four times as large.

As p_0/p_1 varies, there is nothing distinctive about the point $\frac{1}{2}, \frac{1}{2}, \frac{1}{2}$. But at the other points characteristic features emerge, namely values of $| T |$ at least as large as $\frac{1}{2}\sqrt{2}$. For the C_n point sets, with or without their tetrapeptides, $p_0 = p_1$ and $| T |$ has maxima of height $\frac{1}{2}\sqrt{2}$ at such points. For intermediate cases, when some of the residues in the tetrapeptides are absent, there are only negligible changes in the positions and heights of the maxima. Distinctive characteristics in S^* for all such structures have therefore been found. Whether T is T_C, the transform of the carbon point atoms, or T_N, the transform of the nitrogen point atoms, or $T_C + T_N$, T is

a periodic function with par values at a lattice of 'primary' peaks, and there are also 'secondary' peaks at which $| T | \sim \frac{1}{2}\sqrt{2}$. For the first, reciprocals of the distances from the origin are c. $\frac{1}{2}$A. $\sqrt{6}(1, \frac{1}{2}\sqrt{2}, \frac{1}{3}\sqrt{3}, \frac{1}{2}, \ldots)$, for the second c. 2A. $(1, \frac{1}{11}\sqrt{(33)}, \frac{1}{19}\sqrt{(57)}, \frac{1}{3}, \ldots)$.

We now reinstate the atoms. The transform is $T_C f_C + T_N f_N$. Despite the atomic scattering factors, which destroy the periodicity of the transform, the primary and secondary peaks persist at points little displaced in position, though their heights are 'damped'. Thus for the peaks nearest to the origin, $| T |$ is now c. $\frac{1}{5}\sqrt{2}$.

The entries on the intensity map of a crystalline protein are made up of contributions from the skeletons, the R-substituents and the waters. Subject to the discussion of possible small systematic deviations of atoms from network positions, it is here predicted that the contributions of the molecular skeletons have maxima at certain points far out from the origin. It seems unlikely that the R-groups or waters make appreciable contributions at these points. If this is the case, the prediction would say that the intensity maps of the crystals should show the maxima described, always of course taking into account the contributions of all the atoms to the intensity at the origin. So far no published studies record intensities so far out as any of the points. It may be emphasized that the prediction specifies not only the distances of the points from the origin, but also the directions relative to the postulated C_n skeletons. The crystal classes of the various crystalline proteins suggest the probable orientations therein of structures associated with diamond networks if present (Wrinch, 1948b), and so also the directions in which the search for the predicted intensity maxima may be begun.

References

WRINCH, D. (1937). *Nature, Lond.*, **139**, 972.
WRINCH, D. (1946). *Fourier Transforms and Structure Factors*. ASXRED Monograph no. 2.
WRINCH, D. (1948a). *Science*, **107**, 2783.
WRINCH, D. (1948b). *Amer. Min.* **33**, 781.

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 Union of Crystallography

The Executive Committee has accepted a kind invitation from the Swedish National Committee of Crystallography to hold the Second General Assembly and International Congress in Stockholm from 27 June to 3 July 1951. These dates have been chosen in consultation with the Swedish National Committee and with the National Committee of all the Adhering Bodies. It is hoped that this early notice will make it possible for crystallographers throughout the world to arrange to attend.

Further particulars of the meeting will be given from time to time in these columns and elsewhere.

International Tables: offprints in quantity

The *International Tables* Commission announces that it is hoped that arrangements can be made with the printer of the *International Tables* for the supply of offprints of sets of separate tables likely to be useful for class work or for continuous laboratory reference. These would be sold in quantities of not less than 25 at a time and would vary in size from 3 to 127 pages. The price for a 7-page offprint ($8\frac{1}{4} \times 11$ in.), with title-page extra but no cover, would be of the order of $2 post free for 25, and *pro rata* for larger quantities. A grey board cover would add about $1.50 per 25.

Sections that might be in demand as offprints would include, say:

(1) Prof. von Laue's historical introduction (in English);

(2) Introduction to space-group theory with one section of sample space groups;

(3) sin $2\pi nx$, cos $2\pi nx$;

(4) Lorentz polarization factors (direct and inverse);

(5) Introduction to reciprocal-lattice theory;

(6) Wave-length tables in Ångström units;

(7) Atomic scattering factors, calculated and observed;

(8) Absorption coefficients;

and others for which suggestions are invited.

In order that these cheap rates should apply it is necessary for a firm order to be placed, at the time of printing the *Tables*, for the quantities likely to be required within the next ten years, although of course it is not expected that heads of laboratories or of teaching departments will be able to place orders until they know exactly what is available and at what price.

To assist the Commission to make an estimate, however, and to decide what sections should be selected for off-printing, inquiries and suggestions are invited *now* from Universities, Technical and Industrial Research Institutes, etc. What is particularly required is:

(1) An estimate of the possible requirements of the given institute or laboratory over a period of ten years;

(2) The nature of the tables most likely to be required, preferably in terms of the proposed Tables of Contents recently circulated, although suggestions outside these would be welcomed.

All correspondence in this matter should be addressed direct to the Chairman of the Commission (Kathleen Lonsdale, University College, Gower Street, London W.C. 1, England).

American Crystallographic Association Notice

The members of the Crystallographic Society of America and the American Society for X-ray and Electron Diffraction have voted to terminate the existence of these two societies on 31 December 1949 and to form in their place a single society fulfilling the functions of the two existing societies. The name chosen by the members of both societies is *American Crystallographic Association*. The names of the officers of the new society will be announced in this journal as soon as they shall have been elected.

ELIZABETH A. WOOD and WILLIAM PARRISH
Secretaries of A.S.X.R.E.D. and C.S.A.

Acta Crystallographica

Recent issues of this journal have appeared at irregular intervals in order to complete Volume 2 in the calendar year 1949. From January 1950 it is hoped to publish at two-monthly intervals on approximately the tenth day of alternate months.

Book Reviews

Works intended for notice in this column should be sent direct to the Editor (P. P. Ewald, Polytechnic Institute of Brooklyn, 99 Livingston Street, Brooklyn 2, N.Y., U.S.A.). As far as practicable books will be reviewed in a country different from that of publication.

Minerals and How to Study Them. By the late E. S. DANA, revised by C S. HURLBUT, Jr. Pp. 323 + x. New York: Wiley; London: Chapman and Hall. 3rd ed. 1949. Price $3·90; 24s.

It is a tribute to the original book, published in 1895, that after more than half a century, during which great changes in mineralogy have taken place, it should be considered worth while to reissue it. Moreover, although 'much... has been rewritten', 'an effort has been made to maintain the same point of view for the same reader, the beginner in mineralogy'. Before the book can be fairly judged, one should know what kind of beginner is contemplated; is he an amateur with little or perhaps no scientific background, or a first-year student at a University who will pursue the subject further in subsequent years? The answer can perhaps be inferred from the contents of the book.

In the first place, it is clear that minerals are to be studied by qualitative rather than quantitative methods. The use of the petrological microscope is not described nor is thin-section technique. Optical properties, other than those such as colour which require descriptive terms, are disposed of in two short paragraphs together with an illustration of the double refraction of calcite. Very little chemical knowledge is pre-supposed—in fact, virtually none. The reviewer regrets particularly that the structural aspect of mineralogy is barely mentioned. The reader is told that the crystalline state is essentially one with 'an orderly arrangement of atoms', but he is left completely unaware of the detail in which these arrangements are now known. X-ray tests are occasionally mentioned, but the reader could not be blamed if he thought them similar to medical radiographical tests. It came as a shock to find on p. 14 that the atoms in 'a lump of iron' are grouped into molecules.

It seems very ungracious to multiply these comments on a book which has doubtless been of great value in the past and which now reappears beautifully printed and bound, and possessing a wealth of line diagrams and half-tone reproductions. The reviewer considers that the book will be of most use to amateur collectors of minerals who will find it a clear and stimulating introduction to the subject. The section on crystal growing is especially to be commended. The information contained in the determinative tables is clearly set out, and any intelligent beginner, who follows the advice given, will make a good start in this subject. For university students taking a short course in mineralogy as part of a course in geology or mining, the book may also be recommended, though for such students a more modern background to the whole subject would be an advantage. The book is less suitable for students who intend to pursue the study of minerals