It was possible to get preparations with definite orientation of the lattice in all three dimensions. From these preparations it was found that in the cell-walls, tangential and radial planes are present with spacings 9·6 A. and 4·65 A. respectively, and that identity periods of 10·40 A. and 10·15 A. are present in the direction of the long axis of the organ.

The spacing 4·65 A. agrees with the side-spacing of protein chains and must be ascribed to the protein side-chains of the chitin molecule.

A probable position of molecules in the cell-wall of the cylindrical unicellular organ and in the unit cell may be derived from these data. The protein side-chains of the chitin molecule have radial arrangement in the wall; the cellulose chains of the chitin molecule are almost, but probably not completely, arranged parallel to the long axis of the organ. The plane of glucosamin residue ring is perpendicular to the tangential face of the wall.

A full account is given in *Protoplasma*.

A. N. J. **Heyn.**

University of Utrecht,
Holland.
Jan. 21.

## Directional Properties of Short-Wave Frame Aerials

When a receiving frame aerial is rotated about an axis parallel to the electric vector of an incident wave, then with long waves the frame current changes from zero to some finite value as the frame rotates from a position where its plane is perpendicular to the direction of wave propagation to a position where its plane is parallel to this direction. Upon this fact the normal directional properties of frame aerials depend.

With waves of lengths comparable to the frame dimensions, this is no longer a correct statement. When the frame is perpendicular to the direction of the propagation of short-waves, it is found that current antinodes of equal amplitude occur at the ends *AA* of that diameter of the frame (Fig. 1) which is parallel to the magnetic vector *H* of the wave, and current nodes occur at the ends *NN* of the diameter parallel to the electric vector *E* of the wave. Other nodes and antinodes may be symmetrically disposed round the frame at points which depend on the ratio of the wave-length to the frame perimeter.

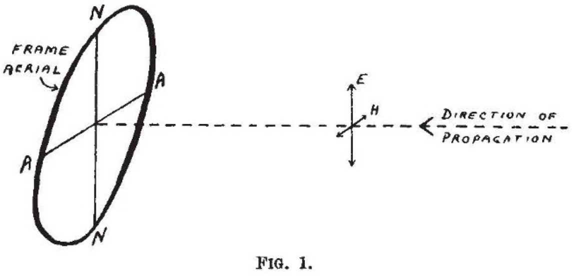

Fig. 1.

As the frame rotates about the diameter *NN*, these latter antinodes move round the frame and change in number and magnitude until the current assumes the distribution previously described[1] for a short-wave frame oriented so that its plane is parallel to the direction of wave propagation. When the frame is rotated about the diameter *AA* parallel to the magnetic vector of the wave, then the current obviously becomes zero when the plane of the frame is again parallel to the direction of wave propagation.

With long waves the frame current will be zero for *any* position of the frame which allows one diameter to be parallel to the magnetic vector of the wave, but with short waves there is only *one* position for which the frame current is zero, namely, when the plane of the frame is perpendicular to the electric vector of the wave.

These results accord with a theory now being developed and have been established qualitatively by using small frames with 40 cm. waves under water.

The exact way in which the current distribution varies with the position and dimensions of the frame compared with the direction of propagation and length of wave respectively, and the consequences on the directional properties of short-wave frames, is now being investigated. It is hoped that a full account of the work will be published in the near future.

L. S. **Palmer.**

University College,
Hull.
Jan. 4.

---

[1] "The Current Distribution round a Short-wave Frame Aerial", Palmer, Taylor and Witty, *Proc. Phys. Soc.*, **46**, 76–84 (1934).

## Spectrum Emitted by Potassium Bromide Crystal under X-Rays

On general grounds, one might anticipate an emission spectrum from a crystal bombarded by X-rays, as the result of the return of electrons to vacant levels. The present note shows the results obtained from work commenced originally in 1933 and later continued in 1934; the experiment was carried out with a small-aperture low-dispersion spectrograph necessitating 24 hours of exposure. The accompanying spectrum (Fig. 1) shows the light emitted by an artificial KBr crystal under bombardment by molybdenum X-rays from a Mueller-Shearer X-ray tube. The comparison lines are the Hg lines, 5791, 5461, 4353, 4047, 3657.

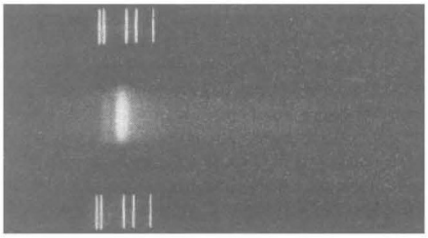

Fig. 1

The spectrum shows three bands, the third in the ultra-violet being less distinct than the others; these bands have their centres at 5310, 4520, 3810; the slight apparent continuous spectrum on each side of the bands is a defect of reproduction. The emission bands may be compared with those found by Roos[1] when specially coloured alkali halide crystals were illuminated by ultra-violet within the special ultra-violet absorption band (*U* band). In the present X-ray case, when an uncoloured crystal was used, there appear only some alternate bands found by Roos, and the intensity distribution is quite different.

P. W. **Burbidge.**
T. G. **Moorcraft.**

University College,
Auckland, N.Z.

---

[1] *Ann. Physik*, **20**, 783 (1934).

© 1936 Nature Publishing Group