Spencer will say to the assertion that the original Asteroid type has persisted unchanged.

Prof. Dunkerly tells us that changes in the ocean water would affect fertilisation and early development. I said nothing about this; but what difficulty is there in supposing that embryonic change affects the adult history? We all know that it does, and the results might manifest just as much regular seriation as appears in any alleged orthogenetic trend. However, I do not remember touching on this in that part of the discourse which Prof. Dunkerly has been so good as to discuss.

F. A. BATHER.

The Fine Structure of the Normal Scattered Molybdenum $K\alpha$-Radiation from Graphite.

IN the September issue, 1928, of the *Physical Review*, B. Davis and D. P. Mitchell reported an experimental investigation of the molybdenum $K\alpha$-radiation scattered by graphite with the aid of an ionisation spectrometer. In their work it is stated that the normal scattered radiation should have a much more complicated structure than the primary radiation. Instead of the one $K\alpha_1$-line they find four lines: one in the same position as the $K\alpha_1$ line and three lines shifted to the long wave-length side by 1·2; 2; 11·3 X-units respectively, the distance between the $K\alpha_1$ and $K\alpha_2$ being 4·28 X-units. As these shifts correspond more or less accurately to the L_{III}-, L_I-, and K-level of the carbon atom, the effect reminds one of the well-known Raman effect in the optical region.

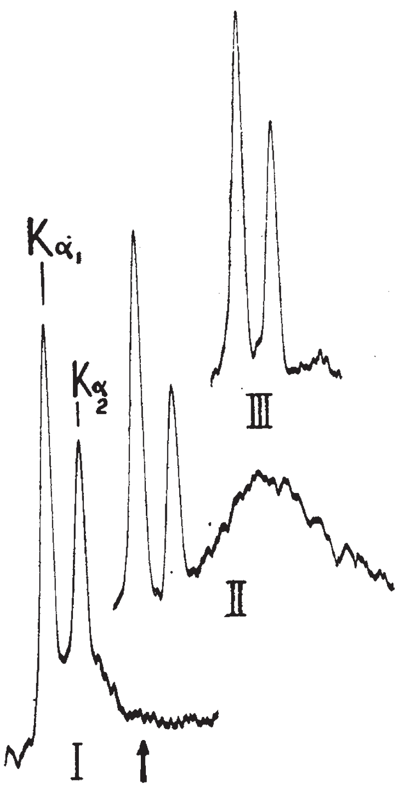

FIG. 1.—Curve I. Normal scattered radiation and Compton scattering. Scattering angle from 25° to 50°. The Compton shift ranges from about 2 to 9 X-units.
Curve II. Normal scattered radiation and Compton scattering. Scattering angle from 45° to 130°. The Compton shift ranges from about 7 to 40 X-units.
Curve III. Direct radiation from molybdenum anticathode.

Because of the high theoretical importance of these experiments, we have tried to repeat them, using the photographic method; but we failed to detect any difference at all between the structure of the primary radiation and that of the 'undisplaced' scattered line. In the meantime, Ehrenberg (*Zs. f. Phys.*, **53**, 234; 1929) published an analogous negative result. Still, we think it worth while to give a short discussion of our work in view of the importance of the problem in question.

The spectrograph used was of the Siegbahn type, calcite was used as analysing crystal, the dispersion was such that the distance between the $K\alpha$-lines was 0·19 mm. on the photographic plate. The scattering graphite was put on the cathode inside the X-ray tube, the alternating tension was 35 kv. eff., the current 25 ma. By taking control photographs it was ascertained that only the radiation scattered by the graphite could reach the photographic plate. All the photographs taken were registered with a photometer of the Moll type (see Fig. 1). Plate I was taken with the graphite at a distance from 5 to 15 mm. from the anticathode focus. The time of exposure was 35 hours. At the small scattering angles from 25° to 50°, the Compton scattering is confused with the normal scattered lines. At a distance, however, of 11·3 X-units from the normal $K\alpha_1$-line where Davis and Mitchell found their weakest component of the scattered complex line (see arrow to curve I), we see that there cannot be any line with an intensity of more than 2 per cent of that of the scattered $K\alpha_1$-line. Plate II was taken with the graphite at a distance from 15 to 20 mm. from the focus. The time of exposure was 75 hours. On this plate the region between the $K\alpha_1$ and $K\alpha_2$ is wholly free from Compton radiation. In this region Davis and Mitchell found two other components of the complex line. From a comparison, however, of curve II with curve III, which relates to the spectrum of the direct radiation, we conclude that there seems to be no essential difference at all between the normal scattered $K\alpha$-doublet and the direct radiation.

It might be remembered that if there should exist in the X-ray spectrum something analogous to the Raman effect in the optical region, we should expect this to give rise not to lines but to a *continuous* spectrum, which we should not be able to detect with the means used in our experiments.

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Variation of Conductivity of the Upper Atmosphere.

MEASUREMENTS of the height of the base of the aurora in northern Norway by C. Störmer (*Geofys. Publ.*, I., No. 5) and by L. Vegard and O. Krogness (*Geofys. Publ.*, I., No. 1) show that a considerable number of the bases are situated at heights of about 100 km. and about 106 km. (compare the frequency curve, Fig. 18, *Geofys. Publ.*, I., No. 1, p. 101). In treating 1737 base-heights between 90 and 120 km. it was found from the frequency curve that during ebb-tide in the atmosphere the maximum at 100 km. was predominant, while during flood-tide the maximum at 106 km. was predominant. Further investigations have shown that the maxima of the frequency curve are to be considered as displacements of one and the same maximum. From this we conclude that, as regards the locality considered, the mass of air situated above 100 km. at ebb-tide is the same