Details of these investigations will be published elsewhere.

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¹ Bertrand, *C.R.*, **177**, 997 (1923).

² Zelinski, *C.R.*, **177**, 1041 (1923).

³ Mond and Heberlein, *J. Chem. Soc.*, **125**, 1222 (1924).

⁴ Boomer, Martin and Argue, *NATURE*, **129**, 433 (1932).

⁵ Pearson and Robinson, *J. Chem. Soc.*, 652 (1932).

Ice-Crystal Haloes

A NOTE in *NATURE* of March 13, 1943, p. 300, reported the occurrence at Bournemouth of what was interpreted as the arc of contact to the 46° halo. Without complete data positive identification of the arc in question is not possible, but it is far more likely to have been the common circumzenithal arc.

The circumzenithal arc is formed by refraction through the 90° angles of ice prisms floating with their axes of symmetry vertical (Fig. 1). Because their orientation is fixed except for freedom to rotate about the axis of symmetry, this arc is well coloured; it may be faint, but the colours are always relatively pure, in sharp distinction from those of the other arcs and rings.

The true upper contact arc to the 46° halo depends for its formation upon a predominance of crystals floating with a 90° refracting edge horizontal (Fig. 2). As these prisms are otherwise randomly disposed the colours must be broken, and the arc will appear brownish-red.

FIG. 1.

FIG. 2.

The conditions for the formation of the circumzenithal arc are readily fulfilled by the presence of umbrella-like crystals consisting of a flat plate on top of an elongate prism, or of prisms pyramidal at the lower end and hollow in the centre. It is difficult, however, to visualize the type of crystal that would give rise to the contact arc, which, if reliable records were available, might prove to be as rare as the parhelia to the 46° halo.

The mention of colour in the Bournemouth arc, the low sun at 4 p.m., February 8, the lack of mention of any 46° halo, and the commonness of the circumzenithal arc, make it reasonably certain that the latter was the arc in question. This arc may be expected any time that parhelia to the 22° halo occur with a solar altitude of less than 32°, provided that the cirrostratus sheet extends overhead.

My observations for the year ending October 15, 1943, may give some idea of the relative commonness of the better-known ice-crystal phenomena:

22° halo		190 days
Parhelia to 22° halo		38 days
Circumzenithal arc		13 days
Sun pillar		9 days
Circumscribed halo of 22° halo (including contact arcs, that is, incomplete halo)		8 days
46° halo		6 days
Horizontal or parhelic circle		5 days

It may be noted that the rainbow was seen on four days in this period and the fogbow (white rainbow) once. These and earlier records show that some of the ice-crystal phenomena are considerably commoner locally than is the rainbow. The fact that many people have never seen even the 22° halo is partly due to a disinclination to look close to the sun or high in the sky.

In three years of consistent observations I have seen Lowitz' arcs four times, and a 19° halo, the counter-sun and the parhelia to the 46° halo once each. The last two were part of a beautiful display already described¹. I have yet, however, to see the contact arc to the 46° halo.

From 15° to 25° solar altitude the circumzenithal arc is virtually tangent to the large halo, but outside this range it quickly departs from it. The confusion of these arcs is widespread, and is even revealed in the records published by Pernter². The distinction is emphasized by Minnaert³, whose fascinating book is recommended to the interested reader.

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¹ Savile, *Mon. Weather Rev.*, **69**, 73 (1941).

² Pernter, J. M., "Meteorologische Optik" (3rd Edit., 1902).

³ Minnaert, M., "Light and Colour in the Open Air" (London, 1940).

Grey Mould (*Botrytis cinerea*) of Flax

IN the course of the examination of large numbers of samples of flax seed by the Ulster method¹ for the presence of seed-borne parasites, many were found to be contaminated with *Botrytis cinerea*. As in some of the samples more than 25 per cent of contaminated seeds was recorded, the pathogenicity of the isolate from home-saved seed was investigated, since *B. cinerea* is known to cause grey mould of flax.

Seeds from a sample known to be free from any known parasite were dipped into a suspension of spores prepared from a pure culture of *B. cinerea* isolated from flax seed. The inoculated seeds were sown in pots of moist sterilized soil which were then covered with sterile bell jars. A few days after the appearance of the cotyledons a number of seedlings produced from inoculated seeds showed brownish-coloured lesions on the hypocotyl at about soil-level; these seedlings afterwards developed the typical symptoms of 'damping off'. Conidiophores first appeared on that portion of the hypocotyl which was originally attacked, and within a short time spores were produced on all aerial parts of the dead seedlings. No difficulty arose in making isolations of the causal organism from the hypocotyls of seedlings showing early symptoms of attack. Seedlings in control pots sown with uninoculated seeds remained healthy provided the covering bell jars were not removed. The experiment was repeated using spores from isolates from diseased seedlings, and similar results were obtained. The work was carried out in an unheated greenhouse during the summer.

Van Poeteren² investigated the control of grey mould by seed disinfection and obtained good results.