

definite and bright when the amount was large, and occasionally disappearing in part or even completely as the atmosphere cleared. Sometimes the whole halo became uniformly faint, while at other times portions of the circumference disappeared. The major axis was vertical, the moon being about on the meridian. The axes were estimated to be about 7° and 4° respectively, but no careful measures were made. The colour, if any, was very slight. The moon was at first quarter."

None of my astronomical friends to whom I have described these elliptical halos has ever seen one. They must be rare phenomena, and well worth recording.

FRANK SCHLESINGER.

Allegheny Observatory, February 24.

The halo appears to be that known as "Hall's halo," but the diameters given are rather less than those observed by Hall. The phenomenon is mentioned in Pernter's "Meteorologische Optik" (p. 262), and an explanation is suggested by him on p. 381 of that work.

[ED. NATURE.]

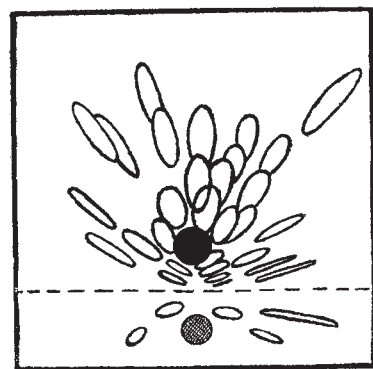
The Reflection of X-Rays.

IN continuation of the experiments of Mr. W. L. Bragg (NATURE, December 12, 1912, p. 410), I have investigated the reflection of X-rays by mica. Mr. Bragg finds one reflected beam, while Messrs. Hupka and Steinhaus (NATURE, March 6, 1913, p. 10) find two beams. Using a parallel pencil and an angle of incidence of 70° , I find no difficulty in photographing five beams emerging from the "incident" side of the mica, of which that obeying the ordinary laws of reflection is the most obvious.

From the "transmitted" side of the mica sheet there are certainly no fewer than thirty distinct beams apart from the intense primary beam which has passed through the crystal (0.33 mm. thick) without much absorption. The plane of the mica sheet was perpendicular to that of the photographic plate. In the reproduction given below, the intense black spot

is produced by the transmitted primary beam, while beneath it is seen another circular patch due to the ordinary reflected beam.

The greatest photographic intensity occurs in those transmitted beams which have suffered the least deviation, the ordinary reflected pencil being feeble in comparison with some of them.



It will be evident that the transmitted pattern is analogous to that obtained by Messrs. Laue, Friedrich, and Knipping (NATURE, November 14, 1912, p. 306), using a pencil of X-rays falling normally on a crystal of zincblende. Repeating my experiments, using a normal pencil, a transmitted pattern is obtained similar to theirs.

Besides giving rise to numerous pencils in definite directions, the mica sheet exhibits the ordinary incident and emergent scattering. It is well known that this effect is small in the plane of the radiator. This is borne out in all the negatives which exhibit general fogging, except along a line which represents the line of intersection of the photographic plate by a plane

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containing the mica sheet. This line is represented in the diagram by the broken line. Similar results are obtained using rock salt and galena.

Since the photograph described above is unsuitable for reproduction by a half-tone block, I have been obliged here to substitute a diagrammatic copy for it.

H. B. KEENE.

Physics Department, University of Birmingham,
March 15.

The Presence of Protozoa in Soils.

UP to the present, so far as I am aware, the only method of demonstrating the presence of Protozoa in soils has been by cultures. This method, of course, leaves untouched the really important question as to what Protozoa are leading a trophic existence at any given time in a soil sample, since many of the forms found later on in cultures may be derived from cysts. In these circumstances I thought it might be of interest to direct attention to a method by which the presence of Protozoa in the trophic stage in the soils can be readily demonstrated, even though this method from a quantitative point of view probably gives low results.

A small quantity of the soil to be investigated is mixed, as soon as it is collected, with about an equal volume of picric acid. The mixture is then placed in a wide dish and carefully stirred, so that the organisms on the surface films between the soil particles are free. If the mixture is then allowed to stand for a time it will be found that most of the bacteria, diatoms and Protozoa that were present come up to the surface film. The coverslips, cut according to the method which I have previously described, can then be floated on the film, and then placed in tubes containing corrosive. These cover-slips can then be handled as though they were ordinary smears. The best method of staining seems to be to stain for some time in strong acid haemalum, followed by eosin. I have tried mixing the soil in the first instance with other fixatives in the place of picric acid, but have not obtained such good results. By this method perfectly clean preparations, showing large numbers of amoeba and flagellates, have been obtained from a six weeks old bed, which had been used for growing seedling cauliflowers. These have been used to compare the active fauna of such a soil with the fauna derived from the same soil in cultures.

As might be expected, it has been found that the prevalence of any given Protozoan in the cultures is not an indication of its prevalence in the trophic stage in the soil, though by varying the methods of culture it has been found possible to cultivate all the Protozoa that have been found by the above method leading a trophic life in this soil at the date of fixation.

C. H. MARTIN.

The Hill, Abergavenny, March 19.

Jelly-fish of the Norquane River.

THE discovery of a jelly-fish in the northern watershed of the Limpopo will be of some interest to zoologists.

During the new year holidays, while making zoological collections in the Bembezi district (thirty miles north-east of Bulawayo), I noticed some jelly-fishes in a pool of the Norquane River, a tributary of the fourth degree of the Limpopo.

With the scanty literature at my disposal, it is not possible at present to identify or determine it as a new species, but judging by the figures in Lankester's "Treatise on Zoology" and in the "Cambridge Natural History," and also by Mr. Moore's statement ("The Tanganyika Problem") that *Limnocyclus tanganyikae* varies in size from that of a shilling to

a two-shilling piece, and is as flat as those coins, these jelly-fishes are not referable to that species.

In life, they are almost hemispherical and slightly flattened on top; the largest do not measure more than 16 mm. in their widest part, and the smallest measure about 6 mm.

The Norquane is a narrow stream with a sandy bed cut into a succession of pools by granite bars. In all the pools over a distance of a mile, hundreds of the jelly-fishes were to be seen. The first specimen was found in a pool about 20 ft. by 30 ft. and 7 ft. deep, late in the afternoon, and a careful search did not at first reveal any more. Shortly after my having a bathe in the same pool, numerous specimens came to the surface, and subsequent observation showed that the creatures swim near the surface in the earlier part of the day, and retire to the deeper water during the hotter hours, from which they were disturbed by the bathing. Their stinging powers, however feeble, probably render the jelly-fishes unpalatable to the fishes in the pool (chiefly *Barbus 3-maculatus* and *Tilapia* sp.), which left them severely alone.

I hope to be able soon to obtain Günther's paper in the *Q.J.M.S.* on *Limnocythina tanganyikae*, when it will be possible to decide whether or not this is a new and the fifth known species of fresh-water medusa. I should add that a careful examination of several pools during three days failed to reveal any signs of a hydrosome stage.

G. ARNOLD.

The Rhodesia Museum, Bulawayo, February 21.

An Experiment for Showing Lines of Force in an Electrostatic Field.

THE general directions of the lines of force between charged conductors can be shown by a method which, though extremely simple, shows as much as the elegant but somewhat elaborate apparatus described by Mr. R. F. D'Arcy (*NATURE*, March 20) would seem capable of.

It is simply to allow a scrap of cotton-wool to fall between the knobs of a Wimshurst machine, or among any conductors connected with them. As soon as the bit of fluff touches one of the conductors it moves off rapidly along a line of force. If the other conductor is oppositely charged the fluff will strike it, and again be repelled, usually in a slightly different direction, thus traversing a different line of force, and so on.

The scrap of charged fluff moves so rapidly under the electric forces that, owing to the persistence of vision, the shape of its path is very evident, and, owing to its lightness and the relatively great resistance offered by the air to its motion, its path approximates very closely indeed to the line of force.

BERNARD M. NEVILLE.

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Snail-cavities in Stones.

REFERRING to Mr. E. W. Swanton's letter in *NATURE* of March 20, may I point out that the Agglestone rock is a sandstone composed of quartz grains bound together by a ferruginous cement.

I believe the excavations of *Helix aspersa* on rock surfaces are produced by chemical action, and that the secretion only acts as a solvent where salts of lime are present. This assumption seems reasonable on the supposition that the snails require lime for the construction of their shells.

Sandstones, unless calcareous, would have to be attacked mechanically by snails for cavities to be formed. Is there any evidence to prove that such cavities have been produced in sandstones?

C. CARUS-WILSON.

COMPLETION OF THE DISCOVERY OF THE GREENLAND COASTS.¹

THE last part of the coast of Greenland to remain undiscovered is the north-eastern tract between Germania Land and the area reached by Peary on his famous journey across the northern ice-sheet to Independence Fiord. This gap has been filled by the Danish expedition under Erichsen, which discovered that instead of the coast continuing in a fairly direct course from Germania Land in 77° N. to Peary Land in 82½° N., Greenland projects in a long peninsula for 5° to the east. The work of the supporting parties of this expedition made some interesting additions to the glacial geology of Greenland, which have been published in Koch and Wegener's memoir on the glacial observations. Erichsen's expedition achieved its object, but he and his two companions, Hagen and the Eskimo Brönlund, perished during the return journey. Brönlund was able to reach nearest home. His body and diary, with a map by Lieut. Hagen, were found by a search-party under Captain Koch. These papers announced the success of the expedition and its tragic end. The journals of Erichsen and Hagen were not recovered, and an expedition to search for them was dispatched under Captain Ejnar Mikkelsen in 1909. This expedition was successful in recovering some messages left by Erichsen in his depôts, but it also nearly perished on the return journey.

The expedition sailed in a small sloop, the *Alabama*, but its plans were disorganised at the start. It called at the Farøe Islands to receive its dogs. But of the fifty dogs which had been bought in Greenland, twenty-three had died on the voyage to the Farøes, and the rest were so diseased that they had to be shot. The *Alabama*, therefore, had to go to the Eskimo settlements in south-eastern Greenland to buy dogs, and was thus seriously delayed. The expedition reached its base, Shannon Island (lat. 75° 10' N.), on August 27, and a party in the autumn sledged up the eastern coast as far as Lambert's Land (79°), where they found Brönlund's grave. After wintering on Shannon Island, Captain Mikkelsen and Lieutenant Iversen marched across the inland ice to the head of Denmark Fiord, which had been discovered by Erichsen; they searched its coasts, found the site of Erichsen's camps, and recovered the messages left in them. Mikkelsen had intended to return to the Eskimo settlements on the western coast through the strait which, according to Peary, extends across northern Greenland; but this plan had to be abandoned when it was found from one of Erichsen's notes that "the Peary channel does not exist, Navy Cliff being connected by land with Heilprin Land." The author has commented severely on this mistake, but, considering the sufferings it caused him, his annoyance is intelligible.

¹ "Lost in the Arctic." Being the Story of the *Alabama* Expedition, 1909-12. By Ejnar Mikkelsen. Pp. xviii+400+plates. (London: W. Heinemann, 1913.) Price 18s. net.