This result is in close agreement with a remarkable experiment made by the late Prof. Birkeland [1] which is reproduced in Fig. 1.

Here cathode rays are sent from an aluminium plate near the magnetic equatorial plane of the magnetic sphere, and a part of the toroidal space is very well seen with corners of rays descending to the polar regions of the sphere, corresponding to the production of polar auroræ. On the two occasions, Oct. 11 and 24, when echoes were heard, the sun was not far from the earth's magnetic equatorial plane. But such favourable occasions disappeared towards the end of October and will not recur before the middle of February. Thus, if this explanation of the most favourable situation of the sun is correct, it is improbable that echoes will be heard again before that time. CARL STØRMER.

Oslo, Dec. 12.

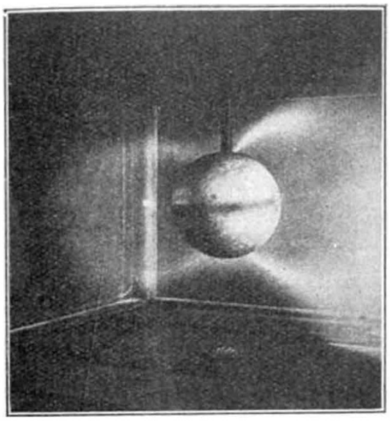

FIG. 1.—Cathode rays in relation to a magnetised sphere.

[1] See "The Norwegian Aurora Polaris Expedition, 1902–1903," vol. 1, Second Section, Fig. 265A, p. 712. (Longmans, Green and Co., London.)

Soap Film Pressure Gauge.

IF a soap film is formed across a circular aperture in one side of an otherwise closed box, and if then air is introduced into, or removed from, the interior, the surface of the film becomes part of a sphere, and therefore the pressure within the box differs from that outside by a quantity which is directly proportional to the surface tension of the film, and inversely proportional to the radius of the sphere.

If R, r, and T are respectively the radius of the hole, the radius of the sphere, and the constant of surface tension, the difference of the air pressure inside and outside the box is $4T/r$ (since both surfaces of the film contribute to the tension) and the difference is + or − according as to whether air has been introduced or withdrawn.

The radius of the sphere can never be less than R, and when $r=R$ the surface of the film is a hemisphere. Thus $\pm 4T/R$ is the greatest difference of pressure which can be balanced by the surface tension.

For any condition which makes the bubble less than a hemisphere, the film may be used as a pressure gauge, since the difference of pressure within and without the box can be determined if T is known and r measured. There are several ways by which the radius of a bubble can be found, that which I have generally used being to measure the size of the virtual image, reflected by the film, of an object of known size and distance. This allows of the determination of r with considerable accuracy.

Convenient apparatus for the purpose can take many forms which need not be described here, but it is worth while to note the order of pressure difference which can be measured by soap films as compared with various other forms of barometric measurement. A good barometer or aneroid will indicate the difference of level between the surface of the table and the floor on which it stands, say a head of 30 inches of air. For a soap film, suppose, for example, that T has a value of 3 grains per linear inch and that $R=1$ inch, then the maximum pressure difference which can be sustained by surface tension is 12 grains per square inch—equivalent to a head of about 3 feet of air. Thus for this particular case the greatest pressure difference which can be dealt with by the soap film is not far from the minimum which can be observed by the aneroid. With a soap bubble, however, the radius can without much trouble be determined with sufficient accuracy to allow of the measurement of pressure difference equivalent to heads of a few hundredths of an inch of air.

I used this form of pressure gauge to find out whether, when a chimney smoked, the pressure in the room rose or fell. A rise of pressure would show that the wind blew down the chimney, and a fall that there was negative pressure on the lee side of the house. In stormy weather I found many instances of both kinds, and the type which prevailed depended, as might be expected, on the direction of the wind.

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Delayed Metamorphosis in a Predaceous Mosquito Larva and a Possible Practical Application.

ON June 10 of this year, in a rot-hole in a tree at Epe in Southern Nigeria, I secured a young specimen of the predaceous larva of the mosquito *Megarhinus* (*Toxorhynchites*) *brevipalpis*, Theo. With the intention of bringing the insect alive to England, it was retained in two or three ounces of its natural water and given a very restricted diet in the form of an occasional *Stegomyia* larva.

It was eventually brought to England in the middle of August, and was maintained at 24° C. without any special attention, until it died on Nov. 18 without having passed the larval stage.

My reason for recording these observations is that it has been suggested (Buxton and Hopkins: "Researches in Polynesia and Melanesia"; London, 1927) that members of this predaceous genus of mosquito, which breed exclusively in rot-holes, should be introduced into Fiji, Samoa, and other South Pacific islands as a measure of control of the local vector of filariasis (*Aedes* (*Stegomyia*) *variegatus*) which breeds in the same situation. The nearest locality for *Megarhinus* in that part of the world is, however, the Bismarck Archipelago, and the difficulty and expense of establishing (as has been deemed necessary) intermediate stations in the conveyance of the insect from New Guinea to Queensland and thence to Fiji and Samoa—a distance of some 3000 miles—has prevented any attempt at the experiment.

It now appears from the observation recorded above that by simply limiting the food supply the larval stage of this insect can be prolonged by at least five months, which would afford ample time for the transmission of larvæ direct, and thereby greatly facilitate the carrying out of the experiment in question.

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