

and distances measured above give positive values, and those below negative. The extreme range of the scale is equivalent to a gradient of 380 volts per metre.

Fig. 2 gives the record for a dust-storm which lasted the greater part of the day. In this figure it may be seen that the positive value never goes beyond 70 volts per metre, and on one occasion even becomes slightly negative.

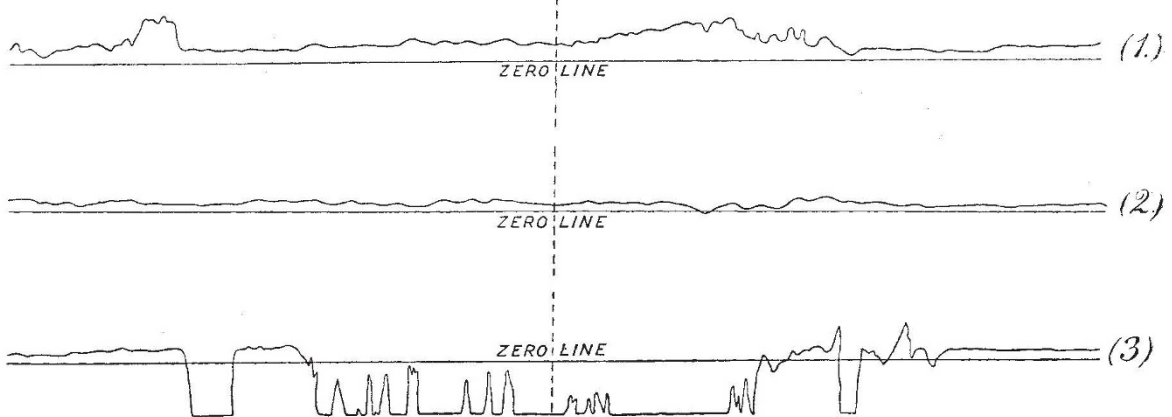
Fig. 3 records a severe dust-storm which lasted from 4 a.m. until 8 p.m. The maximum value of the negative gradient cannot be inferred from the curve because the electrometer needle was deflected as far as it could go, and the horizontal portions of the curve indicate that the potential gradient was higher than the maximum which could be recorded. It will be shown presently that the gradient may reach the value of 5000 to 10,000 volts per metre when the dust is blowing thickly.

The writer has shown (*Phil. Mag.*, May, 1912) that during a dust-storm the charge upon the dust (if siliceous) is positive, while that upon the air at the same time is negative, and he was led from this to devise an electrical machine by means of which charges of both positive and negative electricity might be obtained during a dust-storm. The essential parts are:—(1) A small insulated disc coated with radium attached to a wooden rod about two metres in height; (2) a

#### Induced Cell-reproduction in the Protozoa.

IN the interesting letter by Mr. A. H. Drew, under the above heading, in *NATURE*, February 20, it is suggested in the last paragraph that certain substances called auxetics which caused the development of spores in the case of new species of *Polytoma*, may be necessary for cell-reproduction under natural conditions in ponds, &c., where such substances would probably occur owing to the putrefaction of organic matter.

In the course of an investigation which I have recently carried out on the process of excystation in the ciliated infusorian, *Colpoda cucullus*, from its resting cysts, I have found that this organism can emerge from its cysts when the latter are incubated in 1 per cent. hay infusion (alkaline or acid in reaction) and in pure distilled water—media quite free from auxetics. The real agent which is instrumental in causing excystation is an enzyme which digests the endocyst, and thus allows the organism to swim out into the surrounding medium. As is well known, *Colpoda cucullus* is an organism of wide distribution and of common occurrence in ponds and in infusions of hay, &c. It can frequently be found among rotting grass and decaying vegetation; situations in which the products of organic decomposition and bacterial putrefaction would be plentiful, yet the cysts of this organism can be caused to rupture and yield their



(1) Normal fine weather record (2) a mild dust-storm; (3) a severe dust-storm.

large hollow vessel with a fine wire gauze bottom; and (3) a pair of insulated spheres to serve as dischargers. The hollow vessel generally used was a five-gallon petrol tin supported upon an insulated rod at a distance of about 20 cm. above the ground, and directed with the open end towards the onrushing dust. Much of this dust is carried through, but a considerable portion is retained, and any charge it may possess is given up to the vessel. *This charge was invariably positive.*

The radium-coated conductor, however, took the negative potential of the current of air blowing past it, so that the two balls acquired opposite charges, and a torrent of sparks as continuous as that furnished by an induction coil passed between them. On some occasions the sparks reached a length of 1.5 cm., showing that the potential difference between the conductors must have been at least 40,000 volts when the apparatus was set up on the open veld.

An ordinary vacuum tube having a radium-tipped wire attached to an electrode, the other electrode being earthed, will light up brilliantly during the passage of a dust-storm. A brush discharge is seen to proceed from the electrode and the shape of the brush makes it quite clear that positive electricity is escaping from the earth into the atmosphere.

W. A. DOUGLAS RUDGE.

contents in active condition when incubated in pure water.

I would therefore suggest that it is unsafe to infer that because auxetics may serve to induce cell-reproduction in certain cases, they may be necessary in all.

The winter spores of *Polytoma* and the resting (dauer) cysts of *Colpoda* are not perhaps quite comparable, but I may point out that *Colpoda* most frequently encysts in the condition of the resting cyst, and that therefore if auxetics are necessary at all they ought to be required for excystation from this condition.

An account of my investigations on this subject will shortly be published.

T. GOODEY.  
Rothamsted Experimental Station, Harpenden,  
Herts, March 4.

#### The Spectra of Neon, Hydrogen, and Helium.

IN a letter published in *NATURE* of March 6, Prof. Fowler pointed out that a series of "parallelisms" that we gave of lines in the spectra of neon and hydrogen were probably coincidences, and could not be taken as evidence of identity. We are sorry that we did not make our meaning plainer, in our letter in *NATURE* for February 27, for we did not mean that the lines we compared in the two spectra were