

it may be supposed that the laws of disturbance are not found by me, and are not to be found by the method which I have employed. This would be a great mistake; one which I am bound to correct.

The method which Prof. Stewart recommends has had objections proposed to it by the Astronomer Royal, the Provost of Trinity College, Dublin, and by myself. It is, I think, to defend the method against these objections that Prof. Stewart has written his remarks on the modes of discussion; but I have never heard any objections to the other method, nor, as far as I can understand, does he offer any.

As the method followed by Dr. Lloyd on the Dublin Observations and by myself on the Makerstoun and Trevandrum Observations has shown every law of magnetic disturbance that has been obtained by the other, I am afraid I cannot see that the illustration of the cyclones is applicable to the two methods, even if we were bound to study large cyclones only and to put those of less than a given magnitude out of consideration.

4, Abercorn Place, London, N.W. JOHN ALLAN BROWN

Anomalous Behaviour of Selenium

It has been lately observed that the electrical resistance of selenium is greater in the light than in the dark. It was at first thought possible that this increase of resistance might be due to heat admitted with the light, but Prof. W. G. Adams, in his paper read before the Royal Society, June 17th, 1875, has shown that this is not the case, but that the phenomenon is a purely optical one.

The writer of this letter has to-day tried an experiment with a selenium bar belonging to the Cavendish Laboratory. Its length is 50 mm., breadth 8 mm., thickness about 1 mm.; platinum wires are soldered to its ends, and it has a hard metallic surface. Its electrical resistance is enormous. In the dark it is just over 100 megohms (100,000,000 B.A.U.) When, however, the light of the paraffin lamp of the galvanometer was allowed to fall on it from the distance of about a foot, the resistance DECREASED between 20 and 30 per cent. The experiment was repeated many times, with current sent sometimes one way, sometimes another, and with different sides and edges of the bar turned to the light, but always with the same result, namely, that the effect of letting in the light was to largely decrease the resistance.

A second set of experiments were made with a selenium medal struck by Berzelius soon after the discovery of the metal in 1818, and presented by him to Mr. Deck, by whose son, Mr. Deck of Cambridge, it was kindly lent for the experiment. This medal was of oval shape, about 40 millims. long by 30 broad. Owing to the difference of form between the two specimens, their specific resistances could not be accurately compared; that of the medal was, however, not more than about $\frac{1}{10}$ of that of the bar. The medal was exactly like black lead both to touch and sight, and quite different in appearance to the bar. The resistance of the medal was sensibly the same, both in the dark and in the light; no difference could be detected.

These experiments seem to show that the physical form of the metal has a great deal to do with its behaviour when carrying an electric current and exposed to light.

J. E. H. GORDON

Cavendish Laboratory, Cambridge, June 29

The House-fly

As no one more competent than myself seems disposed to reply to the query of "Harrovian" (NATURE, vol. xii. p. 126) respecting a disease of the house-fly, and which is again referred to by the Rev. D. Edwards in last week's NATURE, I may perhaps be permitted to make a few remarks thereon.

I have frequently noticed dead and dying flies thus affected, generally in the late summer and autumn; and I think I am right in attributing the phenomenon to the growth of a parasitic fungus, called, I believe, *Empusa musci*, in the fly's body. The insects may often be seen settled in a natural position on window-panes, but with the abdomen much distended, and surrounded by a collection of whitish powder, extending for a few lines in all directions on the surface of the glass. The whole of the interior organs of the abdomen are consumed by the plant, nothing remaining but the chitinous envelope, on which the mycelia of the fungi form a felt-like layer; the fructification showing itself externally as filaments protruding from between the rings of the body.

Insects are very subject to the attacks of such parasites. Some of those living in the interior organs of the body seem to do little if any injury to their "hosts," while others completely destroy them; as in the case of *Spharria*, which changes the caterpillars at whose expense it lives into a mass of fungoid growth of most grotesque appearance. It is now well ascertained that a species of *Eobrytus* produces the dreaded "Muscardine" of the silk-growers; and every practical lepidopterist has had to lament the destruction of pet broods of larvæ by some similar disease, which, though perhaps sometimes pathological, is probably in the first instance set on foot by fungi.

The whole subject of the parasites of insects is extremely interesting. According to my experience it is the exception for an insect to be quite exempt from the attacks of one or more animal or vegetable entozoic or epizoaic organism; and I have often found five or six different species inhabiting one unfortunate individual.

I may mention that "Harrovian" will find some remarks on this fly-fungus by Dr. Cohn, in an early volume of the *Journ. Microsc. Science*. I regret that, writing away from home, I cannot give the exact reference.

W. COLE

Stoke Newington, N., July 2

[We print this letter from among several which all correctly explain the phenomenon under consideration in a similar manner.—ED.]

Theories of Cyclones

IN NATURE, vol. xii. p. 98, you notice a paper by Dr. Hann on two rival theories of cyclones. According to one, "whirlwinds are formed mechanically by different streams of air meeting, and centrifugal force causes the central depression. The more modern theory regards a local depression as the first condition, causing an indraft resulting in a whirlwind through the earth's rotation: the primary depression is held to follow condensation of vapour."

The question is how the cyclone begins: whether the first depression is due to the centrifugal force of an eddy, or to the expansion of air in the upper strata from the heat liberated in the condensation of vapour. There need not be any controversy as to the dynamics of the cyclone after it is formed.

There is a mass of geographical evidence in favour of the first-named theory, namely, that cyclones originate in the conflict of the trade-winds of the northern and southern hemispheres when either trade-wind is drawn to some distance across the equator. (A cyclone cannot be formed on the equator, because there the earth has no rotation in relation to a vertical axis). On this subject see Mr. Meldrum's paper in NATURE, vol. ii. p. 151, and my letter in NATURE, vol. iv. p. 305; also Mr. Maury's paper in NATURE, vol. viii. pp. 124, 147, 164.

Mr. Maury fully recognises the truth that the motive power of the cyclone, once it is formed, consists in the heat liberated by the condensation of vapour, which causes expansion in the upper strata and produces an ascending current. I believe the nature of these actions was first explained by Espy, whose "Philosophy of Storms," though well known by name, seems to be less appreciated than it deserves.

There is, however, another reason for the existence of an ascending current at the centre of a whirlwind, which I do not think I have seen stated. The lowest atmospheric stratum of a whirlwind is retarded in its motion by friction against the earth, and its centrifugal force is thereby lessened in proportion to that of the upper strata. The effect of this relative deficiency of centrifugal force in the lowest stratum—that is to say, at the surface of the earth—must be to cause a flow of air at the surface of the earth towards the centre of the whirlwind, and an ascending current at its centre. Such an ascending current is probably the cause of the vertical columns of dust that accompany those small whirlwinds which are common in windy weather.

Old Forge, Dunmurry,
Co. Antrim, June 23

JOSEPH JOHN MURPHY

The Dark Argus Butterfly

It is stated in H. N. Humphrey's work on "British Butterflies," that the Dark Argus Butterfly appears in July, and has only been found in the neighbourhood of Durham and Newcastle, and seldom above half a mile from the sea. When in May I was at Ashmore, which is on the borders of Dorset and Wilts, I took some butterflies answering exactly to the description of