

of a lightning-conductor to the ground, was connected with this wire. The changes which this wire indicated as occurring in the stratum of atmosphere with which it was in contact, were of a most extraordinary character.

Simultaneously with the occurrence of a flash of lightning, even at a mile distance (the battery being disconnected), a torrent of sparks rushed between the exploding balls, presenting the appearance of a thick bundle of brilliant sparks, with a noise similar to that of suddenly breaking a hard fibrous stick. When the battery was in connection with the atmospheric wire, the quantity of electricity brought in by it was sufficient to charge and discharge the battery, over an interval of a quarter of an inch several times so rapidly, that it was impossible to count the discharges, the cracking noise being correspondingly loud. This effect is now accurately imitated by the bundle of sparks passing between the terminals of a powerful induction coil, having an electrical battery connected with it. When it is considered that the earth's surface in immediate connection with this electrified stratum is acted upon electrically by it, one can easily see the influences which such actions are likely to produce upon the delicate vegetable organisms which have not only to act as conductors in these electrical changes, but are exposed to the actions of a sudden development of an enormous amount of ozone. It will therefore be an interesting matter to know how vegetable life will be influenced by an ozonised atmosphere, especially as the conditions necessary for artificial experiments will not be difficult to obtain.

Plymouth, Dec. 29, 1873

J. N. HEARDER

Photographing the Transit of Venus

THE following is the result of some experiments recently made on photographic irradiation:—

If, as is generally supposed, photographic irradiation is caused by the reflection of light from the back surface of the plate, then photographs taken on non-actinic coloured glass ought to be free from irradiation, because the light would be quenched in the glass, and therefore no reflection could take place. Photographs of a model transit were taken on yellow, orange, and red glasses; but in all cases the irradiation was nearly as bad on the coloured glasses as on the clear glass.

Photographic irradiation may possibly be caused, either by the bright light producing an intense state of chemical activity, which has the power of spreading itself, or what seems more probable, the parts of the collodion on which the bright light is falling become luminous, and reflect light to the surrounding parts of the sensitive film, and thus extend the chemical change in each side of the true optical boundary line. If this is the explanation, then we can correct photographic irradiation by allowing only sufficient light to fall on the plate to produce the necessary chemical change, so that there shall be no surplus to be reflected; or we may make the sensitive film of such a nature that it cannot reflect the actinic ray. There are two ways of carrying out the first of these plans. We may either "stop" down the lens by means of a diaphragm, or we may pass the light through a non-actinic coloured screen. The first should be the best plan, but was not found practicable with the Dallmeyer "triplet" lens used in the experiments. Screens of glass and coloured solutions were then tried, and photographs of the model transit taken perfectly free from irradiation, and not to be distinguished from photographs of the model taken against a dull sky, which required 15 seconds' exposure. Experiments were then made to make the sensitive film incapable of reflecting actinic rays. This was done by adding red aniline to the collodion, till the colour was found by experiment to be deep enough. Photographs taken in this way were also quite free from irradiation. After the photographs were developed and fixed in the usual way, they were treated with chlorine gas, which destroyed the red colour and left the photographs on a clear film.

Ocular irradiation is also, in all probability, in part caused by the reflection of light in the eye. But in addition to this cause there is another of considerable importance—namely the "persistence of the image" combined with the unconscious motion of the eye—as the impression received by the brain is not only that of the light on the part of the retina where the image at the time is, but also that of where it was a short time before, the mental impression must therefore be larger than the image on the retina. Ocular irradiation can also in all probability be corrected, by reducing the amount of light falling on the eye, to the minimum necessary to give a distinct impression. The reflection in the eye will then be less. The image not

being so bright will not "persist" so long—and the light not being so brilliant, the stimulus to the unconscious motion of the eye will not be so great. Diaphragms will of course be preferred for this purpose. When screens are used it is probable that neutral tinted ones will be found to suit best.

JOHN AITKEN

The New Marine Animal

IN NATURE, vol. viii, p. 488, under the heading "New Marine Animal from Washington Territory," Mr. P. L. Sclater announces the description by Mr. Stearns of the *Verrillia blakei*, the long-sought-for owner of the wand-like rod named by Gray, *Osteocella septentrionale*.

I write to say that the nationality of the Polyp is altogether British; Burrard's Inlet—the only place it has yet been found—is in British Columbia, close to the north mouth of the Fraser, and the first description of it would have been British too, but for unavoidable postal delays in the transmission of my paper, the receipt of which by the Zoological Society Mr. Sclater mentions.

EDWARD L. MOSS

Royal Naval Hospital, Esquimalt, B.C., Nov. 26, 1873

The Potato Disease

IN NATURE, vol. ix, p. 161, it is stated by Mr. W. G. Smith that the bodies referred by Dr. Montague to *Artotrogus* are possibly no other than *Volvetella ciliata*. Nothing can be more common on decaying potatoes than *V. ciliata*, but I can state most positively that Montague's fungus, whatever its nature may really be, had nothing to do with *V. ciliata*. It is very important that attention should not be drawn off from Dr. Montague's, or rather Dr. Rayer's curious observation by a supposition which is entirely without foundation. A reference to the figures in the *Journal of the Horticultural Society* (vol. i. tab. 4, figs. 27, 28, 29), and the characters of *Artotrogus*, apart from the specimens submitted to myself, and the occurrence within the cellular tissue, ought to be quite sufficient.

Jan. 3

M. J. BERKELEY

Specific Gravity of Sea-water

IN Prof. Wyville Thomson's work "The Depths of the Sea" there appears to me a curious discrepancy between two statements of the specific gravity of the sea, to which it may be useful to direct general attention. At p. 505, Mr. W. L. Carpenter states that the average specific gravity of surface-water, at a sufficient distance from land to be unaffected by local disturbances, was 1.02779. At p. 513, Dr. Frankland gives the specific gravity of four samples of surface-water, the mean of which is only 1.0267, even less than the minimum value as given by Mr. Carpenter. Both results are said to be for temperature 60° F. I should have expected Dr. Frankland's determination to have been the higher, from possible loss by evaporation. The difference may probably be due to want of identity of indication between the instruments used. From whatever cause it may arise, the difference is so considerable, as to leave no doubt whatever that it ought to be accounted for in some way; and the error wherever it lies fully exposed.

R. STRACHAN

Meteorological Office

Optical Phenomenon

A SHORT time ago I was lying, during the heat of the day, in a darkened room in a house at one of the hottest stations in India. There was a great glare of sunlight outside. All at once I became aware of figures moving about on the opposite wall. On examination they proved to be the inverted images of the servants of the establishment who were walking about in the performance of their several duties in the gravelled courtyard outside the house. The white colour of their clothes, the dark colour of their skin, and the red colour of their shashes or turbans, were distinctly reproduced, and every servant was recognisable without difficulty. The images were produced by rays passing through three or four holes in the Venetian shutters; and while they all remained open there was a large penumbra round the images, but on closing all but one hole, this was very much reduced. The holes were of the size of a shilling or half-crown, and made in an outer door as well as the shutter, having been constructed to admit of a punkah rope passing through. The explanation appears to be this:—The sun was