

If the tail of the comet consisted of a fine dust not in a state of incandescence reflecting or dispersing the sun's rays, we should expect its light to be completely polarised. We seem, therefore, driven to assume, either, 1, that the tail consists of fine incandescent particles; or, 2, of particles whose diameter is not small compared with the wave-length; or, 3, of incandescent gas; or, 4, possibly of all three of these states combined.

A. COWPER RANYARD

Photographic Irradiation

IN a letter to NATURE, vol. ix. p. 183, I gave a short description of some experiments on photographic irradiation. The conclusion to which these experiments pointed was that there is a kind of photographic irradiation, caused either by the bright light producing an intense state of chemical activity, which has the power of extending itself in every direction; 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 on each side of the true optical boundary line. As the subject is at present under discussion, I send you the results of the following experiments, which seem to support the above conclusion. In a darkened room a vertical opening 18 in. by 5 in. was made in the shutter; over the opening was fixed a piece of paper thick enough to stop most of the light, and only allow as much to pass as would give a decided but not deep photographic impression: Three long, narrow, parallel openings were cut in the paper, one opening was left clear to the sky, the next was covered with one thickness of tissue paper, and the third with two thicknesses of tissue paper. There was thus produced three parallel bars of different brightness on a uniform and darker ground. Sensitive wet plates were prepared in the usual way on glass and opaque black plates; across the front of the plates, and almost in contact with the collodion, was fixed a horizontal bar of thin blackened metal in such a position that it would cross the image of the luminous bars in the camera. The photographs, after exposure, were developed in the usual way, and it was found that the shadow cast by the horizontal opaque bar was not bounded by straight lines, but the ends of all the bright bars projected into the shadow, and the brighter the bar the farther it projected. I had no means of measuring accurately the bar and its shadow, but there seems but little doubt that the bright bars extended underneath the opaque bar, whilst the edge of the darker ground at the side of the bright bars gave the correct line of the shadow. Now this extension of the bright bars could not have been caused by the reflection from the back of the plate, as this result was always got whether glass or opaque black plates were used. Nor could it have been caused by the oblique pencils referred to by Lord Lindsay and Mr. A. C. Ranyard, because, the opaque bar being close to the collodion, these pencils could not get underneath. The natural conclusion seems to be, that this extension of the bright bars must have been caused by some molecular reflection taking place in the collodion. This form of irradiation can easily be distinguished from the irradiation produced by reflection from the back of the plate, as the latter is simply a sort of haze surrounding the bright object, extending some distance from it, and gradually fading away, whilst the former extends a very short distance and has a well-marked outline, though not so sharp as those parts of the image where there is no irradiation. The irradiation produced by reflection from the back of the plate, and some forms of irradiation due to the imperfections of the lens, though fatal to artistic photography, yet do not interfere much with its scientific value, as they do not affect the accuracy of outline, though they do affect the clearness of the photograph. Molecular irradiation, on the other hand, whilst it scarcely affects artistic photography, is fatal to scientific accuracy. The manner of preventing this latter form of irradiation has been already pointed out, namely, by reducing the intensity of the light falling on the sensitive surface to only that necessary to produce a distinct impression. In artistic photography this is almost never possible on account of the different amount of light on the different parts of the subject, while for scientific purposes this may almost always be done. The imperfections of the image due to the lens seem to be as various as the forms of lenses; one lens used in the experiments gave a curious double hazy-image of the bright object. When the image is near the centre of the "field" the double image fits over the true image, producing an effect somewhat similar to, and was at first mistaken for the effect of reflection from the back of the plate. At first this double image was somewhat puzzling, as it always made its appearance

even when opaque plates were used. The two images were, however, afterwards separated by bringing the true image near the outside of the "field," when the true image and its double were photographed alongside of each other.

The following simple experiment illustrates this molecular form of irradiation, and shows how much the definition of the image depends on the nature of the surface which receives it. Take a camera obscura and throw the image on some translucent substance such as opal glass; paint a small part of the glass with some opaque white substance; bring into the "field" some brilliantly illuminated subject, such as branches of trees against the sky; examine the image from the lens side of the glass, when it will be found that the image over the opal glass is hazy and indistinct, whilst the part of the image on the paint shines out brilliant and sharp.

JOHN AITKEN

Darroch, Falkirk, N.B. June 16

Lakes with two Outfalls—A Caution

LYN CREIGENEN (the larger of the two lakes of that name), situated about five miles S.W. by W. of Dolgelly, has *apparently* two natural outlets—one at the east, the other at the west end of the lake; both streams ultimately fall into the estuary of the Mawddach. The two outlets are on nearly the same level, the one at the east end being perhaps a trifle higher than that at the west end. The whole of the waste water at present passes through the western outlet in consequence of an artificial dam of turf having been made across the eastern channel. There are no indications on the ground which would lead anyone to suspect that either of the outlets had been artificially formed; the general contour of the surrounding country would rather favour the contrary view.

I was, however, informed last week by a man who had lived eighteen years in the district that he had been told that originally the only outlet was that at the west end of the Llyn, and that the other outlet had been made many years ago for the purpose of getting a better supply of water to some mills which then existed, but which do not now exist, on the stream to the east of the lake. If this story prove to be correct it shows how important it is to make full inquiries before stating positively that any lake has two natural outfalls.

From the ordnance map one would imagine that two streams issued from Llyn Arenig (five miles W.N.W. of Bala), but the one shown as starting from the extreme north end of the lake has no existence in fact.

GEORGE R. JEBB

Chester, June 3

FERDINAND STOLICZKA, PH.D.

A BRIEF telegram from India, which arrived just in time for notice in last week's NATURE (vol. x. p. 172), announced the death on the 19th ult., at Shayok, between the Karakorum Pass and Leh in Ladak, of Ferdinand Stoliczka, Palæontologist to the Geological Survey of India, who was returning from Kashgar and Yarkund with the other members of Mr. Forsyth's mission.

Thus has passed away, at the early age of thirty-six, a naturalist who, if his life had been spared, would certainly have attained a very high position amongst the leaders of science. Few men have accomplished an equal amount of work in the same brief space of time. A glance at the Journal and Proceedings of the Bengal Asiatic Society, and the publications of the Geological Survey of India, especially the "Palæontologia Indica," will show the wonderful variety of subjects treated by Dr. Stoliczka. In the course of the last ten years, besides geological memoirs on parts of the Western Himalayas and Thibet, he has published numerous papers on Indian mammals, birds, reptiles, amphibia, mollusca, bryozoa, arachnida, coleoptera, and actinozoa; and these papers are no lists of names or mere descriptions of new species, but they abound with accounts of the life history of the different animals, details of their anatomy, and remarks on classification, and show that their author was as good an observer in the field as he was patient and accurate in the cabinet. His greatest work is undoubtedly his account of the fossil fauna discovered in the Cretaceous rocks of Southern India, in which he proposed the most complete