

the middle and upper classes, who own the railways, there is certain to be a considerable feeling in favour of a scheme which would be fruitful of so much pecuniary benefit to themselves, and it is well to have it discussed beforehand as thoroughly and as thoughtfully as it is discussed here. It is in useful conservatism such as these that Universities often do their greatest services. They are mints at which the coinage that is passing current in the commoner exchanges of the world may be thoroughly tested. Prof. Jevons offers statesmen and politicians an admirable discussion, luminous with the most practical good sense. Like his colleagues, Prof. Ward is conservative in the sympathies of his essay. We have been engaged for many years in breaking down the venerable theory of the Balance of Power in Europe, and we have been attempting to build up in its stead a sort of Temple of Doctrinairism—sacred to a goddess of international arbitration, who is to be capable of the cure of all international ailments. Prof. Ward applies the touchstone of his comprehensive historical knowledge to both. He is utterly hostile to the doctrine of Spinoza that, as the natural state of man is a state of war, no nation is bound to observe a treaty longer than the interest or danger that caused it continues. But the old treaty basis of the peace of Europe having broken down, "the remedy for the danger accruing with new force to the peace of Europe is to be sought, not in an abandonment of the principle of joint action, but in an enlargement and elevation of it, and in the progress of that enlightenment which, instead of enfeebling, strengthens the common action of men and of states. For it is with nations as with individuals. The cultivated, and by culture enlightened, mind is and must be on the side of progress and peace against that of darkness and conflict. The obscure men, like the unformed nationalities, are at once materials and causes of that which disturbs, unsettles, and retards personal and national and international life. Where the education, and more especially the higher education, of a country is fostered, there lie the best promises of progress and of peace."

We do not attempt any detailed criticisms of the several essays. The subjects chosen by fourteen professors on which to address the world are likely to be reasonably well chosen, and the addresses delivered on them are pretty sure to reward the attention of the reader. They strike us as very well chosen; they sufficiently represent the real variety of teaching and of manner of teaching in the institution; they contain complete and occasionally brilliant discussions of subjects of very considerable general interest. They are the expressions of the inner spirit of a seat of learning in which science holds a higher place than she has usually done, but in which there is the most emphatic and continual protest against the degradation or neglect either of literature or of science. They show a body of teachers full of modern life, and at the same time singularly moderate, truthful, and reverent. Several of the essays are historical studies, and in these cases the reputation of the writer is a sufficient guarantee of completeness. In their collected form the "Essays and Addresses" warrant high hopes of the future of the Owens College. In a sense—perhaps a somewhat too literal sense—it is what it was once

called in a journalistic epigram, the University of the Busy. With its present staff it will certainly continue the tradition which connects the older Universities with the highest learning of the time.

W. J.

LETTERS TO THE EDITOR

[The Editor does not hold himself responsible for opinions expressed by his correspondents. No notice is taken of anonymous communications.]

Sir John Herschel's Letters

IT is known to many through the numerous applications I have made, that a collection of the letters of Sir John Herschel is in progress. For the many and valuable contributions, as well as for the kind and sympathetic expressions which I have been favoured with, I cannot be too ready to express once more my sincere acknowledgment; and when I recall these to mind I hesitate to take any less private step to further the end in view, or, by venturing on a public appeal, to forego the advantage of more direct communication. Several considerations however—which not even your courtesy in allowing this letter to appear in the columns of NATURE would justify me in dwelling upon—forbid me to depend solely on the activity of a single importunate pen. The correspondence in question covers more than half a century. Many of the correspondents were of a former generation, and their present representatives are known to but few. I may instance the names of Davy, Young, Wollaston,—not to mention many continental savans—in illustration of this. Many others, less eminent, but not the less recipients of letters which the student of scientific history will prize as containing the germs of much of the force whose impetus we now feel, were hardly known by name beyond their own immediate circles. Many more, as I would fain believe, who either themselves corresponded with my father, or knew him in his letters to their relations, are even now in possession of such letters, and may not be unwilling to let them be seen. Lastly, I hear too much of autograph collectors not to feel a keen desire to make their instant acquaintance. Have they not devoted themselves to preserving individual letters, no matter how trifling, from the fate which has—alas too often—overtaken others, no matter how numerous, or how valuable!

In my applications hitherto I have been constrained to repress the expectation of immediate publication. I am not at liberty to depart from that now. But that the materials which I may now be permitted to store up will eventually help to form the foundation of such a monument as may be fitting—this requires no student of history to tell us. That it may be amply provided for now, before it is too late, is my chief anxiety. For my time is limited, and I have drawn too many blanks not to feel that every year increases their number, let who will take my place.

I apologise for so long a story, and will only add in the most general terms that I appeal to all who possess, or know of the existence of, autograph letters of Sir John Herschel—no matter how insignificant they may seem, for collation with others can alone supply a true test—but of course with due regard to personal consideration—to communicate with me at once. It is hardly necessary to say that all autograph letters will be returned, and that any restrictions will be attended to.

21, Sumner Place, Brompton, S.W.

J. HERSCHEL

Coggia's Comet

YOUR readers may be interested to learn that the light of the comet is by no means strongly polarised. On the 2nd and 4th inst. I examined it with a double-image prism, but could not with certainty detect any difference between the brightness of the two images. I also examined it with a plate of right- and left-handed quartz in the principal focus of the 4-inch telescope and a Nicol's prism packed among the lenses of the eyepiece, but could not detect any traces of colour. With a Savant placed between the eyepiece and the eye no bands were detectable. But on the 6th, about midnight, when the comet was shining very brightly, I could perceive a difference in the brightness of the two images with the double-image prism, indicating polarisation in the plane passing through the sun's estimated place. But I was still unable to detect any traces of polarisation either with a Savant or Biquartz, or with a plate cut from a natural crystal of right- and left-handed quartz giving a band across the field in which the two crystals overlap; a form of polariscope which has been found on other occasions very delicate for faint lights.

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

LLYN 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 Shanyok, between the Karakorum Pass and Leh in Ladak, of Ferdinand Stoliczka, Palaeontologist 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 "Palaeontologia 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