

Cave, which ought surely to belong to the chapter on the "Recent Geological History of Yorkshire," only that the latter happened to be written by one who confined himself to the Holderness drift. Under the head of "The Permian Rocks" there is an exposition of the views of those who would reintroduce the old (not recently suggested) name Poikilitic to include the Trias. It was a pity the author was not acquainted with any recent papers on the series above the Lias, for there are no good boulders in this part of the book. Mr. Hudleston's admirable papers on the Yorkshire Oolites seem to have been written in vain, and there have been modern papers also on the Yorkshire Chalk. It was perhaps excusable for our author to conclude that the third edition of Prof. Phillips' "Yorkshire Coast" contained all the most recent information, though every East-Yorkshire geologist knew that it did not. In examining a work on local geology it is always well to see where the author lived, for the surrounding country will be the best described. So it is here; the best part of the book is the description of the Middle and Upper Coal-measures, which are well developed in the neighbourhood of Bradford. For East Yorkshire and the coast the book is of little value.

The topography of the map requires no other guarantee than the name of the constructors for its excellency. The south-western part of the geological colouring derived from the Geological Survey maps is also very good. Nor can we complain when lack of published material prevents accuracy elsewhere, though it is a reason for regretting the slow publication of the Geological Survey maps which have been long ago completed; but when the whole of the Vale of Pickering is coloured Neocomian, and a patch of the same is placed in the south near Cave, scarcely an acre of rocks of that age being discoverable in the former, and none in the latter locality, one is led still more to regret that the author's map should be spoiled by his not knowing Mr. Hudleston's papers and relying on Prof. Phillips. But he has surely introduced a little mistake of his own, which will be very serious to visitors to the popular watering-places of Scarborough and Filey. The Castle Rock and Filey Brig are coloured—one Lower Oolite and the other Neocomian, whereas they are both what the author would call "Middle Oolite"! It will take more than Mr. Bird to write a good "Geology of Yorkshire."

LETTERS TO THE EDITOR

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.]

[The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to ensure the appearance even of communications containing interesting and novel facts.]

Leaves Injured at Night by Free Radiation

FRITZ MÜLLER, in a letter to me from Sta. Catharina in Brazil, dated August 9, supports the view which I have advanced with respect to leaves placing themselves in a vertical position at night, during their so-called sleep, in order to escape being chilled and injured by radiation into the open sky. He says: "We have had last week some rather cold nights (2° to 3° C. at sunrise), and these have given me a new confirmation of your view on the meaning of the nyctitropic movements of plants. Near my house there are some Pandanus trees, about a dozen years old; the youngest terminal leaves stand upright, whereas the older ones are bent down so as to expose their upper surfaces to the sky. These young leaves, though of course the most tender, are still as fresh and green as before; on the contrary, the older ones have suffered from the cold, and have become quite yellowish. Again, the leaves of *Oxalis sepium* were observed

by me to sleep in a very imperfect manner during the summer, even after the most sunny days; but now, in winter, every leaflet hangs down in a perpendicular position during the whole night." It is a new fact to me that leaves should sleep in a more or less perfect manner at different seasons of the year.

CHARLES DARWIN

Red Rainbows

THE account in NATURE, vol. xxiv. p. 431, of a pink rainbow seen from Mr. Tennyson's house, recalls to me a rainbow which I witnessed in July 1877 over the Lake of Lucerne from the promenade in front of the Schweitzerhof. The bow in question appeared at sunset, when the whole sky, east and west, was lit up with ruddy tints; and just before it faded out, the bow itself, which was a very brilliant one, showed only red and orange colours in place of its usual array of hues. No fewer than five supernumerary arcs were visible at the inner edge of the primary bow, and these showed red only. I fancy that the phenomenon cannot be very rare, from the circumstance that in pictures of the rainbow red and yellow are frequently the only colours set down by the artist. A few months ago Mr. C. Brocke Branwhite of Clifton showed me a very beautiful sketch in oils by his father, the late Mr. Charles Branwhite, a colourist of no mean power, in which a beautiful and exquisitely pellucid rainbow was drawn with red and yellow tints only. It may also be mentioned that in the copy of Raphael's "Madonna di Foligno" in the Dresden Gallery, there is a semi-circular red and yellow rainbow. I have not seen the original Foligno Madonna in Rome; and should be interested to know whether in this also red and yellow are the only tints accorded by the colourist.

Haslemere House, Clifton

SILVANUS P. THOMPSON

IN your issue of the 8th inst. (vol. xxiv. p. 431) your correspondent "A. M." describes what he calls a "pink rainbow" seen by him at Aldworth, near Haslemere, and as a painter I am interested in his description, as it exactly corresponds with the same phenomenon as seen by me here, same date, and viewed with curiosity by myself and friends.

Corrie Hotel, Arran, September 11

DAVID MURRAY

Atoms

ALTHOUGH I am not an "eminent" authority, perhaps you will excuse my troubling you with the following extract from a paper read by me before the Philosophical Society of Glasgow in November, 1875, a copy of which paper I posted to the Editor of NATURE:—"I have long been of opinion that the most probable hypothesis of the origin of atoms is that there is only one kind of matter—ether or its constituents—and that atoms are merely congeries of units of ether circling at enormous speeds round each other, differently grouped, in different numbers, at different velocities, and at different distances, even as the different members of our sun systems. . . . The numbers of units in each similar atom need not be always the same; a few dozens more or less will not be appreciable by us. On the other hand, if a so-called element show a plurality of spectroscopic lines or hues, I do not think it at all doubtful that there is a plurality of units moving to produce these, since they thus show effects of different modes of moving of bodies; all our different states of sensual consciousness of colours are necessarily dependent on differences in the modes of moving of the agents that excite in us such plurality of lines and hues. As the motions of atom, or rather of groups of atoms, excite in us sensations of sound, so the motions of units, or rather of groups of units, excite in us sensations of colour, and of course the lower-pitched movements of dark heat. Then again, we may hold that the more lines that persist in a spark or a sun, the less easily reducible are the portions of the elements showing them, as far as these lines' constituents are concerned—the lines being still undissociated material." (*Proc. Phil. Soc. of Glas.*, vol. x. p. 61.)

HENRY MUIRHEAD

Cambuslang, August 26

Luminous Phenomena on Rupture of Sea-Ice

IN my diary for January 20, 1881, occurs the following passage. I make no attempt to account for the phenomenon, but am certain it was not caused by any reflection of the lights on board the vessel:—

"Started from Christiania at about 2 a.m. in the *Nyland* steamer bound for Christiansand. At Krujero the steamer forced its way through the ice for half an hour till within about a mile of the land, where sleighs met it on the ice. The passengers and cargo were discharged or taken up on the ice, out of which we backed in close proximity to the *Kong Hacon*, which steamer had followed us in. A beautiful sunset and Arctic winter view, clear air, and rich sky, also a distant ship fast in the ice. The *Nyland* stopped at Arendal for the night, having got to the quay through much ice. We observe often phosphorescence or phosphorescence-like sparks and flashes in the ice as it is broken up by the steamer."

I think that the average thickness of the ice might have been about eight inches. I cannot give the temperature, but on the previous day at Christiania the thermometer indicated about 8° or 10° below zero Fahrenheit (about 40° Fahrenheit of frost). The diary from which the above extract is taken was kept jointly by myself and my travelling-companion, Mr. Winter, of the Indian Civil Service, who of course also saw the flashes referred to. I should like to have been able to talk the matter over again with him, but he is now in Ind'ia. J. ALLEN ALLEN

[The question raised in this letter is a very interesting one. The phenomenon is possibly analogous to the electric flashes which are produced when loaf-sugar is crushed or when mica is rapidly split. It appears very improbable that it can be due to phosphorescent creatures in the water under the ice.—ED.]

Tidal Currents versus Wind Waves

IN NATURE, vol. xxiv, p. 286, a writer on "sea-shore alluvion" positively asserts that the travelling of sea beaches is due to wind-waves, and not to tidal currents, and calls a writer in the *Engineer* to task for having stated the latter. Notwithstanding this assertion, I would suggest that the writer in the *Engineer* is right. Twenty-five years ago, when an engineering student, I was taught that sea-beach travelling was due to wind-waves. Afterwards, while knocking about during fifteen years in the vicinity of the south and west coasts of Ireland, I noted facts that went to show that such a theory was not universally correct. This led me to study wind-action on the sea and lakes, also all I could find that had been written on the subject; the result being that as good evidence was so contradictory, no opinion could be come to from the evidence of others. But it was not till about ten years ago, when I was so circumstanced that I could properly study wave-action, and after six years' careful observation on the south-east coast of Ireland, that I found that tidal currents were the principal motive power; and on again reading what had been written on the subject, that I found that nearly all the advocates for the driftage of sea beaches by wind-waves had studied on beaches where the most continuous and powerful winds acted in conjunction with the flow-tide current. As the results of my observations have been published in the *Proceedings of the Royal Irish Academy*, English and Irish Institutions of Civil Engineers, the Geological Societies of London, Dublin, &c., during the last six or eight years, it is unnecessary to repeat them here. I would, however, point out that when there are only wind-waves and no tidal currents, the beaches as a general rule are banked up, but do not travel (the writer in NATURE seems to have observed this, but does not appear to see the importance of it). This may be seen in the tideless Mediterranean, as pointed out by the late Dr. Ansted in his paper on the Lagoons at the Delta of the Rhone; it may also be seen in Malcombe, or any other bay where there is a "head of the tide" but no tidal current; and in the different freshwater lakes, when the wind-waves are the only motive power. But wherever there are tidal currents acting on a coast the beach must travel. Such tidal currents are those that most perplex the erectors of groynes. If there was only the travelling augmented by wind-waves, the erection of groynes would be very simple; but, as a general rule, they are most necessary where there are strong tidal currents (or conflicting currents) due to the regular "flow" tide, "half counter" tides, or "on-shore" tides; which conflicting currents, combined with the action of wind-waves, let them be direct or as "ground swells," make up all the "cutting-out tides." The greater the complications the greater the "cutting out," and the more ingenious have to be the groynes. "Fulls" accumulate with the wind-waves, but rapidly disappear when the wind ceases. I presume the writer of the article in question is aware that the greatest rise of tide and the least current is at the "heads of

the tides," while the least rise and greatest current is at the "nodal or hinge lines"; and I would be interested to know where permanent beaches accumulate in the latter localities, as from what I have seen those that form rapidly disappear when the wind ceases.

G. H. KINAHAN
H.M. Geological Survey

Glaciation

IN NATURE, vol. xxiv, p. 364, I see a notice of a paper by Dr. Woeikoff on the glacial climate, in which it is shown that "the difference of mean temperature at the lower ends of glaciers (in different parts of the world) reaches fully 20°." This might be expected. The extent of glaciation depends not at all on mean or on winter temperature, but chiefly on summer temperature. *Perpetual snow* means *summer snow*, so that summer temperature is what determines the extent of the snow-fields remaining unmelted in the summer, and consequently of the glaciers which are fed by the snow-fields. The extent of glaciation is also much influenced by the amount of snow-fall. All this is stated in Forbes's "Norway and its Glaciers."

JOSEPH JOHN MURPHY

Old Forge, Dunmurry, Co. Antrim

Yellow Glass in Fog

SOME years ago I was staying at an hotel on the Lake of Constance. One morning a fog came on which completely obscured the opposite shore, but looking through a strip of yellow glass, which formed the border of the window, I was able, to my surprise, to see it distinctly. I presume the yellow glass choked the blue rays reflected by the fog, just as a Nicol's prism, held at the proper angle, chokes the rays reflected from the glass and enables us to see clearly the picture behind it. On my way home I stopped in Paris, and, happening to call on one of the principal opticians, mentioned the circumstance to him. He forthwith showed me a naval telescope provided with a cap at the eye end containing a yellow glass, which could be removed at pleasure. I should like to know if the same simple contrivance has ever been used in our own navy. R.

The New Museum of Natural History

IN your article on "The New Museum of Natural History" (NATURE, vol. xxiii, p. 549 *et seq.*) it is stated that the specimen of *Archaeopteryx macrura* in the British Museum is headless. Will you permit me to draw attention to a nodule projecting from the slab in which the fossil lies, which bears a striking resemblance to the cerebral portion of a bird's skull? It is some years since I visited the museum, but I recollect feeling satisfied at the time that the nodule was the missing head, and worth while disintering from its surrounding slate. E. H. PRINGLE

Calicut, July 31

[The nodule referred to by our correspondent is well known, and has been frequently criticised. Mr. John Evans, D.C.L., F.R.S., drew attention to it in an article published by him in the *Natural History Review*, 1865, pp. 415-421: "On portions of a cranium and of a jaw in the slab containing the fossil remains of the *Archaeopteryx*." Although these fragments which occur in the slab in question undoubtedly belong to *Archaeopteryx*, yet, as stated in our article, vol. xxiii, p. 551, "The original specimen described by Prof. Owen is headless," whereas the newly-discovered Berlin specimen has the head entire, and fairly well preserved, and still attached by the neck to the trunk.—ED.]

On the Velocity of Light

IN view of the experiments of Young and Forbes on the velocity of light, and of the article published by Lord Rayleigh on the subject, it may not be out of place to state as a fact which seemed at the time too evident to require special mention in my paper "On the Velocity of Light," that if the velocity of red and of blue light in air differed by as much as one-tenth of 1 per cent., the image of the slit which served as the source of light, instead of being white, would be spread out into a spectrum which could not fail to be observed. The total displacement in these experiments amounted to 133 millimetres; therefore, a difference of velocity of the red and the blue rays of 1.8 per cent. would necessitate a spectrum 2.4 millimetres in length.