limited area, and mostly in unconsolidated beds, and it is quite probable that they would not outlast the destructive influences to which they are subjected if these were continued throughout a geological period. The coast-line occupied by flint-shingle is almost limited to portions of Western Europe, and is relatively insignificant.

J. S. GARDNER
Science Club

The Great Comet of 1882

M. RAOUL GAUTIER, of Geneva, has recently published, in *Astronomische Nachrichten*, No. 2519, three sets of elements of this comet, calculated from a few observations before perihelion. He says that, as it is possible to represent with the same curve, either a parabola or an ellipse, the nearest observations before and after perihelion, he believes "que si la comète a subi une perturbation dans son mouvement lorsqu'elle a passé à son périhélie, cette perturbation a dû être insensible."

As I am not so far advanced with my calculations, for I have begun a thorough discussion of the movement of that comet, I do not know whether there has been or not any considerable perturbation during the passage near the sun; but can the simple fact alluded to by M. Gautier give us much information on that point?

In fact, we can easily understand that although the orbit after perihelion might be quite different from the orbit before that point, still the positions of the comet at a short distance from perihelion may be pretty well represented, within the limits of the errors of observations, by a single curve, which of course will be of second order, but which will not certainly give the calculated positions of the comet at a certain distance from perihelion agreeing with the observations. If we could prove that the orbits calculated, for instance, from observations between September 7 and 12 and between the 22nd and the 30th of the same month agree together, and give the positions of the comet immediately before and after perihelion according to the observations, then we could say that the movement of the comet was not perturbed during the passage near the sun. But this fact is not proved at all, and instead it seems that the passage through the corona has had some effect upon the movement of that remarkable comet.

E. RISTORI

13, Pembridge Crescent, Bayswater, June 16

THIS comet was visible here with the naked eye up to February 28. I so saw it myself on the evening of that day. Owing partly to cloudy weather, partly to moonlight, I had not seen it for ten days or a fortnight previously, but found it on that evening with little difficulty and without any optical help. In my telescope (4-in.) it appeared, roughly, like a long, flat-sided, oval nebula, the central part of the major axis being the brightest of the whole. Two cloudy evenings intervened, and on the following night (March 3) I could not see it with the naked eye, even after finding it with the telescope and knowing exactly where to look, and though the optical condition of the air seemed the same. During April I saw it, with the same telescope, on sixteen evenings, cloudy weather and moonlight interfering on the others. In the present month (May) I saw it five times, that is, up to the 6th certainly, and I believe I saw it on the 9th, but decreasing visibility and increasing moonlight prevented verification. I have just received a somewhat larger instrument (5-in.), with which after the moon has passed I hope to see it again.

A. S. ATKINSON

Nelson, N.Z., May 19

Sun Pillar seen in Jamaica

AT sunset on May 15 I saw for the first time in my life the phenomenon called the *Sun Pillar*. A few days later the mail-packet arrived from England, and in *NATURE* I found much correspondence on its appearance on April 6 at several places in England and Wales between Hull and St. David's.

Major Gibney's admirable description of its general appearance on April 6 (vol. xxvii. p. 605) was so fully confirmed on May 15 in Jamaica that a very brief description may here suffice.

At 6h. 30m. p.m. Kempshot mean time it appeared as a bright ray of light of a faint roseate hue, 2° in width and 30° in height above the horizon, vertical, but not passing through the sun. A rough sketch was made at the time, and the circles of the equatorial were afterwards employed to determine the azimuth of the point where the pillar cut the horizon. This was 70° from the

north towards the west; and as the sun's azimuth was 69° at the same time, the pillar passed 1° to the west of the sun. In the sketch the pillar is represented as passing its own breadth to the west of the sun, but as the sun was then just below the horizon the former measure is likely to be more correct.

Now with regard to the nature of the phenomenon, it certainly was not the usual display of the zodiacal light. The light is here seen to perfection; every fine night when there is no moonlight the zodiacal light may be seen following the ecliptic from the one horizon to the other with but little variation, except perhaps as to the *gegensehein* or stronger illumination near the point in the heavens diametrically opposite to the sun. And so clearly is it seen, that some years ago I carefully measured its breadth at different distances from the sun, and so formed the following table:—

Ang. dist. from Sun.	Breadth of Z.L.	Ang. dist. from Sun.	Breadth of Z.L.
0	0	0	0
30	41'4	110	20'3
40	38'7	120	17'8
50	36'1	130	15'3
60	33'4	140	13'0
70	30'7	150	10'8
80	28'1	160	8'9
90	25'5	170	7'6
100	22'9	180	7'0

From various considerations based upon the figure corresponding to these measures I consider the zodiacal light a terrestrial phenomenon—rays of light are swept back from the sun, chiefly from the tropical parts of the earth, and tend to accumulate at the point in the heavens diametrically opposite the sun.

If there be any truth in this theory, the sun pillar may be a strong and comparatively local development of the same light; this is the only explanation I can give; the explanation given by Mr. G. J. Symons, the well-known meteorologist, "that it is merely a portion of a halo passing through the sun" (vol. xxviii. p. 7), will not apply to the Jamaica observation at all; the sky was far too pure and transparent at the time, and there was not the least trace of *cirrus* cloud.

MAXWELL HALL
Kempshot Observatory, Jamaica, June 7

Error in Hutton's Tables of Logarithms

AT the end of Hutton's "Mathematical Tables" (new edition, 1858, Longmans and Co., London) there is a very useful table containing the logarithms of certain constants frequently used in calculation. The tropical revolution of the earth in days is there given as 365.24226, and the logarithm of this most important constant is given as 2.5625910 instead of 2.5625810.

I would be glad to know from any of your readers whether there are any other important errors in this edition, especially among those tables of logarithms in frequent use.

Jamaica, June 4

MAXWELL HALL

Palaeozoic Sclerotic Plates

IN the course of my researches among the coal shales of Northumberland I discovered two specimens of ossicular rings known as sclerotic plates. The external diameter of one ring is five-eighths of an inch, and the orbital orifice is one-quarter of an inch; this ring of sclerotic plates consists of nine bones arranged as are the eye bones of *Ichthyosaurus*, *Plesiosaurus*, and eagles, viz. in tolerably uniform segments. The second specimen is a quadrant of a ring, and consists of six plates of larger size than the other specimen. I shall be glad to learn if any of your readers have discovered similar sclerotic plates in the Palaeozoic rocks of the British Isles, as specimens are not exhibited in the British Museum, Jermyn Street Museum, or Edinburgh Museum.

T. P. BARKAS

Newcastle-on-Tyne, June 25

Graft-Hybridisation

ST. PAUL, in his Epistle to the Romans, says (ch. xi. v. 17), in illustration of the admission of the Gentiles to the religious privileges of the children of Israel, "If thou, being a wild olive, wert grafted in among them, and didst become partaker with them of the root of the fatness of the olive tree," &c. Olshausen, in his commentary on this epistle, says (English translation, p. 369),

"Whereas, according to the image in this place, the wild branches are ingrafted into the generous tree, reversing the usual process by which good branches are grafted into wild trees, we are informed by both ancient and modern writers that such a process is practicable in this very tree, the olive, and is often practised in the East. Compare Columella 'De Rebus Rusticis,' v. g." Can this be confirmed? It seems scarcely credible. The question bears on the subject of graft-hybridisation, about which many curious facts are collected in Darwin's work on "Variation under Domestication."

JOSEPH JOHN MURPHY

Old Forge, Dunmurry, Co. Antrim, June 29

Wild Duck and Railways

LAST autumn I visited Canada and made a journey to the extreme west point (then reached) of the Canada Pacific Railway, on which three or four thousand men were at the time employed laying down the rails on the prairie, at the very rapid rate of three or four miles a day, or more than twenty miles a week. There are many ponds and lakelets along the track, which abounded at that season with a variety of ducks—mallard, teal, widgeon, &c.—usually very shy, and not easily approached by the sportsman. Yet these ducks had in the short space of from two to five days become so accustomed to the noisy and (to most of the birds) novel engine moving along, that they remained sitting quietly in the water within easy shot when the train was passing. On my return journey I was sorry to find that this confidence on the part of the ducks was taken advantage of by the conductor and other wretched sportsmen (?) who shot at the poor birds from the platform of the cars whilst in motion, although when they did *kill*—I am glad to say there were more misses than hits—they could not stop to pick up the game. A sportsman, to get equally near to the ducks as they permitted the train to approach them, had to use the cover of the long grass and some artful dodging to attain his object. This quick intelligence on the part of the ducks seemed to me something remarkable, as the senses both of sight and hearing must have been, one would suppose, at first alarmingly affected by the great noisy, smoking monster rushing along their favourite and hitherto usually silent haunts.

JOHN RAE

4, Addison Gardens, June 30

Large Hailstones

A SEVERE thunderstorm passed over Woodlesford, six miles south-east of Leeds, between 3.10 and 4 p.m. this afternoon, proceeding from south-west to north-east. Flashes of lightning during that time were almost continuous. At 3.15 heavy rain began to fall, becoming so thick at 3.25 as to render objects a short distance away almost indistinct; at 3.30 this changed to hail, the stones during the worst period being generally irregular parallelopipeds of ice, with two edges of about one inch each, and the third of one-quarter of an inch. These blocks consisted of hard, colourless, transparent ice, surrounding a central, irregularly-shaped mass of opaque white, small air-bubbles of roughly ellipsoidal shape being ranged round this. The white nucleus was not quite so hard as the exterior transparent coating. The force of collision on the railway line was sufficient to make the masses bound to a vertical height of two or three feet. At 3.45 the hail had moderated, when a few light loose clouds were observed quickly passing from north-east to south-west, and thus directly opposite to the direction of the storm, and at a much lower level.

R. WEBB

June 30

Extinction of Flatfish

I HAVE been advised by Mr. Murray of the *Challenger* expedition to inquire, through your columns, whether the experience of any of your correspondents coincides with mine as to the gradual failure—in some places almost the extinction—of flatfish where whelk-gathering is prosecuted.

MALCOLM MCNEILL

The New Club, Edinburgh, June 30

Garfish

IN March last I was being pulled off from the shore to H.M.S. *Himalaya* in the harbour at Aden, when a fish jumped out of the water over the boat, and in doing so struck the hat of another officer and knocked it into the water. When the hat

was recovered we found in the *hard* felt a slit about four inches in length. Unfortunately the fish escaped, but the impression of those who saw it was that it was some kind of garfish, and that the damage done was inflicted by the beak. It appeared to me to be about ten inches long. It is obvious that had the fish struck my friend in the face or neck, or even in the chest, it might have resulted in a fatal injury.

S. ARCHER

Sheerness, June 29

The "*Spirogyra quinina*"

CAN any of your readers inform me of any practical method of exterminating, in a lodge or reservoir, confervoid algae, more especially the fine filamentous variety *Spirogyra quinina*?

Hanley, Staffordshire, June 19

FREDK. HAIGH

ACTION OF LIGHT ON INDIARUBBER

IN continuation of the experiments described in NATURE, vol. xxvii. p. 312, two pieces of caoutchouc tube, about 48 mm. long and 7 mm. wide, were introduced on January 23, 1883, into test tubes containing oxygen confined over mercury. One of these tubes was surrounded by a case of black paper, and both tubes were placed side by side in a north window. On June 27 the tubes were examined: in that exposed to light about 17 cc. of oxygen (about three-quarters of the gas the test tube at first contained) had been absorbed, and the india-rubber had become altered, so that on pressing the tube between the fingers superficial cracks were produced. In the other test tube no appreciable diminution of gas had taken place, and the caoutchouc was unchanged, thus fully confirming the results of the former experiments. We may therefore conclude that caoutchouc alters under the combined influence of light and oxygen, but that neither alone produces any effect.

Cooper's Hill, June 29

HERBERT MCLEOD

ON WHALES, PAST AND PRESENT, AND THEIR PROBABLE ORIGIN¹

II.

THOUGH the early stages by which whalebone has been modified from more simple palate structures are entirely lost to our sight, probably for ever, the conditions in which it now exists in different species of whales, show very marked varieties of progress, from a simple comparatively rudimental and imperfect condition, to what is perhaps the most wonderful example of mechanical adaptation to purpose known in any organic structure. These variations are worth dwelling upon for a few minutes, as they illustrate in an excellent manner the gradual modifications that may take place in an organ, evidently in adaptation to particular requirements, the causation of which can be perfectly explained upon Darwin's principle of natural selection.

In the Rorquals or fin-whales (genus *Balænoptera*), found in almost all seas, and so well known off our own coasts, the largest blades in an animal of 70 feet in length do not exceed 2 feet in length, including their hairy terminations; they are in most species of a pale horn colour, and their structure is coarse and inelastic, separating into thick, stiff fibres, so that they are of no value for the ordinary purposes to which whalebone is applied in the arts. These animals feed on fish of considerable size, from herrings up to cod, and for foraging among shoals of these creatures the construction of their mouth and the structure of their baleen is evidently sufficient. This is the type of the earliest known extinct forms of whales, and it has continued to exist, with several slight modifications, to this day, because it has fulfilled one purpose in the economy of nature. Other purposes for which it was not

¹ Lecture delivered at the Royal Institution on the evening of Friday, May 25, 1883, by Prof. Flower, LL.D., F.R.S., P.Z.S., &c. Concluded from p. 202.