On August 10 the *Knight Errant* went out again and got several fairly successful hauls of the trawl and a serial temperature-sounding in the warm area, returning on Thursday the 12th, and she left Stornoway for the fourth time on Monday, August 16, when the party landed on Rona and gave it a cursory examination. They then steamed towards the deep water of the cold area, and on Tuesday the 17th they trawled successfully, and took a serial temperature-sounding in 540 fathoms. They returned to Stornoway for the last time on the evening of Thursday, and left on the following day for Greenock, where they arrived on Monday, the 23rd.

The observations made by Capt. Tizard in the *Knight Errant* have fully corroborated the results of the *Lightning* and *Porcupine* as to the facts of the abnormal distribution of temperature in the Faroe Channel. They have also established the existence of a submarine ridge rising to within 300 fathoms of the surface, in the position in which such a ridge is required to satisfy the conditions of the doctrine of the interference of continuous barriers with the distribution of deep-sea temperatures. Thus far they may be regarded as entirely successful.

The highest line of the ridge has probably not been found, and the details of temperature have yet to be traced out more accurately along the line and for a short distance on either side. I consider that it would be of the greatest interest to work this case out fully as a striking example, within a few miles of our own shore, of a physical phenomenon of importance from its wide occurrence.

The *Knight Errant* was found quite unsuitable for such work; a small steamer of ordinary strength, with stowage for coals for a fortnight's steaming, and with sails to enable her to lie to in a breeze, could do all that is required within a month or six weeks of the ordinary variable weather of these seas.

Although the solution of this temperature problem was the principal object of this summer's trip, I wished greatly to make some additional observations on the nature of the fauna on the two sides of the ridge, and I was especially anxious to procure some fresh specimens of sponges as material for the structural part of the memoir in which I am engaged with Prof. Franz Eilhart Schultze on the Hexactinellidæ of the *Challenger* Expedition.

The Admiralty declined to give us any material assistance in this direction, but they allowed me to take the gear on board and to get a cast of the trawl or dredge in the intervals of sounding, or when the sounding work was over. I accordingly provided 1,000 fathoms of 2½ inch dredge-rope and other necessary appliances, and Messrs. Henderson, ship-builders, Glasgow, kindly lent us an excellent steam-winch, which was fitted on deck and was of the greatest service both in sounding and trawling. Owing to the boisterous weather and insufficiency of the vessel, this part of our undertaking was not very successful. I got none of the coveted sponges, but two or three hauls of the trawl were taken in each area, and a number of highly-characteristic abyssal forms were procured, including some deep-sea fishes, several crustaceans, and a number of gigantic pycnogonids, some interesting echinoderms, including *Porocidaris*, *Asthenosoma*, *Phormosoma*, *Pourtalesia*, *Rhizocrinus*, and others; some corals, and many curious rhizopods. As the vessel

has not yet returned, I take these names from Mr. Murray's rough notes.

Enough has been done to give further evidence, if such were needed, that a small district on the northern slope of the coast of Scotland will afford a richer harvest to a properly-organised dredging-excursion than perhaps any other spot on the earth. The whole area is singularly productive, and it is bisected by a narrow line, on the one side of which the warm sea at a depth of 500 to 600 fathoms vies in abundance and variety of abyssal forms with the favoured patches off Inosima and Zebu; while on the other side of the line, within a distance of a few miles, we find an epitome of the fauna of the depths of the Arctic Sea.

C. WYVILLE THOMSON

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.]

A Fragment of Primeval Europe

THE paper in NATURE, vol. xxii. p. 400, by Prof. Archibald Geikie, on the glacial phenomena of the north-west coast of Scotland, contains on many points a most true and graphic description of a most peculiar and a most interesting country. But I demur to its accuracy on one of the main features to which he refers. The amount of glaciation on the hills of Laurentian gneiss, as represented in the sketch on p. 401, is inordinately exaggerated. I know that country well, both in its general aspect and in its details, and no part of it presents such a scene of symmetrically rounded hills, like the huts of Caffres in Zululand, as that depicted in the sketch.

It is true that all the lower hills are more or less strongly glaciated. But they are also full of low cliffs, and precipitous rocks upon the sides of the glens, and the whole character of the glaciation is such as to suggest the action of heavy floating ice such as that of the "Paleocrystic Sea," and which acted only upon surfaces specially exposed.

Ben Stack, which is 2,364 feet high, and is composed of the same rock, is not rounded at all, and on the north-west face is full of great precipices along which no glaciation can be seen.

It is perfectly true that the same glaciation which is common on the exposed surfaces of the gneiss cannot be traced on the Cambrian sandstones which overlie it. But this is probably due to the obliteration of the ice-marks by subsequent atmospheric action, which tells rapidly and powerfully on the sandstones, whilst it is almost inoperative on the intensely hard and tough Laurentian gneiss.

That this is the true explanation of the difference now presented by the two rocks, is evident from the fact that the next rock in the ascending series, namely, the white quartzites, do retain surfaces in abundance which are splendidly glaciated. I know no spot in Scotland where the polished surfaces due to glaciation are seen on a greater scale than on the top of the white quartzites which cap the mountain of Quenag in Assynt. This is a classical area in geology—a sketch of it forming the frontispiece of Murchison's "Siluria." The road from Inchnadamf to Kylescure and Scourie passes over a plateau formed of this quartzite, and the beds of white rock, highly glaciated, shine for miles through the heather.

The glaciation which left these surfaces must have passed over the sandstones also. But the rock was not of a material calculated to retain the marks.

Nevertheless I am not prepared to deny that possibly the gneiss of Sutherland may have been doubly glaciated—once in the glacial epoch as hitherto known to geology, and also at some former epoch inconceivably remote, when similar conditions had prevailed.

If well glaciated surfaces of the gneiss can be distinctly traced

passing under the Cambrian conglomerates, such evidence would go a great way. I have examined some spots where the Cambrian conglomerate has left cakes sitting on the gneiss, and at these spots I should say decidedly that there was no proof of the glaciation of the subjacent rock.

That there may be such evidence at other points is very possible; and if Mr. Geikie can establish it he will have made a discovery of high interest in geology.

ARGYLL

August 27

New Red Star

MR. ORMOND STONE, writing from Mount Lookout, U.S., lately informed me that on August 6 he found a very red star, 6.5 mag. in 19h. 10m. $\pm$, and $-16^{\circ} 7' \pm$. I observed it last night, when it appeared, according to my estimation, of no more than 7.5-8 magnitude. In colour it ranks among the most remarkable red stars, and as it is also, very probably, a variable, I would recommend it to the close attention of observers. It agrees approximately in R.A. with the well-known variable τ Sagittarii, but differs in more than a degree of declination from that star, of which I find the place in my *Red Star Catalogue* to be α , 19h. 9m. 19s.; and δ , $-17^{\circ} 10' 7''$ for 1880. In about that position last night I found a small colourless star not more than 10 or 11 magnitude.

JOHN BIRMINGHAM

Millbrook, Tuam, August 29

Locusts and Coffee Trees

MR. S. B. O'LEARY of this city has favoured me with extracts from a letter written by a relation of his residing on a plantation near Antigua-Guatemala, and containing information about the locust-plague, by which lately the crops of Indian corn and a great many coffee-plantations in that country have been destroyed. The insect is called *Chapulín* (*Gryllus miles*, Drury?), and appeared first in the department of Chiquimula, in the eastern part of Guatemala, close to Honduras. Thence it spread over all the warmer parts of the Republic, avoiding the higher and cooler regions. The loss must be very considerable; one gentleman, Don Gregorio Revuelto, in the department of Suchitepeque, lost in one night 70,000 trees, without there being left one single leaf. In April a swarm, supposed to be four leagues broad and about 300 metres long, approached the estate belonging to the writer of the letter, but fortunately could be partly driven away with noise and smoke.

These facts are interesting, as it has not been observed hitherto that locusts, in such a degree, attack the coffee-tree.

Caracas, August 2

A. ERNST

Intellect in Brutes

A VERY interesting instance of animal intelligence has been recently reported in one of our newspapers, and may appear sufficiently remarkable to merit more extended notice. A large and destructive fire lately took place upon the shores of the East River opposite to New York, between which city and Long Island this channel passes. The occasion was the spread of naphtha from a burning oil-ship, which instantly became a trail of fire from which the flames swept into well-filled lumber-yards covered with pine boards, and thence to the loaded barges which lined the docks along the river front, and extended up the banks of a small neighbouring creek.

By the rapid and uncontrolled advance of the conflagration over this wide area the families and occupants of the barges and in the lumber-yards were driven away and forced to seek safety in flight. A Newfoundland dog belonging to the grounds, and at that time roaming amongst the lanes of lumber, found himself imprisoned by a swiftly-contracting arc of flame, with the river on one side as the single avenue of escape. Unlike the beasts in the notable dilemma of Baron Munchausen, these opposed elements refused to leap over the back of their prey, and, extinguishing each other, permit him to escape.

The dog jumped into the water and headed for the opposite (the New York) shore. Although pursued by men in boats and lured by cries and calls from the shores, he steadily kept on his course, and after a long and difficult trip landed on the New York side of the water. From the shore he reached one of the avenues which run lengthwise through New York, and finally found his way to the 34th Street ferry, which lay at a consider-

able distance below the point of his landing. The dog, following the lumber-waggons, had often crossed from one shore to the other by means of this ferry, and now recognised in his present extremity, he easily secured a single passage.

Once returned to the Long Island side, he regained his old quarters, having by this circuitous route baffled the fire and regained his home.

L. P. GRATACAP

Amer. Mus. Nat. Hist., N.Y., August 14

CHATEL, Jersey, must send a more precise address.

THUNDERSTORMS¹

III.

THE name *thunderbolt*, which is still in use, even by good writers, seems to have been introduced in consequence of the singular effects produced when lightning strikes a sandhill or sandy soil. It bores a hole often many feet in length, which is found lined throughout with vitrified sand. The old notion was that an intensely hot, solid mass, whose path was the flash of lightning, had buried itself out of sight, melting the sand as it went down. It is quite possible that this notion may have been strengthened by the occasional observation of the fall of aerolites, which are sometimes found, in the holes they have made, still exceedingly hot. And at least many of the cases in which lightning is said to have been seen in a perfectly clear sky are to be explained in the same way. Every one knows Horace's lines—

“Diespiter
 Igni corusco nubila dividens
 Plerumque, per purum tonantes
 Egrot equos volucrumque currum.”

But Virgil's remark is not so commonly known. He is speaking of prodigies of various kinds, and goes on:—

“Non alias coelo ceciderunt plura sereno
 Fulgura; nec dirii toties arsere cometae.”

It is very singular that he should thus have associated comets and meteorites, which quite recent astronomical discovery has shown to have a common origin.

Another remarkable peculiarity, long ago observed, is the characteristic smell produced when lightning strikes a building or a ship. In old times it was supposed to be sulphurous; nowadays we know it to be mainly due to ozone. In fact, all the ready modes of forming ozone which are as yet at the disposal of the chemist depend upon applications of electricity. But besides ozone, which is formed from the oxygen of the air, there are often produced nitric acid, ammonia, and other compounds derived from the constituents of air and of aqueous vapour. All these results can be produced on a small scale in the laboratory.

Hitherto I have been speaking of lightning discharges similar in kind to the ordinary electric spark, what is commonly called *forked* or *zig-zag* lightning. Our nomenclature is very defective in this matter, and the same may be said of the chief modern European languages. For, as Arago remarks, by far the most common form of lightning flash observed in thunderstorms is what we have to particularise, for want of a better term, as *sheet-lightning*. He asserts that it occurs thousand-fold as often as forked lightning; and that many people have never observed the latter form at all! It is not at all easy to conceive what can be the nature of sheet-lightning, if it be not merely the lighting up of the clouds by a flash of forked lightning not directly visible to the spectator. That this is, at least in many cases, its origin is evident from the fact that its place of maximum brightness often takes the form of the *edge* of a cloud, and that the *same* cloud-edge is occasionally lit up several times in quick succes-

¹ Abstract of a lecture, delivered in the City Hall, Glasgow, by Prof. Tait. Continued from p. 365.