

in the case of London, and less but perceptibly so in that of Brighton, the light has become of a more silvery hue, due doubtless to the extensive use of the electric light. The distance between this place (lat. 51°, long. 0) and London is about thirty-five miles in a direct line, and there is no place of any size between these points, so there can be no mistake about it; and that the reflection of light at such a distance should be visible seems worthy of notice. It would be interesting to know how far, under favourable atmospheric conditions, the reflection of the London lights can really be seen.

W. J. TRENTLER

Fletching, Sussex, November 22

#### A Lunar Rainbow

ANY of your readers who happened to observe the heavens on Saturday night, the 17th inst., at about 11.15 to 11.30, could not fail to notice the beautiful lunar rainbow which was then visible. Though the moon had slightly passed its perigee, it was shining with such dazzling brilliance that the marbled shadows on its surface were almost effaced, and it hung in the heavens like a spotless crystal sun. The very stars seemed farther away, as though they had shrunk back, ashamed and frightened by the silver glory. Jupiter and Sirius alone stood fearless and undaunted—the former, below her to the left, as if in attendance, the latter far away in the starless south. A few featherlike clouds which the moon illumined with a splendour of her own, now and again sailed in stately silence across her path, but that portion which spread directly over her face, seemed to melt and become invisible like a snow flake on a warm hand, so that the cloud floated around her as a veil, fringing but not covering her face. It was when surrounded by one of these clouds that the rainbow became visible. I had never seen one before, so cannot say whether it was more distinct and bright than is usually the case, but I could see most vividly the red, yellow, green, and violet bands with their intermediate shades. The bow seemed formed on the cloud that shaded the moon at the time, and lay round her in a perfect, though comparatively small circle. It remained so for some nine or ten minutes, and then faded gradually away into a luminous halo of golden brown. Those of your readers who were fortunate enough to behold this beautiful phenomenon will, I am sure, agree with me that it was a sight not to be forgotten.

J. C. KERNAHAN

The London Institution, November 24

#### Sudden Stoppage of Clocks

I HAVE four clocks in my house; one is on a wall that bears north-east and south-west, while the other three ranged nearly at right angles about north-west and south-east. The times of these clocks were not exactly together, there being from five to fifteen minutes between the times; but all of them stopped on the morning of November 18 at times as recorded by each between 3.25 a.m. and 3.40 a.m. Have any other clocks stopped on the same night? This place—Lurgybrack, Letterkenny, Co. Donegal, is in lat. 54° 56' and W. long. 7° 41' 52'.

Letterkenny, November 19

G. HENRY KINAHAN

#### Fog Bows

ON November 14, when driving about half way between Convoys and Letterkenny, Co. Donegal, I observed a very complete bow at about 1 p.m., due solely to a fog. For the most part it was quite white, but at the springing there were slight traces of prismatic colours. On November 15 at 7 a.m. at Letterkenny there was also a fog bow; this, however, had all through well developed prismatic colours. The 15th afterwards came on a heavy wet day; the 16th was fine; but since then there have been severe winds accompanied with sleet, snow, and rain.

G. H. KINAHAN

Letterkenny, November 19

#### THE EARLY HISTORY OF THE HERRING<sup>1</sup>

THE Admiralty having intimated on July 31 that they were prepared to grant the use of a gunboat to enable the Board to undertake some investigations into the early

<sup>1</sup> Preliminary Report of the Investigation Committee of the Fishery Board for Scotland.

history of the herring, the convener of the Committee appointed to carry on these inquiries made as complete arrangements as was possible in the limited time, and, along with Sir James R. Gibson-Maitland, proceeded to join Her Majesty's gunboat *Jackal* at Invergordon on August 6. Besides making preparations to collect material to illustrate the growth of the herring during the early stages of its development, it was thought desirable to make arrangements for the examination of the spawning grounds, in order to ascertain under what conditions the spawn was deposited. To assist in the work Mr. J. Gibson, D.Sc., of the Edinburgh University Chemical Laboratory, and Mr. J. T. Cunningham, B.A., of the Zoological Laboratory, were invited to join the expedition.

The trawls, dredges, and other appliances were taken on board on August 6, and on the following day the *Jackal* left Invergordon for the Moray Firth, and began the work of investigating the inshore spawning grounds lying between Wick and Fraserburgh. Each place examined was indicated by a number on the chart, and will be spoken of in the Report as a "station." During the month the *Jackal* was at our disposal sixty stations were made, and nearly as many by the *Vigilant* from the time she relieved the *Jackal* to her return to Granton on October 6. The plan generally adopted at the various stations consisted in (1) taking the depth and the surface and bottom temperatures; (2) collecting samples of water from the bottom, and of the mud, sand, &c., brought up by the sounding apparatus; (3) noting the nature of the surface fauna taken in the tow-net; and (4) examining and, when necessary, preserving the animal and vegetable forms brought up by the trawl, dredges, and tangles. In this way there has been collected a considerable amount of raw material, from which important results will in due time be obtained.

Not the least interesting part of the work consisted in experimenting with herring ova which were successfully artificially impregnated and developed. At first experiments were made with spawn obtained at Helmsdale on August 7, from herring which had been several hours out of the water; but the results being unsatisfactory, it was determined to obtain, if possible, the roe and milt from living fish. We, therefore, frequently remained during the night on the fishing ground, and boarded the herring boats when the nets were being hauled. The fishermen, always pleased to see us, rendered every assistance in their power. Selecting ripe fish, we expressed the roe and milt on squares of glass, which were then placed in carrying boxes specially designed for the purpose. The boxes were conveyed by the *Jackal* to a small laboratory near Geanies, which had been kindly placed at the disposal of the Committee. Once at the laboratory, the glass plates, with the developing eggs firmly adhering to them, were transferred to hatching boxes, through which a constant current of water flowed from a large tank. In from three to five days well-formed active embryos were visible through the thin transparent egg membrane, and in ten days we successfully hatched fry from the artificially impregnated ova. We soon discovered that success depended on having an abundant supply of pure sea-water at an equable temperature. Unfortunately, just as our arrangements for experimenting on a large scale were completed, the herring fishing in the Moray Firth came suddenly to an end, and it was impossible to obtain further supplies of eggs.

We next directed our attention to the nature of the surface forms, which are believed to supply the principal food for the herring fry, and when this, on account of the weather, was no longer possible, we proceeded to examine the mussel scalps in the Dornoch, Cromarty, and Inverness Firths.

As a full account of the autumn's work will be presented to the Board in time for the Annual Report, only a short statement is now given, indicating rather the