

*The Microscope and some of the Wonders it Reveals.* By Rev. W. Houghton, M.A., F.L.S. Fourth Edition. (Cassell, Petter, and Galpin.)

It seems sufficient to notice the appearance of the fourth edition of this little volume, which, like so many works issued by the same firm, bears no date of its appearance.

*The Flora of Essex County, Massachusetts.* By John Robinson. (Salem, 1881.)

THIS enumeration of the plants of Essex county embraces, besides the Phanerogams, the Vascular Cryptogams, and the algæ (marine) and lichens among the Thallophytes. Essex County would seem to be an attractive field to the botanist. Besides open country, deep woods and numerous swamps, the Merrimac furnishes a fine fertile valley. The freshwater ponds, over fifty in number, are from four to four hundred acres in extent, and are rich in water-plants. A sub-alpine flora is to be met with, while a long sea-coast affords suitable dwelling-places for a large number of plants peculiar to such quarters. To this well compiled flora an interesting series of sketches of the lives of some of the early botanists of the district—Cutler, Osgood, Oakes, Pickering—is attached.

*Catalogue of the Fossil Foraminifera in the British Museum (Natural History).* By Prof. T. Rupert Jones, F.R.S. (London: Printed by order of the Trustees, 1881.)

THE Foraminifera which are in a living state to be found widely distributed in the seas of the present day, are also known to enter as fossils into the composition of several of the stratified rocks, forming in some places such vast thickness of limestone, as to command the attention of the Palæontologists. It is found somewhat difficult to draw the line between recent and fossil forms; and it would seem to be equally difficult to be sure what is a foraminiferous form and what is not. In this most useful catalogue, however, all descriptive details and all controversial questions are omitted. Eozoon appears in the list, and so also does Orbitoides. The classification adopted is that of H. B. Brady, and the species are grouped according to their local occurrence and geological age.

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.]

The Aurora and its Spectrum

IN the recent correspondence in your columns on the subject of the aurora, no notice has been taken of an old observation by Anjou, in Siberia, that whenever the aurora flashed up past the moon, a halo was formed. This, with numerous other observations, which need not be detailed here, have led me to the conclusion that suspended crystals of ice have most probably something to do with the aurora; and my object in writing is to suggest to some of your readers who are well equipped with suitable apparatus, that if they could contrive to pass a glow or phosphorescent discharge of electricity through fine-falling or loosely-compacted snow, they might very possibly be rewarded by the discovery of the origin of the green and red lines in the aurora spectrum.

Mr. Capron's experiments seem to show conclusively that it is not an air spectrum, and it is also evident that the conditions of discharge in an atmosphere laden with ice crystals are very different from those in the clean vacuum tubes usually employed by experimenters.

While on the subject perhaps I may be permitted to add one

small contribution to the question. I have examined most of the auroras recorded by the Meteorological Office during the last four or five years with reference to the synoptic conditions of pressure with which they are associated. The result is, that though the larger number may be grouped round a few types of pressure distribution, it is not easy to see any one constant condition.

RALPH ABERCROMBY

21, Chapel Street, London, S.W., December 18

Swan Lamp Spectrum and the Aurora

MR. J. RAND CAPRON'S experiment with the Swan lamp is very interesting; but his inference that the aurora may not be an electric discharge in the upper atmosphere because it does not show nitrogen lines in the spectrum is hardly justified by the experiment. On the contrary, the true significance of that experiment appears to be that there is a certain degree of rarefaction of the air (or vacuum) at which the nitrogen lines disappear. Such a vacuum is given by the Swan, and probably other electric incandescence lamps. According to Mr. Capron's result, when more air got into the bulb and vitiated this fine vacuum, the nitrogen lines appeared. We may say, then, that if the aurora is an electric discharge in the upper air, the rarefaction must be approximately that of a Swan lamp, if there are no nitrogen lines visible in the spectrum of the light. To study this further some one ought to examine the discharge in vacuum tubes containing air at different degrees of density.

J. MUNRO

West Croydon, December 18

The Meteor of November 17

MR. CAPRON'S letter (p. 149) gives an interesting confirmation of the meteoric nature of the light seen on November 17; as showing that it is physically impossible that it can be an aurora, according to accepted theories of that light. Setting aside the impossible estimate of forty-four miles, it should be noticed that the heights assigned are in close agreement, 170 miles being merely stated, like other elements in my letter, as a minimum. The oblique direction of the meteor from 10° altitude in due east to horizon in due south-west, as shown by several observations, is another evidence of its extra-terrestrial origin.

Bromley, Kent

W. M. F. P.

Invertebrate Casts

THE communication in NATURE, vol. xxvii. p. 46, induces me to state the following fact. Engaged this summer in an economic survey of the North Transcontinental Survey for the North Pacific Railroad in the camp just opposite Umatilla, near the Columbia River, Washington Territory, I observed, on June 26, the nympha of a new species of Ophiogomphus, then very common, emerging out of the water for transformation. The Columbia River had been very high, the water beginning to recede, was still more than 30 feet higher than usual. The country around the camp belonged to the so called sagebrush desert, but near the river was a bank of wet sand, flat and smoothed by the receding water. There were no plants around, and only one willow tree, now about 100 feet distant from the river, for five miles on one side and twelve on the other side. I had observed before on the sand a number of traces like the diagram. In the middle a straight furrow, and on each side two series of equidistant dots. By chance I was able to discover that these tracks are made by the nympha of Ophiogomphus (family Gomphina in Odonata). The straight furrow is made by the end of the abdomen, which is heavy and slides upon the ground. The forelegs are shorter, and make, with the end of the tibia, the inner series of dots. The other legs are longer, and make the outer series. More remarkable was it that the furrows were made in a straight line from the water to tree, as it is scarcely probable that a nympha so near its transformation can see well at a distance of about 100 feet. Nevertheless I caught the nympha just at the end of the track—which I saw made—in ascending the tree. The two outer series of dots are one inch distant one from the other. I remember having seen an account of similar tracks on fossil slabs, but I have not been able to find the publication.

H. A. HAGEN

Cambridge, Mass., November 27