

cause for the marvellously perfect cases of adaptive resemblance so common among insects.

Apropos of the extermination of plants, Dr. Abbott remarks (p. 41) with respect to the witch-hazel (*Hamelis virginica*):—"Bent twigs of this plant are still used by the 'gifted' to find water, lost farming tools, and, by one enthusiast, Indian graves. The faithful still claim it as efficacious, and he who doubts is sneered at if he expresses his opinion. All that the rambler can ask is that the plant be not exterminated, and that the fools may be." We may perhaps echo this sentiment on this side of the Atlantic without offence to the members of "Primrose" or any other floral "Leagues." A protest against the extermination of rare plants by "dealers" was circulated by the Corresponding Societies Committee of the British Association last year.

We have given a sufficient idea of this work to commend it to the notice of English naturalists, and we may remark in conclusion that, although the animals and plants referred to are not familiar to the rambler by our own streams, the sparkling anecdotal style will cause the volume to be enjoyed by all, whether trained observers or casual country wanderers, and the spirit in which the author goes forth into the fields and woods or saunters by his favourite "Poetquissings" may be well imitated by the numerous field naturalists now being called into activity by the widely-spread establishment of local societies. "He who has this interest in the life about him can never be lonely, wander wheresoever he will, nor return from a contemplative ramble other than a wiser and happier man." R. M.

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 insure the appearance even of communications containing interesting and novel facts.]

On Refractometers

I OBSERVE that in your issue of June 17 (p. 157) there is an article by Mr. Gordon Thompson on "The Determination of the Index of Refraction of a Fluid by Means of the Microscope." The method there described was, I believe, first proposed by the Duke de Chaulnes in 1767; and in 1876 was suggested by Dr. Royston Pigott in connection with his refractometer. It was employed in 1878 by Dr. Sorby for recognising the minerals in thin slices of rocks; and in 1884 by Dr. Bleekrode in determining the refraction of liquefied gases (*Proc. Royal Society*, vol. xxxvii, p. 343). In these two instances the ordinary method was unavailable. The proposed method has not been much used owing to the fact that the index of refraction cannot be at all depended upon beyond the third place of decimals.

Mr. Thompson considerably exaggerates the difficulty of the usual method by means of a hollow prism: the angle of the prism may be determined once for all; the position of minimum deviation presents no difficulty; and the use of monochromatic light is unnecessary. Indeed it would be objectionable, as it would prevent the determination of the dispersive power, which is often of equal importance with the refractive power of the substance. In my own experiments I have often taken observations both of the refraction and dispersion of five or six liquids during the course of an hour, including the cleaning of the prism between each.

The suggested method seems scarcely to admit of determining the temperature of the drop with any accuracy, which is an important matter where liquids are concerned. It may, however,

doubtless be employed by those who have a good microscope, where great accuracy is not required.

There is an instrument called Abbe's refractometer, which I have recently used for preliminary determinations, and I find it gives accurate results to the third place of decimals. It is founded on the principle of total reflection. It requires also only a drop of the liquid, and as the index of line D is read off without any calculation a complete determination can be made in a minute or two. There is also an arrangement by which the dispersion D to F can be observed and calculated, but I do not find that this is accurate enough to be of much service. The instrument is to be obtained of Carl Zeiss of Jena.

17, Pembroke Square, June 26

J. H. GLADSTONE

Luminous Boreal Clouds

DURING the past two or three years what appears to the writer a distinct class of luminous night clouds in the north sky have occupied his attention. They have probably not escaped more competent observers, and been perhaps referred to simple auroral phenomena, thus escaping discussion. A very marked example was visible here the night before last (22nd inst.), of which inclosed is an illustration from a sketch at the moment.

I may premise the sky was generally clear, stars bright, temperature very low, and wind strong (N.B.) from north-west—a direction maintained for the past two days. Only a slight degree of illumination was imparted to the clouds by a low moon in the south-east, near last quarter. Some light cirrus "scud," high up, conformed to direction of wind.

Above and behind a dark but very limited bank of strato-cumulus, a luminous cloudlet of brilliant pearly lustre appeared, not concurrent exactly with either the magnetic or true meridians, in altitude from 5° to 10° from the horizon, and for 7° in horizontal arc. Its shape, character, and position little varied during observation from 11.30 p.m. to 2 a.m. The structure in this case (only partially realised in the sketch) was striated, the "strike" of main streaks being north-east and south-west. *Transverse bars of luminosity conformed closely to the direction of the cirrus clouds above, and of the wind.* On the three or four other occasions of such observations these luminous cloudlets have been devoid of structure, but in every case they have presented, as in this, an opaque pearly lustre, with definite outline.

Of an entirely different type to the eye are the sudden, diffuse, variable, and transient transparencies of auroræ. Avoiding premature discussion, one cannot but suspect the former occur in much lower and less rare sky-tracts probably than the latter, with a possible frictional factor in their development; and might be distinguished as *nub. culæ borealis* if accorded a special place on further observation. The temperature has been keeping low, and sunset after-gloves have in some degree reappeared during the past week; especially gorgeous being the cloud-tints at sunset of the 22nd inst.

D. J. ROWAN

Dundrum, co. Dublin, June 24

Ampère's Rule

WITH regard to Ampère's rule I should be glad to know what is the general experience of actual teachers?

I have taught electricity to boys for four years, and when at Rugby I learned the subject for I think two years. My experience has been that "Ampère's rule" is not confusing; and as a teacher I find it best to give both this rule and the "screw-motion" rule. I see that Mr. Cumming gives both, on p. 222 of his book.

The College, Cheltenham

W. L.

AS Prof. Daehne (*NATURE*, June 24, p. 168) has called attention again to the treatment of Ampère's rule in my "Electricity Treated Experimentally," perhaps you will allow me to point out that the rule given by Ampère is quoted *historically* only, and for it is substituted a rule, due, I believe, to Clerk-Maxwell, which seems to me preferable to either the original rule of Ampère, or to that quoted by Prof. Daehne, namely, that the movement of a north pole is right-handed to the direction of the current. That is to say, if we assume any right-handed screw to be propelled along the current, the north pole will move in the direction of the twist in the muscles of the wrist in propelling it; and *vice versa*, if the north pole move in