

fog in London, the knowledge of this rain-band would not help him much, for he knows by his chart that rain has already set in.

What he does want to know is whether the cyclone will move northwards, eastwards, or southwards. This no prognostic can tell him; the only known clue to a cyclone path is got from a knowledge of the movements of isobaric lines. In this instance the rain in London was, I think, correctly forecast, but unfortunately such a simple case rarely occurs in this country.

Thus we see that a knowledge of the amount of moisture in any current is of only secondary importance to synoptic forecasting, so that if we may welcome the rainband as an addition to our old stock of prognostics, there is little ground for hoping that it will be of further service than them.

All that Prof. Smyth claims for the spectroscope is to act as a gauge of pure vapour quantity, but it seems probable that its employment may be still further extended. There are strong grounds for believing that an air spectrum may vary not only with the amount of pure vapour, but also with the size, aggregation, and physical condition of the condensed vapour suspended in it. For instance, take the so-called rain-lines. These may appear either alone, or with a rain-band of any intensity; so that if the band is due to pure vapour only, the lines must depend on some other condition. Again in sunset tints we have a natural spectroscope whose colours certainly are the product of both the quantity and quality of the total moisture suspended in the air. I have made a large number of observations on the lurid, coppery, yellow, green, and red skies, which form such a large portion of all weather lore, but without decisive results; for sunset spectra are too complicated and too fleeting to be unravelled by a small instrument. They certainly seem to differ, but their spectra are not so marked as their appearance to the naked eye.

But even supposing that this idea is completely verified, and that the spectroscope can be used as a new weapon of research to discover the still unknown nature of clouds, and that we are ever able to say that such and such an absorption spectrum belongs to such and such a kind of sky, there are no grounds for believing that we can ever regard these spectra otherwise than as a new set of sky prognostics, or that as such they will be of more use in forecasting than those already known.

What the use of any prognostics is in forecasting, and how they are related to synoptic charts, and how isobaric lines map out the shape of rain areas, are other sides of the great problem of weather forecasting, which cannot be discussed here.

Some may differ from Prof. Smyth as to the forecasting value of the rain-band, but all will appreciate the singular skill with which he has surmounted the practical difficulties in the way of making it a quantitative measure of atmospheric vapour.

21, Chapel Street, S.W. October 2 RALPH ABERCROMBY

The Comet

WHEN observing the comet this morning, with $7\frac{1}{2}$ inch aperture and powers of 70 and 150, I at once noticed that the nucleus was far from circular, the length being carefully estimated at $45''$ and the breadth at $15''$, while the measured "Position" of the maj. axis was ($96^\circ-276^\circ$); this was also the supposed direction of the tail, which had ceased to be visible in the increasing twilight.

At 6h. om. G.M.T. the place of the comet was

$$\begin{aligned} \text{R.A.} &= 10\text{h. } 27\text{m. } 3 \pm 5 \text{ secs.} \\ \text{N.P.D.} &= 100^\circ 36' 30'' \pm 10''. \end{aligned}$$

These places, taken with the equatorial, were confirmed by measures of the not far distant star α Leonis. They differ considerably from the calculated place given in the Dunecht Circular, No. 60.

WENTWORTH ERCK

Sherrington House, Bray, Co. Wicklow, October 9

"Note on the History of Optical Glass"

THE writer of the article in a recent number of your journal, entitled "Note on the History of Optical Glass," has fallen into some historical blunders and anachronisms, which are the ground of my addressing you. My grandfather was born in 1738, and would therefore have been but twenty years of age at the date when he is said to have made the acquaintance of the elder Guinand, then sixteen, in Switzerland. It is almost certain that he never was there, at any rate not as an "illustrious savant," engaged in telescopic experiments. His sister's memoirs present

a blank at this exact date, but it is evident that if he travelled at the time when he withdrew from the Hanoverian military service, it was in the character of an obscure young musician. It is just barely possible that there may be some foundation for the story now given—and if so, I should be glad to learn it—but a totally mistaken colour has been given to it by drawing on the future. What follows is still more erroneous. Dollond (the elder) was at this period at the zenith of his fame as an optician; Faraday was not born, and Herschel was an ex-bandsman; yet we are told that he "returned the following year with Dollond and Faraday." It is probably something more than a mere coincidence that about sixty years later the son of that Herschel, the son of that Dollond, and Faraday, were associated in treating with the son of that Guinand for the glasses manufactured by the latter. Apart from this, I submit that hardly anything new is contributed in the "Note." All, and more than all, which it contains will be found in the *Biographie Universelle*, under the name GUINAND, where also is mentioned the Swiss rencontre, but with the name *Dros* in lieu of "Herschel and Utzschneider." According to the *Biographie*, Guinand was born "about 1745," and died in 1825. It was in 1821 that the Astronomical Society was instigated to make inquiries (conducted by my father) regarding Guinand's optical glasses.

J. HERSCHEL

A "Natural" Experiment in Complementary Colours

ABOUT two miles above Ormeim, in the Romsdal (Norway) is the well-known Slettafos, an imposing cascade formed by the impetuous Rauma, which here plunges through a deep rocky ravine. Fascinated by the scene, I stood watching the foaming water for some time, and all at once noticed a most beautiful and delicate rosy pink tint colouring the foam and spray in the ravine. The water, where not broken up, was of a green colour, and the pink tint was at once explained as its complementary. But the point of special interest to me was that this pink colour was not visible except on those parts of the spray and foam which were in the shade of the gorge. In the full light these appeared, as usual, white. The result above described is an excellent illustration, afforded by nature herself, of the advantage of toning down the brightness of the white surface, upon which we wish to evoke a complementary tint, until it no longer exceeds that of the exciting colour—the green in this case.

CHAS. T. WHITMELL

H.M. Inspector of Schools

9, Beech Grove, Harrogate, September 11

Animal Intelligence

IN the article on animal intelligence (*NATURE*, vol. xxvi. p. 523), Mr. Morgan seems to me to have inverted the real process in the case of what he calls "isolation," for he says: "I believe such abstract ideas to be impossible for the brute. I believe them to be the outcome of the use of language." The process of abstraction here alluded to is the conception of a quality apart from the things that possess that quality, as whiteness or edibility.

I watched a little child just able to walk alone, on a railway platform. It went up to a square box, and after staring at it for a few seconds, slowly passed its hand over the top, front and sides, and then along the edge, clearly testing the sense of sight by that of touch. It then did the same with the small wheel of a luggage barrow. It was obviously too young to be able to speak, but I think we may safely assume that it got a notion of what we call "square" and "round." Now a dog can readily acquire a somewhat similar experience, by finding a barrel to be less easy to stand upon than a square box. So far they are much alike; the child, however, certainly exhibited a greater inquisitiveness than a dog is likely to do.

It is obvious that a dog can receive just the same impressions as a child through the senses, so that automatic appreciation of the difference between roundness and squareness is common to both; but, whereas, the dog, as I believe with Mr. Morgan can never get beyond that stage, a child, if not an infant, can make the difference an *object of thought* or a mental abstraction, even without having a word to express it; just as an adult experiencing a new but uncomfortable sensation, can think of it, and coin a term to express it, say, "all-overish-ness;" or again, as one can *feel* indignant or benevolent, and at the same time think about such states without necessarily giving expression to them. If words were necessary, as Mr. Morgan seems to think, then a deaf-