

In NATURE of Jan. 26, Mr. Munro calls attention to the great brilliancy and saturation of many natural yellows as accounting for the difficulty of resolving them into their components. It is, no doubt, quite true that a full yellow could not be compounded of such reds and greens as we come across in daily life, but it is equally certain that a drab or dilute yellow could be; and yet no one recognises the fact by his unaided senses, or thinks it anything but strange and unlikely when told of it. And after all, can it properly be said that natural yellows are more saturated than other colours? That they approach more nearly the corresponding tints in the spectrum is admitted; but is that test a fair one? It seems to me that the homogeneous yellow itself must be considered as dilute when brought into comparison with the nearly primary red and green.

I have another difficulty in accepting Mr. Munro's explanation. A suitable mixture of any red, green, or blue will give a neutral grey. All four come within our every-day experience; but such a result seemed to Goethe, soon after Newton proved it, a paradox of paradoxes, and I believe to unsophisticated minds it seems so still.

Mr. Munro has ingeniously shown from the colour equations that there is no more primary blue in my blue disc than about  $2\frac{1}{2}$  as much as in the red plus  $1\frac{1}{3}$  as much as in the green—a conclusion which seems somewhat startling. In choosing the coloured papers and cards for the discs, I had great difficulty in finding a green that was even tolerably good, and the one that I finally used reflected large quantities of blue light. I had some thought of trying a green silk disc, which was of a much better colour, but feared errors depending on the different character of the surface.

It is not hard to see a reason for the comparative scarcity of good greens. To obtain a good red orange or yellow by means of absorption, all that is necessary is to cut away the spectrum above a certain point; for a good blue, the rays standing below a given one in refrangibility must be got rid of; but in order to isolate a green in anything like purity, the absorbing agent must hit off *two* points of the spectrum, removing all below one point and all above the other. The result is, that while nearly saturated yellows and reds abound—the scarlet of the geranium is almost perfect—hardly a good green is to be met with. The best I know is a mixture, prepared by adding bichromate of potash to a strong solution of sulphate of copper. The addition of a little chloride of chromium to remove the yellow more effectually is perhaps an improvement. If Mr. Munro would care to see the colours which I used for the discs, I should be very happy to send him samples.

Terling Place, Witham, Jan. 29

J. W. STRUTT

#### Comets' Tails

MAY there not be a connection between the colour of the sky and the tails of comets?

Suppose a comet to be surrounded with a wide-spread transparent atmosphere, holding in suspension matter as finely divided and as invisible as the sky-matter of our earth; and suppose the more condensed, but still transparent nucleus to act as a lens, throwing a beam of light upon the otherwise invisible mist of that atmosphere, could not most of the phenomena of those puzzling tails be thus accounted for?

Leicester, Jan. 28

FREDERICK T. MOTT

#### Ocean Currents

MR. LAUGHTON'S letter in the latest number of NATURE shows that the suggestion of a probable influence of differences of atmospheric pressure on ocean currents has not been stated with sufficient clearness.

That a hydrostatic equilibrium would exist under a permanently unequal distribution of the pressures over the ocean, as Mr. Laughton argues, is not to be doubted. But is there any such permanent arrangement?

Granting that the high-pressure area of the trade-winds is nearly constant, varying little from day to day, and only expanding and contracting its limits gradually in summer and winter, the pressures to northward of this over the Atlantic are by no means so steady. Though they give on the average of the year, or even of the month, a *lower* pressure; yet the daily observations show that the pressures over wide areas may vary considerably, rising at one time to equal that of the Trade-wind patch, at another falling very much below it. Quoting from the daily

barometric curves registered in the Quarterly Report of the Meteorological Office (for April—June, 1869), "On the 13th of May in that year, the seven stations whose weather is there recorded (Valencia, Armagh, Glasgow, Aberdeen, Falmouth, Stonyhurst, and Kew) show simultaneously a barometric pressure of 30.1 inches." On the 6th of May these stations had severally reported a pressure of only 28.9 inches. A difference of pressure equal to that of 16 inches of water had taken place over the entire extent of the British Isles, and probably over a much greater space.

The system of synchronous observation is not yet sufficiently extended to enable any positive statement of the general direction of the movement of low pressure areas across the North Atlantic to be made; but there is a strong probability that such depressions travel in a direction continuing the path taken by the hurricanes of the West Indies, since the majority of barometric hollows reach the British Isles from west or south-west. Just as the waters are forced to rise into the central low pressure of a hurricane (to the extent of several feet) and to follow its path, so, in a less degree, does it seem probable that the movement of extended and less violent depressions may influence the ocean currents.

The rate of progress of such depressions appears to be in an inverse ratio to their extent and depth. A West Indian hurricane moves onward at a rate of only fifteen miles an hour (Buchan's Meteorology, p. 269), and the highest speed of European storms, according to the same authority, is forty-five miles an hour; but that minor depressions may travel with much greater velocity is shown by reference to the quarterly report before noticed, where is the record of a hollow of from three to four tenths of an inch, which passed over the British Isles on the 24th of February, 1869, at the rate of ninety miles an hour.\*

Either in causing a considerable change in the level, or in rapidly moving over it, from near an area of constantly high pressure, through a region where the average pressure diminishes, such depressions must surely influence the surface of the ocean, and either aid or retard its currents. That a difference in level of four inches in 1,800 miles can scarcely under any circumstances give rise to a current of twenty miles a day (the word hour in Mr. Laughton's letter is probably a typographical error) is also clear, but the temporary difference in level may be much greater than this within a much shorter distance. The average rate of the north equatorial current, moreover, in the Trade-wind region, is shown by the pilot charts of the Admiralty to be only from ten to twelve miles a day, and it is only claimed for difference of atmospheric pressure that it has some small share in aiding the formation of the current in question.

KEITH JOHNSTON, JUN.

#### Insulation of St. Michael's Mount, Cornwall— When did it occur?

THIS is a very interesting question, and the reader will be enabled to judge for himself, presently, whether there are not sufficient historical facts on record to enable us to answer—"In the eleventh century."

Domesday Book, date 1086, in the part relating to "Cornvalge" (*i.e.* Cornwall), at p. 2, has the following, which I have translated from the abbreviated Latin—"The Land of St. Michael.—Keiwal holds the church of St. Michael. Brismar was holding it in the reign of King Edward. There are two hides which never paid the Danish tax [nunquam geldaverunt]. The land is 8 carucates. There is 1 carucate with 1 villan, and two bordarii, and 10 acres of pasture. Value 20 shillings. Of these 2 hides, Earl Moriton took away 1 hide, value 20 shillings." And accordingly, at p. 11 of Domesday Book, there appear in the descriptive list of the many estates of Earl Moriton, corresponding particulars of the 1 hide which he had taken away.

Now, in the first place, Domesday Book gives no reason whatever for believing that, at its date, St. Michael's Mount was an *Island*, neither does Magna Britannia, vol. 1, p. 303, where the Mount is called *Mychel-stop*, or Michael's place. And in every case, while "annoting" those holding possessions in "Cornvalge," there is an entire absence in Domesday Book of any mention of island or islands on any of the coasts of Cornwall, just as if there had been then no islands on those coasts of sufficient extent to be worthy of mention. On the other hand, it is the

\* The Meteorological Report shows that in January, 1869, 12 depressions reached the British Isles from W.-ward; in February 10, also from W.; in March 8 (5 from W.); in April 7 (5 from W.); in May 8 (7 from W.); and in June 2 from W.