we may take Raper's as a type, consists of excellent practical examples and methods, but is so deficient in explanation and theory that a student could not obtain any grasp of the principles involved without the assistance of some friendly tutor. This is a serious objection if we consider the need of amended methods to meet the present increased speed of ocean transit and the consequent emergencies.

The other group, following on French lines, is so lumbered with investigations of a high mathematical order as to be quite beyond the comprehension of the average sailor.

Jean, who made an attempt to combine the two, produced two volumes of good matter, but ill-arranged and cumbersome. He has, in addition to the versine method, five difficult and different ways of "clearing the lunar distance."

We are glad to see that Mr. Stebbing has taken to heart the fable of the cat and the fox, and in every astronomical problem has selected the method in general use among the advanced school, and has explained and solved his problem by that method, and that only. His book is therefore of modest dimensions, and any student of average intelligence can read it and comprehend it unaided.

The comparatively small number of first-class navigating officers is in itself a conclusive proof that the art of navigation is much more intricate than a casual run through the subject would lead us to suppose. Long experience and special advantages are necessary to graduate as an instructor in this branch of science, and we therefore all the more welcome Mr. Stebbing, who happens to possess these special requirements, as a guide to our sailors of the present and the future.

The Distribution of Rain over the British Isles during the Year 1895. Compiled by G. J. Symons, F.R.S., and H. Sowerby Wallis. Pp. 237. (London: Edward Stanford, 1896.)

MR. SYMONS'S staff of voluntary observers now numbers 3084, having grown from 168 in the year 1860. Of these observers, 2304 have their stations in England, and only 398 in Scotland—a disproportion which is to be regretted. The large number of private stations where good records of rainfall are kept, is a striking testimony to the interest taken in local meteorology.

The present report contains an interesting article on Seathwaite as a rainfall station. The first systematic records of the rainfall at that place were made in 1845, so the station attained its jubilee in 1894. The following conclusions concerning this very wet spot are stated by Mr. Symons: (1) The rainfall at Seathwaite is on the average 135 inches a year. (2) In the wettest year it has exceeded 182 inches, and may possibly reach 190 inches. (3) In the driest year it has fallen to 88 inches, and will probably never be less. (4) In one month (November 1861) more than 35 inches fell. (5) In September 1894, very little more than half an inch fell. (6) There are nine recorded cases of more than six inches falling on one day—probably there have been about a dozen—the heaviest recorded was 7.52 inches on November 26, 1861.

Several plates illustrating Seathwaite, and the positions and patterns of the rain gauges, accompany the article.

In another article in the present volume systematic percolation experiments carried on at Apsley Mills, Hemel Hempstead, are described and discussed. Gauges were sunk in sand, chalk and earth, to measure the percolation at depths of 3 feet and 5 feet in each case. The result of the whole of the observations is, with a probable error of less than 2 per cent., "that with a rainfall of 26 inches, 16 inches percolate through 5 feet of sand, and 10 inches are evaporated from it; and that 12 inches soak through 5 feet of chalk or earth, and

the other 14 inches either evaporate or run off the surface." The differences between the results obtained by the gauges at 3 feet and 5 feet were very small. The loss by evaporation is found by Mr. Symons to follow very nearly the same monthly variation as that from a water surface, but is decidedly less.

There are several other articles on various branches of rainfall work, and they help to make the new issue of "British Rainfall" an interesting volume.

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 intended for this or any other part of NATURE. No notice is taken of anonymous communications.]

The Total Solar Eclipse of August 9, 1896, as observed in a Cloudless Sky at Bodö.

As Bodö was considered as offering conditions not favourable for serious work, this pretty town, so easily accessible for the greater number of European astronomers, was left unprovided with any astronomical instrument. And yet that town was, during the eclipse, favoured by a cloudless sky, which could have given magnificent results. I had the good fortune to observe there the wonderful phenomenon, and to make (what was chiefly my purpose) a sketch of the general outline and the rays of the corona. I do not think that among the thousands of Norwegians who witnessed that grand spectacle there were more than twenty foreigners, almost all English and American ladies and gentlemen.

The place we selected was on a hill at Brevig on the Salten-fjord, near Bodö, which hill had been found on May 3, when the sun was as high as on August 9, to be well situated for the eclipse observation. The weather on the previous days had been fine and very promising, and on the night of August 9 was even more splendid than before. On seeing the sun rise wholly clear from behind the mountains, no trace of the smallest cloud spoiling the clearness of the sky, an enthusiastic "hurrah!" arose from the numerous gathering on the hill.

Two minutes past 4 o'clock we first saw that the sun's edge, in the northern hemisphere and on the right-hand side, was hidden by the moon. Little by little the sun's disc was covered more and more, but the amount of light did not sensibly diminish until more than three-fourths of the disc were obscured. The darkness gradually increased, for the moment of the total eclipse was approaching. How slowly the seconds seemed now to pass, and how quickly after the first moment of totality! That impressive moment occurred at 4.54. Then at once we saw the moon of almost inky darkness encircled by the white corona. The corona was not at all regular. Its most peculiar feature was the total absence of any ray or streamer in the vicinity ($\pm 25^\circ$ W. and E.) of the sun's North Pole. Over the South Pole the corona was also a little less extensive than in the middle latitudes, where the greatest accumulations were to be seen in two enormous wings on both sides of the dark, empty space over the North Pole. The only colour I observed was the pink colour of the chromosphere around the edge of the moon (and less, also, at the sun's North Pole). In the chromosphere a few points (especially one at the left-hand, a little south from the equator) were blazing with dazzling brightness. Although the sudden apparition of Jupiter, Venus and Mercury, and, according to some observers, also of a star in the constellation Gemini, was very impressive, the darkness was not so great as I had expected, and did not hinder me in the least in beginning the sketch, which—not for want of light, but for want of the necessary calm of mind—I could only finish when all totality was over. The moments were too short and precious. I looked also an instant at the water in the fjord, and the snow-mountains on my left hand. The fjord was dull grey, the mountains pink at the bottom, and more yellowish at the top. The grass on our hill was dark olive-green.

At 4.55½ the sudden blazing up of a white point, quickly growing to a crescent at the right-hand side of the sun, proved that totality was over. At the first glimpse of sunlight, corona, chromosphere, and planets ceased to be visible to me.

Till 5.50 the sun remained partially eclipsed. Thus we observed the sun on our steamer *Ofofen*, while returning to Bodö. But who could imagine our surprise, and the increase in our gratitude for the splendid conditions in which we had seen the eclipse, when, twenty minutes after totality was over, we saw the sky everywhere, and especially also at the sun's side, covered with heavy clouds! It was as if these clouds had been caused by some cooling effect of the eclipse. A. BRESTER, JR.

Delft, Holland, August 23.

Air Temperature during the Solar Eclipse.

SOME observations of air temperature, which I was able to make at Vadsö during the solar eclipse on August 9, are perhaps worthy of being put on record. I observed on the plateau or flat-topped hill north of the town of Vadsö, a few minutes' walk beyond Prof. Copeland's station, and at the height of 400 feet above the sea, by aneroid. None of the astronomical observers occupied quite such a high position. It was chosen in order to escape the disturbing effect of air-currents on the hill-side sloping to the fjord. The thermometer was provided with a small bulb, and hung from the tripod of a 3-inch telescope, the bulb being about 18 inches from the ground. No special precautions were taken to shield it from the sun's rays; unfortunately, they were not necessary. A light northerly breeze was blowing, and the sky was heavily clouded.

Speaking roughly, the eclipse began at 4, was total at 5, and was over by 6 o'clock. At 4.8 and at 4.18 the temperature was 44° F.; at 4.23, it was 43° 5'; at 4.28 and 4.33, 43° 2'. From 4.35 to 4.43 the sun was shining brightly, and the temperature rose to 43° 3'; at 4.53 and 4.59, glimpses of the sun were caught before and after totality. The temperature from 4.48 to 4.58 was steady at 43° 0'; at 5.0, it had dropped to 42° 1'; from 5.3 to 5.13 it stood at 42° 3'. By 5.33 it had risen to 43° 8', and at 5.48, when I ceased observing, to 45° 0'.

The suddenness of the fall at, or rather immediately after, totality is very marked, the depression amounting altogether to 19° F. from the commencement of the eclipse, and the subsequent rise being equal to 2° 9' F. to the end of the eclipse.

1 Savile Row, W., August 24. HUGH ROBERT MILL.

The Position of Science at Oxford.

YOUR correspondent "W. E. P." shows a curious ability for injuring his own side. He says that "Oxford collectively has done her best to remove any inferiority she may have had in the past" in respect of her scientific school, and further, "it would be difficult to name a body better qualified to decide what is a good general education than Convocation itself." And yet the whole tone of his letter is a practical confession that Oxford has failed in her best attempt, and that her view of general education has resulted in a practical failure to forward an essential branch of general education. The fact is Oxford's best is bad, and her ideal education is one-sided. The most serious cause of complaint of modern society against the old universities is that they have so controlled the education of the wealthy classes of the community that the landed and professional classes have been educated apart from the commercial and industrial classes to the very great injury of both. One might as well consult a committee of clergy as to the best education for a doctor, as advise with university dons as to the best education for the general community. The influence of a Pagan civilisation has created in them an ideal of life founded on contemplative learning, rather than on a Christian benevolent activity.

GEO. FRAS. FITZGERALD.

Trinity College, Dublin, August 19.

On the Notation of Terrestrial Magnetic Quantities.

AT the International Meteorological Congress to be held in Paris, a number of questions of special interest to magneticians have been proposed for discussion, among which is the following:—"The same notation should be generally employed, *H* for horizontal force, *X* for the northern component, *Y* for the western component, *Z* for the vertical force, and *V* for the potential." As the need of some uniform notation has been made apparent to me in connection with the journal *Terrestrial Magnetism*, I have been paying this matter some attention with the

view of obtaining a concise and logical system for adoption in that journal.

The principle upon which I proceed is to take the first letter of a word designating a particular quantity, if at the same time it conforms with typographic requirements, such, for example, as declination, which is common to several languages. In this way I have thus far obtained the following: *D* for declination, *I* for inclination, *H* for horizontal component of force, *V* for vertical component, *F* for total force. Upon examination it will be found that these letters stand for words derived, in almost all cases, originally from the Latin and Greek languages, and with but insignificant variations in spelling, common to several of the main modern languages.

The Germans will be asked to yield a point with regard to *F*,¹ but this, as will be seen below, will be made up to them in the adoption of *G* for magnetic potential. *V* taken from the Latin *vis*, or *I* from *intensitas*, or *D* from the Greek word *δυναμεις*, would not do for force, as they are already taken. Nor would *T* from *totus* or *P* from *πᾶς* answer, since the former is frequently used for time of vibration, and so in fact is the letter *P*, which stands besides for the first deflection coefficient. As I hope to be able to find a satisfactory notation for all the principal magnetic quantities, I am keeping this matter constantly in mind in adopting any particular letter. The English and French have *force*, and I have, therefore, adopted *F* for total force. As it is frequently the custom to designate angular quantities by Greek letters, I should have preferred, had it been possible, to adopt *δ* and *ι* instead of *D* and *I*, but the Greek *ι* is a very unsatisfactory letter from a typographical standpoint. Moreover, if found desirable later on, the small letters *d* and *i* or *δ* and *ι* can be reserved for the variations on the mean of day and on the mean of year respectively.

I think it very much to be deplored if *Z*, as above proposed, be universally adopted to designate the vertical force. It should not be forgotten that the Gaussian mode of resolving the magnetic force into northerly component (*X*), westerly component (*Y*), and vertical component (*Z*), applies to a *local* system of co-ordinates, not to a *fixed* system, as the layman might naturally suppose—a fact which is even apparently forgotten at times by magneticians. The mean values of these components for a complete circuit of the earth along a parallel of latitude can, in consequence, no more be *physically* interpreted than the mean *H*, for example. I am, therefore, opposed to adopting for the vertical force a letter which in no way gives evidence of the exact quantity for which it stands. *V*, on the other hand, is logically connected with *H*, and at the same time implies that the direction of the quantity that it symbolises is *local*, the direction of the vertical or plumb-line varying from point to point.

For the same reasons I am not in favour of adopting *X* for northerly component, and *Y* for westerly component. Let authors choose this method of notation, if they prefer it; but in a system suggested for universal adoption, it would seem to me that *N* and *W* would more satisfactorily meet the requirements, clearly indicating to the eye as they do the local character of the system of coordinates employed.

As a letter to designate the earth's magnetic potential, I believe none more fitting could be adopted than *G*, after Gauss, the author of this function. Gauss himself used *V*, but this letter is not sufficiently characteristic; it is used to designate many other functions in mathematical physics; and there would, moreover, be a conflict in our system, since *V* seems the most logical letter to designate the vertical force. L. A. BAUER.

Linden, Montgomery County, Maryland, August 10.

On "Hullite."

THE authors of a paper just published in the *Transactions* of the Royal Irish Academy, which is certain to be widely read, have dealt at length with the material called "hullite," urging that it is, in reality, "a hydrous glass of low specific gravity."

This paper was read on June 10, 1895, but a "note added in press" concludes as follows:—

"An abstract of this paper was published in *NATURE* of June 27, 1895; since then I have received, by the kindness of Prof. Cole, a paper by him on 'hullite' [reference given, *Proc. Belfast Nat. Field Club*, 1894-5, p. 1]. It contains an interesting *résumé* of the literature of the subject, and describes, quite independently, the occurrence of 'hullite' as 'a true ground-

¹ The initial letter of the German word *Kraft* is frequently used to designate the moment of inertia, and hence will not answer for force.