The men allege that this "foul water" has an injurious effect upon their tackle, and also lessens their take of some kinds of fish. It continues for about a month and then disappears. This year I have had and still have some of the organisms under microscopic observation, and I am very anxious to know if they have already been the subject of scientific inquiry, or not; and also information as to the geographical extent of their diffusion.

Sheerness-on-Sea W. H. SHRUBSOLE

Composite Portraits

IT is most unfortunate, but an obvious fact, that in the sheet of composite portraits of American notabilities in NATURE of June 25, Figs. 2 and 3 are impressions from one and the same negative. Not only are they alike, but they present the same peculiarities, even the same defects. If it were not so, they would serve to blow to shivers the whole edifice founded upon such averages; for if 16 naturalists and 31 academicians present two composites which are indistinguishable, to what purpose is the average? C. M. INGLEBY

Athenæum Club

IRIDESCENT CRYSTALS OF CHLORATE OF POTASH

THE appearance of Mr. Madan's paper in NATURE, vol. xxxii. p. 102, induces me to offer some additional remarks on this subject.

In the discussion that followed the reading of my paper Mr. Crookes referred to the closely analogous spectra exhibited by opals, as described in his paper (*Proc. Roy. Soc.*, vol. xvii.). This paper, though it came before me at the time when it was read, was not in my mind when I wrote my own. I called shortly afterwards at Mr. Crookes' house, and saw the spectra of his opals. Supposing that there were sufficient grounds for the commonly received idea that the colours of the opal are due to fine tubes in the mineral, we did not at the time conceive that the phenomena could be the same; were it not for this, I should certainly have added to my paper a reference to that of Mr. Crookes.

Mr. Crookes was so good as to lend me his opals for more leisurely study. The further examination has so impressed me with the similarity of character of the spectra, that I am strongly disposed to think that the colours of the opal and those of the chlorate crystals may be due to the same cause. This does not, however, lead me to attribute tubes or striæ to the chlorate crystals, the structure of which can comparatively easily be made out, but to doubt very greatly the theory which attributes the colours of opal to fine tubes.

Mr. Madan does not profess to have actually seen in the chlorate crystals such tubes as he supposes to exist, nor could I see anything of the kind on examining some of the crystals I have got after the appearance of his paper. On the other hand, I notice that Brewster did not state that he had actually seen the supposed tubes, but merely inferred their existence from a comparison of the appearance under the microscope of the precious opal with that of hydrophane. And Mr. Crookes tells me that an opal is not spoiled or affected by being immersed in water or even oil. The fact is that it is extremely difficult to make out what the actual structure is with which we have to deal in the case of the opal, whereas in the case of the chlorate crystals it is unmistakable. Moreover, in the case of the chlorate crystals there is a wonderful uniformity in the phenomena presented by the same crystal, extending, it may be, over nearly the whole of even a large crystal, whereas in the opal the colour extends over comparatively small patches; and even a single patch is seen under the microscope to present differences of structure in different parts. Hence if the colours in opal and those in the chlorate crystals are really due to a similar cause, it seems much more likely that a study of the phenomena of the chlorate crystals will throw light on those of the opal, than that the phenomena of the opal should furnish the key to the explanation of the colours of the chlorate crystals.

In truth, I do not see how the presence of tubes, if such there be in the opal, would account for the phenomena, and especially for the very peculiar spectrum exhibited. The supposition of the existence of rows of tubes leads one to look in the direction of diffraction. But I do not see how monochromatic light, or, at least, light almost monochromatic, can be obtained by diffraction. And even independently of this consideration there is one feature of the production of colour in the chlorate crystals which shows, at once and decisively, that at least in *their* case the colour cannot be due to diffraction. If an iridescent crystal be chosen with an even surface, and the flame of a candle in a dark room be viewed by reflection in it, it is found that the colour is seen in the direction of the regularly-reflected light. In fact, the coloured light forms a well-defined image of the flame of the candle, coinciding with, or overlapping, the colourless image due to reflection from the first surface. This differs altogether from what we get in the case of a grating, or in that of mother-of-pearl or Labrador spar. It agrees so far with the colours of thin plates, or the colours shown by reflection by certain quasi-metallic substances, such as several of the aniline dyes, though the production of colour in these three cases is due to three totally different causes.

It has been conclusively proved that the seat of the colour in the chlorate of potash crystals is in a very thin twin stratum; and I entertain myself little or no doubt that the colour depends in some way on the different orientation of the planes of polarisation in the two components of a twin, and on the difference of retardation of the two polarised pencils which traverse the thin stratum. But anything beyond this is at present only a matter of speculation. I see only two directions in one or other of which to look for a possible explanation; but as these could only be propounded at considerable length, and the matter has not at present advanced further, I refrained from saying anything about it in my former paper, nor will I further mention it here.

In conclusion, I would mention an interesting paper on "The Spectrum of the Noble Opal," by Prof. H. Behrens, a copy of which I have just received by the kindness of the author. In this paper, which is printed in the *Neues Jahrbuch für Mineralogie*, &c., 1873, the author, who was evidently unacquainted with Mr. Crookes's paper when he wrote his own, has described and figured the peculiar spectra of several opals. G. G. STOKES

EXPERIMENTAL FARMING

ENGLISH farmers are not readers. They do not know, apparently, that there is much to unlearn in the practice of their art, old as it may be. But although they will not allow themselves to be enlightened by books or newspapers, they are not incapable of imitation, and for that reason experimental farming, carried out in any particular district in a practical manner, has always proved useful. Up to the present time the history of experimental farms in England is, so far as their number is concerned, a meagre one. In the whole of Europe there are 160 experimental farm stations, of which number the United Kingdom can boast of about half a dozen, including Rothamsted; Woburn, which, by the Duke of Bedford's munificence, has become a field of experiments for the Royal Agricultural Society; the stations of the Highland and Agricultural Society, of the National Board of Education in Ireland, and of the Agricultural Association of Sussex. It is a characteristic feature of our English system that the State lends no assistance to either of these establishments, while that of Sir John B. Lawes, at Rothamsted, has been conducted for many years on a princely scale by the owner at his sole cost.

The Rothamsted station, founded in 1843, has become