both older and younger, put together; and that this continued year after year, though all the while the great herring fishery was mainly supplied by drafts upon that identical and unfailing brood. That there are fluctuations in the abundance of fish, herring and others, is well enough known; that there are good spawning years and bad, or good and bad years for the survival and growth of the young, is also certain. But an increase of birth-rate or a diminution of natural mortality such as would cause the race of ten-year-old herring to outnumber all the rest put together, from four years old to fifteen, is very hard indeed to imagine.

Here, as it seems to me, is a clear case of a biological problem, based upon statistics, surrounded by mathematical difficulties, where the biologist cannot possibly be sure of his ground until he has enlisted the help of the mathematical statistician.

D'ARCY W. THOMPSON.

The Red Flash.

THE interesting recent letter (*NATURE*, vol. xciii. p. 664) on the green flash leads me to send a brief note on a much rarer correlative phenomenon, also, of course, due to atmospheric dispersion, viz., the red flash.

Let there be a cloud low down, with a well-defined lower edge, separated from the actual horizon by an interval of clear sky. Then, at the lower edge of the cloud, just as the base of the setting sun reappears, or that of the rising sun disappears, the red flash may be seen.

I have observed the green flash, connected with the top of the sun, scores of times; but the red flash, connected with its base, only about thrice, as the conditions are obviously much less frequently fulfilled.

I venture to think that "flash" is a more suitable term than "ray," for the latter may lead people to suppose that a long streamer of light is to be expected. I last saw the red flash at Clapham (Yorkshire) on September 11, 1913, at 6.30 p.m. It was preceded by a green flash at the upper edge of the cloud.

It may be well to add that, even when all circumstances seem to be apparently favourable, no flash (either green or red) may be visible. My own experience, now a long one, is that failure is decidedly more frequent than success.

C. T. WHITMELL.

Invermay, Hyde Park, Leeds, September 6.

OPENINGS FOR BRITISH CHEMICAL MANUFACTURERS.

AS a result of the state of war between this country and Germany and Austria an unprecedented opportunity has arisen of making a firm endeavour to establish the manufacture of a very large number of chemicals which have hitherto been produced mostly abroad.

It is a mistake to think, as many people do, that most of these are patented articles; on the contrary, the vast majority are very well-known products in considerable demand, and these ought first to receive the attention of the English manufacturer.

It is very desirable, however, and no doubt this course is being largely pursued, that existing manufacturers should endeavour to extend their energies to the production of materials of a similar character to those which they already make, and

not to enter an unknown field of manufacture unless they feel very sure of their ground. We have, in this country, the nucleus of a vast chemical industry embracing all, or very nearly all, the ramifications that have been so exhaustively extended by the large German chemical works, and now is the time for that nucleus to expand in a natural way until all our requirements and those of our colonies, our allies, and the neutral States can be fulfilled.

This is a point that requires insistence, as there is considerable danger of manufacturers rushing into the production of materials, hitherto bought from abroad, and only incidentally used in their own business, which in many cases have already been made here, or which, on application to the maker of allied substances, could be produced by him with a minimum expenditure of money and labour. Thus the soap-boiler who has formerly purchased foreign synthetic perfumes, the perfume maker who has bought aniline dyes, the aniline dye manufacturer who has had to depend on Germany for his raw materials, all should apply to existing English manufacturers of their requirements before embarking upon the production of materials foreign to their manufacturing experience. The writer has experienced several cases of manufacturers proposing to prepare chemicals which they imagine have been entirely made in Germany, who have been surprised when informed that such are produced in large quantities in this country.

At the same time, however, there is undoubtedly a great opportunity for starting new manufactures in various directions, but the products to be considered first should be of as simple a nature as possible, especially in the case of organic substances, for the successful manufacture of many of the more complicated of these can only, in most cases, be attained after several years' work.

As regards those articles which are patented or protected by a trade mark the Board of Trade has made rules (Patents, Designs, and Trade Marks (Temporary) Rules, August 21, 1914), under which a German or Austrian patent may be entirely suspended, so that there need be no difficulty in obtaining permission to manufacture according to such patents, and, indeed a large number of applications to this end have already been received at the Patent Office.

Further, it may be stated that, although various organic substances can only be made with the use of ethyl or methyl alcohol, methylated spirits not being suitable, the regulations with regard to these under the Finance Act of 1902 make it possible to use them in manufacture in a convenient manner, and it is for the would-be user to suggest to the Commissioners of Customs and Excise the means by which it is proposed to make the spirits unpotable. This object is obviously easily attained by using either the raw material or the finished product as the "denaturant."

Of the actual chemicals for which there is a demand now owing to the stoppage of imports from the continent, perhaps potassium salts take the first place, as the Stassfurt deposits have, for