about N. and S. (magnetic). The evidence suggests movement of the ice from south to north, but we have no knowledge as to whether there did not exist, in Palæozoic times, an exposed mass of ancient rocks to the northward of the present Islands.

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(late Government Geologist for
the Falkland Islands).

Wood View, Grosmont Road,
Plumstead Common, London, S.E.18,
January 3.

The Determination of pH of Microscopic Bodies.

NEUTRAL red has the almost unique property of being both an intra-vitam stain and a fairly good indicator. It has also low salt and protein errors, as Homer has shown (1917, *Biochem. Journ.* 11, p. 283).

If therefore cells are stained with neutral red, the colour of the stain as observed with the microscope enables one to judge roughly the pH within the cell.

Working on certain marine protozoa, I have found a method of greater accuracy than that of merely judging the colour as seen down the microscope. The method is simple and, so far as I am aware, has not been recorded before.

A series of tubes containing solutions of increasing pH is made up in the ordinary way, and a few drops of neutral red are added as indicator. A stout cardboard strip is taken and holes are cut in it at intervals so that the strip will carry the series of tubes (each tube fitting tightly).

The strip with the tubes hanging freely below it is now suspended in the window. With the aid of the microscope condenser the series is focussed sharply in the plane of the object which is being examined.

The appearance down the microscope now consists of the stained object and by its side the image of the series of tubes: both are seen against the same background of sky. By simply tilting the mirror the images of successive tubes of different pH can be brought into juxtaposition with the object examined. In this way the pH of the stained body can be determined by direct comparison.

I have found that the pH determined by the above method can be checked roughly as follows. The mirror is tilted so that the image of one of the tubes forms a background against which the object is seen. In these circumstances the object is illuminated by light of the particular quality corresponding to the colour of the tube. A succession of tubes is used in this manner as a background for the object.

When the background transmits the same quality of light as the stained object, the latter appears relatively light and transparent: this occurs when the colour of the object and the background correspond to the same pH. If the object is illuminated by light from a tube of higher or lower pH, the object appears darker owing to the fact that the light transmitted by the background is not exactly of the same quality as the light transmitted by the object. The pH of the background tube against which the object appears lightest corresponds to the pH of the object.

It must be admitted that the colour change with the pH in the case of neutral red does not render the latter an ideal indicator for the second method, but the effect is quite good enough to be used as a check. Perhaps a better intra-vitam indicator will be discovered in the future, and in that case the method might be developed to a fair degree of accuracy.

In all this work a good achromatic condenser is essential, for the diaphragm must be widely open in

order that the colours of both the object and the image of the tubes may be well defined.

When the light is bad or when artificial light is used, the definition of the colours is greatly increased if the light is first filtered through a dilute solution of copper sulphate. Using this filter, the red tint due to the presence of acid appears darker and is more easily seen in lightly stained bodies.

C. F. A. PANTIN.
The Marine Biological Laboratory,
Citadel Hill, Plymouth, December 14.

Divided Composite Eyes.

It would appear from Mr. Mallock's letter (*NATURE*, December 9) that our knowledge of the Aleyrodidæ or "White Flies" is not so exact as it might be. This, however, takes too pessimistic a view of the situation. Whilst, undoubtedly, much remains to be done, even with some of the British species, the specific limits of those to which he refers are quite well known to students of the group. Indeed, as a result of my own researches I have been able, in recent communications to the *Entomologist* and the *Vasculum*, to assign our British species to no fewer than four distinct genera, Aleyrodæ, Tetralicia, Aleurochiton, and Asterochiton, and the forms mentioned by Mr. Mallock reveal themselves as comprising two genera and three species, namely, *Aleyrodæ prolella* L., *A. brassica* Walk., and *Asterochiton vaporariorum* West.

Clearly, as no hint is given that any of his insects were bred from *Chelidonium majus*, the figures given cannot represent *A. prolella* as indicated by the legend; they must be referred either to *Aleyrodæ brassica* or to *Asterochiton vaporariorum*. If *A. brassica* is the insect intended, then as a larva it feeds on cabbage, as a pupa it lacks well-developed dorsal papillæ, and in the perfect condition has spotted wings with the median nervure appearing as a short spur. On the contrary, the larvæ of *Asterochiton vaporariorum* can be collected from any of the plants enumerated, its pupæ have dorsal papillæ, and its imago possesses immaculate wings displaying no trace of the media.

To the latter insect belongs the notoriety gained by the so-called "White" or "Tomato" fly during the past twenty years. Unfortunately, this Aleyrodid, although a native of neotropical regions, is so adaptable in its food habits as to be nearly polyphagous and, furthermore, has acquired the habit of wintering at ordinary air temperatures even in this rather bleak locality on the north-east coast. A colony with which I was experimenting in 1921 successfully withstood all the frosts of the winter of 1921-22, the first brood of the present season emerging in May.

A further point I cannot understand is Mr. Mallock's comparison of the life-cycle of the Aleyrodidæ with that of the Aphididæ. So different are the two cycles that I feel sure that some mistake has arisen here. In every detail of their structure and life history their affinities lie rather with the Psyllidæ (particularly with some of the Triozæ possessing scale-like larvæ) or toward the Coccidæ.

Finally, I should like to point out that I am preparing a monograph of the British Aleyrodidæ and should therefore be extremely glad to receive species of the group, more especially if they are accompanied by their respective larvæ and pupæ.

J. W. HESLOP HARRISON.
Armstrong College, Newcastle-upon-Tyne,
December 12.