

with the following observations. When a short interruption is made in a musical note it is not a beat (*i.e.* a short silence) that is heard, but, on the contrary, a short noise which appears to add itself to the un-interrupted note. The way this short interruption is produced and an explanation of the noise that results according to the resonance theory of hearing will be found in the *British Journal of Psychology* (vol. xi., 1921, p. 277).

If, then, in order to change the phase of a note by  $\pi$ , the usual interval between successive impulses is altered from  $\tau$  to  $\tau \times \frac{3}{2}$ , the beat (*i.e.* the silent interval) which the observer hears cannot be due to the mere interruption in the sequence of the waves, because experiment shows that such an interruption would be heard as a short noise. But, further, even if Dr. Perrett's explanation could be accepted for the case where the interval is increased from  $\tau$  to  $\tau \times \frac{3}{2}$ , it clearly could not, I think, apply to the case where, in order to introduce a change of phase of  $\pi$ ,  $\tau$  is reduced to  $\tau/2$ ; for on Dr. Perrett's reasoning no beat should be evident in this case, whereas experiment shows it to be present.

H. HARTRIDGE.

King's College, Cambridge.

#### Hæmoglobin in Mollusca.

SIR RAY LANKESTER will find some interesting experiments on the usefulness of hæmoglobin to Planorbis and Chironomus larvæ in a paper by Leitch in the *Journal of Physiology* (vol. 1., 1916, p. 370), in which the author indicates that its respiratory value comes into play only when the oxygen pressure is quite low. This does not, of course, solve the problem as to why there should be various closely allied mollusca (Limnæa) living side by side with Planorbis, and with apparently equal success, which have no hæmoglobin beyond a trace in the muscles of their lingual apparatus. The possession of a considerable quantity of hæmoglobin seems to be a generic character, since it is present in all the species of Planorbis, which differ a good deal among themselves in their habits and in their capacity to live in clean and dirty water, and absent in all sorts of Limnæa. Sir Ray Lankester seems to have forgotten what he taught me in his elementary class twenty-six years ago: that hæmoglobin has come to have secondary (decorative) uses in man; but he will perhaps be as loath to admit an æsthetic sense in snails and their companions as he has been to accept the selective intelligence of Earland's foraminifera in building their tests. But the albino form of *Planorbis corneus* found by Mr. W. T. Webster near Barnet, in which the colour of the hæmoglobin is not obscured by black pigment, is certainly a gorgeous spectacle.

A. E. BOYCOTT.

17 Loom Lane, Radlett, May 14.

#### Physiological Reactions in the Protozoa.

It would be deplorable if the letter by Mr. Ludford, and with the address of a zoological laboratory (*NATURE*, May 12, p. 332), should be thought by anyone to represent the attitude of zoologists in general or of protozoologists in particular towards physiological problems. It would be hard to find a more individualistic reaction than the "grouping" of Protozoa in direct response to a particular chemical or physical stimulus. Typical experiments are described in every physiological or protozoological

text-book, and it requires some imagination to see in such behaviour "the dawn of a gregarious instinct."

It is difficult to understand how any student of zoology or biology could have written the sentence beginning "On the part of Protozoa, protection against toxins in the water is a necessary *precaution that has to be taken to safeguard the individual*" (*italics mine*). Do the Protozoa really practise sanitary science, and are they no longer subject to natural selection?

J. S. DUNKERLY.

Zoology Department, The University,  
Glasgow.

#### Picture-hanging Wire.

IN reference to Mr. Marston's letter upon the above subject (*NATURE*, May 19, p. 362), I have for many years past used and advocated the use of plain copper wire in preference to any other means of suspension. The only matter that calls for careful attention is avoidance of "kinks." With heavy pictures my practice is to have two entirely independent suspensions—screw-eyes, wire, and wall nail or hook—the duplicate being entirely screened by the picture, and either actually or so nearly sharing the weight that should the other suspension fail it could take the whole load at once without jar.

If I use a (nailed-on) wall-hook I put a stout nail immediately beneath to provide against failure of the brass hook, and I have found it a good plan when using a brass-headed nail to drive in a wire nail at a steep angle beneath it so that the head of the wire nail lodges beneath the brass head. The wire nail acts excellently as a strut.

A. J. STUBBS.

#### Anode Rays of Beryllium.

THE method of anode-ray analysis which was used to determine the isotopes of lithium (*NATURE*, February 24, p. 827) has recently been applied to the case of beryllium. A well-marked parabola was found corresponding to a single charge and an atomic weight  $9.0 \pm 0.1$  ( $\text{Na} = 23$ ). No second line was observed which could with certainty be attributed to beryllium, but the parabola at 9.0 was not so strong as that at 7.0 for lithium, and it is doubtful if one of a tenth the intensity could be observed. On one plate a scarcely perceptible indication of a line was found in the neighbourhood of 10, but as more recent photographs, in which the line at 9 was stronger, did not show it, it seems likely that it was not due to beryllium. No indication was found which would suggest that the atom of beryllium can lose two electrons under the conditions of these experiments.

G. P. THOMSON.

Cavendish Laboratory, Cambridge, May 23.

#### The Colours of Primroses.

MAY not Dr. Heslop Harrison's experiences of primulas (*NATURE*, May 19, p. 359) be due to the influence of cold and somewhat resemble what is seen in our so-called copper-beech in the spring and early summer? Few seem to be aware that during the summer its characteristic colour entirely disappears and it then has the ordinary green foliage. Other plants, too, *e.g.* some varieties of roses, show the same sensitiveness.

G. ABBOTT.

May 24.