

will unite. At the moment of union the form of the vortex is very unstable, being an extreme case of the vibrating elliptical ring. It at once springs from a horizontal dumb-bell into a vertical dumb-bell, so rapidly that the eye can scarcely follow the change, and then slowly oscillates into the circular form as shown in Fig. 6. This same phenomenon can be shown with two paper tubes held in opposite corners of the mouth and nearly parallel to each other. The air in the room must be as still as possible in either case.

R. W. WOOD.

University of Wisconsin, Madison.

Dust-tight Cases for Museums.

THE new geological museum now being erected here will have high windows and a long south aspect. The effect of this will be that the sun will fall suddenly on glazed cases and as suddenly pass off them, thus by the expansion and contraction of the air causing dust-carrying currents to force themselves through every chink. From this cause it costs about three times as much to keep cases and specimens clean on the side exposed to the sun as it does in the shaded part of a museum. This may be obviated by elastic diaphragms (which would hardly allow sufficient movement for such large cases as ours) or by small sliding shutters packed with cotton-wool something like Tyndall's respirators.

Can any of your readers refer us to museums in which such a system has been tried, or give us any advice on the subject before our cases have been built?

T. MCKENNY HUGHES.

Woodwardian Museum, Cambridge, February 19.

Audibility of the Sound of Firing on February 1.

SIR W. J. HERSCHEL'S letter is very interesting, and I should like to make a few remarks upon it. To begin with, it must, I think, be granted that the discharge of the guns was almost simultaneous. The special correspondent of the *Times* on board the *Majestic* says, "and then simultaneously all the vessels in the long lines joined in, like the tolling of the passing bell." And the special correspondent of the *Times* at Osborne says: "A minute's interval . . . again the quick red flashes down the line, and again the dilatory roar." But why do we find the full minute's interval at Eastbourne, and three reverberations a minute at Oxford? Assuming that there was no firing at Windsor, the reason, I think, must be sought for in the very different character of the roads the sound had to travel over to reach these respective places. In our case the road was all over the sea with the exception of a few miles of low-lying land at Selsey Bill. On the other hand, to reach Oxford the sound would be greatly impeded by the contour of the land, to say nothing of some possible echo from the high ground of the Isle of Wight. Independently of Sir W. J. Herschel's letter, I have grounds for thinking that the sound followed the course of the valleys, and it is possible that the separate reports per minute emerged by as many different channels of passage and of echo. To have received the sound in a straight line, that is to say, to have been high enough to have seen the ships at Spithead, one would have had to have been at an elevation of somewhere about 2800 feet at Eastbourne and 3200 feet at Oxford.

Eastbourne.

H. D. G.

Influence of Physical Agents on Bacteria.

IN your report of Dr. Allan Macfadyen's lecture on the influence of physical agents on bacteria (p. 359), I should like to call attention to one point. Dr. Macfadyen suggests that since phosphorescent bacteria regain their power of emitting light after being cooled to the temperature of liquid hydrogen, it may be the case that life is not dependent for its existence on chemical reactions. Because, says he, at the temperature of liquid hydrogen, e.g. -250°C ., all chemical reactions are well-nigh, if not absolutely, at a standstill, if life were dependent on chemical reactions for its continuance, at that low temperature life would be destroyed. I would submit that this is a case of *non sequitur*. It appears exceedingly probable that the action of excessive cold in *suspending* and stopping vital phenomena, while not *destroying* the capacity of organisms to resume their vital activities, supports the prevalent view that life is dependent on chemical processes. For may it not be that excessive cold, while preventing the vital processes from taking place, by no means alters the chemical constitution of the com-

pllicated molecules, the interactions of which normally produce vital phenomena, and leave these molecules, which one may call biogens or anything else, in exactly the same state as they were immediately before the onset of excessive cold, ready as soon as the conditions become suitable once more to resume those vital processes which are known as metabolism.

As an illustration of what I mean I will quote a case of inorganic phosphorescence. It is well known that phosphorus is slowly oxidised in air and emits light at the same time. This reaction takes place when the air is at the pressure of the atmosphere, and the partial pressure of the oxygen is one-fifth of an atmosphere. If, now, the pressure of the air be made equal to five atmospheres, or if the air be replaced by pure oxygen at a pressure of one atmosphere, in both of which cases the pressure of oxygen is five times as great as before, the oxidation ceases and the phosphorescence vanishes. But this is only because the conditions are unsuitable, the constitution of the phosphorus and the oxygen is unaltered, and as soon as the pressure of the oxygen is lowered the phosphorescence begins once more. In both cases, the bacteria and the phosphorus, the action of the physical agent—in the one case cold, in the other pressure—is merely to render the conditions unsuitable for the appearance of the phenomenon, and not to destroy the possibility of its subsequent revival.

H. D. D.

Balliol College, Oxford, February 10.

Malaria and Mosquitoes.

I WAS stationed in Karachi, Sind, for more than twenty years. There was undoubtedly a strong belief with the Indians that the disturbance of ground for building led to fever; building operations may be estimated by the fact that I went to a city of 45,000 inhabitants and left 130,000. Not long before I left, the ground of the native town was disturbed by the installation for the first time of a system of underground drainage. I think, but am not sure, this was followed by an outbreak of fever.

Qua mosquitoes, may there not be a distinction between malarious and ordinary fever.

F. C. CONSTABLE.

Wick Court, near Bristol, February 24.

Snow Crystals.

AFTER the recent heavy snow in this district, the slight fall yesterday afternoon did not, at first, attract much attention, appearing like sleet to the casual observer. It proved, however, to be of an unusual character, consisting chiefly of beautifully-formed single crystals. It was remarked that "it was snowing stars;" and the ground became covered with myriads of them, varying in size, some being a quarter of an inch in diameter. These "frost flowers" appear to have been common enough in Tyndall's Alpine experiences, but are, I imagine, rarely seen in England upon this scale. The thermometer registered 30°Fahr ., and it would be interesting to know if this phenomenon was peculiar to the High Peak district, and what are the conditions conducing to such a display.

WM. GEE.

Buxton, February 19.

A "NEW STAR" IN PERSEUS.

WE have received the following:—*Edinburgh Circular*, No. 54. A new star was discovered in Perseus, by Dr. T. D. Anderson of this city, on February 21, 14h. 40m. G.M.T. The star was then of the 2.7 magnitude, and shone with a bluish-white light. Dr. Anderson gave as its approximate place for 1901⁰:—

R.A. 3h. 24m. 25s. Decl. $+43^{\circ} 34'$.

At 6h. 58m. G.M.T., on the 22nd, the undersigned estimated the Nova as 0.3 magnitude brighter than α Tauri, and at 8h. 10m. considered it equal to Procyon, which it closely resembled in colour.

On the 23rd, at 8h. 10m. G.M.T., Dr. Halm and Mr. Clark found the new star 0.2 magnitude brighter than Capella.

A direct-vision prism on the 6-inch refractor showed nothing beyond a perfectly continuous spectrum. With the large Cooke spectroscopy on the 15-inch equatorial the first impression was the same as with the smaller