

here on the horns of a dilemma. He evidently puts the cart before the horse. It is the movements of the heart which determine the movements of the blood, and not the converse.

The cardiac movements are due to a change of shape in the sarcoles elements or ultimate particles of the muscular fibres of the heart, and in the adult organ can only be effected by a vital and alternate elongation and shortening of all the fibres composing the heart; the elongation occurring during the diastole and the shortening during the systole. Similar remarks are to be made of the voluntary muscles which, as stated in my work on "Animal Locomotion," are endowed with centrifugal and centripetal movements.

That the opening and closing of the ventricles of the heart are in no way connected with the passage of blood through the substance of the organ, is proved indirectly by the movements of the heart of the embryo. Here the heart opens and closes with time-regulated beat, while yet a mass of cells, and before it contains blood either in its cavities or in its substance. But that the presence of blood is not necessary to such movements is placed beyond doubt, for rhythmic movements occur in the vacuoles of certain plants, as e.g. the *Volvox globator*, *Gonium pectorale*, and *Chlamydomonas*, where no blood is present.

Lastly, if a frog be slightly curarised and its spinal cord destroyed, it is found, on exposing the heart, that the sinus venosus, vena cava inferior, the auricles and ventricles are quite destitute of blood, and yet the organ beats normally and with the utmost regularity. Mr. Garrod has consequently not yet succeeded in answering my query as to how the diastole of the left ventricle is produced. He has failed to show that it is not effected by the active elongation or centrifugal movements of all its fibres.

J. BELL PETTIGREW

#### Lakes with two Outfalls

HAVING observed the discussion lately carried on in your pages as to the existence of lakes with two outfalls, I think the following description of such a lake by Prof. Bell, of the Geological Survey of Canada, may be interesting to some of your readers. It occurs on the summit of the high Laurentian country between Lake Superior and Hudson's Bay:—

"In crossing the country from Lake Nipigon to the Albany River, we first followed the Ombabika River to its source, which is in Shoal Lake, three and a half miles long and one mile wide, lying at a distance of twenty-five miles north-east of the mouth of the river. This lake lies due north and south, and discharges both ways, the stream flowing northward towards the Albany, called the Powitik River, being nearly as large as the southern outlet. No portage occurs on the Ombabika for about nine miles before reaching Shoal Lake, nor for nearly five miles beyond its northern outlet; so that we passed the height of land with the greatest possible ease, having had about seventeen miles of uninterrupted canoe navigation, from the time we made the last portage, in going up the southern side, till we came to the first on going down on the northern. Shoal Lake has an elevation of scarcely 300 ft. over Lake Nipigon, or about 1,200 ft. above the sea."—*Report of Progress Geological Survey of Canada for 1871-72*, p. 107.

GEORGE M. DAWSON

Montreal, Feb. 19

#### The Ink of the Cuttle-fish

WITH reference to the interesting account in *NATURE*, vol. ix. p. 332, of a gigantic Cephalopod captured in American waters, and of a still larger one, which attacked the boat belonging to some fishermen near Newfoundland, by twining its arms round the vessel, and which, having had two of those arms cut off by the fishermen, moved off, "ejecting a large quantity of inky fluid to cover its retreat," I desire to draw attention to an observation respecting this fluid, which I made on the occasion of a visit to the Crystal Palace Aquarium. My friend Mr. Lloyd was good enough to dislodge a cuttle from its place of concealment, and the usual inky discharge followed, as the creature shot across the tank. Mr. Lloyd states in his interesting "Handbook to the Marine Aquarium," "that the ink (which is viscid) does not generally become diffused through the water as writing ink would be, but is suspended in the water in a kind of compact cloud till it gradually settles down, and is dispersed in flakes." Now I quite think, with Mr. Lloyd, that this being the case, it is difficult to perceive how, according to the generally received opinion, its retreat is covered by the ejected cloud. It seems to me more likely that this discharge is to divert the at-

tention of a pursuer—a dog-fish for instance—which would for the moment be startled by the sudden appearance of masses of dark colour in the water, and in the confusion the cuttle makes his escape.

Now that public aquaria are becoming so general in our great towns, it is much to be hoped that this and many other interesting problems in marine zoology may be solved.

Birmingham, Feb. 28

W. R. HUGHES

#### Transmission of Light in a Squall

ON the Admiralty Pier, Dover, during a "squally" gale, I remarked an occasional jerking or unsteadiness in one of the adjacent lights, say two miles off, to one of the coast-guard's men with whom I was talking at the time.

To him this was a well-known observation in squally weather. At times, he said, two lights could distinctly be seen for a second or so; frequently the shape of the light was changed, by elongation, vertically and horizontally.

The above phenomenon, if not generally known, might be worth noticing and verifying in your excellent paper.

I suppose an explanation is to be found in the different densities of the atmosphere through which a ray of light must pass in rough unsteady weather; the second image being simply the persistence of the one seen immediately before the change in position of the ray by refraction.

JAMES C. INGLIS

#### DR. LIVINGSTONE AND THE CAMERON EXPEDITION

IN *NATURE* for Feb. 26, we expressed the desire which we felt, in common with our readers, for information respecting the orders that have been sent to Zanzibar as to the disposal of Dr. Livingstone's body. We now have great pleasure in being able to announce that Lord Derby acted with the promptitude and energy which might be expected from a statesman who has always shown a warm sympathy for the cause of geography. With the concurrence of the family, his Lordship has sent a telegram ordering the body of the illustrious traveller to be sent to England, and we believe that it is to be accompanied by one or two of Livingstone's faithful negro followers.

The melancholy death of Dr. Dillon and the return of Lieut. Murphy, leaves Lieut. Cameron alone, to proceed to Ujiji, to recover the box of papers left there by Livingstone, and to prosecute further geographical exploration. Heavy unforeseen expenses obliged Lieut. Cameron, who has proved himself to be a resolute and observant explorer, to purchase stores at exorbitant rates at Unyan-yembe. The necessity for providing for the march of Murphy and Dillon to the coast, with Livingstone's body and most of his followers, is his complete justification for incurring this unauthorised expenditure, and there can be no doubt that the Geographical Society will treat its gallant emissary in a generous and liberal spirit. Cameron has suffered cruelly from fever and ophthalmia, and he is now resolutely pressing onwards in the performance of his work—the Society's work—in the face of greater difficulties than were encountered by any previous expedition. He carries with him our warmest wishes for his success, and the sympathy of every true geographer in England.

#### ON THE NEW RHINOCEROS AT THE ZOOLOGICAL GARDENS

A GLANCE at our list of additions to the Zoological Gardens during the last week will inform the reader that the Zoological Society has been successful in adding to its already unrivalled collection of specimens of the genus *Rhinoceros* still another species, which is exhibited for the first time in the Society's collection, and most probably in this country.

It is well known amongst naturalists that in Asia there are to be found two species of *Rhinoceros*, with a single horn developed on the top of the nose. The