measurement of the resistance of the human body, suggested that the latter instrument was too sensitive, and that from self-induction perfect silence could not be obtained. Both these remarks are true; but if time and the chairman had permitted, I should have said that absolute silence is rarely got, but that the minimum of sound is so easy, after a little practice, to estimate, that one-hundredth of a revolution on either side of it is instantly detected. The bridge wire takes ten turns on the barrel; consequently this amount is the thousandth part of a wire three metres long. Using a fixed resistance of $100^{\omega}$, the possible error is quite unimportant, and even with $1000^{\omega}$ it is far within other instrumental accidents.

But as in the somewhat similar case of counting "beats" between tuning-forks, a sensitive and an educated ear is needed. At first starting I found that I made considerable mistakes, one of which is recorded in a paper contributed to NATURE some weeks back. W. H. STONE

Wandsworth

### Simple Methods of Measuring the Transpiration of Plants

THE "potétomètre" described in NATURE, May 22, p. 79, appears to be an ingenious but a rather complicated instrument. Experience has, however, taught me that the extremest simplicity is most desirable. Mr. Ward hints at difficulties of manipulation which are quite conceivable. The plan I have adopted, and find to answer, as far as it goes, is to insert the cut end in a small test-tube and cover the surface of the water with a little oil. The whole can then be weighed to three places of decimals, and the absolute amount of loss in a given time is easily ascertainable.

But a serious objection must be made against all experiments with cut shoots and leaves, for they can only give, at best, unsatisfactory results. The amount of transpiration varies so much under the ever-changing conditions of light, heat, dryness, &c., that it is only by a long series of comparative experiments *with the same specimen* that the differences peculiar to each kind of plant can be ascertained; and no cut shoot can be employed for two or three days, much less for several days, as are necessary for obtaining satisfactory results; as the amount of loss steadily decreases till death ensues, although the shoot may be *apparently* quite healthy for a long time. I have been experimenting for several summers on the transpiration of plants under coloured lights, and at first used cut specimens, as so many experimenters have done, but I found they were most untrustworthy. I now grow the plants in miniature pots, which are covered up in gutta-percha sheeting. These can be weighed to two places of decimals. By this simple method all difficulties are entirely obviated. GEORGE HENSLOW

Drayton House, Ealing

### Worm-eating Larva

THE following note, which I received from the Rev. Robt. Dunn of Cricklade, may be worth publishing in reference to Prof. McKenny Hughes's "Notes on Earthworms." Mr. Dunn says: "This afternoon (May 6) on a gravel path I saw a worm wriggling in an unusual way, and stooping down I saw that a big earthworm had a smaller worm hanging on at the belt or knob, or whatever you call it; so I got a bit of stick and pushed off the parasite and found it no worm, but I should say a sort of centipede, with a very red head, about one inch long. So I captured him and put him in methylated spirit, when he vomited what I presume was worm's blood." He further adds that what the beast vomited was a stream of crimson fluid; it separated at once into white flocculent matter with brick-red specks, but since it has all turned into a white sediment. Mr. Dunn sent me the animal, which proves to be the larva of a beetle, either one of the Staphylinidæ or Geodephaga.[1]

Southampton W. E. DARWIN

### Cultivation of Salmon Rivers

I HOPE we may assume, from the paragraph which appears among the "Notes" in your issue of last Thursday (p. 129), that the Fishery Board for Scotland is about to take some active course towards the removal of obstructions to the ascent of salmon up Scottish rivers. When you say the Board "is specially desirous to introduce as soon as possible a fishway at the falls, and this, when done, would open up some 500 miles of excellent fishing and spawning ground," I hardly think you can be alluding to any one particular river. Am I correct in supposing you refer to the aggregate mileage of rivers in Scotland now closed by *natural* obstructions, *i.e.* waterfalls? The Report of the Special Commission to inquire into the condition of the salmon fisheries of Scotland, published in 1871, informed us that the River Tay alone had some 115 miles of river blocked against the salmon by the two natural obstructions of the Tummel Falls and the Falls of Garry on the two important Tay tributaries from which the respective waterfalls are named. If your "Note" meant to include the entire mileage of Scottish rivers seriously affected by artificial dams of a more or less obstructive character (and their name is legion in Scotland), as well as by the natural barriers that occur, I think 500 miles of obstructed fishing and spawning ground is far too low an estimate; it might in fact, I should say, be multiplied at the very least by three. Now that theoretical plaything are being laid aside, and in their place appears a prospect of a more sound, natural, and scientific basis being made the foundation of our future salmon cultivation, the absolute necessity of opening up the natural breeding-beds of the fish will, it is hoped, become patent to every one, and the dream of my old friend the late William J. Ffennel, the father, so to speak, of our modern salmon fishery legislation and salmon river cultivation may at last be realised. "If I live," he said to me one day (I hardly care to remember how long ago it was, or how soon after he was taken from us), "I shall never rest until every weir and mill-dam in the three countries—England, Ireland, and Scotland—has a thoroughly good and permanent salmon ladder built upon it, or into it, or around it. We have shown we can restore the fisheries; we must now restore the rivers. That, sir, is the true position to take up, and that must be our next aim." Had Mr. Ffennel lived, river restoration would probably have progressed more than it has during the last decade. MARK HERON

June 9

[The falls referred to in our note on the Fishery Board for Scotland last week (p. 129) are the Falls of the Tummel.—ED.

## A RARE BRITISH HOLOTHURIAN

OF the six species of Holothurians with shield-shaped tentacles (the Aspidochirotæ) that are known to occur on the shores of the North Atlantic Ocean, two—*H. obscura* and *H. agglutinata*—were so shortly described by Le Sueur as to be still strange to American naturalists; no definite statement as to the presence of a true, that is, aspidochirote, Holothurian in the British seas has ever made its way into any systematic revision or synopsis of the class.

Shortly, however, after the publication of Forbes' "British Starfishes," Mr. Peach of Gorran Haven, Cornwall, published in the *Annals and Magazine of Natural History* for 1845 (vol. xv. p. 171) a short article on the "Nigger" or "Cotton-Spinner" of the Cornish fishermen, in which he quite rightly remarks that no typical Holothurian with twenty tentacles had been observed by Forbes, and exhibits a just pleasure in being able to say that he had discovered one. Later, two Irish naturalists—Prof. Kinahan and Mr. Foot—separately noted the existence of what one called *Cucumaria niger* and the other *Holothuria niger*. With an exception to be mentioned immediately, no writer has for nearly forty years given the least indication of a knowledge of the existence of this "Cotton-Spinner," and it may therefore be supposed that it was always with interest that I examined any form that came from the British seas. A short time since, on opening a Holothurian that had been in the British Museum for nearly twenty years, I found that, instead of those tubules which, arising from the wall of the cloaca, were first seen by Cuvier, and called Cuvierian organs by Johannes Müller, being small and inconspicuous, or, as often happens, altogether absent, they formed rather a large, almost solid, compact mass of

[1] Mr. W. F. Blandford has called my attention to an account of a similar encounter between a worm and a larva given in Dallas's "Elements of Entomology," p. 6.

closely-packed tubes, which overlay the rectal portion of the intestine, and occupied nearly one-third of the general body-cavity.

On comparing the general structure of this animal with the account given by Mr. Peach, I found that his article dealt so little with anatomical points that it was impossible to say whether or no there was any real relation between his "Cotton-Spinner" and my specimens, which, like his, were of Cornish origin. There was, however, a physiological experiment that could be made, and which might, I hoped, be successful. In the description given by our modern master of Holothurian organisation, Semper says, in speaking of the Cuvierian organs: "The sticky property of these organs is known in the true Holothurians, and in England they have even given the name of the 'Cotton-Spinner' to *Holothuria nigra*." I attempted to draw out one of the tubes of the mass, and, as I hoped, I found it extend. I threw it into water, and I found that it swelled out. More accurate experiment showed that it could be made to elongate twelve times and to swell out in water to seven times its diameter. It was at once clear that I had before me the creature of whom Peach had written: "It is extremely irritable, and, on being touched or disturbed, throws out a bunch of white tapered threads about an inch in length and one-eighth in thickness." Peach goes on to say that they "soon become attenuated, either by the agitation of the water or the coming into contact with something;" but as he goes on to say that they stick to everything they touch, I doubt not that, when that thing is alive it tries to run away, till the moral effect of the gradually elongating and as regularly swelling threads paralyses it with fear. At Dr. Günther's suggestion I tested the strength of these elongated threads, and I found that, when so thin as to be barely visible, six were strong enough to hold up a weight of between 800 and 1000 grains.

I communicated a paper detailing the zoological and anatomical characters of this very rare form, which seems to be known only to the fishermen of Cornwall, to the Zoological Society at their meeting on May 20, and I direct attention to it in this more widely circulated journal because it seems to show in a very pointed way how from the absence of opportunity for investigating animals that live not deeper than twenty fathoms we do not only remain ignorant of the contents of our own seas, but that we have in this "Cotton-Spinner" an opportunity of testing the hypothesis of Semper as to the function of these Cuvierian organs, and of putting on the basis of scientific observation and experiment the "great detestation" in which, as Peach tells us, they are held by the fishermen. While Cuvier regarded the organs to which in later years he was made name-father as testes, and Jäger and the great majority of subsequent writers as kidneys, Semper, who had unexampled opportunities of watching and examining them in the Philippines, came to the conclusion that they were organs of offence or defence. To this conclusion the French naturalist Jourdan and the German Dr. Hamann have been led on the ground of histological observation; in England the only observations yet made have been such as are possible in a museum with specimens that have been in spirit for nearly twenty years. I earnestly hope that the line of investigation indicated by the facts that are here recorded will be soon followed out by one who is working in a marine biological laboratory on the British coast.

F. JEFFREY BELL

## *VISITATION OF THE ROYAL OBSERVATORY*

THE visitation of the Royal Observatory, Greenwich, took place on Saturday last, when there was a very numerous attendance of astronomers and representatives of the allied sciences. The Report this year does not contain anything striking, but enables us to see how usefully and smoothly the work of the Observatory has been going on during the past year. Still novelties were not entirely absent, chief among them being the new Lassell reflector.

The new dome for this telescope was completed by Messrs. T. Cooke and Sons at the end of last March, and is in every respect satisfactory. It is thirty feet in diameter, covered with *papier-mâché*, on an iron framework, and turns with great ease. The shutter-opening extends from beyond the zenith to the horizon and is closed by a single curved shutter (3 feet 6 inches wide at the zenith and 6 feet wide at the horizon), which turns about a point in the dome-curb opposite to the shutter-opening, and runs on guiding-rails at the horizon and near the zenith, the curved shutter being continued by an open framework to complete the semicircle. This arrangement appears to leave nothing to be desired as regards ease of manipulation. After the completion of the dome, the carpenters' work on the flooring, &c., of the building and the attachment of the observing-stage (which is fixed to the dome) have necessarily occupied much time, and the building is hardly yet complete in all details. The equatorial has required a number of small repairs and general cleaning, some parts of the mounting having been probably strained in process of removal, and the bearings in particular having suffered from wear and subsequent disuse, so that it has been necessary to raise the instrument and regrind these in several instances. The mirror has been cleaned, and appears to be in very good condition as regards polish. The definition on stars seems to be very good as far as it has been practicable to test it before the mounting of the telescope has been put into proper order. The delay in the completion of the dome has necessarily delayed the work on the instrument, which is now rapidly advancing to completion.

First among the astronomical observations properly so called referred to by the Astronomer-Royal was the work done by the transit-circle. "There is no change of importance to notice in this instrument, which has been kept in good working order. A reversion-prism for use with the collimators as well as with the transit-circle is being made by Messrs. Troughton and Simms. The sun, moon, planets, and fundamental stars have been regularly observed throughout the year, together with other stars from a working catalogue of 2600 stars, comprising all stars down to the sixth magnitude inclusive which have not been observed since 1860. Considerable progress has been made in obtaining the requisite three observations of each star, and there is a good prospect that by the end of next year, when it is proposed to form a new Nine-Year Catalogue, the whole of the stars will be cleared off. The annual catalogue of stars observed in 1883 contains about 1550 stars."

The following statement shows the number of observations with the transit-circle made in the year ending 1884 May 20:—

| | |
|---|---|
| Transits, the separate limbs being counted as separate observations ... ... ... ... | 5213 |
| Determinations of collimation error ... ... | 303 |
| Determinations of level error ... ... ... | 360 |
| Circle observations ... ... ... ... | 5049 |
| Determinations of nadir point (included in the number of circle-observations)... ... ... | 353 |
| Reflection-observations of stars (similarly included) ... ... ... ... ... ... | 548 |

As regards the computations—

| | |
|---|---|
| Clock times of transit over the true meridian, corrected for collimation, level and azimuth errors, are prepared to ... ... ... ... ... | 1884 May 18 |
| Clock errors and rates are determined to | May 11 |
| Mean R.A.'s for 1884 January 1 are prepared to ... ... ... ... | May 11 |