

stopped by a shock, it may possibly be found that those only stop whose pendulums vibrate in a particular plane. This should be noted.

In conclusion, it is only right to acknowledge the large amount of trouble which has been taken by many observers in all parts of the island in recording and forwarding reports of the shocks they have felt. Especial mention may be made of:—

Mr. J. R. Hurst, District Surveyor, Moorina,

Mr. A. Campbell, of St. Mary's,

• Mr. O. C. Heiden, Gould's Conntry,

owing to the very large number of shocks which they have had to record.

NOTES ON THE INFUSORIAL PARASITES OF THE TASMANIAN WHITE ANT.

BY W. SAVILLE-KENT, F.L.S., F.Z.S., Superintendent and
Inspector of Fisheries, Tasmania.

[Read, November 17, 1884].

So long since as the year 1856, Mr. C. Lespes, in a memoir devoted to the organisation of the European White Ant (*Termes lucifuqus*), recorded the fact that the contents of the intestine of this insect is represented by a brown pulp consisting chiefly of a living agglomeration of Infusoria. No specific description of these Infusoria has been published up to the present date, and it is only so recently as the year 1881, that a detailed account, with illustrations, of the analogous parasites of the American White Ant (*Termes flavipes*), has been contributed by Dr. Joseph Leidy to the "Proceedings of the Academy of Natural Sciences," Philadelphia. Through the kind courtesy of Dr. Leidy, I was enabled to include re-prints of his drawings of these parasitic animalcules in my monograph of the Infusoria then in course of publication, and subsequently received from him while residing in London, a supply of the White Ant with its accompanying parasites for personal examination.

It was with much interest that I discovered soon after my arrival in Tasmania, that a species of White Ant (specific name at present undetermined) abounds in this colony, feeding after the manner of the North-American type upon decaying timber, and having its intestine similarly laden with parasitic Infusoria. On making a close examination of these Infusoria I ascertained furthermore that they agreed with

the American types in being referable to no less than three distinct varieties, two of which may be included in the generic groups instituted for the American species by Dr. Leidy, while the third form is entirely distinct. As species none of the series are precisely identical with any that have hitherto been described and have consequently to be recorded as new to science.

The largest and most abundantly developed form to which I will draw attention on this occasion is referable to Dr. Leidy's genus *Trichonympha*. It is an elongate or pyriform animalcule, having normally a smooth, somewhat inflated posterior region, and an acuminate pointed, highly flexible anterior portion, which is more or less distinctly striated in a longitudinal direction. From Dr. Leidy's species *Trichonympha agilis*, it differs most distinctly in the relative shortness of the hair-like cilia which clothe the entire surface of the body. In the last-named species a portion of these cilia are as long, or longer than the body, and exhibit under certain conditions, a remarkable plume-like aspect. In the Tasmanian species, which, by way of compliment to the talented discoverer of the genus, I propose to distinguish by the title of *Trichonympha Leidyi*, the length of the cilia but little exceeds that of many of the Opalinidæ and other previously known endoparasitic Infusoria. It is furthermore not so easy to recognise in the present species that the cilia, with respect to their length, form three or four more or less distinct series as obtains in the American variety, for while those that clothe the equatorial region of the body are somewhat the longer, the entire series merge into one another by almost imperceptible gradations. In this respect the species here introduced may be said to resemble an immature stage of the American type. The great flexibility of the anterior portion of the body is a feature common to the American and Tasmanian species, both exhibiting in a like manner a tendency to roll this region upon itself in the form of a helix.

An important point that was left undetermined by Dr. Leidy respecting the structure of *Trichonympha* relates to the precise position of the oral aperture. The bodies of the animalcules are almost invariably filled with fragments of the woody debris devoured by their hosts the White Ants, which shows that their sustenance is taken into their body in a solid state and is not simply absorbed in the fluid form as occurs with the group of the Opalinidæ. A prolonged observation of living examples of the American species remitted me by Dr. Leidy, and likewise of the Tasmanian type here introduced has resulted in my determining that a distinct oral aperture is developed upon one side of the body at a short

distance only from the apical extremity. This orifice takes the form of a transverse slit, and is followed by a narrow oesophageal track which opens into the capacious digestive cavity that occupies one-half or two-thirds of the posterior region of the body. The plan recommended by Dr. Leidy for observing the vital phenomena of these animalcules is to empty out the intestine of the White Ant containing them into a little white of egg. I also have found this material favourable for their observation, but have gained an additional insight into their life history by employing in a like manner thinly diluted milk. In this medium they not only live for a considerable time, but meet with abundant nutriment, their pharynx and digestive cavity being frequently found densely packed with its component corpuscles after their immersion in this fluid for a short interval.

As with the American species *Trichonympha Leidyi* is represented in its earlier and immature conditions by a host of polymorphic forms that differ greatly in aspect from the adults. The youngest observed are of an ovate contour, and clothed throughout with cilia of even length. These young individuals gradually increase in length until their long diameter may equal or even exceed four or five times their greatest breadth, the cilia in the more advanced phases being longest posteriorly, while the surface may be obliquely furrowed in opposite directions. It is in connection with this transitory condition that I have observed the phenomena of propagation not hitherto recorded. This is effected by a process of transverse fission, division taking place towards the anterior region of the body along two intersecting furrows. The anterior of the two separated moieties assumes a pyriform outline, and grows speedily to the parent shape, while the posterior one retains its primitive attenuate fusiform contour, and may continue to multiply by fission.

When placed in diluted milk the animalcules of both the American and Tasmanian species of *Trichonympha* have been observed by me to assume a fixed condition that has not hitherto been described. An attachment to the surface of organic substances or other convenient fulcra, is then accomplished through the medium of the long fascicle of hair-like cilia that are produced from their posterior extremity. These cilia intersecting one another at a short distance from the body form a sort of hollow cone, the expanded base of which grasps the selected fulcrum of support after the manner of an acetabulum. This habit of, as it were, anchoring themselves by their long caudal cilia was observed of both the adult and immature animalcules. No trace of the structure common to all higher Infusoria known as the contractile vesicle has been detected in connection with *Trichonympha*

agilis, and in the species now introduced it is, so far as I have been able to ascertain, as conspicuously absent. In this absence of a contractile vesicle *Triconympha* assimilates itself to many Opalinidæ. While commenting upon the apparent position of *Triconympha*, with relation to other Infusorial forms (Manual of Infusoria, Vol. II., p. 553), it was suggested by me that, with respect to the great length of its cilia and characteristic movements, it to some extent resembled the multiflagellate genus *Hexamita*. Though the more abundant evidence since adduced has sufficed to demonstrate that it belongs essentially to the Holotrichous Ciliata, the great length of the cilia, the manner in which they are employed, and the habits the animalcules exhibit of anchoring themselves to foreign substances by their long posterior cilia, is suggestive of the remote derivation of these White Ant parasites from a flagelliferous type allied to *Hexamita*.

Of the two remaining Infusoria found by me in the Tasmanian White Ant the one is apparently referable to Dr. Leidy's genus *Pyrsonympha*, while the other belongs to Stein's multiflagellate genus *Lophomonas*, so far recorded as a parasite only of the Orthopterous insects *Blatta* and *Grylotalpa*. Several important points in their organisation not having yet been clearly ascertained, descriptive details of these two new forms are reserved for a future communication.

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ON A METHOD OF DETERMINING THE TRUE MERIDIAN.

BY H. C. KINGSMILL, M.A.

[Read November 17, 1884.]

I propose to describe a method of obtaining the true meridian by observation, which, so far as I am aware, has not been tried in this colony. The method is theoretically simple, but many ideas which are simple in theory, are found to have practical difficulties which render them useless in actual work.

I do not think that this objection will apply to the case in question, but I shall be glad to have the opinion of some one who has had experience in taking observations.

Public attention was called to the meridian question some time ago by Mr. McIntyre, a New Zealand surveyor, who gave much valuable information in a paper which he read before this Society.

He pointed out that magnetic bearings were not suffi-