

### 3. Notes on the Clitellum of the Earthworm.

A criticism.

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A paper was read on June 8th 1892, before the »Edinburgh University Darwinian Society« by Mr. Frank J. Cole, Assistant in the Zoological Department of the (Edinb.) University, upon the »Physiology of the clitellum in *L. terrestris*«. The paper was printed and published and owing to the courtesy of the author I received a copy of it. Had it not been republished (with but slight alterations as to his »ideas« on copulation and cocoon formation) in the »Zoologischer Anzeiger« No. 434, 435, it might well have been passed over without notice: but in its present form it will be widely distributed and may be read by numerous zoologists who are not acquainted with the recent literature on this subject, and since it is full of errors of observation and misconceptions and ignorance as to the theories of earlier writers, it appears to me, as one who has been engaged for the last six years on the special study of the Oligochaeta, to be desirable to draw attention to the paper, lest the statements therein be accepted as accurate.

Mr. Cole, who now dates his paper from the »Physiological Laboratory of the University of Oxford« discusses the structure and function of the Clitellum, and the process of Copulation in the Earthworm. With the exception of the usual textbooks, his acquaintance with the literature of the subject does not include that of the last five and twenty years; for while quoting the classic paper on the histology of the Earthworm by Claparède in 1869, and one on the anatomy, by Lankester 1865, he makes no reference to the standard works of Vejdovsky, nor the careful and accurate account of the structure of the clitellum given by Cerfontaine in 1890<sup>1</sup>: Even if he had known of the existence of these and other memoirs on the subject, it is probable that he would still have published his paper: as he would have disagreed with all their statements.

For although it is perfectly easy, by means of any ordinary elementary histological method (such as hardening in alcohol and staining in Borax Carmine) to demonstrate the structure of the clitellum and the truth of Cerfontaine's statements, yet Mr. Cole (p. 456) has seen no nuclei in the long club-shaped cells! (to which by the way, he gives the cumbrous name of »calceo-cutaneous« glands). He appears to have obscured his preparations by some unnecessary method of triple staining.

<sup>1</sup> Arch. de Biologie. X.

Further, the »cellular character« (which he doubts p. 454) of the coarsely granular, columnar cells — called by him »calceo-cuticular« glands — is readily demonstrated by a simple method, and one which is essential to the study of cell-shape, viz. maceration in bichromate of potash or some such reagent.

But since he is unable to recognise the unicellular gland cells (»goblet-« or »mucus-cells«) in the ordinary hypodermis, what wonder that he is confused by the more complicated structure of the clitellum?

Again, wherein lies the difficulty (p. 456) of seeing the capillaries traversing the layer of clitellar cells? For having recognised these he is good enough to congratulate Claparède!

With regard to the process of copulation in the Earthworm — a matter to which I have paid some attention — I would ask Mr. Cole one question: — Has he ever observed two worms engaged in the process? If he had, he would not need to have troubled to discuss the various statements of less observant authors — statements which, certainly, are not entirely accurate: but, after a prolonged argument to show the futility of their statements, Mr. Cole puts in their place a theory of his own as to the passage of the spermatozoa from one worm to another: a theory founded on no firm basis of fact, but on »probabilities«.

In two individuals out of some hundreds he discovers a duct — inflation of cuticle — passing from the 15th segment to the tubercula pubertatis: he believes the male duct does not open to the exterior in segment 15th but that this new duct does all he wants from it — as it explains to him the use of the tubercula. He is not aware, that these tubercula are (as a matter of observation) used during copulation for the purpose of fixing the two worms together.

His remarks on cocoon formation »add nothing to the little already known« (to quote his own words). He does not appear to be aware of what is known, or he would scarcely have suggested — imagined, evolved from his inner consciousness — that the cocoon is formed in two separate curved »sheets«, the edges of which are then cemented together. Another question — Has he seen the cocoon of *L. herculeus*, or other Earthworm?

In the process of »copulation« two matters, which must be kept distinct, have to be decided: 1) how the worms become joined together, 2) what happens to the spermatozoa. Further, this »Copulation« must be differentiated from another double process viz. the formation of the cocoon and the laying of eggs.

It must be confessed that we are still in some doubt as to the exact series of occurrences during these processes; but we may be

allowed to form an opinion from what is known (see especially Vejdovsky, »Entwick. Untersuch.«) to happen in the aquatic Oligochaeta: nevertheless, we must still endeavour to find out these facts for the Earthworms. No amount of argument much less imaginings from insecure premises, can settle the matter: only direct and accurate observation will satisfy Zoologists.

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#### 4. Rotifers related to *Euchlanis lynceus*, Ehrbg.

By H. S. Jennings, Assistant in Vertebrate Morphology, University of Michigan, U.S.A.

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In recent numbers of the *Zoologischer Anzeiger* have appeared articles by Jägerskiöld (*Zool. Anz.*, Sept. 25, 1893) and Wierzejski and Zacharias (*Zool. Anz.*, Nov. 13, 1893) setting forth the synonymy of the *Euchlanis lynceus* of Ehrenberg and of other species of the same genus. The list of synonyms requires, it seems to me, some additions.

While studying the Rotifera of some of the inland lakes of Michigan in the summer of 1892 and of Lake St. Clair in the laboratory of the Michigan State Fish Commission in the summer of 1893, I found in great abundance the form described by Wierzejski and Zacharias in the *Zeitschrift für wiss. Zoologie*, Bd. 56, Heft 2, as *Bipalpus lynceus*, Ehrbg. Comparison with the descriptions given by Herrick of *Ploesoma lenticulare* (*Bulletin of the Scientific Laboratories of Denison University*, Vol. I, No. I, 1885) and by Vorce of *Gomphogaster areolatus* (*Proceedings of the American Society of Microscopists*, 1882 and 1887) showed an agreement in all essential points — though both descriptions are incomplete, especially that of Vorce. In order to remove all doubt as to the identity of my specimens with those of Vorce, I sent mounted specimens of the form to Dr. Vorce, who very kindly compared them with his own mounted specimens and sent me photographs taken from the type specimen of *Gomphogaster* and from other specimens of the same species.

He reports that there is not the slightest doubt of the identity of my specimens with his own. Hudson, even in the absence of specimens, recognized the identity of *Gomphogaster areolatus*, Vorce, and *Ploesoma lenticulare*, Herrick (*Monograph of the Rotifera*, Supplement, p. 58). Moreover, the agreement of this form with the *Bipalpus lynceus* of Wierzejski and Zacharias is so minute that there can be no question as to their identity. Jägerskiöld (l. c.) recognizes the identity of *Gastroschiza foveolata* with *Bipalpus lynceus*. A complete

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