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XXXIII.—*Researches at the St. Andrews Marine Laboratory (under the Fishery Board for Scotland).—On Larval Actiniæ parasitic on Hydromedusæ at St. Andrews.*
By ALFRED C. HADDON, M.A. (Cantab.), M.R.I.A., Professor of Zoology, Royal College of Science, Dublin.

SEVERAL larval Actiniæ, together with the Leptomedusæ on which they were found, were sent to me by Prof. W. C. M'Intosh in the month of February in the present year. None of the specimens were sufficiently advanced for me to be able to say with certainty to what genus or species they belong, but Prof. M'Intosh has kindly promised to get me more specimens, and I hope that with increased material I may be able to do better justice to the beautifully preserved specimens which my friend has entrusted to me.

I have previously referred (1) * to the recorded instances of larval Actiniæ being found as ectoparasites of Medusæ, one of the first records being that of Dr. T. Strethill Wright (2) from the Firth of Forth. The Actiniæ attach themselves to the upper or under surface of the bell, or to the margin, or to the gastric region of the Medusæ.

The Actiniæ from St. Andrews are of slightly different ages; the youngest exactly corresponds to the stage of *Hal-campa chrysanthellum* described and figured by me (*l. c.* pl. xi. figs. 1-5). At this time there are eight larger mesenteries which correspond in position and in the arrangement of their longitudinal retractor muscles with the eight mesenteries of *Edwardsia*, but in addition there are four smaller mesenteries which form the complementary pairs to the four lateral larger mesenteries. There are also only eight short tentacles, which are arranged in two groups of three, the two others being opposite one another and between the two groups. The tentacles arise from the chambers between the eight large mesenteries. The inter-mesenteric chambers (entocœls) of each lateral pair of mesenteries are not prolonged into tentacles, and it is the four gaps, corresponding to these chambers, which cause the arrangement of the tentacles noted above. It will be seen that the central tentacle of each of the groups of three corresponds with the entocœl between each pair of directive mesenteries. As in the parasitic larva of *Hal-campa chrysanthellum* there is a single deep œsophageal groove; the grooved end of the œsophagus likewise extends a short distance below the normal lower border of the œsophagus.

* See list of papers at end of this article.

In the slightly older larvæ the general structure and disposition of the parts is precisely as above, except that, of course, the size is larger, the tentacles longer, and that new tentacles are making their appearance in the lateral entocœls. I am not yet in a position to state whether there is any particular order in their development.

In a paper (3) which will shortly appear in the Transactions of the Royal Irish Academy, I am pointing out the great importance of the earlier stage in the development, ontogenetic and phylogenetic, of the Actiniæ, and it is highly satisfactory to find another example of it in these forms.

We now come to the question, To what genus and species can we refer these interesting little parasites? At first sight they bear an unmistakable resemblance to the larva of *Halcampa chrysanthellum*, both externally and anatomically; so we may confidently consider them to be closely allied. The presence of twelve mesenteries precludes their being Edwardsiæ. The genera *Peachia* and *Ilyanthus* are usually associated with *Halcampa*; of the second of these I can say nothing, as it has never been anatomically described, besides, it is quite a rare form, and our larvæ are decidedly common. We then narrow the problem to the genera *Halcampa* and *Peachia*. Only two British species of *Halcampa* are known—*H. chrysanthellum* of North-European distribution (4), and *H. arenaria*, discovered and described by me (5) from the south-west of Ireland; of this only two specimens have been obtained.

I have made sections through three parasitic larvæ of *H. chrysanthellum*, and am therefore well acquainted with it, and although they agree perfectly with the St.-Andrews forms in their general appearance and structure, still there are distinctions in their histology which cannot now be gone into. One point, however, deserves special mention, and that is, the appearance of the longitudinal retractor muscle of the larger tentacles. In the earlier stages of *H. chrysanthellum* the muscle is relatively more extended than in the adult, but the more distal plications are of considerable length, and decidedly recall those of the adult. In a later stage this is naturally still more marked. The corresponding muscle in the St.-Andrews specimens is much less conspicuous, it extends for a greater distance across the mesentery, consequently the plications are more numerous; but, on the other hand, they are very much shorter and simpler than in *H. chrysanthellum*.

In transverse sections through *Peachia hastata* I find that the retractor muscles are very greatly developed, forming a regular close-set fringe to the border of the mesentery, and

Three Diagrams of Transverse Sections of Actinian Larvæ (*Peachia hastata*?) parasitic on Hydromedusæ at St. Andrews.—A. C. HADDON.

thus constituting a type of muscle very different from the reniform section of the retractors in *Halcompa*. My material, as I have previously said, is insufficient for me to pronounce an unqualified opinion, but there is nothing in the character of the longitudinal muscles of the mesenteries antagonistic to the view that these are the larvæ of *Peachia hastata*. The latter species, according to Prof. M'Intosh (6), is common in the neighbourhood. I would further point out that the St.-Andrews larvæ, stage for stage, are decidedly larger than those of the *Halcompa* which occurred to me; this would also correspond with the greater size of the adult *Peachia* as compared with that of *Halcompa*.

According to Prof. Verrill (7), the young of an American species of *Peachia* is parasitic in the lip-folds of *Cyanea arc-tica*. Prof. M'Intosh quite recently published a note on our form, which he assumes to be the larva of *Peachia hastata*, without, however, adducing any evidence in favour of his supposition, except the statement that the adult is very common. The parasitic actinian certainly appears to be not at all unfrequent. So far as my evidence goes, it supports, but does not prove, Prof. M'Intosh's conclusion.

List of Papers referred to in above Report.

- (1) A. C. HADDON.—“Note on the Arrangement of the Mesenteries in the parasitic Larva of *Halcompa chrysanthellum* (Peach).” Proc. Roy. Dublin Soc. (n. s.) v. 1887, p. 473, pl. xi.
- (2) T. S. WRIGHT.—“Observations on British Zoophytes. On *Peachia Fultoni*, a parasitic Actinia.” Proc. Phys. Soc. Edinb. ii. 1859, p. 91; New Edinb. Journ. xii. 1860, p. 156; Ann. & Mag. Nat. Hist. [3] viii. 1861, p. 132.
- (3) A. C. HADDON.—“Revision of the British Actiniæ.—Part I.” Trans. Roy. Irish Acad. 1888 (*in the press*).
- (4) A. C. HADDON.—“Note on *Halcompa chrysanthellum*, Peach.” Proc. Roy. Dublin Soc. (n. s.) v. 1886, p. 1.
- (5) A. C. HADDON.—‘Actinozoa’ in “First Report on the Marine Fauna of the South-west of Ireland.” Proc. Roy. Irish Acad. (2) iv. Sci. p. 616. (See also Trans. Roy. I. Acad. 1888.)
- (6) W. C. M'INTOSH.—“Invertebrate Marine Fauna of St. Andrews.” Ann. Mag. Nat. Hist. [4] 1874, xiii. p. 220.
- (7) A. E. VERRILL.—“On the Polyps and Echinoderms of New England.” Proc. Boston Soc. Nat. Hist. x. 1866, p. 338; also in Rept. U. S. Fish Comm. i. (1871-72), 1873, p. 739.
- (8) W. C. M'INTOSH.—“Notes from the St. Andrews Marine Laboratory (under the Fishery Board for Scotland).—No. VII. 3. On the Commensalistic Habits of the Larval Forms of *Peachia*.” Ann. Mag. Nat. Hist. [5] 1887, xx. p. 101.