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On the avicular sarcoptidæ, and on the metamorphoses of the acarina

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The pond in which this was found is a very small one, only 5 or 6 yards in diameter, and the only other species I have met with in it is *Lophopus crystallinus*; of the latter I have not met with any this year. This variety grows attached to twigs in the full blaze of the sun; and the little animals appear to enjoy it immensely. The specimen I obtained was about four inches long, by an inch thick in the middle; but I left another about the same length but apparently thicker.

I am, Gentlemen,
Yours obediently,
EDWARD PARFITT.

Devon and Exeter Institution,
Exeter, June 18, 1868.

On the Avicular Sarcoptidæ, and on the Metamorphoses of the Acarina.
By C. ROBIN.

The Acarina pass through a series of metamorphoses—a hexapod larva issuing from the egg becoming converted into a nymph, from which the adult Mite proceeds. The author has observed in the Sarcoptidæ a more complicated series of phenomena; in these the males pass through four, and the females through five stages, indicated as follows:—

1. The egg, on issuing from which the animal has the form of
2. A hexapod larva, followed by the stage of
3. Octopod nymphæ without sexual organs.

4. From some of these nymphæ issue:—*a*, sexual males, after a moult which is final for them; *b*, from others issue females without external sexual organs, resembling the nymphæ, but larger, and in some species furnished with special copulatory organs.

Finally, after a last moult following copulation, these females produce

5. *The sexual and fecundated females*, which do not copulate, and in the ovary of which eggs are to be seen. No moult follows that which produces males or females furnished with sexual organs; but previously to this the moults are more numerous than the changes of condition.

Ovular and embryonal state.—The eggs of these Acarina are of a cylindroid form with rounded ends, one of which is smaller than the other, and corresponds with the rostrum. They are more or less flattened on one side; and to this surface the ventral surface of the young animal corresponds. The exclusion is effected by the division of the cephalic extremity into two halves. The ova are deposited by the avicular Sarcoptidæ in the angle formed by the barbs with the stem of the feather. In general the segmentation of the vitellus has not commenced when the eggs are laid; but in some species the vitellus is divided into four lobes while the egg is still in the oviduct. The division takes place in planes perpendicular to the greater axis of the vitellus.

The Larva.—In all the species the larvæ are hexapod; and the arrangement of the epimera shows that it is the third, and not the

fourth pair that they possess on issuing from the egg. When the males have the fourth pair of legs disproportionately large, these legs remain small throughout the preparatory state, and only acquire their large size under the skin of the nympha before the last moult. The larvæ undergo from two to three moults before passing to the state of nymphæ. They have only one pair of hairs at the apex of the abdomen.

The Nymphæ.—The impuberal octopod individuals, or nymphæ, show no distinctive sexual characters. In those species the males of which have the fourth pair of legs disproportionately large, these remain small during the whole of this state, and increase in size under the skin before the last moult, at the same time that the sexual organs are produced. At the same period are formed the posterior prolongations of the abdomen in some species; and at its close the sex of the individuals may be distinguished.

In the larva from which a nympha is to be produced, the fourth pair of feet are seen beneath the skin, folded forwards. These and the lobes and hairs borne by many nymphæ are evidently produced beneath the skin of the larva. The nymphæ have two pairs of long setæ at the apex of the abdomen.

The nymphæ have only the single *granular tegumentary plate of the epistoma*, the *thoraco-abdominal plate* of the sexual individuals being wanting in them. They undergo two or three moults in this state.

The coupled females.—These, although larger, are not always easy to distinguish from the nymphæ; in some species they have two colourless appendages to the hinder part of the body, which do not exist in the nymphæ. This copulation of adult males with individuals having no sexual organs is remarkable, as nothing of the kind has been observed in *Tyroglyphus*, *Glyciphagus*, &c., although a similar phenomenon was noticed in *Psoroptes* by Bourguignon and Delafond. In these avicular *Sarcoptidæ* a female may often be seen in copulation and retained by the male, showing through her integuments a female with well-developed genital organs. The adhesion of the male to the female is effected by means of the two anal disks possessed by the former. The adhesion lasts for some days, but the actual coition seems to occupy but a small portion of this time. The ova are developed in the ovaries of the females whilst still in this nymph-like form, and before the final moult.

The author remarks upon the relationships of these parasitic *Sarcoptidæ*, and gives the following list, in a note, of the forms observed by him, which will be fully described in his memoir:—1. *Pterolichus*, g. n., including 5 new species; 2. *Dermalichus* (Koch), sp. *passerinus* (Linn.), *oscinum* (Koch), and 1 new species; 3. *Pteronyssus*, g. n., sp. *Dermal. picinus* (Koch); 4. *Proctophyllodes*, g. n., sp. *Dermal. glandarinus* (Koch), and 4 new species; 5. *Pterodectes*, g. n., with 3 new species.—*Comptes Rendus*, tome lxvi. April 20, 1868, pp. 776–786.

The Pelvis and Hind Limbs of Whales.

Professor Van Beneden has read a paper at the Academy of