

We are thus led to conclude—

1. That in the species above cited, which have their sexual generation represented by gonophores always attached to the hydroid polype, or by semimedusæ or free medusæ, the ova originate in the interior of the hydroid polype itself, and not in these gonophores or medusæ.

2. That the ova are only differentiated cells of the endoderm, and that we can observe all the transitions between an ordinary endodermic cell and a well-developed ovum.

3. That the ova are conveyed into a bud, which is at first only a diverticulum of the body-walls of the polype; that this bud enlarges, and finally becomes a gonophore, destined to be always attached, or a semimedusa or a free medusa.

4. If we accept as demonstrated the facts that I have just expounded, the gonophores, the semimedusæ, and the medusæ cannot be regarded as sexual individuals; consequently it would seem that alternation of generations cannot be accepted for these species.—*Comptes Rendus*, August 16, 1881, p. 345.

Biological Evolution of the Aphis of the Alder * (*Vacuna alni*, Schrank). By M. J. LICHTENSTEIN.

Among the Aphidians there exists a small group of insects which is distinguished from all the rest at the first glance by the mode of carrying the wings. Instead of being roof-like, as is the rule, these organs are laid flat upon the back, as in the males of the Coccidæ.

Of these the *Phylloxera* is the best known type. I have already, some ten years ago, traced the evolutive cycle of this genus, showing the *Phylloxera* of the oak with two apterous and two winged forms, the *Phylloxera* of the vine with three apterous and a single winged form, and the *Phylloxera acanthohermes*, which is always apterous.

Besides the genus *Phylloxera*, which has only three joints in the antennæ, only two other genera carry their wings horizontally, namely *Aploneura*, with six joints in the antennæ, and *Vacuna*, with five joints in the antennæ.

Only one species of *Aploneura* was known, namely the *Aphis* of the pistachio (*A. lentisci*); I discovered its sexual forms in a second on the roots of grasses. I regard this second species as a form of that of the pistachio, believing that there is a migration from the pistachio to the grasses, as also in that of the *Phylloxera* from the white oak to the green oak, and *vice versâ*.

It remained to study the *Vacunæ*, of which two species are known—*V. dryophila* on the oak and *V. alni* on the alder and birch.

Vacuna dryophila lives on the green oak and the white oak; and I have hitherto been unable to ascertain any regular migration; but, at any rate, in December, a winged form appears under the leaves of the white oak (*Quercus pubescens*), and there deposits sexual

* There is also upon the alder another *Aphis* (*Aphis alni* of Kalténbach, Koch, &c.) which is a true *Aphis* with seven joints in the antennæ, and has been placed by Passerini in the new genus *Pterocallis*. I only intend here to examine the *Aphis* with flat wings, allied to *Phylloxera*, with which it has even been sometimes confounded.

individuals, male and female, which copulate after moulting. This winged form is what I have called the *Pseudogyne pupifère*. The fecundated female deposits, around the buds of the oak, brilliant black eggs without any covering. These eggs hatch in the spring.

Vacuna alni, according to authors (De Geer, Kaltenbach, Koch), appears in the spring in the form of a green founder *Aphis*, and produces young which acquire wings in June.

I do not know these two forms, which are my *Pseudogynes fondatrices* and *émigrantes*; but in July I have found, at Luchon, a large wingless *Aphis* of a brick-red colour, with a median line and four streaks (two on the shoulders and two at the nectaries) white, which deposited along the stems and under the leaves green young of two sizes. Although accustomed hitherto to apterous sexual forms, I immediately suspected that this large red *Aphis* was the *pupiferous* form, although it was wingless.

And, in fact, a very few days afterwards, and after a few very rapid moults, I saw the small individuals become active males, running about in search of the females and copulating with them. The *Pseudogyne pupifère*, which is wingless and red, is 1.10 millim. in length; the green female is 1 millim. long, and its transparency shows a large egg in its abdomen.

The male, which is also green, is 0.66 millim. in length. On pressing the abdomen very gently we see the penis issue, of the usual form of that of Aphidians.

After copulation, a shining secretion of a pearly white is seen to make its appearance on both sides of the abdomen of the female; this indicates that oviposition is about to take place. In fact, two or three days afterwards the egg is deposited, and the female induces it all round with the nacreous secretion that exudes from her abdomen, not in filaments, but in the form of small waxy plates. In tubes these eggs are placed upon the cork; I have not witnessed the oviposition in freedom.

The discovery of the sexual forms of *Vacuna alni* completes the knowledge of these forms in all the known species of Aphidians which carry their wings horizontally.

In *Phylloxera* and *Aploneura* the sexual individuals have no rostrum; nevertheless they enlarge and undergo at least one, and perhaps several moults. In the *Vacunæ* the sexual forms have a rostrum and feed. In this they approach the genus *Schizoneura*, several species of which have sexual forms bearing a rostrum. It is curious also to see in the genera *Phylloxera* and *Vacuna* species with a *winged pupiferous* form side by side with others with an *apterous pupiferous* form.

But in any case nothing could be more dangerous than to attempt to judge by analogy of these singular animals. Seeing the two *Vacunæ* side by side, one would take them for the same insect: now one oviposits in August, and the other in December; one has the *pupiferous* form apterous, the other winged; one has no secretion, the other exudes nacreous plates.

Consequently there still remain many observations to make before we can venture to undertake the classification of the Aphidians from a biological point of view.—*Comptes Rendus*, August 29, 1881, p. 425.



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