

found by the latter in *Cardium rusticum* and by himself in *C. edule*. The elongated flattened body is covered with a delicate membrane, finely striated transversely. At its narrower extremity is an unarmed mouth at the bottom of a sucking-cup. The author has observed no œsophageal tube, which is contrary to Lacaze-Duthiers's statement. In the middle region the body shows a closed cylindrical cavity lined with nucleated cells, and in this part there is also a second circular sucking-disk. The posterior part also has an interior cavity, smaller than that in the middle region, with which it has no communication, but having a cord running to an aperture at the base of the caudal lobe (see below). It is probably excretory. Between the anterior and posterior cavities there is a darker, granular, transverse band, from the lateral extremities of which similar bands are given off anteriorly and posteriorly, the whole representing a capital H. The author regards these as the first traces of genital glands.

The aboral extremity of the body bears a curious caudal appendage, composed of a voluminous median lobe, flattened transversely, and from which are given off on each side two filaments of great length and very contractile, capable of attaining many times the length of the body and then of retracting by rolling up.

Although during the months of November, December, January, and February this *Bucephalus* is to be met with in about 4 per cent. of the examples of *Cardium edule*, and a certain number of them always in the state above described, which the author regards as the adult Cercarian stage, the *Distomum* belonging to it could not be found in them; by the end of March all traces of the parasites disappear*.—*Bull. Soc. Linn. Norm. sér. 4, vol. ii. p. 145 (1889)*, with a plate.

On the Formation of the Antherozooids in Eudorina elegans.

By M. P. A. DANGEARD.

The colonies of *Eudorina elegans* are composed of sixteen or thirty-two cells occupying the surface of a sphere, each possessing two long cilia, a nucleolated nucleus, an amyliiferous corpuscle, and a lateral red point; the colony moves by the agency of the cilia; asexual reproduction takes place by repeated bipartition of the cells.

The sexual colonies are male and female, the latter closely resembling the ordinary vegetative colonies, except that the contents of the cells are more opaque and their number may be reduced to four. In the male colonies each cell by successive bipartitions gives origin to thirty-two or sixty-four cells which remain united in the same plane, forming yellowish disks, which escape and move through the water often for a considerable time; when one of them falls in with a female colony the antherozooids composing it are set free;

* In a subsequent note M. Huet records his observations upon another Cercarian parasite of *Cardium edule*, which he was also unable to trace to maturity.

they are very long, have two long cilia at their anterior extremity, and a very contractile plasma; finally they penetrate into the jelly surrounding the female cells or "oospheres," and the fusion of an antherozoid and an oosphere gives origin to an ovum, which becomes red in passing to the condition of latent life.

In *Chlamydomonas Reinhardti* the author has shown* that in two cells which conjugate to form an ovum the nuclei become fused together, and this is no doubt the case in *Eudorina*, although it has not been observed directly.

Besides the normal mode of formation of the antherozoids in *Eudorina* the author has observed another which he thinks serves to elucidate the value and signification of the sexual reproduction in some Volvocineæ. His observations were made in February upon cultures of about six months.

In a colony of 32 cells, when the division of the cells has advanced to the 8- or 16-stage, as the division does not follow a parallel course in all the cells, some will remain entire while others are already divided into 2, 4, 8, or 16. The division completed these cells arrange themselves as if to form an asexual colony, and then the following phenomena were observed, here given in the order of their occurrence.

On *Monday* the colony presented two mother-cells, A and B, each containing 16 elongated green antherozoids, moving briskly within the cavity containing them.

On *Tuesday* most of the antherozoids of A had escaped; those of B were still very active. In a third mother-cell, C, the still globular daughter-cells arranged themselves in accordance with a spherical surface and then began to move slowly within the cavity; they were green and possessed two cilia and a red point.

On *Wednesday* the antherozoids of B escaped; their plasma contracted with great facility, and, except in their green colour, they exactly resembled the ordinary antherozoids. In C the cells quickened their movements and became more elongated in form; in a fourth mother-cell, D, the daughter-cells also began to move.

The same phenomena occurred during the following days in each cell of the colony.

The author considers that these facts show clearly that in *Eudorina* the formation of a disk is not a necessary preliminary to the production of the antherozoids, but that green globular cells resembling the vegetative cells and oospheres may *directly* give origin to antherozoids; whence it follows that the sexual reproduction of *Eudorina*, and consequently of *Volvox*, is only an unimportant modification of the *isogamy* which is known to occur in some *Chlamydomonades*, in *Chlorogonium*, *Pandorina*, and *Stephanosphaera*.—*Bull. Soc. Linn. Normandie*, sér. 4, vol. ii. p. 124 (1889).

* *Bull. Soc. Linn. Norm.* 1887.



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