

Außer dieser Rinne ist der ganze Rücken mit zahlreichen runden Grübchen und nach der Mitte zu gekrümmten kurzen, glatten Borsten versehen. — Ventral: Sternalschild sehr lang, mit zahlreichen großen runden Grübchen. Ventrianalschild kurz; ventraler Teil desselben mit ebensolchen Grübchen. Ventrianal-, Metapodial- und Peritrematalschilder mit hervorspringenden, dicken, chitinösen Rändern. — Hypostoma und erstes freies Palpenglied (Trochanter) mit je einem dreizähligen Haar.

Oslebshausen, unter Steinen bei der kl. Brücke über die »alte« Weser (1 Deuton.) 11. IV. 01.

Gen. *Eremaeus* C. L. Koch.

18. *E. varius* Oudms. et Vgts. n. nom.

Diese Art wurde schon 5. Sept. 1900 von Oudemans unterschieden (Tijdschr. voor Entom. v. 43, p. 162), jedoch nur als eine Aberration oder Varietät angesehen. Sie gleicht *E. exilis* (Nic.), hat aber keine Lamellarspitzen.

9. A Method of Demonstrating the external Discharge of the contractile Vacuole.

By H. S. Jennings.

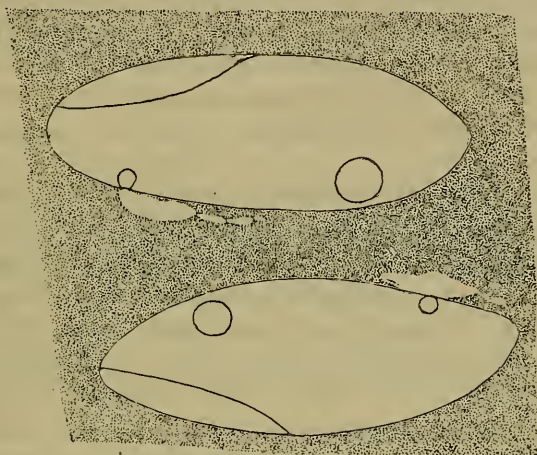
(With 1 fig.)

eingeg. 3. Mai 1904.

Penard (Faune Rhizopodique du Bassin du Lemman, Geneva, 1902, p. 644—662) has recently opened again the question whether the contractile vacuole of Protozoa really discharges to the outside, pointing out that the evidence on which this generally received view is based is very inadequate. A method by which the external discharge, when it occurs, can be demonstrated experimentally is then desirable. In studying the currents produced by the cilia in *Paramecium*, I came upon such a method, by which it is possible to demonstrate with the greatest ease that in this organism and various others the contents of the contractile vacuoles are discharged to the outside. The method is extremely simple. It consists in mingling a large quantity of finely ground India ink, or Chinese ink, with the water containing the animals. The ink is procured in sticks, in the usual way, and is rubbed up with two or three drops of water in a watch glass till the water is thick and muddy with the finely ground ink. In this the *Paramecia* are mounted and covered in the usual way. The layer of water must be thin, so that the animals shall not be completely hidden by the ink. When such a preparation is placed on the stage of the microscope, and much light is admitted from below, it is black and nearly opaque,

save that the bodies of the *Paramecia* are very white, transmitting much light. Watching quiet specimens, the discharge of the contractile vacuoles to the outside is observable with the greatest ease. The clear fluid from within the vacuoles passes into the black and opaque surrounding water, where it is absolutely conspicuous, as a white and shining spot. Owing to the ciliary movement of the animal, the fluid from the vacuole is of course quickly carried away and lost, but is visible for one or two seconds after its discharge. The figure shows the typical appearances as observed in *Paramecium*.

There are two chief difficulties in making the observations. First, the *Paramecia* are of course usually in rapid movement, revolving on the long axis, as well as swimming forward. Second, the vacuoles are



Discharge of the contractile vacuoles in two slightly compressed specimens of *Paramecium*, as seen when mounted in India ink.

much more likely to be discharged on the upper or lower surface of the animals than at the side, and it is only in the latter case, when a profile view is obtained, that the discharge is clearly observed. When the fluid is discharged in such a way as to lie above or below the body of the animal, it is practically invisible, since there is no contrast between it and its background. The simplest way to meet these difficulties is to draw some of the water from the preparation by means of filter paper, till the cover glass rests upon the *Paramecia*, compressing them lightly, and holding them still. Usually some of the animals come to rest in such a position that the contractile vacuoles appear at one edge, and are discharged freely into the water, as in the figures. The fluid at the moment of discharge and for a second after is then conspicuous. In order to determine with certainty whether the dis-

charge takes place in the same way under normal conditions as in the compressed specimens, it is necessary to watch free-moving individuals, and under these conditions the observations are difficult and require much time and patience, for the *Paramecia* are rarely in the proper position for observation at the moment of discharge. But by spending some hours on this, I was able to observe the discharge many times on free, uncompressed specimens, so that there is no question but that the phenomena shown by the compressed animals are normal.

By the use of this method I have observed the discharge of the contents of the contractile vacuoles in a number of Infusoria and Rotifera, including, in the former group, *Paramecium*, *Nassula*, and *Oxytricha*; in the latter group, *Hydatina senta*, *Diaschiza*, and *Philodina*. I regret that I have had no opportunity to study favorable examples of *Amoeba* from this point of view. Even in case the vacuoles are discharged to the outside in *Amoeba*, observation of the fact will doubtless be difficult, since the vacuole is probably usually discharged on the upper surface of the animal, where the contents would be invisible.

The use of India ink (Chinese ink) rubbed up with water for such purposes as that indicated and for observation of ciliary currents I have found much preferable to the carmine or indigo commonly employed. The India ink is much finer and darker and absolutely without chemical action. Attempts have been made before to observe the discharge of the contractile vacuole by the use of carmine or indigo; the usual negative result I believe to have been due the larger granules of these substances, rendering it hardly possible to make so densely opaque a mixture without destroying the fluidity of the water and injuring the animals. To see the discharged vacuolar contents, the surrounding water must be almost solidly black, without injury to the animals: this is easily attained with the India ink.

Zoological Station, Naples, Italy, April 27, 1904.

II. Mitteilungen aus Museen, Instituten usw.

1. Naturvetenskapliga Studentsällskapet, Upsala.

Zoologische Sektion.

(Schluß.)

Sitzung den 27. Februar 1903.

I. Trägårdh, cand. phil., teilt den Fund von *Polynema natans* Lubb. mit. Er bestätigt, daß *Polynema* sich eines gut entwickelten Tracheensystems erfreut, was von anderer Seite bestritten worden war.

Im Zusammenhang hiermit wurde eine Darstellung der aquatischen Hymenopteren gegeben.

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