NUMBER 435 JUNE 30, 1941

OCCASIONAL PAPERS OF THE MUSEUM OF ZOOLOGY

UNIVERSITY OF MICHIGAN

ANN ARBOR, MICHIGAN UNIVERSITY OF MICHIGAN PRESS

NOTES ON THREE SPECIES OF *AEOLOSOMA* (OLIGOCHAETA) FROM MICHIGAN

BY ROMAN KENK

KNOWLEDGE of the distribution of the genus *Aeolosoma* in North America is still very incomplete. This is due, in part, to the fact that the study of the smaller forms of Oligochaeta offers some technical difficulties. In the genus *Aeolosoma* even the extent of the variation of morphological characters has not yet been sufficiently studied, and the identification of some species is therefore rather problematical.

Aeolosoma frequently occurs in stagnant and running waters and is sometimes very abundant in cultures of aquatic material or in aquaria. Several species seem to have a world-wide distribution, apparently because of their ability to encyst and to tolerate, in their latent stages, a transportation over great distances by wind and by other agents of dispersal. The following three species, all new for Michigan, have been observed in the vicinity of Ann Arbor.

Aeolosoma leidyi Cragin, 1887

This species was incompletely described by Cragin (1887: 31) who collected it in Shunganunga Creek, Shawnee County, Kansas. Both Beddard (1895: 185) and Michaelsen (1900: 15) consider Cragin's form a dubious species, and Michaelsen is inclined to transfer part of Cragin's animals to *A. tene-*

brarum Vejdovský. As no discussions have appeared since, a more detailed redescription of the species is appropriate.

The animals (Fig. 1) are transparent, whitish. The length of specimens in fission is 2–3 mm.; that of single animals, or of the anterior zooids alone, up to 2 mm. The prostomium is rounded and, when the animal moves around, distinctly wider than the subsequent segments. The number of setigerous segments in a single specimen, or in the first zooid of a chain, varies from six to twelve. The oil glands or integumental globules are pale olive-green, round or irregular, and are distributed, as in other species of the genus, over the entire surface epithelium except for the central area of the ventral head surface (the area occupied by the ciliated epithelium).

Four bundles of from two to seven setae (Fig. 2) occur in each setigerous segment. They are of two kinds: *a*) capilliform setae—fine, flexible, almost straight when protruding free into the water, and of different lengths in the same bundle (80–170 μ); two to six capilliform setae in each bundle of the anterior segments, and none, one, or two in those of the posterior segments—and *b*) sigmoid or uncinate (crotchet-shaped) setae, which are stiffer and shorter (60–70 μ), one to three in each bundle, except in the bundles of the first setigerous segment. The sigmoid setae have simple, bent extremities (not bifid as in *Aeolosoma tenebrarum*), and their shape changes gradually from the anterior to the posterior segments: the anterior setae have only slightly bent distal hooks, whereas in the posterior segments the hooks are more sharply bent.

To summarize, the first setigerous segment has only longer and shorter capilliform setae; the following ones have both capilliform and sigmoid setae, the number of the former, in general, decreasing; and the last segments may have only sigmoid setae, usually two to each bundle, as Cragin also has noted.

The alimentary tract widens between the second and third sets of setal bundles. Nephridia are usually present in almost all segments behind the first bundles, to a maximum of eight pairs. Sometimes, however, they are asymmetrically ar-

ranged, the first nephridium being developed on one side only. In some specimens, both nephridia of the first pair are missing, and the most anterior ones are between the second and third setal bundles. A similar variation of the number and arrangement of the nephridia has been observed before, for example, by Vejdovský (1884: 21) in *Aeolosoma hemprichi* and by Štolc (1903: 75) in *A. quaternarium.*

The brain is shallowly emarginate posteriorly.

Aeolosoma leidyi is closely related to *A. tenebrarum,* from which it differs mainly in the structure and arrangement of the sigmoid setae and in the color of the oil glands. In *A. tenebrarum* there are no sigmoid setae in the first three setigerous segments, and in the subsequent segments the sigmoid setae have split extremities (i.e., are biuncinate). Beddard (1889: 52) found in the material which he referred to *A. tenebrarum,* however, that the sigmoid setae of the posterior segments had simple distal points. The color of the oil glands —yellowish in *A. tenebrarum,* pale green in *A. leidyi*—seems to be of lesser taxonomic significance, as in other species their color may vary to a considerable extent.

Aeolosoma leidyi was found in an infusion of a soil sample from the dry bottom of a temporary pool, about five miles southeast of Ann Arbor, Michigan.

Aeolosoma headleyi Beddard, 1888

My material of this species does not conform in all details to either of the two descriptive accounts by Beddard (1888) and Pointner (1911: 627–29). However, there cannot be any doubt as to the identity of these forms. *A. headleyi* occurs in the aquaria of the Division of Fishes of this Museum. In several tanks the animals were found (November, 1940) in great abundance, moving about on the glass walls. When the water was stirred, they readily detached themselves from the glass and floated passively in the water without apparent swimming movements. If crowded in a dish, they tended to group together in balls. At least two strains exist, which differ mainly in size. In the smaller strain, the maximum length attained

by the chains of animals in active fission is 3 mm.; in the large strain, more than 4 mm. The maximum sizes of single animals, or of the anterior zooids of the chains, are 1.6 mm. and 2.5 mm. respectively.

The animals are transparent and appear, when crowded, whitish or slightly yellowish. The oil glands of the surface epithelium are, as a rule, pale green. In several specimens of the larger strain, however, there are, besides the numerous pale-green globules, a number of darker, bright green globules, often with a bluish tint. The latter are situated mostly in the head region, but they are also found elsewhere, in smaller numbers. Occasionally there were seen also what appeared to be colorless integumental bodies.

The prostomium (Fig. 3) is broader than the subsequent segments and rounded, or spade-shaped with a rounded tip, when the animal is moving.

A single animal, or an anterior zooid, consists of the head and from nine to twelve setigerous segments. The setae (Fig. 4) are all capilliform, very fine and flexible, almost straight when protruding freely. The setae of one bundle are of different lengths, from 73 to 235 μ in the small, and from 80 to 335 μ in the large, strain. An average of from five to seven (maximum, nine) setae occurs in the anterior, and from two to five in the posterior, bundles. There is no regular arrangement of the long and short setae in the single bundles such as Pointner seems to have observed in his material. (He states that the central setae of a bundle were longer than the lateral ones.)

Nephridia occur in from eight to ten pairs, the first one lying between the first and the second sets of bristle bundles, in the region of the esophagus. Behind the first pair, every setigerous segment, except the most posterior ones, has a pair of nephridia.

The brain is transversely elongated and straight, or slightly emarginate, posteriorly.

The ciliated pits on both sides of the prostomium are typically developed. Each pit is connected with the mouth opening by a distinct ciliated furrow.

No genital organs were seen (November, 1940).

It has been believed that the bright green color of the integumental glands and the presence of only capilliform setae and a large number of nephridia constitute the chief characteristics of *Aeolosoma headleyi* (see Michaelsen, 1900: 14–15). However, Beddard stated that "the oil globules showed every tint of green from a pale yellowish to a dark blue-green" and also found "colourless oil-bodies." Pointner observed green and colorless oil glands. In my material, the great majority of the specimens possessed pale green globules, and only a small number of animals of the larger strain had the variety of colors reported by Beddard.

With regard to the setae, Beddard only has stated that "their shape is perfectly similar to that of the setae in *A. variegatum,*" which were described by Vejdovský (1885: 283) as being all capilliform and somewhat curved. Beddard gave in his Figure 3 a drawing of a section through a setal sac in which three setae appeared, all of about equal size and only slightly bent. In his Figure 1 the setae were drawn as straight and with slight variation in size. Pointner observed straight or little curved setae of different lengths.

The shape of the brain was not mentioned in Beddard's description, but was shown in his Figure 1 as a transversal structure with almost straight anterior and posterior margins. Actually, I could observe an almost straight posterior outline in some specimens of my material. In the majority, however, the posterior contour was somewhat emarginate.

Our specimens conformed with Beddard's animals also in the arrangement and the large number of the nephridia. Pointner's material had only from three to six pairs, arranged somewhat irregularly.

If all the characteristics of *Aeolosoma headleyi* are considered, a very close relationship of this species with *A. variegatum* Vejdovský cannot be denied. The latter differs from our form mainly in the distribution of the nephridia, which are missing in the esophageal region.

I am indebted to Dr. Carl L. Hubbs for kindly permitting

me to study the incidental fauna of the aquaria of his department.

Aeolosoma hemprichi Ehrenberg, 1831

This species was very abundant in infusions of soil material collected from the bottom of a temporarily dry pool, eleven miles northeast of Ann Arbor, Michigan. It also appeared in great numbers in cultures of *Paramecium* in the Department of Zoology of this University. It is a rather small form (total length of the entire animals, 0.9–1.5 mm.; of the anterior zooids, 0.8–1 mm.), characterized by orange-colored oil globules, only capilliform setae of unequal lengths (67–120 μ) in the bundles, and a posteriorly emarginate cephalic ganglion. The species is very widely distributed geographically (Europe, Asia, Africa, North America). *Aeolosoma stokesi* Cragin (1887 : 31) from Kansas, which has been considered by Michaelsen as probably synonymous to *A. quaternarium* Ehrenberg, is actually *A. hemprichi* (Cragin states that the setal fascicles consist of "four or five unequal simple setae," whereas *A. quaternarium* has setae of equal length in one bundle).

Thanks are due Dr. Arthur E. Woodhead for kindly calling my attention to the presence of *Aeolosoma* in cultures of Protozoa in the Department of Zoology.

A fourth species of *Aeolosoma, A. tenebrarum* Vejdovský, has been reported by Moore (1906 : 166) from New Baltimore (northeast of Detroit), Michigan.

LITERATURE CITED

BEDDARD, F. E.

1888 Observations upon an Annelid of the Genus *Aeolosoma*. Proc. Zool. Soc. London, 1888, pp. 213–17, Pl. 12.

1889 Note upon the Green Cells in the Integument of *Aeolosoma tenebrarum*. *Ibid.*, 1889, pp. 51–56, Pl. 5.

1895 A Monograph of the Order of Oligochaeta. Oxford: Clarendon Press. Pp. xii + 769, 5 pls.

CRAGIN, F. W.

1887 First Contribution to a Knowledge of the Lower Invertebrata of Kansas. Bull. Washburn Coll. Lab. Nat. Hist., 2: 27–32.

MICHAELSEN, W.
1900 Oligochaeta. *In* Das Tierreich, 10. Berlin: Friedländer. Pp. xxix + 575.

MOORE, J. P.
1906 Hirudinea and Oligochaeta Collected in the Great Lakes Region. Bull. U. S. Bur. Fish., 25: 155–72, Pl. 32.

POINTNER, H.
1911 Beiträge zur Kenntnis der Oligochaetenfauna der Gewässer von Graz. Zeitschr. wiss. Zool., 98: 626–76, Pl. 28–29.

ŠTOLC, A.
1903 Über den Lebenscyklus der niedrigsten Süsswasserannulaten und über einige sich anschliessende biologische Fragen. Česká Akad. (Prague), Bull. internat. sci., 7: 74–130.

VEJDOVSKÝ, F.
1884 System und Morphologie der Oligochaeten. Prag. Pp. 172, 16 pls.
1885 *Aeolosoma variegatum* Vejd. Příspěvek ku poznání nejnižších annulatův. Správy České Spol. Nauk (Prague), Tř. math.-přír., 1885, pp. 275–90, 1 pl.

PLATE I

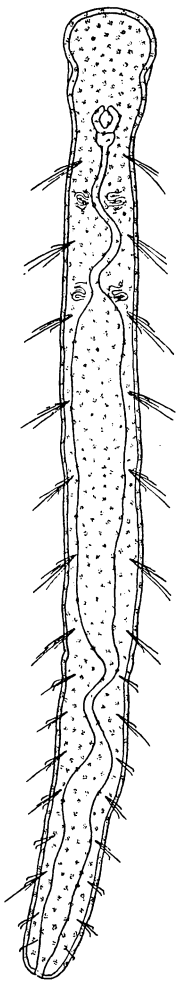
FIG. 1. *Aeolosoma leidyi,* entire animal, seen from the dorsal side, × 50.

FIG. 2. *Aeolosoma leidyi,* setal bundle, × 500.

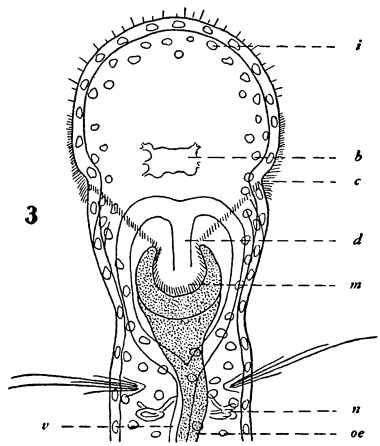
FIG. 3. *Aeolosoma headleyi,* anterior end, ventral view, × 108:

b, brain.
c, ciliated pit.
d, dorsal blood vessel.
e, esophagus.
i, integumental globules.
m, mouth.
n, nephridium.
v, ventral blood vessel.

FIG. 4. *Aeolosoma headleyi,* setal bundle, × 400.



1



3

2

4