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Generic diagnosis of Trachelobdella Diesing, 1850 (Hirudinea, Piscicolidae) and the geographical distribution of the species of this genus

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(O rodovom diagnoze Trachelobdella Diesing, 1850 (Hirudinea, Piscicolidae) i geograficheskom rasprostraneni vidov etogo roda.)

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Diagnosis of the genus Trachelobdella and its species composition have been subjects of discussion for many years (Blanchard, 1894 - reference No. 5; Shchegolev, 1912 - 2; Meyer, 1965 - 9). Differences in opinion were principally related to the problem of classification of three genera of Piscicolidae : Trachelobdella Diesing, 1850; Calliobdella (Callobdella) van Beneden et Hesse, 1863; Scorpaenobdella Saint-Loup, 1866. These were

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considered by some to be synonymous and by some to represent three distinct genera.

At present, Trachelobdella and Calliobdella are considered to be separate genera, but Scorpaenobdella is believed to be a synonym of Trachelobdella (deSilva, 1960 - 11; Knight-Jones, 1962 - 7; Soos, 1965 - 12).

The diagnosis of the above genera has until now been only incompletely studied; it has been mainly based on external similarity (Meyer, 1965 - 9). Hence eleven sea- and freshwater species which are characterized by a body sharply divided into two regions - the neck and the trunk, and by large lateral vesicles, are included in the genus Trachelobdella. Studies of external morphological and anatomical features have shown that this genus consists of three easily distinguishable groups of species. Based on this it has been proposed to divide the genus Trachelobdella into three [sub]genera: Trachelobdella Diesing, 1850, containing a group of marine species; Limno-trachelobdella Epstein, 1968, containing a group of Asian freshwater species; Baicalobdella Dogiel, 1957, containing one species from Lake Baikal (Epshtein, 1968 - 3).

In the following, the diagnosis of Calliobdella and Trachelobdella, based on composite external morphological and anatomical characteristics, is presented, some new parameters of the tropical leech Trachelobdella lubrica are reported, and the geographical distribution of Trachelobdella species is considered. The following served as the materials for this article: collections of the Institute of Zoology of the Academy of Sciences of USSR containing 1 collection (4 specimens) of Calliobdella nodulifera Malm, 1863; a collection (1 specimen) of Calliobdella lophii van Beneden et Hesse, 1863 (this material was identified by L. Johansson); six collections (12 specimens) of Trachelobdella

lubrica (Jrube, 1840) from the Mediterranean Sea which belonged obviously to V. D. Zelenskii. Furthermore, the 17 finds (36 specimens) of T. lubrica collected by V. D. Korotaeva (the laboratory of parasitology of marine animals at TINRO) in the area of the Great Australian Bight were used.

Diagnosis of genera Calliobdella and Trachelobdella

Diagnosis of the genus Calliobdella

Leeches of medium size, length of the body (30 - 60 mm) is 14 - 16 times greater than the body width; body shape is cylindrical and somewhat flattened. There are eleven pairs of small lateral vesicles. There are no eye- or eye-like spots on the distal sucker. Full somite comprises of 4 - 6 rings. Skin is smooth. The snout invagination orifice is in the middle of the anterior sucker. The base of the proboscis is located between the second and the third ganglia of the ventral nerve cord. Small oesophageal diverticula are present. Lateral appendages of the stomach chambers are little developed. The blind sacs are fused but five openings persist on the level of the ganglia. Cloacal sac [literally rectal vesicle] is not developed.

There are six pairs of seminal vesicles. Seminal reservoirs of glomerular appearance are on the 6 - 7th ganglion level. Ejaculatory tubules are short and they form simple loops. A glandular mass on the surface of their terminal [distal] regions can be either present or absent. The copulatory pouch is very large. A strongly developed globular muscular organ is localized between the copulatory pouch and the terminal [distal] regions [of the ejaculatory tubules]. Short ovisacs are located in the space between the 6th and the 7th ventral nerve cord ganglia. Oviducts do not form a muscular vagina. Cords of conducting tissue connect the ovisacs with the posterior wall of the copulatory pouch. There is no

copulatory zone on the clitellum.

Marine leeches. They are widely distributed in the Atlantic Ocean along the European coast; in Japan (?). They are parasites of different species of Teleostei.

Type species: Calliobdella lophii van Beneden et Hesse, 1863.

Besides C. lophii, Calliobdella nodulibera (Malm, 1863) undoubtedly belongs to this genus. The Japanese species Calliobdella livanovi Oka, 1910 was not studied anatomically and thus its affiliation with the genus Calliobdella requires verification.

Diagnosis of the genus Trachelobdella Diesing, 1850

Leeches of medium size (body length 30 mm). The shape of body is variable. Body is usually short, body length being 4 - 6 times greater than the body width; this ratio may reach 10 - 12 in considerably elongated leeches. Body is flat, the anterior region is sharply delimited from the wider posterior body region. Lateral vesicles are large and there are usually twelve or thirteen pairs of them. No eye- or eye-like spots are on the posterior sucker.

Full somite comprises of three rings; these are further divided by shallower furrows. There are usually six rings in the somite.

The proboscis [snout] invagination orifice is located in the middle of the anterior sucker. The base of the proboscis is between the second and the third ventral nerve cord ganglia. No oesophageal diverticula are present. Lateral appendages of the stomach chambers are either present or absent. The blind sacs are almost fully fused. Lateral appendages of the intestine are either poorly developed or absent. The cloacal sac [literally rectal vesicle] is present.

There are five or six pairs of seminal vesicles. Glomerular seminal reservoirs are on the level of the sixth to eighth ventral nerve cord ganglia. Ejaculatory tubules are short. On the surface of their terminal [distal] regions there is a well-developed glandular mass. A large copulatory pouch is present. The muscular organ between the copulatory pouch and the terminal [distal] regions [of the tubules] is either poorly developed or absent. Short ovisacs are located between the sixth and the eighth ganglia. Oviducts merge to form a muscular vagina. Neither a tissue mass nor the cords of conducting tissue are present.

Marine leeches. They are distributed in tropical seas, some species are found in the cool seas of both the north and the south hemispheres. They are parasites of different fish species.

Type species: Trachelobdella muelleri Diesing, 1850. In addition the following species belong to the genus: T. lubrica Grube, 1840; T. maculata Moore, 1898; T. rugosa Moore, 1898; T. australis Blanchard, 1900; T. iuederitzi Augener, 1936; T. leptcephali Ingram, 1957. Among the above species, the location of T. maculata and T. rugosa is unknown; nevertheless they were obviously found in a sea. According to the data of Moore (1898 - 10) T. maculata was discovered by one of the expeditions aboard the steamer "Albatross". This ship was used for investigations carried out in different regions of the Atlantic and Pacific Oceans for many years. T. rugosa was collected from a "red snapper", one of the sea-fish species of the family Bericidae (The Illustrated Dictionary of Commercial Fish Names in the West Pacific Ocean, 1964).

Cyrilobdella alcibiades Leigh-Sharpe, 1933, can probably be included into the genus Trachelobdella and the generic term Cyrilobdella can be

changed to the synonymous term Trachelobdella. To judge from the extremely short description of this Mediterranean Sea species by V. Leigh-Sharpe (1933 - 8), C. alcibiades fully complies with the external morphological diagnostic criteria (its internal structure was not studied) for Trachelobdella (a sharp division of the body into two parts, large lateral vesicles, absence of eyes) and according to its body shape and the size of its suckers it is very similar to the pressed/contracted specimen of T. lubrica. C. alcibiades, however, possesses only eight pairs of lateral vesicles; the number of these is known to vary among the leeches within the genus Trachelobdella. Furthermore, as a result of considerable body compression and flabby skin the small vesicles of the last pairs are often unnoticeable. To judge from Leigh-Sharpe's description, he possessed one specimen but failed to investigate the annulation of the last segments.

It should be mentioned that the type species of the genus Trachelobdella - T. muelleri - is represented only by the specimens examined by K. Diesing in 1850, and re-examined by R. Blanchard in 1894. The anatomical structure of this species has not been investigated, a fact which also applies to the remaining species of this genus with the exception of T. lubrica and T. leptocephali. It is therefore possible that further investigations of the entire group of marine Trachelobdella will result in changes of the generic diagnosis and the [species] composition of this genus.

Comparison of the Mediterranean and the
Australian specimens of T. lubrica.

T. lubrica is distributed in the Mediterranean Sea, in the Atlantic Ocean along the European coast (Herter, 1935 - 6) and along the West African coast north of the equator (Meyer, 1865 - 9). The occurrence of this species in Australian waters has immensely broadened its range. Taking into

consideration some of the features of the Australian specimens we find it expedient to present here a short comparative characterization of the two forms.

Measurements, shape and relative proportions of the body. The Mediterranean T. lubrica (Fig. 1) are leeches of medium size (body length up to 30 mm); a short body (L/D_2 * the mean - 4.8; max. - 7.7; min. - 2.6) is abruptly divided into two parts - a narrow and cylindric anterior segment and a wide posterior segment (D_2/D_1 mean - 3.5; max. - 6.4; min. - 2.2) that is somewhat flattened (D_2/N_2 mean - 1.2; max. - 1.5; min. - 1.0). Almost all the Australian leeches are very small (body length 3.5 - 7 mm); however, one of the specimens was 19 mm long. Body shape (Fig. 2) is similar to that of the Mediterranean leeches (L/D_2 mean - 4.9; max. - 12; min. - 3.4; D_2/D_1 mean - 2.2; max. - 3.0; min. - 1.3; D_2/N_2 mean - 1.4; max. - 2.5; min. - 0.9).

Suckers. The anterior sucker of the Mediterranean T. lubrica is small (C/D_2 mean - 0.3; max. - 0.5; min. - 0.2).

* The following symbols are used: L - body length, D_1 - maximum width of the anterior segment of the body, D_2 - maximum width of the posterior segment of the body, N_2 - maximum thickness of the posterior segment of the body; C - diameter of the anterior sucker
P - diameter of the posterior sucker
R - length of the free dorsal part of the anterior sucker
M - length of the ventral part



Fig. 1. *Trachelobdella lubrica* from the Mediterranean Sea.
Dorsal external appearance.

The posterior sucker is small (P/D_2 mean - 0.3; max. - 0.7; min. - 0.4; P/C mean - 1.1; max. - 1.7; min. - 1.4), bent backwards and centrally attached to the body (P/M mean - 1.1; max. - 1.5; min. - 0.8). The Australian leeches have somewhat larger suckers (C/D_2 mean - 0.5; max. - 0.8; min. - 0.3; P/D_2 mean - 0.7; max. - 1.0; min. - 0.4; P/C mean - 1.3; max. - 1.8; min. - 1.0). The posterior sucker is centrally attached to the body.

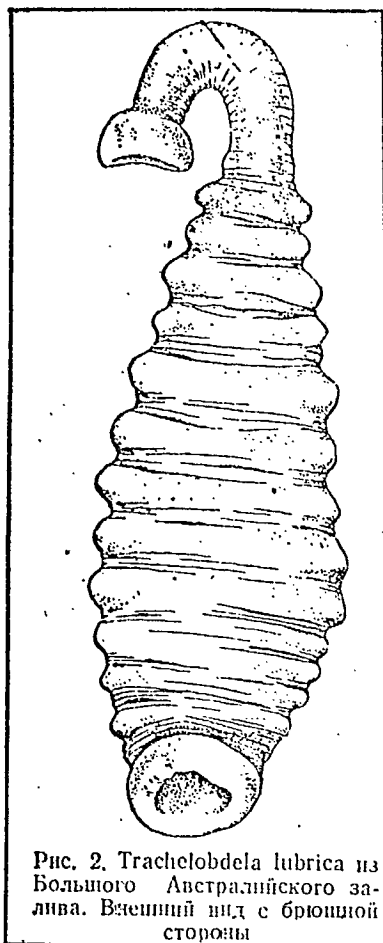


Fig. 2. *Trachelobdella lubrica* from the Great Australian Bight.
Ventral external appearance.

Annulation of the clitellum and full somite of the Mediterranean leeches is shown in Fig. 3. We failed to determine the clitellum annulation and the position of sexual orifices in the Australian leeches because of unsuitable fixation. Number of rings on a full somite varies between 3 and 6. In both the Mediterranean and the Australian leeches in the anterior portion of the body three to four pairs of large papillae, usually referred to as "non-pulsating vesicles", may be seen (though sometimes not clearly enough). All leeches exhibit

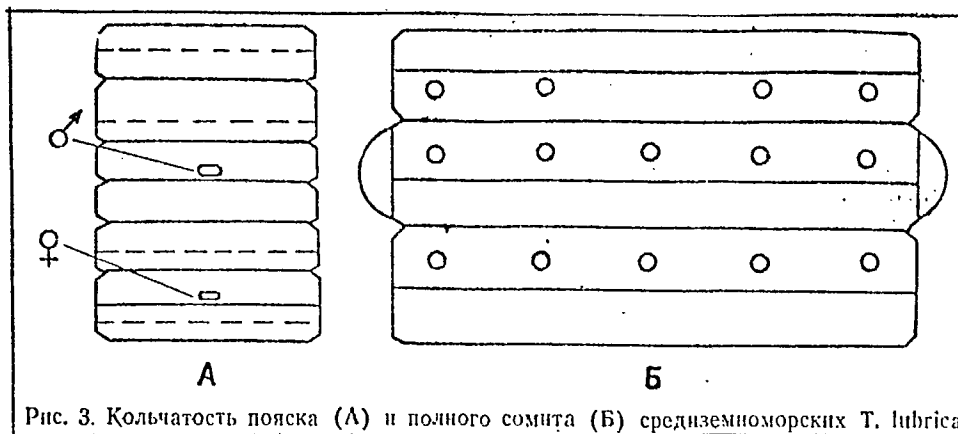


Fig. 3. Annulation of the clitellium (A) and full somite (B) of the Mediterranean *T. lubrica*.

twelve pairs of large lateral vesicles which occupy three to four rings in the anterior, and two rings in the posterior, segment of the body of a six - ring somite. Arrangement of the vesicles is characteristic of the species: the first four pairs are located considerably more ventrally as compared to the subsequent pairs; the last two pairs of vesicles are often clearly located more ventrally.

Coloration. The Mediterranean leeches were discolored by the fixative. According to the data in the literature (Apathy, 1888 - 4; Herter, 1935 - 6) the body color of *T. lubrica* varies between a dark yellow and an olive green. The anterior part of the body is lighter in color; the anterior sucker exhibits one to two transversal brown striae and the posterior sucker has orange - yellow radial striae. There are segmental eyes on the body. Small leeches are much lighter in color. Their bodies are transparent and intestines are visible through the integument. The Australian leeches

(see Fig. 2) are almost white with a slight green shade. The integument of the majority of the leeches is transparent, but the transparency disappears in larger specimens. These are greenish in color with a slight brown shade. The papillae are sometimes yellow in color. Many specimens exhibit two yellowish spots on the anterior sucker; little yellowish spots appear beneath the margin of the sucker. The posterior sucker exhibits some yellow spots radially located. Sometimes a few brown pigment cells can be observed on suckers and vesicles.

Structure of the intestine and the sexual organs (Fig. 4, 5) is similar in both the species and corresponds to the generic diagnosis (see above).

Thus the Mediterranean and the Australian T. lubrica are similar in their principal features of taxonomic significance. The structure of the sexual apparatus in both forms is in full agreement with the description of the West African T. lubrica by M. Meyer (1965 - 9). Australian leeches differ in several ways: they are much smaller than the Mediterranean species, have relatively larger suckers, transparent integuments, and no segmentally distributed black spots, which were observed in leeches of this species by S. Apathy (1888 - 4). However, it is possible that our collection contained only young specimens (the measurements of one of our specimens were similar to those of the Mediterranean variety). Young specimens always exhibit relatively larger suckers; it is also mentioned in the description of T. lubrica that young specimens are transparent. The importance of black spots for the systematics of T. lubrica is not fully understood. M. Meyer (1965 - 9) did not mention this feature in his description of the West African specimens.

It cannot be ruled out that further, more detailed investigations will uncover even more important differences. At present, however, there are no grounds for separating the Australian *T. lubrica* into a distinct species.

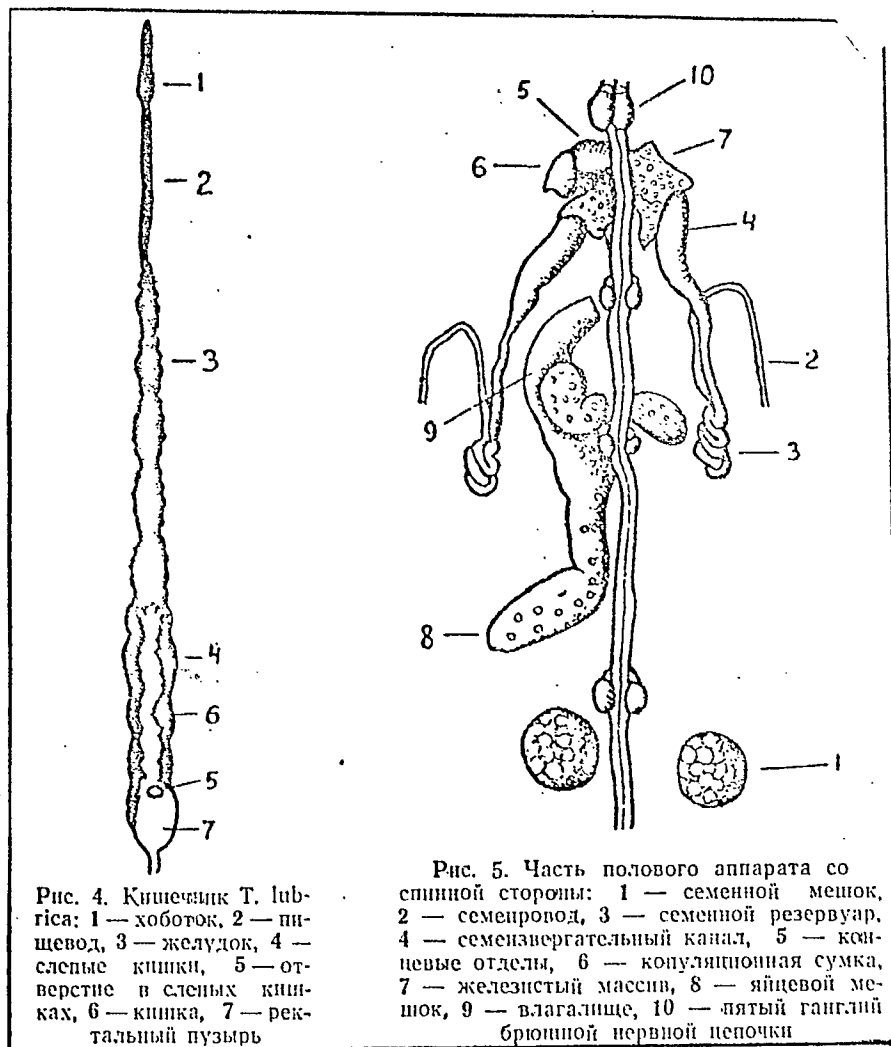


Fig. 4. The intestine of *T. lubrica*: 1 - proboscis, 2 - oesophagus, 3 - stomach, 4 - caeca, 5 - caecal orifice, 6 - intestine, 7 - cloacal sac [literally rectal vesicle].

Fig. 5. Parts of the sexual apparatus as they appear from the dorsal view. 1 - seminal vesicle, 2 - seminal duct, 3 - seminal reservoir, 4 - ejaculatory tubule, 5 - terminal regions, 6 - copulatory pouch, 7 - glandular mass, 8 - ovisac, 9 - vagina, 10 - fifth ventral nerve cord ganglion.

Geographical distribution of species of the genus Trachelobdella.

The following is known about the distribution of leeches of the genus Trachelobdella:

T. lubrica: the North Sea, the Mediterranean Sea, the Atlantic Ocean along the European coast and the northwest coast of Africa, the Great Australian Bight; T. muelleri - the Mediterranean Sea, the Atlantic Ocean along the Brazilian coast; T. luederitzi - southwest Africa; T. leptcephali - Tasmania; T. australis - Tierra del Fuego.

It can be assumed from the above data that the area of distribution of the genus Trachelobdella is similar to that of the genus Pontobdella. The distribution patterns of both the genera are spread over tropical seas, however, some species may also enter cooler waters.

Especially interesting from this viewpoint is the finding in the Antarctic Ocean of the leech Trachelobdellina glabra Moore (Moore, 1957 - 11) which is very similar in its external features to the species of Trachelobdella. Its anatomical investigation would be most valuable for the clarification of the origin and the generic connections of the Piscicolidae fauna of Antarctica.

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