Zool. Anz. **220** (1988) 3/4, S. 173—178
VEB Gustav Fischer Verlag Jena

A New Leech Species from North America, *Helobdella californica* nov. sp. (Hirudinea: Glossiphoniidae)

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With 3 Figures and 1 Table (Eingegangen am 17. August 1987)

Key words: Hirudinea, Glossiphoniidae, *Helobdella californica*

Abstract

A new leech species, *Helobdella californica* nov. sp., discovered in Stow Lake, San Francisco, California, is described. The species shows the following characteristics: length 12—18 mm, width 3—5 mm, fully extended up to 30 mm long and 2 mm wide. Color: dorsal side: dark grey-black, with conspicuous longitudinal black stripes; ventral side: white with black spots. One pair of eyes on segment II; a brown scute in the neck (segments V/VI). Gonopores on segment XI separated by 1 annulus. Crop with 6 pairs of branched caeca; 6 pairs of testisacs. The cocoons, larvae and young are carried by the parent attached to the ventral side of the body. The hosts are oligochaeta (*Tubifex*), water snails (*Physa gyrina*) and crustacea (*Gammarus*).

Introduction

The genus *Helobdella* Blanchard 1896 is comprised of small leeches belonging to the family Glossiphoniidae which are characterized by one pair of eyes, diffuse salivary glands, maximally 6 pairs of crop caeca and one annulus between the gonopores (Blanchard 1896, Soos 1969, Sawyer 1972, 1986). The majority of the described species are distributed in South America (Soos 1969, Sawyer 1986). The leech fauna of North America comprises 5 *Helobdella*-species. The world-wide distributed *H. stagnalis* L. differs from the other 4 species by the presence of a dorsal scute (Sawyer 1986).

In February 1986 I discovered in Stow Lake, Golden Gate Park, San Francisco, a *Helobdella*-species which superficially resembles *H. stagnalis*. A careful examination, however, revealed that this leech differs consistently from *H. stagnalis* in several external and anatomical features. In the present report I will describe this leech as *Helobdella californica* nov. sp. and summarize the features which separate this species from the closely related *H. stagnalis*.

Materials and Techniques

About 150 specimens were investigated during February 1986 through April 1987. The leeches were collected by hand from the underside of stones and leaves from Stow Lake and unnamed ponds and creeks of the adjacent Botanical Garden in Golden Gate Park, San Francisco, California. The leeches were kept at room temperature (18—24 °C) in aquaria or petri dishes which contained a few aquatic plants from their habitat. For anatomical studies fixed specimens were cut at 10 μm and stained in haematoxylin and eosin using standard techniques.

Description of species

Helobdella californica nov. sp.

1. External features

Body broadest posterior to its middle and tapering gradually toward both ends (Fig. 1); dorso-ventrally body very much flattened, especially when leech is at rest.

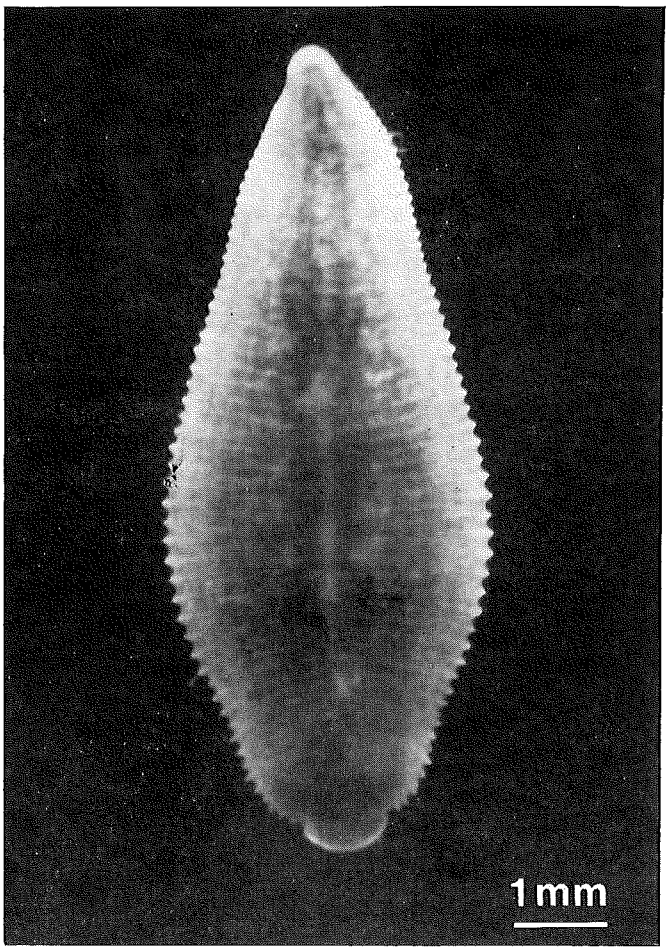

Fig. 1. *Helobdella californica* nov. sp., ethanol-fixed Holotype, dorsal view

The leech is very active in its movements and can elongate its body so as to become more than ten times as long as it is broad. Body size:

Length, at rest: 12—18 mm, fully extended: 25—30 mm.

Width, at rest: 3—5 mm, fully extended about 2 mm.

Color: The dorsal side is dark grey-black due to the presence of superficial, in or under the epidermis localized, branched assemblies of black pigment cells. The pigment cells are arrayed as conspicuous longitudinal stripes (Figs. 1, 2). No papillae present on the dorsal side of the body. The ventral side is white, with scattered, irregular arrays of black pigment cells (spots).

The head is only slightly wider than the neck with one pair of eyes on segment II (Fig. 2). Oral sucker on ventral side of the body, round-slightly triangular in shape with the mouth pore at the frontence. The species has a dark brown-red brown colored, chitinous scute (nuchal plate) on the anterior part of the dorsal side of the body (Segments V/VI), (Fig. 2). The posterior sucker is round (diameter about 1 mm) and dark pigmented on the dorsal side of the body (Fig. 1).

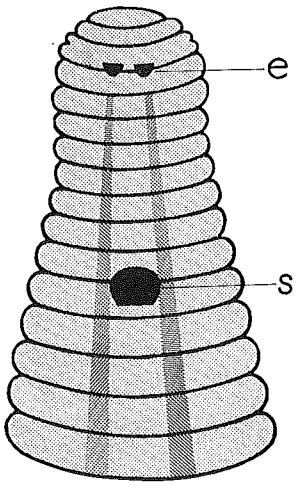

Fig. 2. Anterior part of the body, dorsal view. e — eyes; s — scute

Gonopores separated by 1 annulus and positioned within segment XI (Fig. 3). Pseudospermatophores are very small (<1 mm long) and only detectable on the body of the leech by use of a magnifying lens.

The ball-shaped cocoons are composed of 2—8 pink, yolk-rich eggs (diameter about 0.5 mm) encased in a transparent membrane. The cocoons, larvae and young are carried by the parent attached to the ventral side of the body.

2. Anatomy (Fig. 3)

The mouth pore is placed at the ventral side of the oral sucker and leads into a short oesophagus which opens into a long oesophageal tube, extending from segment VI to XI. This tube contains the eversible proboscis.

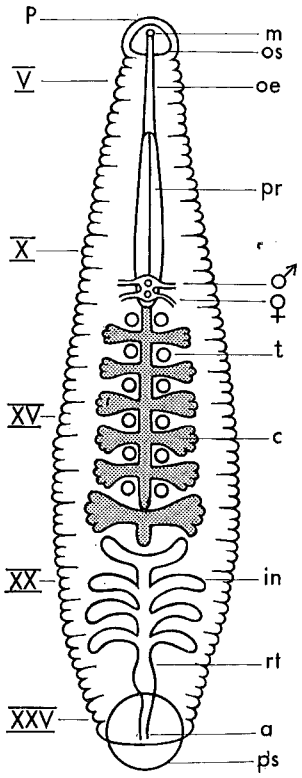

Fig. 3. Anatomical features, reconstructed after a series of cross sections of a paratype. a — anus, c — crop, in — intestine, m — mouth pore, oe — oesophagus, os — oral sucker, p — prostomium, pr — proboscis, ps — posterior sucker, rt — rectum, t — testisac

The crop (stomach) originates at segment XI and extends to segment XVIII. It expands laterally to form six pairs of crop caeca in the intertesticular regions of these segments. All six crop caeca are branched at their lateral ends. The last pair of crop caeca is separated by the anterior pairs by a very narrow connection. The posterior end of the crop opens into the intestine which extends from segment XVIII to XXII. It has four pairs of lateral intestinal diverticula. The first pair is directed anteriorly and the last three pairs posteriorly. The intestine leads into the rectum which opens dorsally.

Six pairs of testisacs between the lateral crop caeca; paired ovisacs, extending from segment XI to XVII (not shown in Fig. 3). The clitellar glands are localized within the female gonophore.

3. Habitat; hosts; reproductive period

H. californica nov. sp. was found in Stow Lake and several unnamed ponds and slowly running creeks in the adjacent Botanical Garden. In these eutrophic waters *H. californica* nov. sp. is very common and can be encountered regularly on the underside of stones and fallen leaves, especially at the shallow bank. Under the same stones

H. triserialis can be found. In this habitat watersnails (*Physa gyrina*) and crustaceans (*Gammarus*) are very abundant and possibly serve as the major natural hosts of *H. californica* nov. sp.

In captivity, *H. californica* nov. sp. sucked the blood (e.g. haemolymph) from watersnails (*Physa gyrina*), crustaceans (*Gammarus*) and oligochaeta (*Tubifex*). Usually several leeches fed together on one host until all body fluid has been sucked off.

In their habitat leeches carrying cocoons, larvae and young could be found from the beginning of March through the end of September. This indicates that *H. californica* nov. sp. reproduces continuously throughout the whole warm season.

Locus typicus: Stow Lake, Golden Gate Park, San Francisco, California

Holotype: Ethanol-fixed specimen, 2. II. 1986

Paratypes: Ten ethanol-fixed specimens, same date. Holotype and Paratypes are deposited in California Academy of Sciences, San Francisco, Calif. (CAS # 064209 and 064210).

Discussion

Based on superficial features alone, *H. californica* nov. sp. resembles to the cosmopolitan *H. stagnalis* L. Both species have a dorsal scute, a structure which seems to be the remnant of an embryonic attachment gland (CASTLE 1900, HARDING 1910). A close examination, however, reveals several consistent morphological and anatomical differences between the two species (Tab. 1). In general, *H. stagnalis* is significantly smaller than *H. californica* nov. sp. and is more or less unpigmented-pale grey, often with a greenish, yellowish or brownish tinge (CASTLE 1900, HARDING 1910, AUTRUM 1958, SAWYER 1972, ELLIOTT and MANN 1979).

Table 1. Features separating *H. californica* nov. sp. from *H. stagnalis* L.

Feature	*H. californica* nov. sp.	*H. stagnalis* L.
body length at rest [mm]	12—18	8—12
color (dorsal side)	dark grey-black	transparent-pale grey
pigment pattern	arrayed as longitudinal stripes	no longitudinal stripes
posterior sucker	pigmented on dorsal side	unpigmented
crop	6 branched pairs of crop caeca	6 unbranched pairs of crop caeca, last pair directed backwards
color of specimens fixed in 80% Ethanol	dark grey-black	white

The other four North American *Helobdella*-species are separated from *H. stagnalis* and *H. californica* nov. sp. by the lack of a dorsal scute (SAWYER 1972, 1986). The polymorphic *H. triserialis*, which can be found together with *H. californica* nov. sp. in the same habitat, is characterized by a brown color and conspicuous white spots on the dorsal side of the body (KUTSCHERA 1987). *H. fusca* is a a variable species which is,

according to SAWYER (1986), inadequately distinguished from *H. triserialis*. *H. transversa* is characterized by transverse pigment patterns and is known only from the western Great Lakes states of North Amerika (SAWYER 1972, 1986).

Finally, *H. papillata* differs from all the other *Helobdella*-species mentioned above by a roughly and heavily papilliated dorsal side (SAWYER 1986).

Zusammenfassung

Im Stow Lake, San Francisco, Kalifornien, wurde eine neue Egelart gefunden und als *Helobdella californica* nov. sp. beschrieben. Die Art ähnelt oberflächlich betrachtet *H. stagnalis* L., unterscheidet sich von dieser jedoch durch zahlreiche morphologische und anatomische Merkmale.

Acknowledgements

I wish to thank J. LEONHARD for performing the serial paraffin sections of fixed specimens and Dr. W. BROWN for critically reading the manuscript. This investigation was supported by the Alexander von Humboldt-Stiftung (Feodor Lynen Forschungsstipendium).

References

AUTRUM, H.: Hirudinea. in: BROHMER, P., P. EHRMANN und G. ULMER: Die Tierwelt Mitteleuropas, Lfg. 7B Bd. **1**. Leipzig 1958.

BLANCHARD, R.: Viaggo del dott. A. Borelli nella Republica Argentina e nel Paraguay XXI Hirudinees. Boll. Mus. Zool. et. Anat. comp. Torino. **11** (1896) 1—24.

CASTLE, W. E.: Some North American fresh-water rhynchobdellidae and their parasites. Bull. Mus. Comp. Zool. Harvard Univ. **36** (1900) 18—64.

ELLIOTT, J. M., and K. H. MANN: A key to the British fresh water leeches with notes on their life cycles and ecology. Freshw. Biol. Ass. Scient. Publ. **40** (1979).

HARDING, W. A.: A revision of the British Leeches. Parasitology **3** (1910) 130—201.

KUTSCHERA, U.: Notes on the taxonomy and biology of leeches of the genus *Helobdella* Blanchard 1896 (Hirudinea: Glossiphoniidae). Zool Anz. **219** (1987) 321—323.

SAWYER, R. T.: North American freshwater leeches, exclusive of the piscicolidae, with a key to all species. Ill. biol. Monogr. **46** (1972).

—: Leech Biology and Behaviour. Oxford: Clarendon Press 1986.

SOOS, A.: Identification key to the leech (Hirudinoidea) genera of the world, with a catalogue of the species. VI. Family: Glossiphoniidae. Acta. Zool. Scien. Hung. **15** (1969) 397—454.

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