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## ***Rhynchelmis* subgenus *Sutroa* Eisen new rank, with two new species from western North America (Annelida, Clitellata, Lumbriculidae)**

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### **Abstract**

The lumbriculid *Rhynchelmis* subgenus *Sutroa* Eisen, 1888 new rank is defined for a group of Nearctic species having multiple diverticula originating at the spermathecal ducts and eversible penial bulbs. Characters are confirmed in specimens of the type species, *Rhynchelmis (Sutroa) rostrata* (Eisen, 1888), collected from the type locality. *Rhynchelmis (Sutroa) klamathensis* Fend **n. sp.** is described from open water benthic habitats in Upper Klamath Lake, Oregon, USA. It resembles other *R. (Sutroa)* species in the paired spermathecal diverticula, the spermathecal and penial bulbs, the histological structure of the atria, the nonfunctional anterior male funnels, and the arrangement of blood vessels. *Rhynchelmis klamathensis* differs from all Nearctic *Rhynchelmis* in lacking a filiform proboscis. The combination of large body size, the elongate spermathecal ducts with paired and usually unbranched diverticula, the highly contorted atria, and the complex male pores with conical penes also distinguish typical *R. klamathensis* from other *Rhynchelmis* species. Smaller specimens with otherwise similar morphology, from the Sacramento River Delta, California, are also assigned to this species. *Rhynchelmis (Sutroa) diespluviae* Fend **n. sp.** is described from several stream sites, mostly in northern Idaho, USA. *Rhynchelmis diespluviae* differs from closely related species in morphology of the conical penes, and in the structure and anterolateral position of the paired spermathecae.

**Key words:** Clitellata, Oligochaeta, Lumbriculidae, *Rhynchelmis*, taxonomy, freshwater fauna

### **Introduction**

The Nearctic species attributed to the lumbriculid genus *Rhynchelmis* Hoffmeister, 1843 were reviewed by Fend and Brinkhurst (2000), with one Aleutian species and two species from southeastern USA described since then (Fend 2005; Fend & Lenat 2010). The 14 previously described Nearctic species are medium to large worms with a filiform proboscis. In addition to general body form, *Rhynchelmis* species can generally be defined by male pores and spermathecae in X and VIII, respectively; elongate-tubular atria; anterior male ducts reduced; spermathecae joining the gut; and branched lateral blood vessels beginning as far forward as segment VIII (Appendix 1). All of these characters are subject to variation, and may be lacking in some species.

Although the genus is Holarctic, most Palearctic species were assigned to the subgenus *Rhynchelmis* by Fend & Brinkhurst (2010), corresponding to *Rhynchelmis* s. str. of Hrabě (1936, 1961, 1982). *Rhynchelmis (Rhynchelmis)* is easily defined by 1) the highly-developed body wall musculature, with longitudinal muscles curling inwards in fixed specimens, 2) spermathecal ampullae with a short diverticulum, 3) vasa deferentia thick and glandular, and 4) in some species an accessory organ, possibly a rudimentary atrium, in the preatrial segment (Appendix 2). The Nearctic *Rhynchelmis elrodi* Smith & Dickey, 1918 was assigned to a separate genus, *Rhynchelmoides*, by Hrabě (1936), redefined by Hrabě (1982) with the inclusion of three additional Nearctic species. As *Rhynchelmoides* was defined by characters that are more general for the family, the genus was rejected by most subsequent authors (Cook 1971; Holmquist 1976; Fend & Brinkhurst 2000), although it was retained by Sokolskaya (1983). However, Fend and Lenat (2010) re-erected *Rhynchelmoides* as subgenus of *Rhynchelmis*, including three of the Nearctic species mentioned in Hrabě (1982), three additional Nearctic species, and the Palearctic *Rhynchelmis orientalis* Yamaguchi, 1936. Spermathecae always lack diverticula, and the ampulla does not connect to the gut in five of the seven *R. (Rhynchelmoides)* species. Male ducts differ from most other *Rhynchelmis* in the near or complete

time for the additional collections. Bob Wisseman (Aquatic Biology Associates, Corvallis, Oregon) provided additional *R. rostrata* specimens from the Klamath watershed. Christina Piotrowski (California Academy of Sciences) verified the absence of *R. rostrata* types in that collection. Manuscript reviews by Pilar Rodriguez (Universidad del País Vasco), Mark Wetzel (Illinois Natural History Survey), Tarmo Timm (Estonian University of Life Sciences) and Ralph Brinkhurst are greatly appreciated.

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**APPENDIX 1.** Comparison of genera of Lumbriculidae with spermathecae in VIII and male pores in X. Characters likely to be apomorphic relative to the Lumbriculidae (Hrabě 1982, 1984; Brinkhurst 1989; Martin & Kaygorodova 2008) are underlined.

***Pseudorhynchelmis* Hrabě, 1982**

1. Proboscis absent.
2. Size small to medium, body diameter < 1 mm.
3. Chaetae simple-pointed. Modified spermathecal or penial chaetae may be present; penial chaetae may have copulatory glands.
4. Lateral blood vessels absent in posterior segments (where described).
5. Preclitellar nephridia not observed, but nephridia not mentioned in most descriptions.
6. Spermathecae paired in VIII, with tubular duct and well-developed ampulla, without diverticula, and not attached to gut. Spermathecal pores may have vestibula or other epidermal modifications.
7. Male ducts semiprosoporous, with anterior vasa deferentia well-developed and functional; testes in IX.
8. Vasa deferentia join atrium subapically; vasa deferentia may be thicker entally than near atrium. Posterior vas deferens forms a loop in XI.
9. Atria paired in X, club-shaped, petiolate, or short-tubular (in 1 species extending back 2 segments); may have glandular epithelium; prostates in large, irregular fascicles cover atrial ampulla.
10. Penes usually small but distinct, in small sacs.

This genus is diverse, and proposed synapomorphies appear highly variable. Discussions of diagnostic characters and exceptions are given in Martin & Kaygorodova (2008) and Fend & Brinkhurst (2010). The above diagnosis is based on those of Hrabě (1982) and Kaygorodova & Liventseva (2007). Following those accounts, we assume that the spermatheca-gut junction described in some species is erroneous. Consistency of some of the above characters cannot be evaluated, as they are not always mentioned in the original species descriptions. - About 10 Palearctic species, mostly from Lake Baikal; most were originally described as *Rhynchelmis* species. The validity of *P. dissimilis* (Semernoy, 2004) has been questioned by Martin & Kaygorodova (2008).

*Pseudorhynchelmis alyonae* (Martin & Kaygorodova, 1998)

*P. anomala* (Semernoy, 2004)

*P. dissimilis* (Semernoy, 2004)

*P. minimaris* (Semernoy, 2004)

*P. olchonensis* (Burow & Koshov, 1932)

*P. paraolchonensis* (Giani & Martinez-Ansemil, 1984)

*P. parva* (Michaelsen, 1905)

*P. semernoyi* Martin & Kaygorodova, 2008