

A new species of *Leodamas* Kinberg, 1866 (Polychaeta: Orbiniidae) from the Yellow Sea and the East China Sea

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Abstract

Based on polychaete specimens collected from coastal areas of China in 1959, a new species of the family Orbiniidae, *Leodamas sinensis* sp. nov. is described in the present paper. The new species can be distinguished from its congeners by the combination of following characters: branchiae present from chaetiger 5; each thoracic neuropodial postchaetal lobe possessing broad tori, with a digital to triangular-shaped papilla at its midlength; 4 or 5 vertical rows of uncini and one posterior row of accompany capillaries in thoracic neuropodia; acicula present in both abdominal notopodia and neuropodia, slightly or distinctly projecting. A key to all known species of the genus is provided.

Key words: new species, Orbiniidae, Polychaeta, *Leodamas*, taxonomy, China seas

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1 Introduction

The family Orbiniidae Hartman, 1942 is an important polychaete group in the macrobenthic communities, commonly inhabiting sandy or muddy bottom from intertidal areas to shallow or moderately deep sea. Orbiniid species are elongate worms, paired branchiae located mid-dorsally between the notopodia, morphologically divided into two body parts: anterior thoracic region, dorso-ventrally flattened, with lateral parapodia and posterior abdominal region, cylindrical, with dorsal parapodia, segments usually soft and easily broken into fragments (Fauchald, 1972).

Leodamas Kinberg, 1866 was regarded as a subgenus of *Scoloplos* until Blake (2000) raised it to generic status. Species of *Leodamas* with prostomium pointed, branchiae single or multiple branches, either from anterior thoracic chaetigers 4–7 or from posterior thoracic chaetigers, postchaetal lobes and subnodial lobes never more than four lobes of both types combined, thoracic neuropodial uncini large, conspicuous arranged in one to many distinct rows, with accompanying capillaries few or entire lacking (Blake, 2017). The difference between *Scoloplos* and *Leodamas* is the form and arrangement of the thoracic neuropodial uncini. In *Scoloplos*, thoracic neuropodial uncini are relat-

ively thin, inconspicuous, and accompanied by numerous capillaries. Blake (2017) thoroughly reviewed species currently assigned to *Leodamas* either as a full genus or as a subgenus to *Scoloplos*, and divided them into two groups according to the start of branchiae and the number of rows of the thoracic neuropodial uncini.

When checking orbiniid specimens deposited in the Marine Biological Museum, Chinese Academy of Sciences (IOCAS), we found some specimens which belong to an undescribed species of *Leodamas*. Here we described them as a new species to science. A taxonomic key to 30 species (including the new one) is also provided.

2 Materials and methods

All specimens were collected during the “National Comprehensive Oceanograph Survey” (1958–1960). They are deposited in the Marine Biological Museum of the Chinese Academy of Sciences (MBMCAS), and preserved in 75% ethanol solution. Specimens were examined under Zeiss Stemi 2000-C stereomicroscopes. Line drawings were made using ‘AxioCam 5’ digital camera and scanning electron microscopes (SEM). The following abbreviations are used: coll., collector; MBM, Marine Biological

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Museum; R/V, research vessel; spec., specimen; Sta., station.

3 Systematics

Family Orbiniidae Hartman, 1942

Subfamily Orbiniinae Hartman, 1957

Genus *Leodamas* Kinberg, 1866

Type-species: *Leodamas verax* Kinberg, 1866

Leodamas sinensis sp. nov.

Type material. Holotype. MBM023009, Yellow Sea, R/V 404, Sta. 4002, 33°45'N, 123°30'E, 65 m, mud, coll. Xu Jieshan, 5 December 1959. Paratype. MBM023011, East China Sea, R/V V, Sta. 4064, 29°N, 123°E, 65 m, brown mud, coll. Lin Guangyu, 4 April 1959. MBM023266 (2 spec.), East China Sea, R/V 404, Sta. 4001, 33°45'N, 123°E, 54 m, sandy mud, coll. Zhu Jinzhao and Xu Jieshan, 26 October 1959. MBM023007, Yellow Sea, R/V V, Sta. 4010, 33°30'N, 123°30'E, 67 m, mud, coll. Cui Yuheng, 21 January 1959. MBM023008, Yellow Sea, R/V V, Sta. 4002, 33°45'N, 123°30'E, 69 m, yellow soft mud, 12 January 1959.

Additional material. MBM023010, East China Sea, R/V C, Sta. 4002, 33°45'N, 123°30'E, 64 m, sandy mud, coll. Zhang Weiquan, 3 July 1959. MBM023236 (2 spec.), Yellow Sea, R/V 404, Sta. 4009, 33°30'N, 123°15'E, 55 m, mud, coll. Xu Jieshan, 6 December 1959. MBM023239, Yellow Sea, R/V 404, Sta. 4010, 33°30'N, 123°30'E, 60 m, mud, coll. Xu Jieshan, 6 December 1959. MBM023234, Yellow Sea, R/V 404, Sta. 4001, 33°45'N, 123°E, 53 m, mud, coll. Xu Jieshan, 5 December 1959. MBM023272, East China Sea, R/V 404, Sta. 4003, 33°45'N, 124°E, 74 m, brown mud, coll. Zhu Jinzhao, 12 December 1959. MBM023275 (3 spec.), East China Sea, R/V 404, Sta. 4009, 33°30'N, 123°15'E, 57 m, brown mud, coll. Zhu Jinzhao, 13 December 1959. MBM023273, East China Sea, R/V 404, Sta. 4010, 33°30'N, 123°30'E, 63 m, brown mud, coll. Liu Jixing, 13 December 1959. MBM023277, East China Sea, R/V 404, Sta. 4012, 33°30'N, 124°00'E, 69 m, hard sandy mud, coll. Zhu Jinzhao, 12 December 1959. MBM023037, East China Sea, R/V C, Sta. 4003, 33°45'N, 124°E, 74 m, sand mud, coll. Zhu Jinzhao, 3 July 1959. MBM023267, East China Sea, R/V C, Sta. 4003, 33°45'N, 124°00'E,

75 m, sandy mud, coll. Zhu Jinzhao and Xu Jieshan, 26 October 1959. MBM023271, East China Sea, R/V 404, Sta. 4011, 33°30'N, 123°45'E, 68 m, soft mud, coll. Zhu Jinzhao and Xu Jieshan, 25 October 1959. MBM023035, East China Sea, R/V C, Sta. 4008, 33°30'N, 123°E, 47 m, sandy mud, coll. Zhang Weiquan, 2 September 1959. MBM023261, East China Sea, R/V C, Sta. 4009, 33°30'N, 123°15'E, 56 m, sandy mud, coll. Zhu Jinzhao and Xu Jieshan, 25 October 1959.

Diagnosis. Prostomium triangular. Thoracic region with 15–17 chaetigers. Branchiae present from chaetiger 5. Each thoracic neuropodia postchaetal lobe possessing broad tori, with a digital to triangular papilla at its midlength. Thoracic neuropodia with large uncini conspicuously arranged in 4 or 5 vertical rows, and one row accompany capillaries posterior to uncini. Abdominal noto- and neuropodia each with an acicula slightly emergent. Notopodia each with 3–5 furcate chaetae.

Description. Holotype incomplete, broken into two fragments, posterior end missing. Anterior fragment with 88 chaetigers, 36.90 mm long and 4.63 mm maximum width, posterior one with 41 chaetigers, 26.85 mm long. Specimen preserved in alcohol yellow to light brown.

Body long, thorax flattened dorso-ventrally; abdomen cylindrical. Thoracic region with 17 chaetigers, wider than abdominal region, transition to abdominal region gradual, last thoracic chaetiger having fewer chaetae. Intersegmental annulations present (Figs 2a and 3a). Branchiae present from chaetiger 5, continuing to end of body; branchial filament simple, lingulate, basally inflated (Figs 2a, d and e).

Prostomium triangular in outline, blunt on tip, eyespots absent; peristomium a single short achaetous ring (Fig. 2a), nuchal organs as transverse slits at anterior border of peristomium, Proboscis saclike.

Thoracic notopodia elongated, similar in length in thoracic and anterior abdominal chaetigers, then shortened gradually through posterior abdominal region (Figs 2a, b, d, e; 3a, c, d).

Thoracic neuropodia postchaetal lobe expanded, possessing broad tori, with a middle papilla; papilla digitiform on anterior 5 or 6 chaetigers then gradually shortened to triangular-shaped (Figs 2a, b; 3a, b). Abdominal neuropodia with thickened elongated lobes, uniramous, bearing one short cirriform postchaetal lobe (Figs 2d, e).

Thoracic notopodia each with fascicle of crenulated capillaries (Figs 2a, b), 3 or 4 furcate chaetae (Figs 2f; 3i, j), and 2–4 embedded aciculae; abdominal notopodia with fascicles crenulated capillaries, 2 to 3 furcate chaetae, 1 acicula, tip of acicula slightly emergent (Fig. 2d). Furcate chaetae rather shorter than capillaries, easily broken, with unequal tynes; each tynes with 9 to 10 needles on each side, shaft with faint annulations (Figs 3i, j). No flail chaetae.

Thoracic neuropodia with dense fascicles of blunt-tipped uncini arranged in four or five rows, posterior row short, only a third of anterior rows, typically curving ventrally to anterior rows (Figs 2a–c); uncini with numerous transverse ridges, with developed subapical notch (Figs 2g; 3e–h); long crenulated capillaries in single posterior row, 13 to 16 on superior side and 4–6 on inferior side (Figs 2b, c; 3k, l). Abdominal neurochaetae including 4 to 8 thin crenulated capillaries and single acicula, tips slightly emergent (Figs 2d, h).

Etymology. The species is named for its type locality in sea areas of China.

Distribution. The Yellow Sea (53–69 m) and East China Sea (47–75 m) (Fig. 1)

Variations. Both notopodial and neuropodial acicula project-

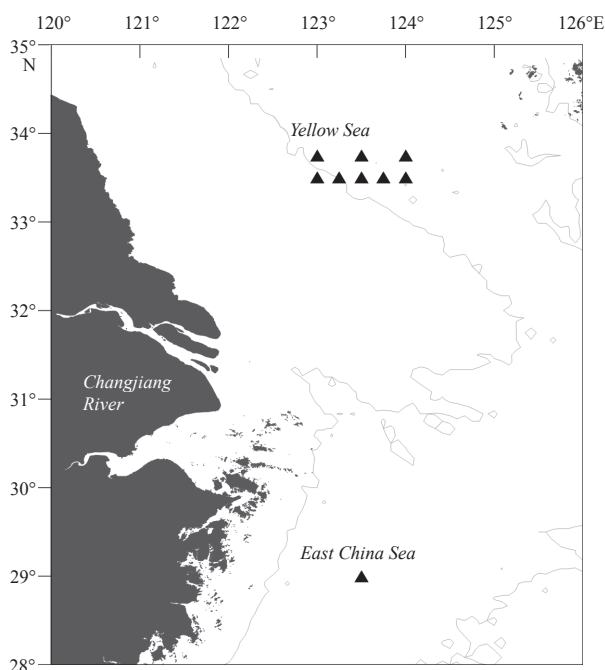


Fig. 1. Sampling sites of *Leodamas sinensis* sp. nov., the Yellow Sea and the East China Sea.

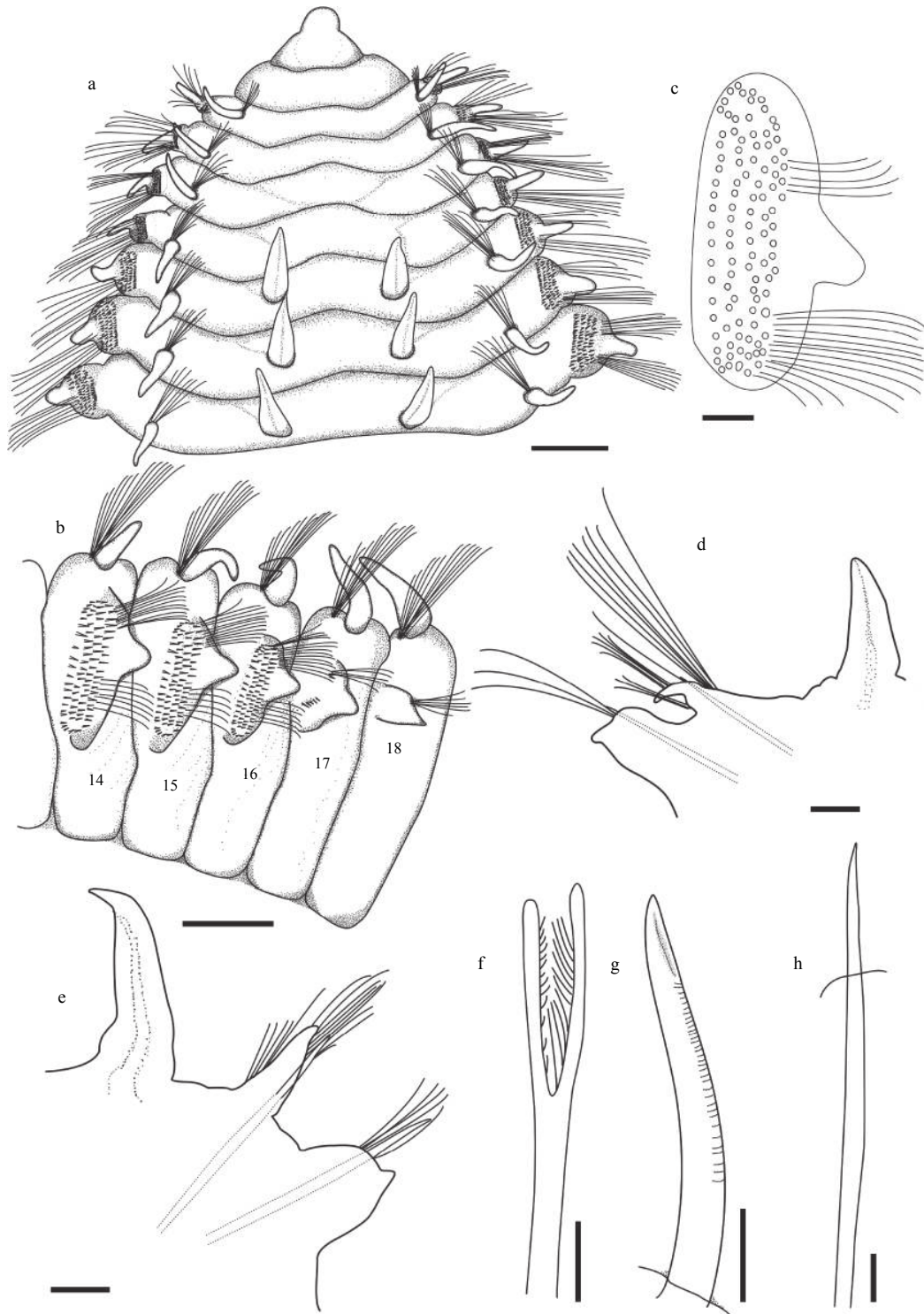


Fig. 2. *Leodamas sinensis* sp. nov. Holotype (MBM023009, a–d) and Paratype (MBM023011, e–h). a. Anterior end, dorsal view; b. chaetigers 14–18 in lateral view; c. diagram of middle thoracic neuropodium showing arrangement of the uncini; d. abdominal parapodium, posterior view; e. abdominal parapodium, posterior view; f. furcate chaeta; g. thoracic neuropodial uncinus; and h. abdominal neuropodial acicula. Scale bars: 0.5 mm (a, b, d, e), 0.2 mm (c), 20 μ m (f), 50 μ m (g), and 0.1 mm (h).

ing from body wall in holotype and several examined specimens, only the tip of acicula slightly emergent from body wall (Fig. 2d), while posterior abdominal chaetigers of two specimens (MBM023-010, MBM023011) with acicula distinctly projecting from body wall (Figs 2e, h). Meanwhile, the number of chaetigers in thorax vary from 15 to 17, most species have 17, only few specimens

(one of specimen of MBM023275 and MBM023277) have 15 and 16 thoracic chaetigers. Furthermore, one specimen (MBM02-3273) has branchiae presenting from chaetiger 7.

Remarks. *Leodamas sinensis* sp. nov. has 4 or 5 rows of thoracic neuropodial uncini and branchiae present from the chaetiger 5 and thus belongs to the *Leodamas* Group A proposed by

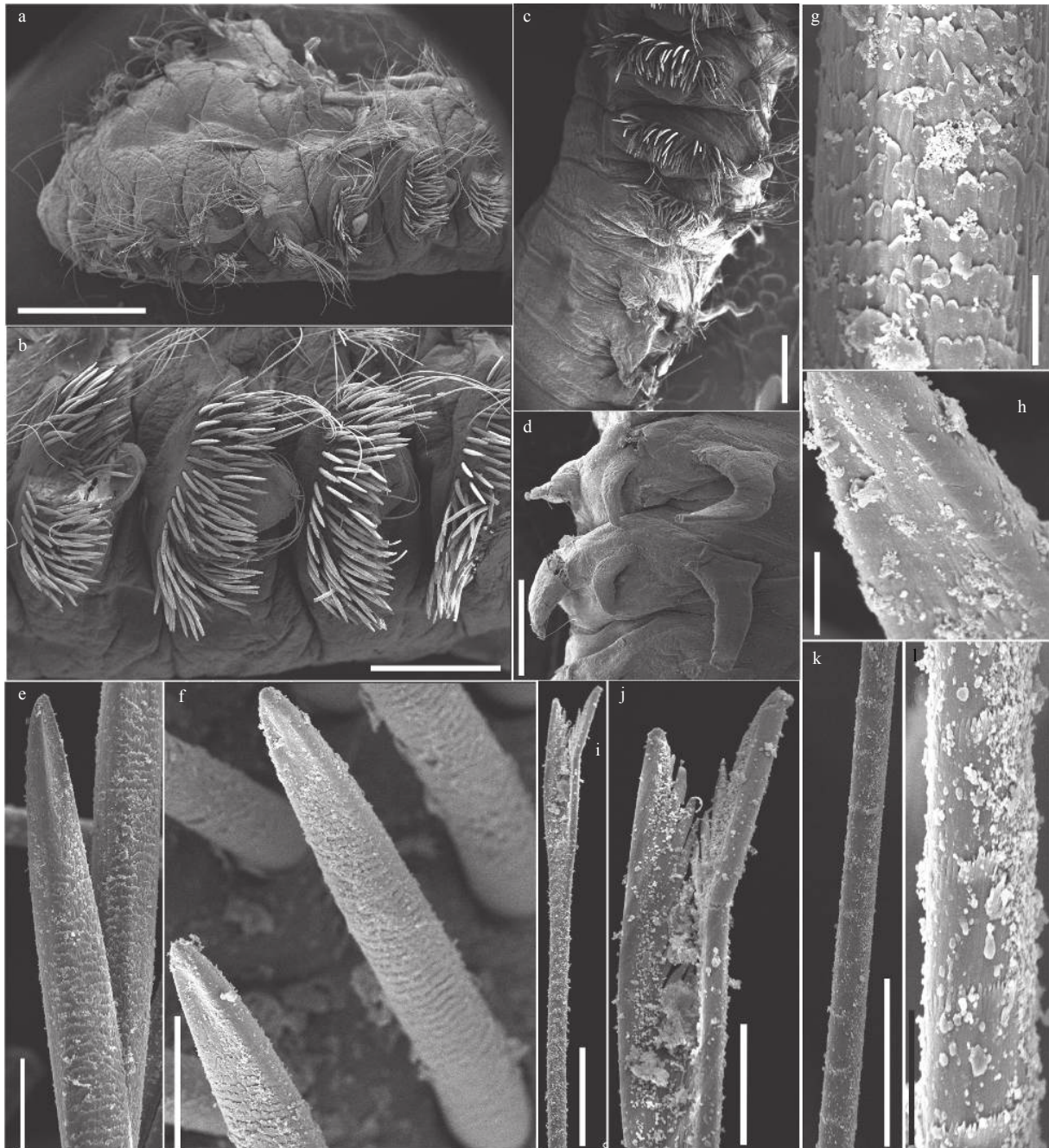


Fig. 3. SEM pictures of *Leodamas sinensis* sp. nov., MBM023010. a. Anterior end, lateral view; b. thoracic region, lateral view; c. posterior thoracic region in right lateral view showing transition to abdominal segments; d. abdominal parapodia, dorsal view; e and f. thoracic neuropodial uncini; g and h. details of thoracic neuropodial uncini; i. furcate chaeta; j. detail of furcate chaeta; k. crenulated capillaries; and l. detail of crenulated capillaries. Scale bars: 1 mm (a), 500 μ m (b–d), 20 μ m (e and k), 25 μ m (f and i), 5 μ m (g, h, j and l).

Blake (2017). So far, 20 species have been included in *Leodamas* Group A (Blake, 2017). The new species has two very distinct features: all thoracic neuropodial postchaetal lobe consisting of broad tori, with a digital to triangular-shaped papilla at its midlength; both abdominal notopodia and neuropodia with emergent or projecting acicula.

Among these species, the new species is mostly related to *L. dendrocirrus* (Day, 1977), *L. perissobranchiatus* Blake, 2017 and *L. tribulosus* (Ehlers, 1897) in having same structure of thoracic neuropodial postchaetal lobe. *Leodamas sinensis* sp. nov. differs from *L. dendrocirrus* in having a single neuropodial postchaetal

lobe in thorax and 1 or 2 emergent or projecting abdominal notopodial acicula, while in *L. dendrocirrus* thoracic notopodia possess 2–5 separate branches continuing on abdominal chaetigers, and the abdominal notopodial acicula is absent. *Leodamas sinensis* sp. nov. can be distinguished from *L. perissobranchiatus* by having single lingulate branchiae (vs. palmately branched with 2–4 branches). *Leodamas sinensis* sp. nov. differs from *L. tribulosus* by structure of thoracic neuropodial uncini (developed subapical notch and blunt tips vs. dorsal groove terminating in two pointed teeth); in addition, abdominal notopodial acicula is present (vs. absent).

Key to species of *Leodamas* Kinberg, 1866

1. Branchiae from an anterior thoracic chaetiger (chaetigers 4–7), thoracic neuropodia with 3 or more vertical rows uncini..... Group A 2
 - Branchiae from a posterior thoracic chaetiger or anterior abdominal chaetiger (chaetigers 12–40), thoracic neuropodial uncini in 1 or 2 vertical rows Group B 21
2. Branchiae branched on some chaetigers 3
 - Branchiae always single 4
3. Thorax with 11–13 chaetigers, branchiae from chaetiger 4, palmate with up to four separate branches.....
 -*L. perissobranchiatus* Blake, 2017
 - Thorax with 19–20 chaetigers, branchiae from chaetiger 5, each with maximally nine branches, each branch arises from a common raised core..... *L. latum* (Chamberlin, 1919)
4. Thoracic notopodia branched 5
 - Thoracic notopodia single..... 6
5. Thorax with 17–18 chaetigers; capillaries present in thoracic neuropodia, thoracic neuropodial uncini strongly curved without notch..... *L. dendrocirrus* (Day, 1977)
 - Thorax with 22–24 chaetigers; capillaries absent in thoracic neuropodia, thoracic neuropodial uncini weakly curved, notched on the convex side..... *L. verax* Kinberg, 1866
6. Abdominal notopodial flail chaetae present; a subpodial lobe present from chaetiger 14–15 continuing through anterior abdominal chaetigers..... *L. hyphalos* Blake, 2017
 - Abdominal notopodial flail chaetae absent.....7
7. Furcate chaetae absent, thoracic neuropodial uncini straight with lateral hood.....*L. chevalieri* (Fauvel, 1902)
 - Furcate chaetae present.....8
8. Subpodial lobes present on last thoracic chaetigers and anterior abdominal chaetigers.....9
 - Subpodial lobe absent.....11
9. Abdominal neuropodium with 3 or 4 flail chaetae; thoracic neuropodium with few accompany capillaries.....
 -*L. johnstonei* (Day, 1934)
 - Abdominal neuropodium without flail chaetae; thoracic neuropodium without capillaries.....10
10. Abdominal notopodia with a single slightly projecting acicula; posterior thoracic and anterior abdominal chaetigers with 3 or 4 subpodial lobes; branchiae from chaetiger 7.....
 -*L. cirratus* (Ehlers, 1897)
 - Abdominal notopodia without acicula; posterior thoracic and anterior abdominal chaetigers with one subpodial lobe; branchiae from chaetigers 6.....*L. fimbriatus* (Hartman, 1957)
11. Abdominal notopodia with acicula.....12
 - Abdominal notopodia without acicula.....14
12. Thoracic neuropodia with 2 rows of uncini.....
 -*L. thalassae* (Amoureux, 1982)
 - Thoracic neuropodia with 3–5 rows of uncini..... 13
13. Branchiae from chaetiger 6, only last 1–2 thoracic chaetigers with one neuropodial postchaetal digitiform papilla....
 - *L. brevithorax* (Eibye-Jacobsen, 2002)
 - Branchiae from chaetiger 5–7, all thoracic neuropodia with broad tori bearing triangular-shaped postchaetal lobe, all thoracic notopodia well developed*Leodamas sinensis* sp. nov.
14. Neuropodial uncini change in structure from anterior to posterior of thoracic chaetigers.....15
 - Neuropodial uncini nearly of the same type on all thoracic chaetigers..... 16
15. Thoracic neuropodia without capillary; uncini of anterior chaetigers with straight shaft, blunt tip and weak transverse ribs, transitioning to uncini with curved expanded tips with subapical notch and prominent ribs on shaft.....
 -*L. cochleatus* (Ehlers, 1900)
 - Thoracic neuropodia with 2–7 thin capillaries; uncini of anterior 4–5 chaetigers with straight shaft, blunt tip and thin hood on convex side, uncini of following chaetigers with large thickened hood, imparting bidentate appearance.....
 - *L. hamatus* Dean and Blake, 2015
16. Thoracic neuropodia with 3 or 4 heavy spines before rows of numerous hooded uncini..... *L. gracilis* (Pillai, 1961)
 - Thoracic neuropodia with several rows of uncini, without heavy spines.....17
17. Abdominal neuropodial acicula strongly hooked.....
 - *L. dubius* (Tebble, 1955)
 - Abdominal neuropodial acicula straight or slightly curved... 18
18. Thoracic neuropodium with digital or triangular-shaped postchaetal lobe, thoracic neuropodial uncini with dorsal groove terminating in two pointed teeth.....19
 - Thoracic neuropodium with transverse postchaetal ridge, without postchaetal lobe, thoracic neuropodial uncini without dorsal groove..... 20
19. All thoracic neuropodia with digital or triangular-shaped postchaetal lobe, branchiae presenting from chaetiger 5, thorax with 22–25 chaetigers, abdominal neuropodia with crenulated capillaries*L. tribulosus* (Ehlers, 1897)
 - Small triangular-shaped neuropodial postchaetal lobe present from middle body chaetigers, branchiae presenting from chaetiger 6, thorax with 14–20 chaetigers, abdominal neuropodia with smooth, non-crenulated capillaries.....
 -*L. marginatus* (Ehlers, 1897)
20. Thorax with 18–21 chaetigers, abdominal neuropodia with ventral cirrus.....*L. orientalis* (Gallardo, 1967)
 - Thorax with 23–28 chaetigers, abdominal neuropodia without ventral cirrus.....*L. rubrus* (Webster, 1879)
21. Thorax with 40 chaetigers.....*L. maciolekae* Blake, 2017
 - Thorax with less than 30 chaetigers.....22
22. Abdominal neuropodium with flail chaetae, thoracic neuropodium with 3 or 4 rows of uncini.....
 - *L. acutissimus* (Hartmann-Schröder, 1991)
 - Abdominal neuropodium without flail chaetae, thoracic neuropodium with 1 or 2 rows of uncini.....23
23. Branchiae dendritically branched with up to 6 filaments
 - *L. cylindrifera* (Ehlers, 1904)
 - Branchiae single.....24
24. Last 9–10 thoracic chaetigers with 3 large, bent, pointed, acicular spines anterior to single row of pointed uncini
 - *L. agrestis* (Nonato and Luna, 1970)
 - Thoracic chaetigers with only uncini, acicular spines absent...
 -25
25. Thoracic neuropodial uncini with transverse ridges or ribs26
 - Thoracic neuropodial uncini smooth with no ridges or ribs..... 27
26. Thorax cylindrical; chaetigers 1–3 uniramous, notochaetae absent.....
 - *L. minutus* López et al., 2003
 - Thorax weakly dorso-ventrally flattened; all chaetigers parapodia biramous..... *L. mazatlanensis* (Fauchald, 1972)
27. Thoracic neuropodia each with a single row of uncini...
 -*L. texana* (Maciolek and Holland, 1978)
 - Thoracic neuropodia with one or two rows of uncini..... 28
28. All thoracic neuropodia with two rows of uncini, thorax with 24–30 chaetigers.....*L. madagascarensis* (Fauvel, 1919)
 - Chaetiger 1 with 1 row of uncini, chaetigers 2–13 with 2 rows and chaetigers 14–19 with 1 row of uncini; thoracic neuropo-

- dial with 1–2 capillaries.....*L. platythoracicus* López et al., 2003
 – Anterior and middle thoracic chaetigers with 2 rows of uncini, thereafter 1 row; thoracic neuropodial without capillaries
 *L. treadwelli* (Eisig, 1914)

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