

## *Cossura yacy* sp. nov. (Cossuridae, Annelida) from a tropical Brazilian estuary

Lorena K. S. Sousa<sup>1</sup> , Miodeli Nogueira Júnior<sup>2</sup> ,  
Marco V. J. Cutrim<sup>1</sup> & Verônica M. de Oliveira<sup>3</sup>

1. Programa de Pós-Graduação em Oceanografia, Universidade Federal do Maranhão, Av. dos Portugueses, s/n, Cidade Universitária Dom Delgado, 65080-805 São Luís, Maranhão, Brasil. (lorenakarine.ss@gmail.com; marco.cutrim@ufma.br)
2. Departamento de Sistemática e Ecologia, Universidade Federal da Paraíba, João Pessoa, PB, Brasil. (miodeli@gmail.com)
3. Programa de Pós-Graduação em Recursos Aquáticos e Pesca, Universidade Estadual do Maranhão, Cidade Universitária Paulo VI, Tirirical, 65055-970 São Luís, MA, Brasil. (oliveira.veronica@gmail.com)

Received 04 July 2018

Accepted 07 May 2019

Published 30 May 2019

DOI 10.1590/1678-4766e2019021

**ABSTRACT.** The family Cossuridae is monogeneric for *Cossura* Webster & Benedict, 1887 which currently has 28 known species, three of which already recorded for Brazilian coast. In the present study we describe *Cossura yacy* sp. nov. increasing to 29 the number of known Cossuridae species. We have found and analyzed 60 individuals of *C. yacy* sp. nov. from São Marcos estuarine complex (ca. 02°S; 44°W) around São Luís Harbor (Maranhão, Brazil). It differs from other species of the genus mainly by the presence of two pairs of nuchal organs at lateral margins of the peristomium, branchial filament in the median region of the third chaetiger and by short and long capillary smooth chaetae with spinulosa on the distal half. These two chaetal types are present through the body both in the neuropodia and in the notopodia. Adults specimens of the *Cossura yacy* sp. nov. have seven notopodial and five neuropodial chaetae in the 5<sup>th</sup> parapodium; nine notopodial and seven neuropodial chaetae in the 20<sup>th</sup> parapodium; five notopodial and six neuropodial chaetae in the 43<sup>th</sup> parapodium. Pygidium has three long anal cirri, reaching the fourth posterior segment.

**KEYWORDS.** taxonomy, morphology, polychaeta, Brazil, tropical.

Cossuridae is a small polychaete family with 28 known species all placed in the genus *Cossura* Webster & Benedict, 1887 (READ & FAUCHALD, 2018). The genus was monotypic for *Cossura longocirrata* Webster & Benedict, 1887 until 1955 when *Cossura candida* was described by HARTMAN (1955). This genus was formerly assigned to Cirratulidae until the establishment of the family Cossuridae in 1963 (DAY, 1963; READ, 2000). Two other genera were erected within Cossuridae to embrace those species with spines in the abdominal chaetigers instead of capillaries (EWING, 1987): *Cossurella* Hartman, 1976 and *Heterocossura* Wu & Chen, 1977, both currently considered junior synonyms of *Cossura* (READ & FAUCHALD, 2018).

Species of *Cossura* are characterized by the body regionalized in thorax and abdomen, a conical prostomium tapering to a sharp or rounded tip or extended laterally as horns (LIÑERO-ARANA & DÍAZ-DÍAZ, 2010; JUMARS *et al.*, 2015) and usually without eyes. First chaetiger uniramous and the others along the body biramous (HILBIG, 1996). A long branchial filament is present in the dorsal region. Simple chaetae, which may be smooth or have the exterior

margin with small spines (spinulosa). Pygidium with anal cirri of variable shape and length (EWING, 1984). The most used characters to distinguish the different species of the genus are the shape of the prostomium, the chaetiger which the branchiae first appear, chaetal type and anal cirri with or without intercirral processes in the pygidium (EGREMY-VALDEZ, 2009; FOURNIER & PETERSEN, 1991). These polychaetes typically inhabit sandy or muddy marine sediments, in shallow or deep waters (ZHADAN, 2015). They are non-selective surface deposit-feeders, using their oral tentacles to accomplish so (JUMARS *et al.*, 2015).

Among the 28 species currently known in the genus (READ & FAUCHALD, 2018; Tab. I), nine have been recorded from South America, three of them on Brazil (AMARAL *et al.*, 2013). However, most of the studies are from south and southeast Brazilian coast, close to the historically consolidated research groups (e.g. LANA *et al.*, 2017). The North and Northeastern Brazilian tropical estuaries potentially have a very high diversity, but are largely unexplored, as exemplified here with the description of a new coastal species.

## MATERIAL AND METHODS

Sampling of biological material. Benthic samples were collected in the canal of the São Marcos Bay, Maranhão, Brazil, in areas under influence of dredging activities (Fig. 1). All stations had unconsolidated muddy sediment and ca. 20 m depth. On each station benthic material was sampled with a 20-L van Veen trap and the material sampled was fixed in 4% formalin. In the laboratory the material was sieved (0.5 mm) and analyzed under stereomicroscope.

Preparation and identification of material. Slides were mounted for detailed observations of the morphology of parapodia and chaetae. The specimens were identified using stereoscopic and optical microscopes. Descriptions were prepared following external body-morphology such as prostomium, branchiae position, parapodia, chaetae and anal cirri. Measures of width included only parapodia, without considering the chaetae. For improved contrast while checking for papillae, Shirlastain dye have been used.

Photographs were taken using a Zen AxioCam ICc5 of Zeiss attached to the stereoscopic and optical microscopes and the software Axion vision 4.8. The parapodia were dried and coated on a double carbon tape and examined in a scanning electron microscope (Hithachi TM-3030 from Universidade Federal do Maranhão). The type material was deposited at “Coleção de Invertebrados Paulo Young” (CIPY) from Universidade Federal da Paraíba, João Pessoa, PB.

## RESULTS

### *Cossura yacy* sp. nov.

urn:lsid:zoobank.org:pub: 023027E2-D1CC-4C4A-8C1A-B22910702C75

(Figs 2 – 15)

Type material. The holotype is a complete specimen with 79 segments, 10 mm length and 0.5 mm width, São Marcos Bay, São Luís do Maranhão, Brazil, 2°30.0'S, 44°27.0'W, 20 m, 28 October 2014 (CIPY-1736). Paratypes: 59 paratypes complete and incomplete, length ranging from 2.0 to 10.0 mm and chaetiger numbers from 23 to 80. All sampled at São Marcos Bay, São Luís do Maranhão port complex, Brazil, 2°30.0'S, 44°27.0'W, 20 m, 28 October 2014 (CIPY-1735).

Diagnosis. Two pairs of nuchal organs at lateral margins of the peristomium. Branchial filament arising from median region of the 3<sup>rd</sup> chaetiger. Bundles of short and long capillaries chaetae in both parapodial rami. Both chaetal types are smooth with spinulosa on distal half.

Description. The holotype has body elongated and cylindrical, with tapered posterior end (Fig. 2). Conical prostomium, longer than wide and slightly flattened dorsoventrally, without eyes and usually with a pronounced dorsal fold (Figs 3, 5-8). Division between the prostomium and peristomium not well defined (Figs 3, 4). Two pairs of nuchal organs at the lateral margins of peristomium (Fig. 7).

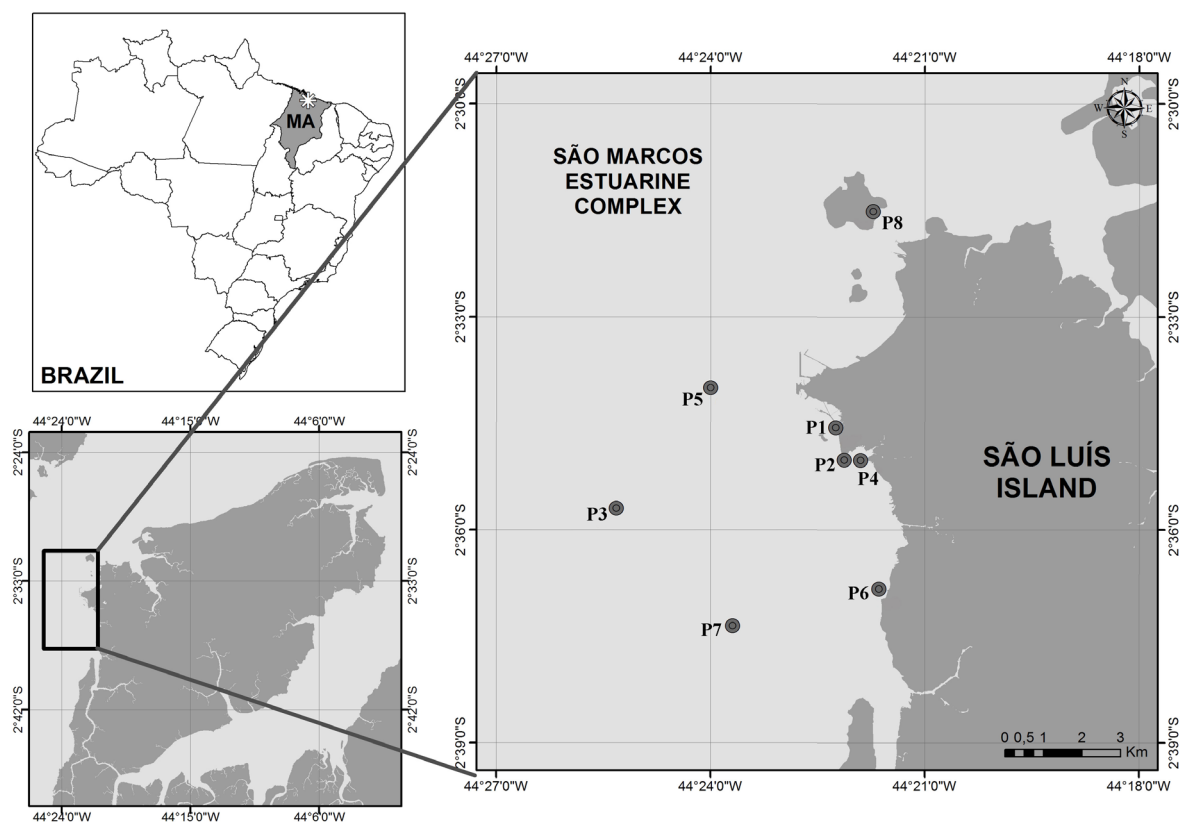


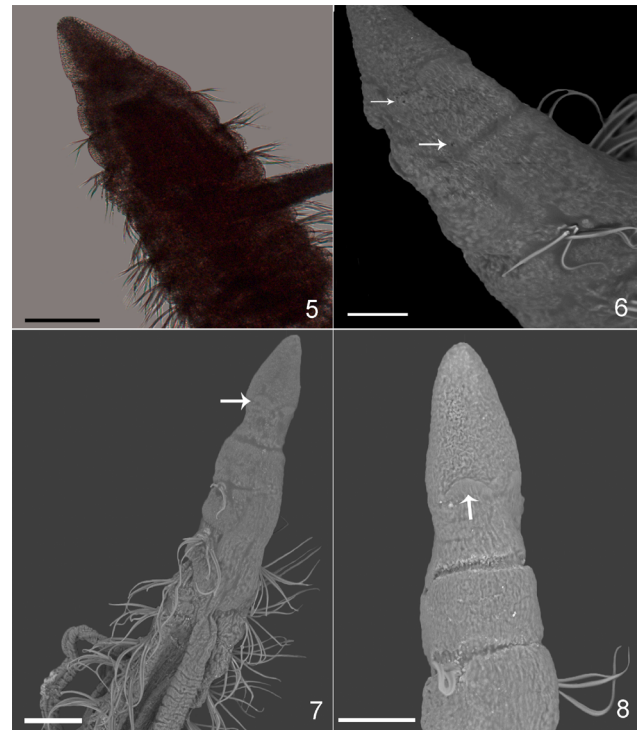
Fig. 1. Collection sites in the São Luís do Maranhão port complex, Northeastern Brazil.

Inverted proboscis with tentacles observed through dissection in one paratype. Body divided in thorax and abdomen evidenced by a body narrowing (Fig. 4). The thoracic region reaches the 28<sup>th</sup> segment and has glandular inflations divided by a dorsal groove perpendicular to the body axis. Thorax dorsoventrally flattened and more rigid than the abdomen. Branchial filament dorsal, annulate, arising from median region of the 3<sup>rd</sup> chaetiger, and exceeding the body length (Figs 2, 3). Parapodia rudimentary and without great

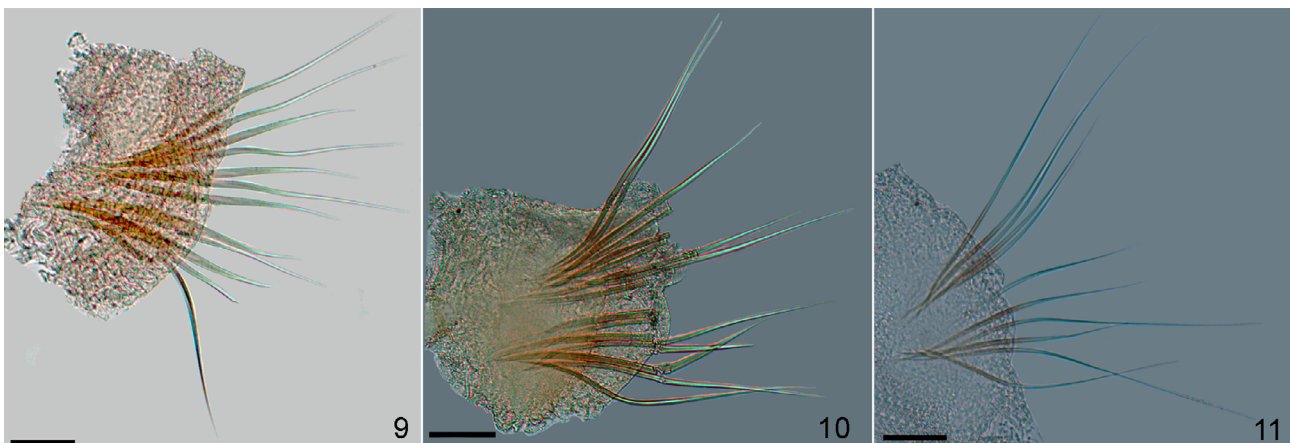
variation, with acicula absent throughout the body (Figs 9-11). First chaetiger with uniramous parapodia, and all others with biramous parapodia; all biramous parapodia alike and laterally positioned on each segment. Parapodial lobes are absent and thus chaetae emerge directly from the body-wall. Two types of capillary chaetae short and long with end curved; short chaetae exceed half the length of the long chaetae and are thinner (Figs 12-14). Both chaetal types are smooth with spinulosa (fine hairs) on the distal half. The same two chaetal types occur in the thorax and abdomen and in the neuropodia and notopodia, with predominance of long chaetae in the notopodia. The number of chaetae varies among



Figs 2-4. *Cossura yacy* sp. nov., paratype: 2, dorsal overview; 3, dorsal view of anterior region; 4, Narrowing dividing the thoracic and abdominal regions (arrow). Scales: Fig. 2, 0.5 mm; Fig. 3, 0.2 mm; Fig. 4, 0.5 mm.



Figs 5-8. *Cossura yacy* sp. nov., paratype: 5, anterior view; 6, two lateral nuchal organs (arrows); 7-8, Dorsal view of the division between the prostomium and peristomium (arrows). Scales: Fig. 5, 0.2 mm; Fig. 6, 0.4 mm; Figs 7, 8, 0.3 mm



Figs 9-11. *Cossura yacy* sp. nov., parapodia from a paratype, in anterior view: 9, parapodium 5; 10, parapodium 20; 11, parapodium 43. Scales: Fig. 9, 0.1 mm; Figs 10, 11, 0.05 mm.



the different regions of the body in all studied specimens: the 5<sup>th</sup> parapodium bears seven notopodial and five neuropodial chaetae; the 20<sup>th</sup> parapodium bears nine notopodial and seven neuropodial chaetae; the 43<sup>th</sup> parapodium bears five notopodial and six neuropodial chaetae (Figs 9-11). Pigidium with three long anal cirri without intercirral processes, one median dorsal and two in the lateral margins of the anal opening, reaching the last four chaetigers (Fig. 15).

Colour. Preserved specimens without pigmentation.

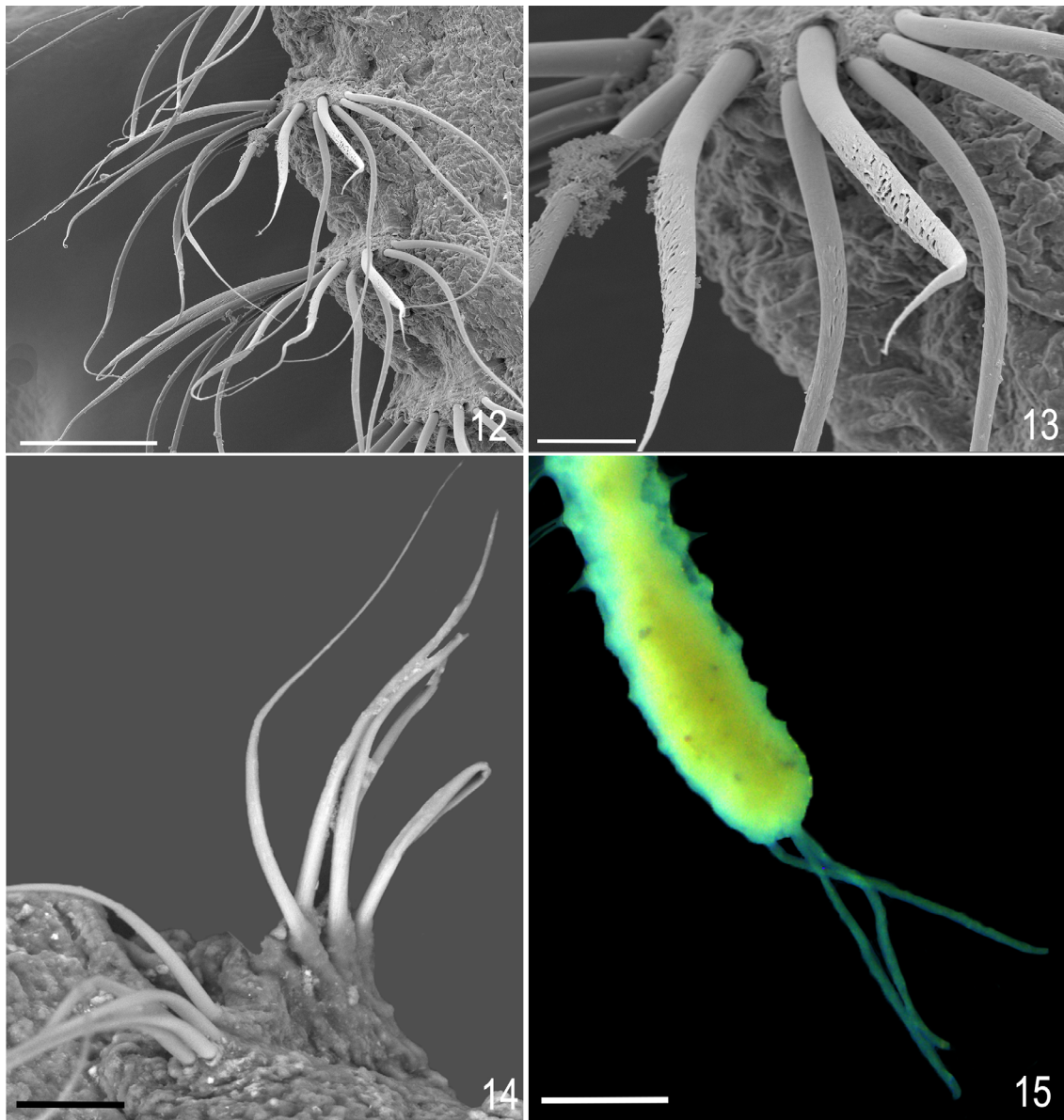
Habitat. Substrate with dominance of silt, clay and fine sand.

Geographical distribution. Atlantic Ocean, São Marcos Bay, Maranhão, Brazil.

Etymology. The species name is derived from the Tupi word *yacy* (moon).

## DISCUSSION

Most Cossuridae species have conical prostomium, likewise *C. yacy* sp. nov., although in some the prostomium may be more rounded (e.g. ZHADAN, 2015; see Table I and references therein). The exceptions are *Cossura ginesi* Liñero-Arana & Díaz-Díaz, 2010, with well-developed lateral horns in the prostomium (LIÑERO-ARANA & DÍAZ-DÍAZ, 2010), and *Cossura rostrata* Fauchald, 1972, with prostomium wider than larger in adult specimens (FAUCHALD, 1972; HILBIG, 1996). In *C. yacy* sp. nov. the first parapodium is uniramous while all others are birami, similar to other cossurid species. *Cossura yacy* sp. nov. has the branchial filament in the median region of the third chaetiger, differing from *Cossura laeviseta* Hartmann-Schröder, 1962, *Cossura*



Figs 12-15. *Cossura yacy* sp. nov. Scanning electron microscopy of the chaetae: 12, parapodium 4 and 5; 13, parapodium 5; 14, parapodium 43. Fig. 15, Detail of the pygidium region with anal cirri, in dorsal view. Scales: Figs 12, 0.05 mm; 13, 0.0 mm; Fig. 14, 0.1 mm; Fig. 15, 0.04 mm.

Tab. I. Comparison of main characteristics of *Cossura* species known worldwide.

Species	Prostomium	Nuchal organs	Proboscis	Branchial filament dorsal	Chaetae outer margin	Pigidium	Reference
<i>Cossura yacy</i> sp. nov.	Conical, longer than wide	Two pairs of nuchal organs at lateral margins of the peristomium	With tentacles observed through dissection	Annulate, arising from median region of the 3 <sup>rd</sup> chaetiger	all capillary chaetae with smooth base and distally spinulosa	Three long anal cirri without intercirral processes	This study
<i>Cossura abyssalis</i> Hartman, 1967	Bluntly rounded in front, wider dorsally, about as long as wide	Unknown	Unknown	Arising from median region of the 3 <sup>rd</sup> chaetiger			HARTMAN, 1967
<i>Cossura aciculata</i> (Wu & Chen, 1977)	Bluntly conical with round tip	Not seen	Unknown	Annulate, arising from median region of the 3 <sup>rd</sup> chaetiger	Fine spinulosa are present along the outer margin	About 10 lobes, without appendages, except for one small bulb located mid-ventrally	ZHADAN, 2015
<i>Cossura alba</i> Hartman, 1967	Triangular, longer than wide	Unknown	Unknown	Filament from border between chaetigers 4 and 5	With dense fine spines	Unknown	HARTMAN, 1967
<i>Cossura bansei</i> Hilbig, 1996	Prostomium about as long as wide	Unknown	Unknown	Arising from posterior border of chaetiger 3	Fine spines are present along the outer margin	With three anal cirri	HILBIG, 1996
<i>Cossura brunnea</i> Fauchald, 1972	Conical, anteriorly rounded	Unknown	Unknown	Cylindrical filament arising from the middorsal of the 3 <sup>rd</sup> chaetiger	Fine spines are present along the outer margin	With three long anal cirri	FAUCHALD, 1972
<i>Cossura candida</i> Hartman, 1955	Conical lobe, a little longer than wide	Unknown	A soft lobed pouch extending from a short cylindrical base and terminating distally in about 12 digitate, subequal lobes	Cylindrical filament arising from the middorsal of the 3 <sup>rd</sup> chaetiger	Fine spines are present along the outer margin	With three long anal cirri	HANCOCK, 1955
<i>Cossura chilensis</i> Hartmann-Schröder, 1965	Triangular shaped with wide round anterior margin	Unknown	With 2-3 digitate lobes	Originating on anterior median border of chaetiger 3	Fine spines are present along the outer margin	With three long anal cirri	SOTO & LEMUS, 2016
<i>Cossura coasta</i> Kitamori, 1960	Clearly demarcated with a blunt depressed cone	Unknown	Unknown	Arising at chaetiger 3	Unknown	With three long anal cirri	PILLAI, 2001
<i>Cossura consimilis</i> Read, 2000	Blunt conical, with round tip	Unknown	Unknown	Arising on anterior median border of chaetiger 3	Fine spines are present along the outer margin	With three long anal cirri	READ, 2000
<i>Cossura dayi</i> Hartman, 1976	Conical	Unknown	Unknown	Unknown	Fine spines are present along the outer margin	Unknown	HARTMAN, 1976

Tab. 1. Cont.

Species	Prostomium	Nuchal organs	Proboscis	Branchial filament dorsal	Chaetae outer margin	Pygidium	Reference
<i>Cossura delta</i> Reish, 1958	Conical	Two pairs of nuchal organs	The base bears from 15 to 20 digitate lobes	The single long, cylindrical tentacle originates from the middorsal of the 3 <sup>rd</sup> chaetiger	Fine spines are present distributed along the outer margin, according to the type of chaetae	Characterized by possessing 6 to 10 digitate lobes on either side of the anus, with three long anal cirri	REISH, 1958
<i>Cossura dimorpha</i> (Hartman, 1976)	Depressed, broadly rounded in front	Visible nuchal organs	Unknown	Annulate, arising from median region of the 3 <sup>rd</sup> chaetiger	With dense fine spines	Unknown	HARTMAN, 1976
<i>Cossura flabelligera</i> Zhadan, 2017	Conical, with rounded tip, about as long as wide	Not seen	Unknown	Branchial filament attached to mid-length of chaetiger 3	With dense fine spines	Pygidium not found	ZHADAN, 2017
<i>Cossura ginesi</i> Liñero-Arana & Diaz-Díaz, 2010	Trapezoidal, dorsoventrally flattened, with well-developed anterior lateral horns	A pair of nuchal organs as lateral ciliated furrows	With approximately 20 ciliated digitated lobes	Arising from posterior border of chaetiger 2	First one as curved capillary with long tips and rows of dense fine spines and smooth spine-like tip	Perianal pad vertically cleft, with radial corrugations forming lobes, and with three long slender cirri	LIÑERO-ARANA & DÍAZ-DÍAZ, 2010
<i>Cossura heterochaeta</i> Orensanz, 1976	Conical	Unknown	Unknown	Filament from middorsal of chaetiger 2	With dense fine spines	Unknown	ORENSANZ, 1976
<i>Cossura hutchingsae</i> Zhadan, 2015	Trapezium-shaped with wide round anterior margin	Unknown	Unknown	Filament from border between chaetigers 2 and 3	With dense fine spines	Unknown	ZHADAN, 2015
<i>Cossura keablei</i> Zhadan, 2015	Rectangular or trapezium-shaped, with round or almost straight anterior margin	Unknown	Unknown	Branchial filament arising from chaetiger 3	With dense fine spines	Unknown	ZHADAN, 2015
<i>Cossura laeviseta</i> Hartmann-Schröder, 1962	Conical	A pair of nuchal organs	Unknown	Branchial filament arising from anterior of chaetiger 3	Smooth	With three short anal cirri	EGREMY-VALDEZ, 2016
<i>Cossura longocirrata</i> Webster & Benedict, 1887	Conical	Not seen	Unknown	Arising from posterior part of chaetiger 2	Unknown	With three long anal cirri	ZHADAN, 2015
<i>Cossura petithoneae</i> (Ewing, 1987)	Longer than wide, broadly rounded anteriorly	Pair nuchal slits at postero-lateral prostomial margin	Unknown	Inserting between chaetigers 3 and 4	Rows of dense fine spines	Unknown	EWING, 1987
<i>Cossura platypus</i> Zhadan, 2017	Triangular in lateral view, longer than wide	Not seen	with 10 buccal tentacles	Filament attached to middle-length of chaetiger 3	With dense fine spines	Divided by vertical cleft, with three short simple cirri, no intercirral process	ZHADAN, 2017

Tab. I. Cont.

Species	Prostomium	Nuchal organs	Proboscis	Branchial filament dorsal	Chaetae outer margin	Pigidium	Reference
<i>Cossura pseudakaina</i> (Ewing, 1987)	Longer than wide, broadly rounded anteriorly	Pair of nuchal slits at postero-lateral prostomial margin	Unknown	Filament attached to segmental border between chaetigers 2 and 3	With dense fine spines	Rim slightly scalloped in appearance, simple ciliated, digitate caudal cirrus attached at apex of midventral notch	EWING, 1987
<i>Cossura pygodactylata</i> Jones, 1956	Conical	Unknown	Unknown	Arising from middle-posterior part of chaetiger 2	With dense fine spines	With three long cirri and 8–12 shorter intercirral processes	JONES, 1956
<i>Cossura queenstandensis</i> Zhadan, 2015	Blunt conical, with round tip and broadened base	Unknown	Unknown	Filament attached to segmental border between chaetigers 2 and 3	With dense fine spines	One or two cirri, in some cases they are short	Zhadan, 2015
<i>Cossura rostrata</i> Fauchald, 1972	Bluntly conical	Unknown	Unknown	Arising from chaetiger 3	With dense fine spines	With three anal cirri	FAUCHALD, 1972
<i>Cossura soyeri</i> Laubier, 1964	Conical, anteriorly rounded	Present	Unknown	Inserted at posterior margin of chaetiger 2	With dense fine spines	With three anal cirri	PARAPAR, 1995
<i>Cossura sima</i> Fauchald, 1972	Shorter than wide with a bluntly rounded anterior margin	Unknown	Unknown	Arising from chaetiger 3	With dense fine spines	With three anal cirri	FAUCHALD, 1972
<i>Cossura modica</i> Fauchald & Hancock, 1981	Conical	Unknown	Unknown	Arising from chaetiger 4	all capillary chaetae have distal spinulosa		FAUCHALD & HANCOCK (1981)

*chilensis* Hartmann-Schröder, 1965, *Cossura abyssalis* Hartman, 1967, *Cossura sima* Fauchald, 1972, *Cossura dayi* Hartman, 1976, *Cossura duplex* Tamai, 1986, and *Cossura consimilis* Read, 2000 from Atlantic and Pacific oceans, with branchial filament in the anterior region of the third chaetiger (REISH, 1958; READ, 2000; SOTO & LEMUS, 2016; see Table I); differs also from *Cossura soyeri* Laubier, 1964, *Cossura heterochaeta* Orensanz, 1976, *Cossura longocirrata*, *Cossura ginesi*, *Cossura pygodactylata* Jones, 1956 and *Cossura flabelligera* Zhadan, 2017 all with branchia in the second chaetiger (BACHELET & LAUBIER, 1994; ZHADAN, 2015; Tab. I) and from *Cossura alba* Hartman, 1967, *Cossura dimorpha* (Hartman, 1976), *Cossura modica* Fauchald & Hancock, 1981 and *Cossura pettiboneae* (Ewing, 1987) with branchia in the fourth chaetiger (see Table I and references therein). *Cossura yacy* sp. nov. differs from other species of the genus also by the presence of the two pairs of nuchal organs at lateral margins of the peristomium. Since the only species of Sewing that have nuchal organs are *C. ginesi* nuchal organs located on lateral side of the prostomium, *C. keablei* lateral organs localized behind chaetae bundle beneath notopodia and *C. consimilis* with low transverse ridges of dorsal nuchal organs visible at posterior lateral margin the prostomium. *Cossura yacy* sp. nov. has two types of smooth capillary chaetae with spinulosa on distal half, differing from *Cossura delta* Reish, 1958 which also have two chaetal types with spinulosa in the external edge, but has limbated chaeta restricted to the anterior neuropodial segments (REISH, 1958). *Cossura heterochaeta* has curved acicular chaetae with abrupt tips only in the anterior neuropodia (ORENSANZ, 1976). Similar to most other species of the family (Tab. I), *C. yacy* sp. nov. has three long anal cirri, one ventral and two dorsal reaching the fourth posterior segment. This is different from *C. brunnea* with anal cirri surpassing the fourth posterior segment (EGREMY-VALDEZ, 2009), from *C. pygodactylata* with anal cirri with digitated lobes in both sides of the pygidium (BACHELET & LAUBIER, 1994; ZHADAN et al., 2012), from *Cossura coasta* with branched anal cirri, from *C. laeviseta*, *C. modica* and *C. duplex* with three short anal cirri and from *Cossura pseudakaina* Ewing, 1987 with pygidial papillae and a single short anal cirrus (READ, 2000), (Tab. I and references therein).

**Acknowledgements.** We thank support from the Universidade Federal do Maranhão (UFMA) and to the Oceanography Graduate Program from UFMA. The Phycology Laboratory (UFMA) helped with laboratory facilities. Mr. Edilausson Moreno Carvalho and Dr. José Bauer for helping in the photographs with the electron microscope from UFMA. Dr. Hilton Tulio Costi, Coordinator of the Institutional Laboratory of Electronic Microscopy of the Museu Paraense Emílio Goeldi. Dr. Wagner Magalhães helped to improve the text. LKSS received scholarship support from “Coordenação de Aperfeiçoamento de Pessoal de Nível Superior” (CAPES).

## REFERENCES

- AMARAL, A. C. Z.; NALLIN, S. A. H.; STEINER, T. M.; FORRONI, T. O. & GOMES FILHO, D. 2013. *Catálogo das espécies de Annelida Polychaeta do Brasil*. Available at <[http://www.ib.unicamp.br/museu\\_zoologia/files/lab\\_museu\\_zoologia/Catalogo\\_Polychaeta\\_Amaral\\_et\\_al\\_2012.pdf](http://www.ib.unicamp.br/museu_zoologia/files/lab_museu_zoologia/Catalogo_Polychaeta_Amaral_et_al_2012.pdf)>. Accessed 10 Nov 2017.
- BACHELET, G. & LAUBIER, L. 1994. Morphology, ecology and juvenile development of *Cossura pygodactylata* Jones (Polychaeta: Cossuridae). In: Arcachon Bay, SW France, with a reassessment of the geographical distribution of *C. pygodactylata* and *C. soyeri* Laubier. *Annales du Muséum d'histoire Naturelle* 162:355-369.
- DAY, J. H. 1963. The Polychaete fauna of South Africa. Part 8: New species and records from grab samples and dredgings. *Bulletin of the British Museum (Natural History) Zoology* 10:383-445.
- EGREMY-VALDEZ, A. 2009. Cossuridae Day, 1963. In: de LEÓN-GONZÁLEZ, J. A.; BASTIDA-ZAVALA, J. R.; CARRERA-PARRA, L. F.; GARCÍA-GARZA, M. E.; PEÑA-RIVERA, A.; SALAZAR-VALLEJO, S. I. & SOLÍS-WEISS, V. eds. *Poliquetos* (Annelida: Polychaeta) de México y América Tropical. Monterrey, Universidad Autónoma de Nuevo León. 737p.
- EWING, R. M. 1984. Family Cossuridae Day, 1963. In: UEBELACKER, J. M. & JOHNSON, P. G. eds. Taxonomic guide to the polychaetes of the northern Gulf of Mexico. Metairie, Minerals Management Service Gulf of Mexico Regional Office. 44p.
- EWING, R. M. 1987. Review of the genus *Cossurella* (Polychaeta: Cossuridae) including descriptions of two new species and a key to the species of the world. *Bulletin of the Biological Society of Washington* 7:3-10.
- FAUCHALD, K. 1972. Benthic polychaetous annelids from deep water off western Mexico and adjacent areas in the eastern Pacific Ocean. Los Angeles, Allan Hancock Foundation. 561p.
- FAUCHALD, K. & HANCOCK, D. R. 1981. Deep-water polychaetes from a transect off central Oregon. *Allan Hancock Monographs in Marine Biology* 11:1-73
- FOURNIER, J. A. & PETERSEN, M. 1991. *Cossura longocirrata*: Redescription and distribution with notes on reproductive biology and a comparison of described species of *Cossura* (Polychaeta: Cossuridae). *Ophelia International Journal of Marine Biology* 5:63-80.
- HARTMAN, O. 1955. Endemism in the North Pacific Ocean, with emphasis on the distribution of marine annelids, and descriptions of new or little known species. In: Allan Hancock Found ed. *Essays. The Natural Sciences in Honor of Captain Allan Hancock on the occasion of his birthday July 26 1955*. Los Angeles, University of Southern California Press, p. 39-60.
- HARTMAN, O. 1976. Polychaetous annelids of the Indian Ocean including an account of species collected by members of the International Indian Ocean Expeditions, 1963-1964 and a catalogue and bibliography of the species from India. *Journal of the Marine Biological Association of India* 16:191-252.
- HILBIG, B. 1996. Family Cossuridae Day, 1963. In: BLAKE, J. A.; HILBIG, B. & SCOTT, P. H. eds. *Taxonomic Atlas of the Benthic Fauna of the Santa Maria Basin and Western Santa Barbara Channel*. Santa Barbara, Museum of Natural History, p. 385-404.
- JUMARS, P. A.; DORGAN, K. M. & LINDSAY, S. M. 2015. Diet of Worms Emended: An Update of Polychaete Feeding Guilds. *Annual Review of Marine Science* 7:20-24.
- KITAMORI, R. 1960. Two new species of cirratulid and Nephtyidae (Annelida: Polychaeta). *Bulletin of the Japanese Society of Scientific Fisheries* 26:1082-1085.
- LANA, P. C.; PAGLIOSA, P.; PAIVA, P. C.; CARRERETTE, O.; PARESQUE, K.; NOGUEIRA, J. M. M.; AMARAL, A. C. Z.; STEINER, T. C.; CHRISTOFFERSEN, M. L.; GARRAFFONI, A. R. S.; DI DOMENICO, M.; BARROSO, R.; RIZZO, A. & FUKUDA, M. V. 2017. Polychaetes in Brazil: people and places, past, present and future, In: DÍAZ-DÍAZ, O.; BONE, D.; RODRÍGUEZ, C. T. & DELGADO-BLAS, V. H. eds. *Poliquetos de Sudamérica. Boletín del Instituto Oceanográfico de Venezuela* (volumen especial):24-70.
- LIÑERO-ARANA I. & DÍAZ-DÍAZ Ó. 2010. A new species of Cossuridae (Annelida: Polychaeta) from Venezuela. *Inter-ciência* 35:789-792.
- ORENSANZ, J. M. 1976. Los anélidos poliquetos de la provincia biogeográfica Argentina. IX. Poecilochaetidae y Cossuridae. *Comunicaciones Zoológicas del Museo de Historia Natural de Montevideo* 10:3-8.
- READ, G. B. 2000. Taxonomy and distribution of a new *Cossura* species (Annelida: Polychaeta: Cossuridae) from New Zealand. *Proceedings of the Biological Society of Washington* 113:1096-1110.
- READ, G. & FAUCHALD, K. 2018. *World Polychaeta database. Cossura Webster & Benedict, 1887*. Available at <<http://www.marinespecies.org/aphia.php?p=taxdetails&id=129251>>. Accessed on 28 Feb 2018.



- REISH, D. J. 1958. Description of a new species of *Cossura* (Annelida: Polychaeta) from the Mississippi Delta. **Journal of the Washington Academy of Sciences** **48**:53-55.
- SOTO E. H. & LEMUS, D. 2016. Nueva descripción de *Cossura chilensis* Hartmann- Schröder, 1965 (Polychaeta: Cossuridae), de la Bahía de Valparaíso, Chile central con notas de su ecología. **Revista de Biología Marina y Oceanografía** **51**:609-620.
- TAMAI, K. 1986. Two new species of *Cossura* (Polychaeta, Cossuridae) from Western Japan. **Bulletin of the National Science Museum Tokyo** **12**:155-161.
- WEBSTER, H. E. & BENEDICT, J. E. 1887. The Annelida Chaetopoda, from Eastport, Maine. **U. S. Commission Fish & Fish** **22**:707-758.
- ZHADAN, A. 2015. Cossuridae (Annelida: Polychaeta: Sedentaria) from Australian and adjacent waters: the first faunistic survey. **Records of the Australian Museum** **67**:1-24. <http://dx.doi.org/10.3853/rj.2201-4349.67.2015.1639>
- ZHADAN, A. E.; VORTSEPNEVA, E. V. & TZETLIN, A. B. 2012. Redescription and biology of *Cossura pygodactylata* Jones, 1956 (Polychaeta: Cossuridae) in the White Sea. **Invertebrate Zoology** **9**:115-125.