POLYCHAETA FROM VENEZUELA I: SCOLECIDA

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ABSTRACT: This work is an updated review of the knowledge of the Scolecida infraclass recorded in Venezuela. It provides a brief diagnosis of the families that constitute the Scolecida (Annelida: Polychaeta: Sedentaria), identification keys of all the Scolecida species that have been recorded on the Venezuelan coasts, and information on some taxonomic problems that must be solved. This review aims to provide a tool to help students and professionals interested in the taxonomy of polychaetes, so that they can more accurately determine the scolecids present on the coasts of Venezuela.

KEYWORDS: annelids worms, biodiversity, Caribbean Sea, identification keys, scolecids, taxonomy

RESUMEN: Este trabajo constituye una revisión actualizada sobre el conocimiento de los escolécidos registrados en Venezuela. En el mismo se proporciona una breve diagnosis de las familias que componen al clado Scolecida (Annelida: Polychaeta: Sedentaria), así como claves de identificación para todas las especies de Scolecida que han sido registradas en las costas Venezolanas, además de suministrar información sobre algunos problemas taxonómicos que deberán ser resueltos. El objetivo de esta actualización es proporcionar una herramienta que coadyuve a los estudiantes y profesionales interesados en la taxonomía de poliquetos a determinar de manera más certera a los escolécidos presentes en las costas de Venezuela.

PALABRAS CLAVE: anélidos, biodiversidad, Mar Caribe, claves de identificación, escolécidos, taxonomía.

Scolecida consists of polychaetes with relatively simple body shapes. Generally, they have a prostomium, a distinct peristomium, the body is segmented, at least in the thorax and abdomen, and always has capillary chaetae. Members of this infraclass typically lack prostomial appendages, except for some taxa such as Paraonidae, which have a medium antenna. Benham (1896) erected the name Eucephala, in which he included four sub-orders: Nereidiformia (Orbiniidae), Terebelliformia, Scoleciformia (Arenicolidae, Maldanidae, Opheliidae and Scalibregmatidae) and Capitelliformia (Capitellidae). Rouse & Fauchald (1997) proposed the Scolecida clade to group families with a lack of cephalic and prostomial appendages, two or more pairs of pygidial cirri, and other phylogenetic aspects. Currently, the infraclass comprises the families Arenicolidae, Capitellidae, Maldanidae, Opheliidae, Orbiniidae, Paraonidae, Scalibregmatidae, and Travisiidae, including Cossuridae as a sister group of the previous families due, among other things, to the presence of lateral sensory organs along of the whole body. In Venezuela, 61 species have been recorded up to now (Díaz-Díaz *et al.* 2017).

Identification keys for the polychaetes families recorded in Venezuela

1a.– Posterior end covered by a chitinized shield. With many anal branchiae.....**STERNASPIDAE**

1b.– Posterior end not covered by a chitinized shield. Branchiae, if present, arranged otherwise.....2

2a. Body with homomeric segmentation. Parapodia often with compound chaetae. Phanerocephalic prostomium.....(Errantia).....3

2b. Body with heteromeric segmentation. Thoracic and abdominal regions may be distinct according to chaetae or parapodial development. Parapodia rarely with compound chaetae. Prostomium and peristomium are generally fused (Sedentaria); if distinct, no prostomial appendages.....23

3a. Dorsal region partially or fully covered by elytra and paleal chaetae or by elytra and numerous capillary chaetae that form a felt.....4

3b. Dorsal region not covered by those structures.....8

4a. Dorsal region partially or fully covered by paleal

chaetae.....**CHRYSOPETALIDAE**

4b. Dorsal region covered by elytra that form a felt..... .....**APHRODITIDAE**

4c Dorsal region covered by elytra.....5

5a Compound neurochaeta. Elongated body with several hundred segments. Auricles can be present or absent….....**SIGALIONIDAE**

5b Simple neurochaeta. Small body, usually with less than a hundred segments. Auricles are absent.....6

6a- Neuroaciculae with a wide conical, distal end, which forms a hammer-head like structure.....**EULEPETHIDAE**

6b- Neuroaciculae with a distinct distal end, usually sharp or blunt.....7

7a-Biramous parapodia. Median antenna, if present, inserted on the anterior margin of the prostomium, with sessile eyes on the prostomium.....**POLYNOIDAE**

7b.– Sub-biramous parapodia. Median antenna inserted on the middle or posterior region of the prostomium, with sessile eyes or pedunculated ommatophores on the prostomium.....**ACOETIDAE**

8a.-Dorsal region with globular capsules; 2–3 pairs of lateral antennae, a median antenna.....**SPHAERODORIDAE**

8b.– Smooth dorsal region without globular capsules; although some forms may have papillae, 1-5 or absent antennae.....9

9a.– Prostomium with caruncle, sometimes covered by the first chaetigers.....10

9b.– Prostomium without caruncle.....11

10a.– Notochaetae in transversal rows on the dorsal region. Branchiae and notochaetae alternating.....**EUPHROSINIDAE**

10b.– Notochaetae in lateral clusters, never in dorsal ones, sometimes minute. Branchiae limited to the laterodorsal margin of the body, pectinate or arborescent; rarely absent.....**AMPHINOMIDAE**

11a.– Ovoid prostomium, usually with a pair of eyes. Parapodia laterally projecting. With simple or compound chaetae.....12

11b.– Reduced prostomium, usually without eyes. Parapodia not laterally projecting. All chaetae are simple, often with notopodial hooks.....**PILARGIDAE**

12a.– Pharynx is continued with a barrel-shaped muscular proventriculus extending throughout several segments.....**SYLLIDAE**

12b.– Pharynx is not continued with a similar structure.13

13a.– Awnless pharynx (without chitinous parts).....14

13b.– Pharynx with chitinous parts (mandibles, maxillae, paragnaths, etc.).....15

14a.– Very long body consisting of numerous segments. Oval dorsal cirri oval, elongate, foliaceous, cordate, or rounded. Furcate chaeta absent....**PHYLLODOCIDAE**

14b.– Short body consisting of few segments. Elongate cirriform dorsal cirri, never foliaceous, cordate, or rounded. Notopodial furcate chaeta present or absent. (Up to three prostomial appendages; simple and compound chaetae; free-living species or symbiotic ones with other marine invertebrates).....**HESIONIDAE**

15a.– Conical, ringed prostomium without palps.....16

15b.– Rounded, subquadrate prostomium; if conical, never ringed.....17

16a.– Proboscis with four terminal mandibles (visible by a transparent body wall if invaginated). All parapodia uni- or biramous.....**GLYCERIDAE**

16b.– Proboscis with numerous chitinous parts (macrognaths and micrognaths) visible by a transparent body wall if invaginated. Uni- or biramous anterior parapodia; biramous posterior ones.....**GONIADIDAE**

17a.– Medium-sized pharynx with longitudinal rows of subdistal papillae, and usually a circle of marginal papillae.....**NEPHTYIDAE**

17b.– Relatively short pharynx without any rows of papillae. Sometimes papillae may be present scattered or in small groups. Marginal papillae absent.....18

18a.– Eversible pharynx consisting of two rings, a pair of curved, dentate mandibles, and usually with paragnaths or papillae.....**NEREIDIDAE**

18b.– Partially eversible pharynx without papillae or paragnaths, with a pair of ventral mandibles, and usually with one or several pairs of maxillae.....19

19a.– Prostomium without appendages; if present, overlapped by the peristomium.....20

19b.– Prostomium with appendages (antennae or pal ps).....21

20a. Simple or compound hooded hooks in some chaetigers. A pair of maxillary supports.....**LUMBRINERIDAE**

20b. Hooded hooks absent. Three maxillary supports.....**OENONIDAE**

21a. With a pair of lateral antennae and a pair of palps. Maxillary apparatus consisting of rows of free denticles.....**DORVILLEIDAE**

21b.– With one or three occipital antennae and a pair of palps, or palps absent. Maxillary apparatus consisting of 4 - 5 pairs of maxillae.....22

22a.– With two frontal and three occipital antennae.....**ONUPHIDAE**

22b. Frontal antennae absent, one or three occipital antennae. Cephalic lateral palps.....**EUNICIDAE**

23a.– Not differentiated prostomium and peristomium.....24

23b.– Well-differentiated prostomium and peristomium.....35

24a.– Anterior end with operculum. Calcareous tube...25

24b.– Anterior end without operculum. With a membranous tube or without it.....26

25a.– Sinuous, rarely spiral tube. Symmetrical body with more than four thoracic chaetigers..... **(SERPULIDAE)**.....**SERPULINAE**

25b.– Spiral tube (at least in the beginning). Asymmetrical body with up to four thoracic chaetigers..... **(SERPULIDAE)**.....**SPIRORBINAE**

26a.– Anterior end with specialized chaeta directed anteriorly forming a cephalic cage or operculum.....27

26b.– Anterior end with no specialized chaeta.....29

27a.– Two first anterior chaetae with specialized chaetae forming an operculum. Body segmented into four regions (thorax, parathorax, abdomen, and caudal region), in addition to the cephalic region and the pygidium.....**SABELLARIIDAE**

27b.– First directed anteriorly chaetiger with specialized chaetae forming a kind of cephalic cage. Body segmented into at least two regions.....28

28a.– Body with three regions (thorax, abdomen, and scapho). Conical tube consisting of cemented sand grains. Thick anterior chaetae in a transverse row. Branchial lamellae.....**PECTINARIIDAE**

28b.– Body with two or three regions. Soft, mucous or absent tube. Thin anterior chaetae sometimes as laterally fan-shaped ones, directed forward. Cirriform or pectinate branchiae arranged in a transverse row. Retractile, uncinate mouth tentacles with teeth arranged in one or fewer rows.....**AMPHARETIDAE**

29a.– Anterior end transformed into a radiolar crown arranged in two rarely branched semicircles. Branchiae absent.....30

29b–. Anterior end not transformed into a radiolar crown. With well-developed branchiae limited to the anterior region; arborescent, filamentous, lamellar, or absent.....32

30a–. With more than three thoracic segments. Uncini in a row; sometimes with accompanying chaetae.....31

30b.– With up to three uncinate thoracic segments arranged in numerous bundles on the abdominal neuropodia.....**OWENIIDAE**

31a.– Abdomen with 2-4 segments. Radioles without a cartilaginous skeleton. Separate branchial lobes. Specimens are rarely larger than 1 cm; usually 1 mm..... .....**FABRICIIDAE**

31b.– Abdomen with numerous segments. Radioles with cartilaginous skeleton formed by two or more rows of cells. Dorsally fused branchial lobes. Specimens with medium to large size; up to 45 cm.....**SABELLIDAE**

32a.– Branchiae generally absent; if present, limited to the posterior region as short digitiform filaments.....33

32b.– Branchiae usually present; arborescent, filamentous, lamellar; limited to the anterior region....34

33a.– Fused prostomium and peristomium; often transformed into a cephalic plate. Cylindrical body with elongated segments (bamboo worms). Neuropodia with falcate spines or barbed uncini.....**MALDANIDAE**

33b.– Fused prostomium and peristomium, but never forming a cephalic plate. Hammer-shaped body (thin anterior end, swollen posterior end). Not elongate cylindrical segments. Smooth chaetae on both branches. Without falcate spines or barbed uncini. With a papilla between the parapodial branches...**FAUVELIOPSIDAE**

34a.– With lamellar or filamentous branchiae. Anterior thoracic neuropodia with acicular spines; the posterior ones with acicular uncini.....**TRICHOBRANCHIDAE**

34b.– With arborescent, filamentous or absent branchiae. Thoracic neuropodia with uncini in 1 or 2 rows, sometimes with a long manubrium. Abdominal uncini in one row with a short manubrium.....**TEREBELLIDAE**

35a.– Without peristomial or post-peristomial palps. With or without branchiae.....36

35b.– With peristomial or post-peristomial palps. With or without branchiae.....43

36a.– Segmented body.....37

36b.– Not segmented body, or inconspicuous segmentation.....42

37a.– Differentiated thorax and abdomen.....38

37b.– Differentiated body into at least three body regions.....40

38a. Body with inconspicuous segmentation. Difficult to differentiate the thorax from the abdomen. Cirriform, single branchia dorsally inserted between segments 2-5 .....**COSSURIDAE**

38b.- Body with conspicuous segmentation. Well differentiate the thorax from the abdomen. Branchiae, if presents, paired cirriform, branched, foliaceous or triangular.....39

39a.– Wide, dorso-ventrally flattened thorax. Dorsally displaced notopodia in the abdominal region. Crenulate chaetae; hooks, sub-uncini. Lyrate chaetae present or absent. Crenulate chaetae present on abdominal noto- and neuropodia.....**ORBINIIDAE**

39b.– Cylindrical body. In some cases, the thoracic region is larger than the abdominal one. Not dorsally displaced notopodia in the abdominal region. Capillary notochaetae limited to the thorax or up to the first abdominal chaetigers. Hooded hooks present on abdominal noto- and neuropodia. Sub-uncini and lyrate chaeta absent.....**CAPITELLIDAE**

40a.– Capillary chaetae on all chateigers, noto- and neuropodia. Modified spines and lyrate chaetae may be present. Branchiae on anterior region or entire body...41

40b.– Capillary notochaetae on all chateigers. Branchiae (mainly branched) on mid-body segments.....**ARENICOLIDAE**

41a.– Elongate body with numerous segments (usually more than 100); segmented in the prebranchial, branchial, and postbranchial region. Branchiae larger than the dorsal cirrus; present from chaetiger 4-10; arranged between 15-20 segments.....**PARAONIDAE**

41b.– Elongate body, but with few segments (up to 60); segmented in the anterior region (prostomium, peristomium, and fewer anterior segments). Widened middle and posterior region. Branchiae, if present, arranged along the entire body; usually present from the second to posterior segments.....**TRAVISIIDAE**

42a.– Non-segmented body. Acute prostomium. Integument surface smooth. Body with distinct ventral groove. Tapering or rounded prostomium.....**OPHELIIDAE**

42b.– Inconspicuous segmentation. Integument surface areolate. Acute, rounded, or T-shaped prostomium.....**SCALIBREGMATIDAE**

43a.– Palps with dorsal peristomial or post-peristomial origin.....44

43b.– Peristomial palps with other than dorsal origin....45

44a.– Palps with ciliated palpophore. Prostomium with caruncle. Multiarticulate notochaetae. Falcate or aristate neurochaetae. Non-segmented body..... .....**FLABELLIGERIDAE**

44b.– Long, grooved, pinnate palps with ventral origin. Flat, spade-shaped prostomium without caruncle. Simple capillary notochaetae simple; never multiarticulate. Falcate, bidentate, multidentate, hooded or not hooded neurochaetae.....**MAGELONIDAE**

45a.– With tentacle-like palps or cirri in post-peristomial segments. Conical or rounded prostomium. Cirriform branchiae in pairs along the whole body..... .....**CIRRATULIDAE**

45b.– With peristomial grooved palps with dorsal origin. Prostomium with a different shape or reduced. Branchiae, if present, pinnate, lamellar, or cirriform; usually present in the anterior región.....46

46a.– Modified fourth chaetiger. Body segmented into three regions. Variation in the parapodial and chaetal shape. Branchiae absent. Fused prostomium and peristomium.....**CHAETOPTERIDAE**

46b– Unmodified fourth chaetiger. Non-segmented body, although in some cases, a variation in parapodial and chaetal shape is observed. Branchiae generally present. Non-fused prostomium and peristomium.....47

47a.– Differentiated prostomium and peristomium. Generally short anterior chaetae; if long, not forming a cephalic cage. Specialized chaetae in some taxa, often with hooded hooks. Terminal anus.....**SPIONIDAE**

47b.– Very long, slender anterior chaetae, forming a kind of cephalic cage. Without specialized chaetae.....**POECILOCHAETIDAE**

Family Arenicolidae Johnston, 1835

Arenicolids comprise a small group of Polychaeta with elongated bodies, ringed segments, and a thick, rough epidermis. The body size of these specimens ranges from a few millimeters (*Branchiomaldane* Langerhans, 1881) to 1m in length (*Arenicola loveni* Kinberg, 1866). Arenicolids usually inhabit buried in soft sediment, in the intertidal and shallow subtidal zones, except that they inhabit rocky substrates with mud accumulation. Díaz–Díaz & Cárdenas–Oliva (2012) reported several specimens of *Branchiomaldane maryae* Nogueira & Rizzo, 2001 associated with many macroalgal species in the intertidal-subtidal zone on the northern coast of the Araya Peninsula.

The prostomium is small, conical, or rounded in shape, without cephalic appendages or eyes, except *Branchiomaldane maryae*, which has two groups of up to seven lenticular eyes (Fig. 1A). The peristomium is reduced (Fig. 1A, B). Body segments are similar, although the ones with branchiae are usually slightly longer and the posterior ones shorter (Fig. 1H). Parapodia are biramous with poorly developed chaetigerous lobes; they do not have either dorsal or ventral cirri (Fig. 1C). Branchiae are usually branched, associated with the notopodium in the mid-posterior body section, or cirriform as in *Branchiomaldane* (Fig. 1C, H).. All chaetae are simple; the notopodial ones are capillary limbate (Fig. 1D-F), while the neuropodial ones are hooks without a protective sheath (Fig. 1G). In the case of *B. maryae*, it has 3 - 4 lateral wattles that can be seen only under SEM. The pygidium is simple, without papillae or pygidial cirri, but can also have a lobe (Fig. 1H).

About 30 species were recognized worldwide (Rouse & Pleijel 2001, Díaz–Díaz & Cárdenas–Oliva 2012). Recently, Pamungkas *et al.* (2019) stated that the family consists of five genera and 22 valid species worldwide. In Venezuela, Díaz–Díaz & Cárdenas–Oliva (2012) recorded the only species of arenicolid (*Branchiomaldane maryae*) known so far in the country.

Family Capitellidae Grube, 1862

Capitellids comprises vermiform polychaetes with an elongated, thin, cylindrical body, sharp or blunt ends, and generally smaller size. These specimens have a small prostomium, which can be conical or rounded, without appendages, and with or without eyespots. The body has a limited number of segments in the thoracic region and numerous abdominal segments. Chaetal and hook types and disposition are the main difference between both regions. In some cases, transitional segmentation may be present, so distinguishing these two regions may be unclear. The body surface is smooth, although the thoracic region is rough or areolate in some taxa. Branchiae, if present, are usually retractable, located on the ventral region of the middle and posterior parapodia, and generally branched as in *Dasybranchus lumbricoides*. However, they can also be simple, digitiform, and small, as in some species of the genera *Heteromastus* and *Notomastus*. Generally, males of the *Capitella capitata* complex have two pairs of genital chaetae on the dorsum of chaetigerous segments 8 and 9. The pygidium usually lacks anal cirri, except for species of genus *Mediomastus* and of the genus *Scyphoproctus*. The former ones have a longer ventral cirrus, and the latter ones have an anal plate with acicular spines and a pair of digitiform cirri.

Capitallidae is one of the best-known families of polychaetes. For the characterization of its species, most authors provide schematic drawings to represent a lateral view (Fig. 1I)) of the anterior region, comprising the prostomium and the chaetigerous segments that shape the thorax. Chaetae and hooks distribution is represented by letters in those drawings, both on the notopodia and on the neuropodia. This is thus particularly useful for identifying the species (Díaz-Díaz & Rozbaczylo 2021).

According to Pamungkas, *et al*. (2019), the family Capitellidae consists of 46 genera and 196 species. While ten genera and 35 species are recognized in the Caribbean region, only six genera and eight species have been recorded in Venezuela.

Identification keys for Capitellidae species recorded in Venezuela

1a.- Thorax with 9 segments. Genital spines present or absent.....*Capitella*.....2

1b.- Thorax with 10 or more segments. Genital spines absent.....3

2a.- Segments 1-7 with capillary chaetae.....*Capitella* cf. *capitata*

2b.- Segments 1-3 with capillary chaetae (Fig. 1I) ....*Capitella giardi*

3a.- Thorax with 10 chaetigers segments. First four chaetigers with capillary chaetae; the posterior ones with hooded hooks.....*Mediomastus*.....Branchiae present.....*Mediomastus californiensis*

3b. Thorax with 11 or more segments.....4

4a.- With 11 thoracic segments.....5

4b.- With 12 or more thoracic segments with chaetae...6

5a.- Segments 1-5 with capillary chaetae. Segments 6-11 with covered hooks. First segment biramous. Notochaetae present in the abdominal segments. Small notopodial and neuropodial lobes.....*Heteromastus filiformis*

5b. Segments 1-11 with capillary chaetae. First segment biramous or uniramous. Notochaetae absent in the abdominal segments. Small notopodial lobes; enlarged neuropodial lobes.....*Rashgua*..... *Rashgua lobatus*

6a.-Thorax with 12 segments.....*Scyphoproctus*.....7

6b.- Thorax with 13 or more segments..... .....*Dasybranchus lumbricoides* [1]

7a.- Disc-shaped anal plate with 10 pairs of acicular chaetae group along the margin (Fig. 1J, K)..... .....*Scyphoproctus guadalupensis*

7b.- Disc-shaped anal plate with 5-7 groups of acicular chaetae along the margin.....*Scyphoproctus platyproctus*

1.- *Dasybranchus lumbricoides* was originally described from the Philippine Islands; however, it has been recorded from the Pacific to the Atlantic, including the Caribbean region (Ewing 1984a; Liñero-Arana 1996). According to García-Garza & De León-González (2011), specimens reported by Hartman (1947) from Corona del Mar, Newport Harbour, were re-examined, as well as the ones reported by Fauchald (1972) on Del Carmen Island in the Gulf of California. They concluded that these corresponded to *Notodasus harrisae* and considered that the genus *Dasybranchus* should be reviewed for the Wider Caribbean Region.

Family Cossuridae Day, 1963.

Cossurids are easily recognizable by a slender mid-dorsal branchia (Fig. 1L) that emerges from the body between cheatigers 2 and 5, depending on the species. This branchia is cylindrical, can be as long as the animal's body, and is highly vascularized (Ewing 1984b; Egremy-Valdez 2009). They are usually small; however, some specimens exceed 20 mm in length and have more than 100 segments. The prostomium is conical (Fig. 1L), although some species have lateral horn-like extensions that give it a T-shaped appearance (Fig. 1M). They have a pair of nuchal organs on the posterior margin of the prostomium and no cephalic appendages or eyes. The peristomium forms a complete ring and is well-differentiated from the prostomium. The segmentation of the body consists of: an anterior region slightly dorsoventrally flattened and muscularized; a fragile cylindrical abdominal region without circular muscle fibers; and a posterior region with few generally indistinguishable segments (usually ten). Parapodia are biramous, except for the first pair, usually uniramous. In the anterior segments, both branches are so close that they appear to be uniramous. Both also have chaetae; the neurochaetae are commonly thicker and relatively shorter than the notochaetae (Fig. 1N, O).

There are about 25 species known worldwide, being over half of them described from the Pacific region. They inhabit sandy or clayey sediments, where they build a fragile tube by mucous secretion.

So far, most of the species identified are from the Pacific Ocean (Rouse & Pleijel, 2001). One is from the Indian Ocean, two are from the Atlantic Ocean, and one is from the Mediterranean Ocean. Three species have been recorded in Venezuela.

Identification keys for Cossuridae species recorded in Venezuela

1a.- Distally rounded prostomium.....2

1b.- Distally enlarged prostomium with two lateral extensions that give the prostomium a T-shape.....*Cossura ginesi*

2a.- Branchial filament from chaetiger 2 with 30-31 thoracic chaetigers.....*Cossura soyeri*

2b.- Branchial filament from chaetiger 3 with 15-18 thoracic chaetigers.....*Cossura delta*

Family Maldanidae Malmgren, 1867

Maldanids, also known as bamboo worms due to their appearance of bamboo shoots, have a cylindrical, long, relatively slender body consisting of few segments.

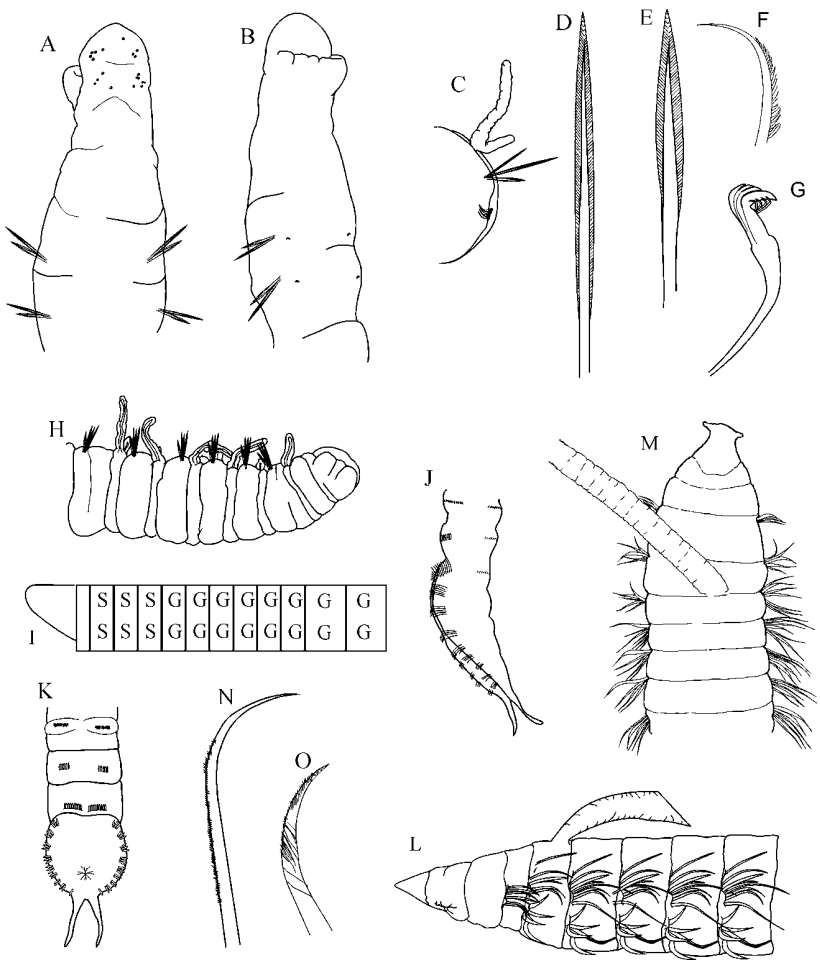

Figure 1.- *Branchiomaldane maryae*: A) anterior end, DV: B) same, VV: C) brenchiferous segment, AV; D-F) notochaetae; G) neuropodial hook; H) distal end, , LV; *Capitella giardi*: I) thorax schematic draw; *Scyphoproctus guadalupensis*: J) distal end, LV; K) same, VV; *Cossura soyeri*: L) anterior end, LV; *Cossura ginesi*: M) anterior end, DV; N) notochaeta; O) neurochaeta (AV: anterior view; DV: dorsal view; LV: lateral view). A-H: redrawn of Díaz-Díaz *et al*. 2012; I-L: redrawn of Díaz-Díaz *et al*. 2014; M-O: redrawn of Liñero-Arana & Díaz-Díaz, 2010

The anterior region usually has short segments, the mid-region has longer ones, and the segments on the posterior region of the body have a smaller length (Wolf 1984). Polychaetes of this family typically inhabit soft substrates in relatively quiet waters. They are distributed from the intertidal zone to great depths. For instance, *Nicomache* (*Loxochona*) *lokii* Kongsrud & Rapp, 2012, was reported from a hydrothermal vent at 2,350 m depth in the submarine mountain range in the Arctic Ocean. In tropical, temperate, or cold latitudes, they may reach up to 20 cm in length; however, *Sabaco elongatus* (Verrill, 1873) may reach 45 cm (Light 1974). Maldanids' tubes are usually fragile and built of compacted sand and mud particles.

The prostomium is oval or obliquely truncate with membranous margins and a median cephalic keel. Sometimes numerous eyespots may be present. The prostomium is fused with the peristomium. The proboscis is eversible, globose, with papillae and cilia.

Parapodia are biramous, poorly developed, without cirri. Notochaetae are simple, acicular, limbate or spiny. Although neurochaetae are rostrate, some genera may have thicker acicular hooks on the first three chaetigers. The pygidium is variable and may be represented by a complex cylinder with an anal plate, with or without anal cirri, or simply by a terminal anus. This latter part occludes the entrance to their tube, and its irrigation is

produced by peristaltic contractions of the elongated segments (Salazar–Vallejo & Díaz–Díaz 2009).

Branchiae are absent. However, they are present in some species of *Johnstonia* Quatrefages, 1866. Their branchiae are as short, digitiform filaments; they are irregularly distributed in the posterior segments. In some species of *Sabaco* Kinberg, 1866, they are also in the dorsal region of the middle segments of the body. Light (1991) does not consider them as real branchiae, since no vascular system is observed; therefore, it is not of taxonomic value to them.

On one hand, Salazar–Vallejo & Díaz–Díaz (2009, 2021) report that the family Maldanidae consists of 30 genera and more than 200 species. On the other hand, Pamungkas *et al*. (2019), from data available in WoRMS, record 45 genera and 272 species worldwide. In Venezuela, seven genera and nine species have been recorded.

Identification keys for Maldanidae species recorded in Venezuela

1a.- Without cephalic plate (Fig. 2A). Chaetigers 1-3 with 4 (3-5) spines on the neuropodia. Symmetrical annal funnel with anal cirri (Fig. 2B)....Nicomachinae..... *Nicomache*.....*Nicomache antillensis*

1b.- With cephalic plate (Fig. 2D, F, H, J, L).....2

2a.- Dorsal anus...Maldaninae....Hooks in single series. Larger nuchal organs, J- or U-shaped.....3

2b.- Terminal anus.....Euclymeninae.....4

3a.- Well-developed pygidium with a foliate projection or with cirri, (Fig. 2C) without anal valve. A preanal achaetiger.....*Asychis*.....*Asychis atlanticus*

3b.- Reduced or vestigial pygidium with anal valve. Two achaetigers...*Maldane*....Anal plate with a lateral notch and a ventral dentate lobe (Fig. 2D). Cephalic plate with lateral notch (Fig. 2E).....*Maldane glebifex*

4a**.-** With branchial filaments on the last two chaetigers. Anal plate with a larger mid-ventral cirrus..... *Johnstonia*.....with 19 chaetigers and 3 achaetous segments. Scattered branchial filaments (Fig. 2G). 19-22 unequal anal cirri (Fig. 2G).....*Johnstonia duplicata*

4b.- Without branchial filaments. An anal plate of similar or varied length cirri.....5

5a.- Pygidium with similar anal cirrus.....6

5b.- Pygidium with a major medioventral anal cirrus (rarely 2) or alternating short and long cirri.....8

6a.- Chaetiger 4 with a prominent collar. Chaetiger 9 with specialized notochaetae, basally bilimbated and constricted to the middle of the limbus. Anal plate cirri of the same size or alternating (Fig. 2K, M)..*Clymenella*..7

6b.- Chaetiger 4 without collar. Chaetiger 9 without specialized notochaetae. Anal plate with cirri of the same size (Fig. 2I).....*Isocirrus*....*Isocirrus corallicolus*

7a.- Cephalic margin with lateral notches (Fig. 2J). Chaetiger 3 with 3-6 rostrate hooks ....*Clymenella brasiliensis*

7b.- Cephalic margin without lateral notches (Fig. 2L). Chaetiger 3 with 3-15 rostrate hooks...*Clymenella mucosa*

8a.- With rostrate hooks on the first neuropodia.. Anal plate with 20-30 cirri, a larger, mid-ventral one, or alternating (Fig. 2M). Cephalic plate with lobulate palpus. Abundant ocelli (Fig. 2N)....*Axiothella*... (Neuropodium 3 with only 3-5 rostrated hooks (in specimens up to 50 mm in length).....*Axiothella somersi*

8b.- With acicular spines on the first neuropodia. Cephalic plate without lobulate palpus. Anal plate with a larger anal cirrus, the rest of similar size, or with cirri varying in size.....*Euclymene*....*Euclymene coronata*

Family Opheliidae Malmgren, 1867.

Ophelids have a wide worldwide distribution and often occupy sandy or muddy substrates from intertidal to hadal depths (over 8000 m). They are slender and cylindrical-bodied polychaetes with a pointed prostomium. Some species, such as *Armandia* and *Ophelina*, are fast and energy-swimmers, adapted to bury themselves quickly. Ophelid lengths range from less than 5 mm to more than 100 mm, and some species have a fixed number of segments, from 30 to 60 depending on the species (Blake 2000). They are usually almost transparent; some range from pink to reddish-brown colored.

The body can be short, like the *Armandia* species, or elongate with an anterior subdistal enlargement and distally tapering, like *Thoracophelia* (=*Euzonus*) (Blake 2011), and may present well defined segmentation, like in *Thoracophelia*, a poorly one as in *Ophelia* or absent as in *Ophelina*. The integument is generally smooth, and the intersegmental constrictions are inconspicuous. Some genera may have deep ventral or lateral grooves,

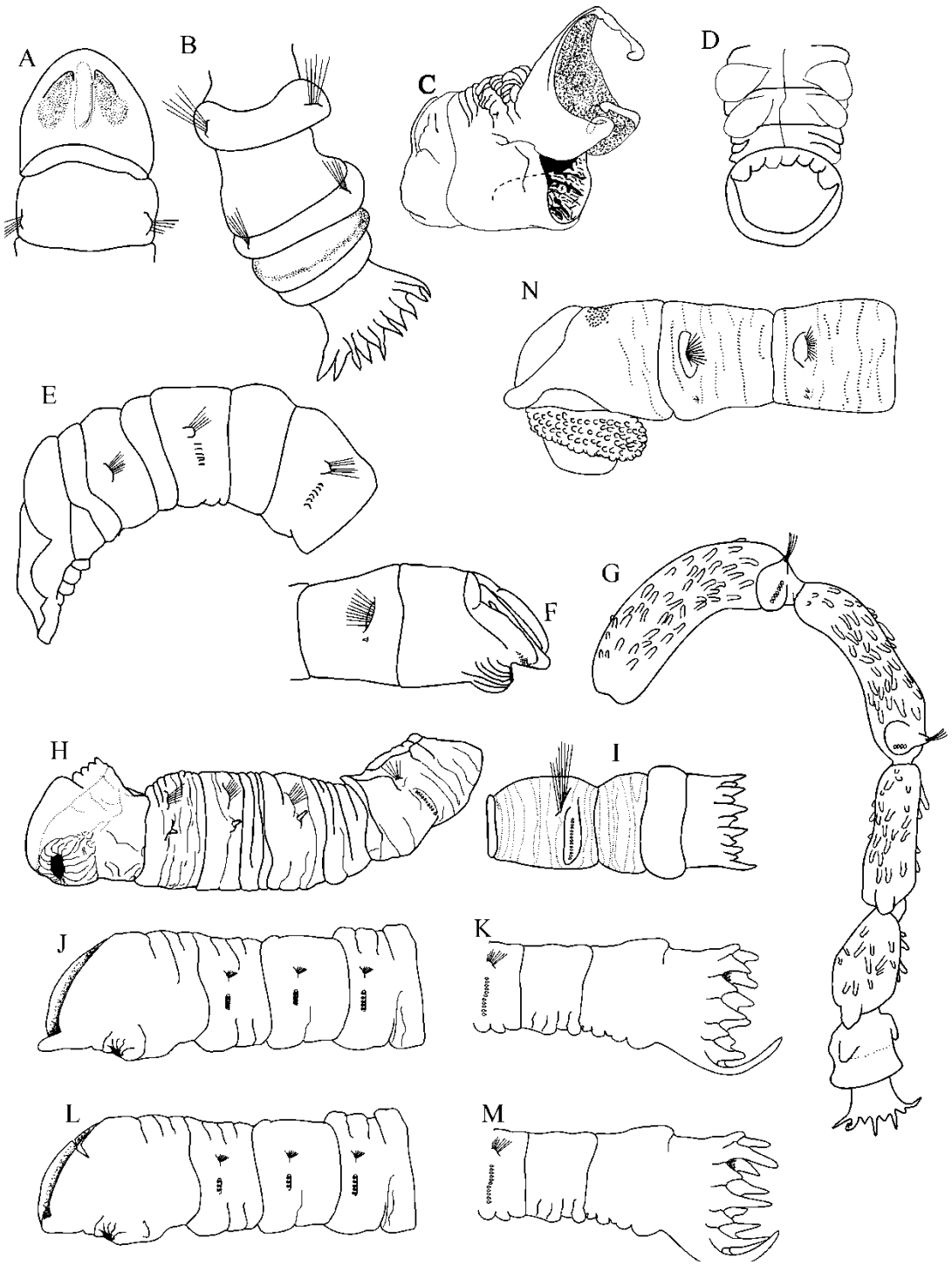

Figure 2.- *Nicomache antillensis*: A). anterior end, DV; B) posterior end, DV; *Asychis atlanticus*: C) distal end, LV; *Maldane glebifex;* D) posterior end, FV; E); anterior end, LV; *Johnstonia duplicata*: F) anterior end, LV; G) posterior end, LV; *Euclymene coronata*: H) anterior end, LV; I) posterior end, LV; *Clymenella brasiliensis*: J) anterior end; LV; *Clymenella mucosa*: K) posterior end, LV; L) anterior end, LV; *Axiothella* sp.: M); posterior end, LV; N) anterior end, LV. (AV: anterior view; DV: dorsal view; LV: lateral view). A-N:: redrawn of Salazar.Vallejo & Díaz-Díaz 2009.

or an expanded anterior region of the body with lateral eyes and anal cirri.

The prostomium has a conical shape, short or elongated, without cephalic appendages. However, in *Armandia* (Fig. 3A) and *Ophelina*, the anterior end presents a very similar palpodium to that in the prostomium of some paraonids, which appears to have a tactile function. In most ophelids, the peristomium is reduced and limited to the buccal region. Yet, in some species of *Ophelia*, the peristomium forms a distinct ring, which is often considered an achaetous segment. In these cases, the mouth is located between the first two chaetigers. Subdermal eyes and a pair of eversible nuchal organs may be present on the posterior margin of the prostomium.

Most segments are biramous, except for some posterior segments, which may be achaetous. The first ones are similar to those of the overall body, although slightly smaller. In *Ophelia*, the parapodia are small and have chaetae emerging from the body wall. In others species, such as *Armandia* and *Ophelina*, the parapodial branches are rounded projections, that may have a postchaetal lobe and a ventral cirrus. Branchiae, if present, are usually located just behind and above the notopodium, although they are absent in most taxa (*Polyophthalmus* and *Trachitrypane*). Branchiae may begin in chaetigers 2 or 3 (*Armandia*, *Ophelina*) or 8 and 10 (*Thoracophelia* and *Ophelia*). They can also be present in most chaetigers or limited to the segments in the middle or posterior region (*Thoracophelia*). Branchiae may be digitiform (Fig. 3B), retractile or not retractile, and branched as in *Thoracophelia*. Ophelids have capillary chaetae on both branches, which may be simple, smooth, or hirsute. Segments may be multiannulate, as in Scalibregmatidae, but the epidermis is not rough. Some species have lateral eyes, as in *Armandia* and *Polyophthalmus*, while others have interramal sensory papillae, as in *Ophelina* and *Ophelia*. The most posterior segments are achaetous, slender, and retractile (Blake & Macioleck 2016a).

The pygidium varies in shape, but it is usually long and forms a sort of pygidial flap. In *Ophelida,* for instance, it is surrounded by an arc of short cirri and presents a pair of long ventral cirri. In others, as *Armandia* and *Ophelina* (Fig. 3C), this flap hat papillae and long ventral cirri on the margin, while in *Thoracophelia heterocirrus* Rozbaczylo & Zamorano, 1970, this presents a ventral cirrus with a triangular-plate shape and 18 dorsolateral papillae. The anus is terminal.

There are around 150 nominal species of ophelid polychaetes grouped in 8 genera (Pamungkas *et al.* 2019). In Venezuela, three genera and ten species have been recorded (Díaz-Díaz *et al*. 2016; 2017). However, only three species have been completely determined, and six of them have been determined only at the genus level. The record of *Armandia polyophthalma* in La Tortuga Island made by Hartman (1944) is uncertain because its locality type is the Mediterranean Sea (Fauvel 1925).

Identification keys for Opheliidae species recorded in Venezuela

1a.- Ventral groove present in the posterior part of the body only.....*Ophelia*

1b.- Ventral groove present along the whole body.....2

2a.- Branchiae absent. Lateral eyes present..... *Polyophthalmus*.....*P. pictus*

2b.- Branchiae present. Lateral eyes present or absent....3

3a.- Body with 29 or fewer chaetigers. Anterior parapodia with short prechaetal lobes.....*Armandia maculata*

3b.-Body with 35 - 52 chaetigers. Anterior parapodia with long prechaetal lobes.....*Armandia agilis*

Family Orbiniidae Hartman, 1942.

Orbinids are burrowing worms that inhabit shallow waters to great depths. They are often found in fine sandy sediments, mainly in shallow-water bays and estuaries; however, some species have been recorded in hydrothermal vents several hundred meters deep. They vary in size: the adults from *Proscoloplos* species barely reach 4 mm in length, while some species from the genus *Orbinia* may reach 30 cm. The body consists of a large number of segments and has two regions: an anterior region, or dorsoventrally flattened muscular thoracic region, and an abdominal one that is very fragile (Taylor 1984; Blake 1996, 2000; Soliz–Weiss *et al*. 2009; Díaz–Díaz *et al*. 2012). There have been several attempts to classify family and to propose a standard terminology for defining its members, according to their morphological structures or characteristics (Pettibone 1957; Hobson & Banse 1981; Hutchings & Murray 1984; Mackie 1987; Solís–Weiss & Fauchald 1989; León–González & Rodríguez 1996; Dean & Blake 2015; Blake 2017). Thanks to phylogenetic and molecular studies (Bleidorn *et al*. 2009; Zhadan *et al*.

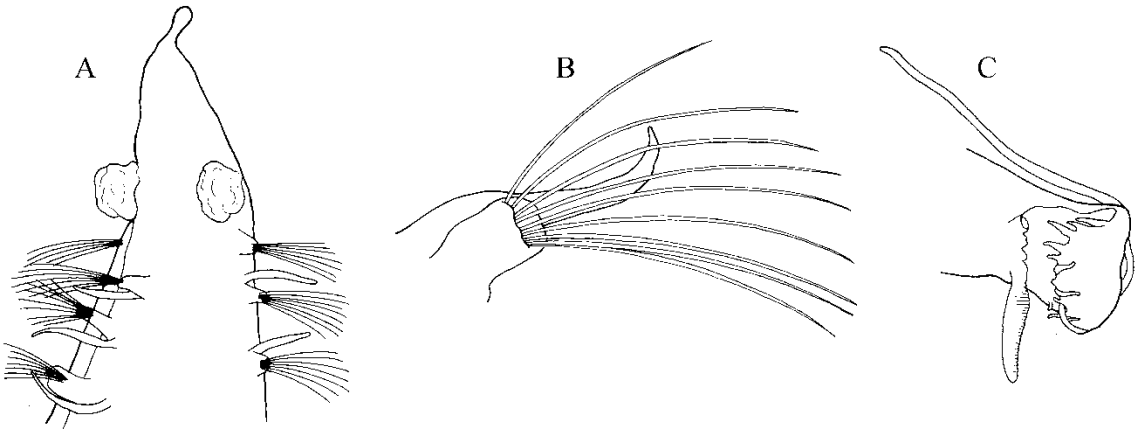

Figure 3. *Armandia agilis*: A) anterior end, DV; B) branchiferous parapod; C) posterior end, VV. (Redrawn of Díaz-Díaz & Liñero-Arana, 2011).

2015), to some extent, solving some taxonomic problems has been possible.

Traditionally, this family was divided into two major groups: Protoariciinae and Orbiniinae. However, the species *Methanoaricia dendrobranchiata* Blake, 2000, was identified in the deepwater thermal vents of the Gulf of Mexico, associated with groups of *Bathymodiolus childressi*, and the family was later divided into Methanoariciinae, Microrbiniinae, and Orbiniinae. Yet, subsequent phylogenetic-molecular studies showed that the genus *Methanoaricia* would be included within the subfamily Orbiniinae (Bleidorn 2005; Bleidorn *et al*. 2009).

The prostomium is rounded, sub-quadrangular, or conical (Fig.4A). It usually has a pair of eyes in front of the nuchal organs, and no other cephalic appendages are present. The peristomium is uni or biannulate. Yet, the latter is considered the fusion of the first segment with the peristomium. However, further investigation is necessary, especially for micro-orbinids, in which two achaetous segments are observed before the first chaetiger.

The thoracic region of most orbinids is dorso-ventrally flattened, and the abdominal region is cylindrical, generally less muscular, and more fragile. Parapodia are biramous with well-developed chaetal lobes (Figs. 4B-G). In some species (*Orbinia*), subpodal lobes are also observed. Their chaetae are capillary septate, crenulate, or tabulate (Fig. 4H). A few lyrate chaetae may be present; they usually have different types of spines (Fig. 4I) and hooks called uncini (Fig. 4J, K). In micro-orbinids, the hooks are similar to those observed in Arenicolidae and Maldanidae. Branchiae usually appear between chaetigers 2 and 30, although they are absent in some species of micro-orbinids such as *Orbiniella*. These may be small and papillate in the anterior segments; elongate with a cylindrical or foliaceous shape in the posterior ones branched or with several filaments in some species. The pygidium is usually small and has one or several pairs of cirri.

Twenty genera and a little more than 160 species have been identified worldwide. In Venezuela, seven genera and eleven species have been recorded.

Identification keys for Orbiniidae species recorded in Venezuela

1a. Peristomium consisting of two rings ....*Protoaricia* cf. *pigmentata*

1b. Peristomium consisting of a ring (Fig. 4A).....2

2a. Prostomium rounded on the anterior margin to semi-square; not pointed.....3

2b. Triangular, pointed prostomium (Fig. 4A).....4

3a. Branchiae from chaetiger 6. Lyrate chaetae in the thoracic region. Thick, smooth hooks; distally rounded.....*Naineris setosa*

3b. Branchiae from chaetiger 9. Lyrate chaetae absent. Thoracic neuropodia 1-4 with thicker hooks with hirsute tip (Fig. 4K).....*Califia* cf. *calida*

4a. Thoracic neuropodia only capillary..... *Leitoscoloplos*.....*Leitoscoloplos robustus*

4b. Some parapodia with another type of chaetae.....5

5a. With more than four subpodial and ventral papillae per parapodial branch in posterior thoracic neuropodia, and some anterior abdominal chaetigers.....*Orbinia*.....6

5b. If present, not more than four subpodial and ventral papillae on each side of posterior thoracic neuropodia (Fig. 4F).....8

6a. Branchiae present from chaetiger 6..... .....*Orbinia americana*

6b. Branchiae present from chaetiger 8.....7

7a. Interramal cirrus present in abdominal segments (Fig. 4G).....*Orbinia riseri*

7b. Interramal cirrus absent.....*Orbinia* sp.

8a.– Middle and posterior abdominal neuropodia with a thin aciculum emerging from the parapodial lobe. Branchiae usually present from segment 5 or 6.…. *Leodamas*.....9

8b.– Middle and posterior abdominal neuropodia with a thin aciculum emerging from the parapodial lobe. Branchiae usually present from segment 5 or 6..... *Scoloplos*.....11

9a.- Branchiae only on abdominal chaetigers ....*Leodamas texana*

9b.- Branchiae from chaetiger 6.....10

10a- Broadly oval and dorsoventrally depressed thoracic segments in the transversal section. Up to 28 thoracic chaetigers. Last thoracic and anterior abdominal segments with a long, tapering postchaetal lobe..... .....*Leodamas rubrus*

10b.- Flattened dorsally and rounded ventrally thoracic segments in the transverse section. Up to 24 thoracic chaetigers. With 1-2 subpodial lobes in last thoracic segments and anterior abdominal chaetigers.....*Leodamas johnstonei*

11.- Thorax with up to 17 chaetigers. Thoracic and abdominal notopodium without furcate chaetae. Bilobate thoracic neuropodial lobe. Ventral papilla absent.....…. *Scoloplos* cf. *capensis*

11b.- Thorax with up to 22 chaetigers. Abdominal notopodia with at least two furcate chaetae. Unilobate thoracic neuropodial lobe with a small notch on posterior segments. With one or two ventral papillae at the joint of the thoracic to the abdominal region.....*Scoloplos armiger*[2]

[1]Bone (1983) recorded *Scoloplos (Leodamas) uniramus* for Punta Morón; however, this species was reallocated to *Leodamas johnstonei* (Day, 1934). Yet, since this species' type locality is South Africa, its presence in Venezuela is uncertain. After Bone's record (1983), it has not been recorded again.

[2]The presence of this species in Venezuela is uncertain because its type locality is Norway.

[*]Jiménez & Liñero-Arana (1993) recorded *Haploscoloplos* sp. for Bahía de José, Anzoátegui, but the species of this genus were reallocated to *Leodamas*. Unfortunately, there is no taxonomic data on the specimen reported in that study; therefore, it is not included in the key.

Family Paraonidae Cerruti, 1909

Paraonids are a small group of little-known polychaetes, mainly because most of them have been recorded in deep waters. Most have a small size, do not exceed 40 mm in length, although they may consist of numerous segments (up to 200). Their bodies are fragile and easily fragmented.

The prostomium is usually rounded or slightly conical and fused with the peristomium. Eyes may be present or absent. Some species also have ciliated grooves in the anterolateral region of the prostomium. They can be recognized by the presence of a median antenna on the prostomium, which is very fragile. This antenna may be long or short, smooth, articulated, or branched in some cases; however, it is absent in some genera (*Paraonis, Paraonides, Levinsenia*). A distal eversible organ, or palpode, may be present at the anterior end of the prostomium (*Paraonis fulgens*, *Levinsenia*). The peristomium may be limited to the region around the mouth. Parapodia are biramous and have protruding parapodial lobes with numerous chaetae, short postchaetal lobes, or elongated cirriform structures, commonly dorsal. The ventral ones, if present, are small. A tiny interramal papilla may be present in the anterior region of some species (*Aricidea (Acmira) laubieri*). The chaetae are capillaries on both branches; some genera (*Cirrophorus, Paradoneis*) may also have furcate or lyrate chaetae. The neuropodium usually has robust spines that may end in hooks, spines, or hoods (*Aricidea* and *Paraonis*).

Branchiae are foliaceous or thin, ciliated, with several blood vessels. They are arranged in pairs and

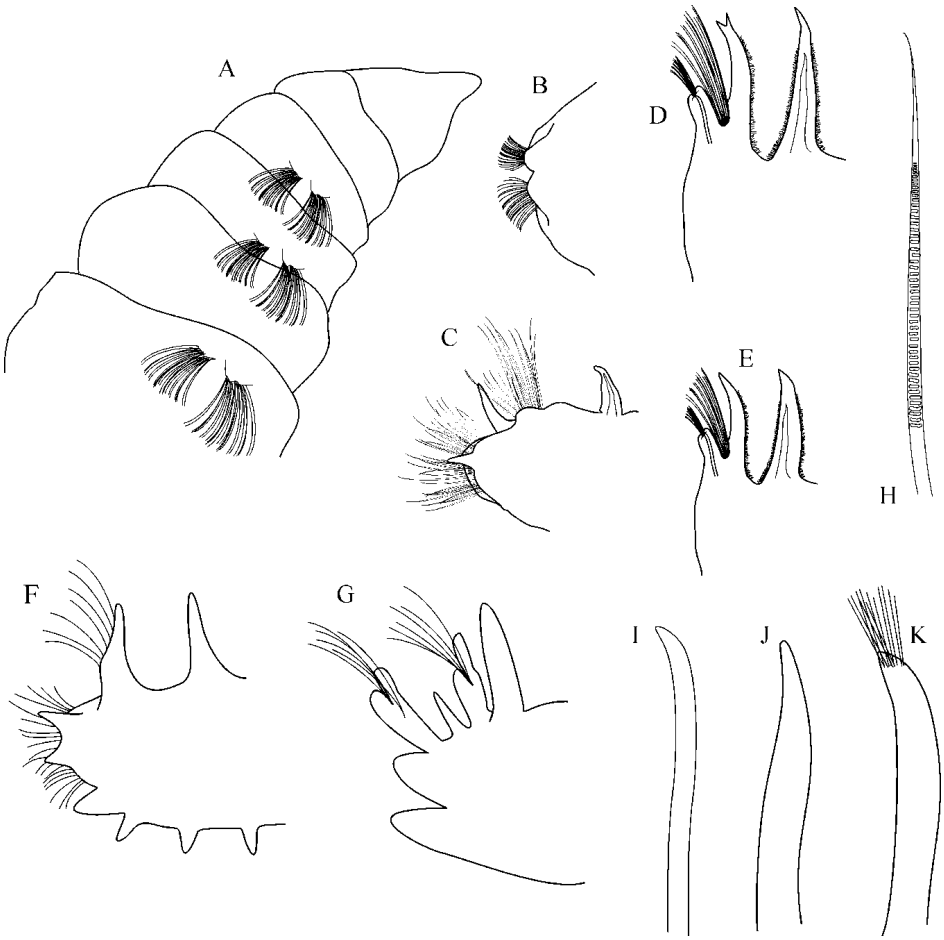

Figure 4. *Leitoscoloplos robustus* A) anterior end, LV, B) first chaetifer, AV; C) posterior thoracic parapod; D-E) abdominal parapods; *Scoloplos* sp: F) posterior thoracic parapod; *Orbinia riseri*: G) posterior abdominal parapod; H) crenulated chaeta; I) acicular spine; J); K) brush tip hook. (A-K: redrawn of Díaz-Díaz *et al*; 2012).

slightly displaced to the dorsum of the parapodium. Branchiae are present in the anterior segments (between 8 and 60) and may begin between chaetigers 4 to 18. Prebranchial and branchial regions are more flattened and muscularized than the postbranchial region. The pygidium usually has three cirri, although species with two and up to eight cirri have been described.

At present, 87 species are recognized worldwide, although several authors imply that the total number of undescribed paraonids is very high. Three genera and 13 species have been recorded on the coasts of Venezuela.

Identification keys for Paraonidae species recorded in Venezuela

1a.- With modified (Figs. 5A-F, H, I), furcate notochaetae or lyrate spines (Figs. 5K-J). With or without median antenna.....2

1b.- With or without modified chaetae (Fig. 5G); if present, they are located in the postbranchial region and are never lyrate.....3

2a.- Without median antenna. Lyrate chaetae from chaetigers 5-6. With 11-15 pairs of branchiae. Without neuropodial hooks on the posterior chaetigers.....*Paradoneis lyra*

2b.- With median antenna.....*Cirrophorus americanus*

3a.- With median antenna (may have been lost).....4

3b.- Without median antenna.....(*Levinsenia*).....13

4a.- Modified chaeta, similar to a thick capillary chaeta; abruptly elongated, ending in a long, slender arista (Figs. 5H).....*Aricidea* (*Strelzovia*).....

modified, capillary, thick chaetae with very thin terminal aristae.....*Aricidea* (*Strelzovia*) *suecica*

4b.- Modified, geniculate or curved chaetae without subterminal spine (Fig. 5E), or as a stout hook with or without accessory spine, arista or pubescence (Fig. 5A) 5

5a.- Modified, geniculate or curved chaetae without subterminal spine....*Aricidea* (*Aricidea*).....7

5b.- Modified chaeta as a stout hook with or without accessory spine, arista, or pubescence...*Aricidea* (*Acmira*).....8

7a.- Long median antenna, reaching to chaetiger 5; articulated with 3-6 joints and up to 18 pairs of branchiae.....*Aricidea (Aricidea)* cf. *wassi*

7b.- Short, smooth, subulate median antenna, reaching to chaetiger 2 with up to 60 pairs of branchiae.....*Aricidea* (*Aricidea*) cf. *fragilis*

8a.- Bifid antenna (bilobate)..... .....*Aricidea* (*Acmira*) *philbinae*

8b.- Unilobate antenna.....9

9a.- Modified, bidentate chaetae with arista at distal end (Figs, 5C, F).....10

9b.- Modified, unidentate chaetae with or without arista at distal end (Figs. 5B, E).....11

10a.- Distally thinned antennae, reaching the anterior margin of chaetiger 2. Eyes present. 23 pairs of branchiae.....*Aricidea* (*Acmira*) *lopezi*

10b.- Rounded antenna, reaching to chaetiger 1. Eyes absent. 11-15 pairs of branchiae..... .....*Aricidea* (*Acmira*) cf. *taylori*

11a.- Modified, unidentate chaetae with arista at distal end.....*Aricidea* (*Acmira*) *catherinae*[1]

11b.- Modified, unidentate chaetae without arista at the distal end.....12

12a.- Modified setae with sheath (Fig. 5B); 9-11 branchiae pairs; prostomium with a protuberance at tip .....*Aricidea* (*Acmira*) *cerrutii*

12b.- Modified, strongly curved chaetae without a sheath (Fig. 5E). 13-17 pairs of branchiae. Prostomium without protuberance at tip.....*Aricidea* (*Acmira*) *simplex*

13a.- Modified, bidentate chaetae (hook-shaped) (Fig. 5N) arranged in rows of 5 chaetae....*Levinsenia reducta*

13b.- Modified, unidentate chaetae (Fig. 5M)..... .....*Levinsenia gracilis*

[1] Uncertain species because its type locality is the Mediterranean Sea.

Family Scalibregmatidae Malmgren, 1867

Scalibregmatid polychaetes are uncommon in the Caribbean Sea. They can be found in numerous groups in northwestern Europe, distributed from shallow waters to depths over 1000 m, even in hadal zones (more than 9000 m). Scalibregmatid polychaetes are small to medium-sized organisms, not exceeding 60 mm in length and having between 30 and 60 segments. Most of them inhabit buried in soft sediments. Although they are not tube-building polychaetes, they build sediment galleries and are considered deposit-feeding organisms. A few species are the exception to the rule. Martínez *et al*. (2013) refer to *Axiokebuita cavernicola* Martínez, Di Domenico & Worsaae, 2013, and *Speleobregma lanzaroteum* Bertelsen, 1986, as species inhabiting marine caves and pools with underground connection to the sea on the Canary Islands. They inhabit very coarse sediments to which they adhere due to adhesive glands present in the pygidium and might be suspensivorous (Blake 2016).

The body of scalibregmatid polychaetes may be short, broad, and cylindrical. They may be tapering at the anterior and posterior ends (*Polyphysia* Quatrefages, 1886) or elongate and anteriorly flared or hammer-shaped (*Scalibregma* Rathke, 1843; *Scalibregmides* Hartmann–Schröder, 1965; *Scalibregmella* Hartman & Fauchald, 1971; *Speleobregma* Bertelsen, 1986). However, a few species have elongated, slender bodies, such as *Axiokebuita* Pocklington & Fournier, 1987. Their surface is rough, areolate; the segments may have 1 to 6 rectangular pad rings of varying sizes. The body is not clearly segmented, but the parapodial structure may differ in the posterior segments of some taxa. According to Blake (2016), some species have a prominent ventral groove, and they consider that this characteristic should be considered in the future. The prostomium may be bifid as members of the genus *Polyphysia* or may have two processes or frontal or lateral horns as in *Scalibregma* or *Sclerocheilus* Grube, 1863. According to Orrhage (1993), these would represent palps. *Axiokebuita* and *Speleobregma* have many cilia that could collect food particles from the water column and take them to the

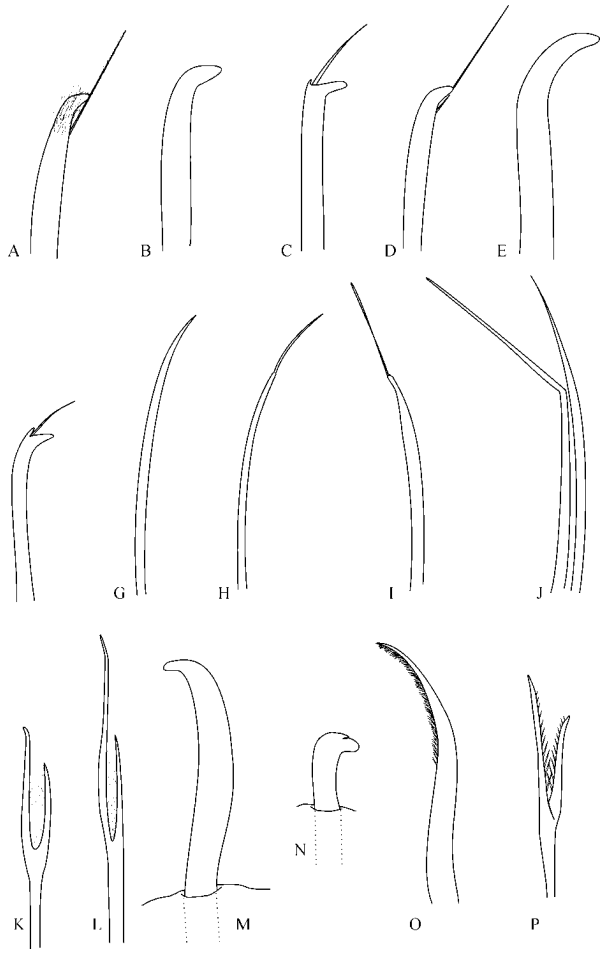

Figure 5.- A-F, H.-J, M-N) modificated chaetae of Paraonidae species; G) capillary chaetae; K,L) lyrated chaetae of Paraonidae species; P) lyrated chaetae od Scalibregmatidae species; O) acicular chaetae of *Asclerocheilus mexicanus*. (A-N: Redrawn of Díaz-Díaz *et al.*, 2009; O-P: redrawn of Díaz-Díaz *et al.*, 2004).

mouth. Eyes may be present on the prostomium; a pair of eversible nuchal organs may be located on the posterior margin of the prostomium. The peristomium is distinct from the prostomium; it forms a dorsal ring and 1 to 3 ventral rings that fuse and form the upper and lower lips of the mouth. Parapodia are biramous with a simple, short, conical, or truncated chaetal lobe. In the posterior segments of some genera, the parapodia may have dorsal and ventral cirri (*Scalibregma* and *Oligobregma* Kudenov & Blake, 1978). Some can have only ventral cirri (*Parasclerocheilus* Fauvel, 1928 and *Sclerocheilus*), and they are absent in other genera (*Asclerocheilus* Ashworth, 1901 and *Polyphysia*). The interramal papilla is present in some taxa (*Scalibregma*); it can be homologous of the lateral organs of other taxa located in the same position. In *Scalibregmides* the noto- and neuropodial postchaetal lamella is very prolonged. Branchiae may be present on the anterior segments and are branched structures emerging from the dorsal part of the base of the notopodia.

Chaetae are all simple, can be capillary and lyrate (Fig. 5P). In some cases, they have thick recurved acicular spines distributed anteriorly on segments 1-4 (Fig. 5O), as in the genera *Asclerocheilus, Parasclerocheilus, Sclerobregma* Hartman, 1965, and *Sclerocheilus*. The pygidium is usually small and simple, and the margin is smooth (*Polyphysia*) or with numerous cirri (*Asclerocheilus*).

The family includes 15 genera and about 70 recognized species worldwide, but according to Blake (2016), this polychaete diversity is underestimated mainly because many species inhabit deep water and difficult-to-sample habitats. Three species have been recorded in Venezuela, of which *Scalibregma inflatun* and *Hyboscolex longiseta* are uncertain because their type locality is Norway and South Africa, respectively.

Identification keys for Scalibregmatidae species recorded in Venezuela

1a. Neither dorsal nor ventral cirri present. Eyes present or absent. Branchiae present or absent. Acicular spines present or absent.....2

1b. At least ventral cirri present. Eyes absent. Branchiae present. Acicular spines absent.....*Scalibregma inflatun*

2a. Acicular chaetae with a curved, hirsute distal end; arranged in two transversal rows; only present on the notopodium of chaetiger 1. Branchiae present too. Eyes absent. Reduced parapodia on posterior segments. Pygidium with three digitiform anal cirri .....*Asclerocheilus mexicanus*

2b. Acicular chaetae on anterior chaetigers. Branchiae absent. Eyes present. Parapodia reduced. Pygidium with five digitiform anal cirri.....*Hyboscolex longiseta*[1]

[1]Since this species' type locality is South Africa, its presence in Venezuela is uncertain. Day (1973) recorded this species for North Carolina. *Hyboscolex longiseta* is similar to *H. quadricincta* (Kudenov 1985), identified for the Gulf of Mexico. The former can be distinguished from the latter by the presence of smooth capillary chaetae instead of spiny ones due to the poor development of the

parapodial lobes and the number of anal cirri. Díaz-Díaz & Liñero-Arana (2004) recorded *H. longiseta* based on three specimens of which the longest on had 3 mm length, but which could be *H. quadricincta* Kudenov, 1985. No other specimens of *Hyboscolex* have been obtained so far to determine its identity.

Family Travisiidae Hartmann–Schröeder, 1971

Travisiidae is a small family composed of 36 recognized species assigned to the genus *Travisia* Johnston, 1840. They inhabit buried in soft sediments, from coarse sand to fine sands, but without building permanent tubes or galleries. Members of this family have relatively short, thick, spindle-shaped to club-shaped bodies with both tapering ends. The body surface is rough or areolate, has ringed segments, having the posterior segments papillae-like structures of different sizes. The prostomium is small, smooth, rounded, conical, sharp, or truncate without prostomial appendages or eyes. Nuchal organs are present at the posterolateral border as indentations. The peristomium is formed by a ring. Parapodia are biramous with reduced or completely absent setal lobes. Annular parapodial structures are usually modified in the posterior segments, forming lateral, dorsal, and ventral flaps on the parapodia. These may be short and distally rounded or elongated leaf-shaped, tapered or triangular. Branchiae may be present from segments 2-3, along the body, and on some posterior ones. They are simple, cirriform, short or long, covered by a procuticle, and without ciliated margins. They lack gland cells, which completely distinguish them from ophelid polychaetes. Only *T. palmeri* and *T. chiloensis* have ringed branchiae. Branchiae distribution and length are of taxonomic value. All chaetae are capillary. The pygidium is usually very short and relatively simple, sometimes with several lobes and often with short papillae (Hartmann-Schröder 1971; Blake& & Maciolek 2016).

For the Caribbean region, Santos (1977) recorded *T. hobsonae* Santos, 1977, in coastal waters of Florida, which are associated with fine and medium sands. There is only a single record for La Tortuga Island, Venezuela made by Hartman (1944) that could be *T. hobsonae*. However, no other travisids species have been recorded since then.

REFERENCES

Ashworth, J.H. 1901 The anatomy of *Scalibregma inflatum* Rathke. Q. J. Microsc., 45, 237–309.

Benham. W.B. 1894. Suggestions for a new classification of the Polychaeta. *Rep. Brit. Asso. Advan. Sci*., 1894: 669–697.

Benham, W. B. 1896. Archiannelida, Polychaeta, Myzostomidaria. In: S. F. Harmer & A. E. Shipley (eds.). The Cambridge Natural History. Macmillan, London, pp. 241 - 334.

Bertelsen, R.D. 1986. *Speleobregma lanzaroteum*, a new genus and species of Scalibregmatidae (Polychaeta) from a marine cave in the Canary Islands. *Proc. Biol. Soc. Wash.*, 99(3): 375–379.

Blake, J. 1981. The Scalibregmatidae (Annelida: Polychaeta) from South American and Antarctic Seas, collected chiefly during the cruises of the R/V Anton Bruun, R/V Hero and USNS Eltanin. *Proc. Biol. Soc. Wash.,* 94(4):1131-1162

Blake, J.A. 2000. Chapter 7. Family Opheliidae Malmgren, 1867. In: Blake, J.A., Hilbig, B., & Scott, P.V. (eds.). *Taxonomic atlas of the Santa Maria Basin and Western Santa Barbara Channel.* Vol. 7. Annelida Part 4. Polychaeta: Flabelligeridae to Sternaspide. Santa Brabara Museum of Natural History, Santa Barbara: 145-168.

Blake, J. 2015. New species of Scalibregmatidae (Annelida, Polychaeta) from the East Antarctic Peninsula including a description of the ecology and post-larval development of species of *Scalibregma* and *Oligobregma. Zootaxa.* 4033 (1): 57-93

Blake, J.A. 2011. Revalidation of the genus *Thoracophelia* Ehlers, 1897, replacing *Euzonus* Grube, 1866 (Polychaeta: Opheliidae), junior homonym of *Euzonus* Menge, 1854 (Arthropoda: Diplopoda), together with a literature summary and updated listing of *Thoracophelia* species. *Zootaxa*, 2807: 65-68.

Blake, J.A. 2016. Scalibregmatidae Malmgren, 1867: 1–35; *en*: *Handbook of Zoology Online*, Westheide & Purschke (Eds.); Handbook of Zoology A Natural History of the Phyla of the Animal Kingdom. Annelida: Polychaetes. Published on line. http://www.degruyter.com/view/zoology/bp_029147–6_73**.**

Blake, J.A. 2017. Polychaeta Orbiniidae from Antarctica, the Southern Ocean, the Abyssal Pacific Ocean, and off South America. *Zootaxa*, 4218(1):1–145.

Blake, J.A. & N.J. Maciolek. 2016a. Opheliidae Malmgren, 1867: 1-17. In: Westheide, Purschke & Böggemann (eds.), *Handbook of Zoology*, *a Natural History of the Phyla of the Animal Kingdom.* Published online. http://www.degruyter.com/view/Zoology/bp_029147-6_7S.

Blake, J.A.& N.J. Maciolek. 2016b. Travisiidae Hartmann-Schröder, 1971, New Family Status. *In*: Westheide, W.; Purschke, G. (eds.). *Handbook of Zoology*. pp.10, De Gruyter, available online at http://www.degruyter.com/view/Zoology/bp_029147-6_75 page(s): unpaginated.

Bleidorn, C. 2005. Phylogenetic relationships and evolution of Orbiniidae (Annelida, Polychaeta) based on molecular data. *Zool. J. Linn. Soc*., 144:59–73.

Bleidorn, C., N. Hill, C. Ersèus & R. Tiedemann. 2009. On the role of character loss in orbiniid phylogeny (Annelida): Molecules vs. Morphology. *Mol. Phylogen. Evol.*, 52:57–69.

Bone, D., V. Doering & P. Penchaszadeh. 1983. *Macrofauna Bentónica en los Fondos Arenosos de Punta Moron y su Relación con la Descarga del Efluente Térmico de la Planta Centro*. Informe final de la Fase II del Proyecto por contrato CADEFE-USB, INTECMAR. 63-94.

Day, J.H. 1973. New Polychaeta from Beaufort, with a key to all species recorded from North Carolina. NOAA Technical Rep NMFS Circ 375:153.

Dean, H.K. & J.A. Blake. 2015. The Orbiniidae (Annelida: Polychaeta) of Pacific Costa Rica. *Zootaxa*, 3956 (2): 183–198.

Díaz-Díaz, O. & I. Liñero-Arana. 2004. Nuevos registros de Scalibregmatidae (Annelida: Polychaeta) de la región nororiental de Venezuela. *Bol. Centro Invest. Biol.*, 38 - 1, pp. 32 - 40.

Díaz-Díaz; O., I. Liñero-Arana; A. Cárdenas-Oliva; V. Vanegas-Espinosa; O.E. Díaz-Pérez. 2009. Paraonidae Cerruti, 1909 (Annelida: Polychaeta) de la costa sur del Gran Caribe.*Bol. Cent. Invest. Biol. Univ. Del Zulia*,. 43(3): 437 - 461.

Díaz-Díaz, O. & I. Liñero-Arana. 2011. Nuevas adiciones de poliquetos (Annelida: Polychaeta) para el golfo de Cariaco, Venezuela II: Sedentarios. *Bol. Inst. Oceanogr. Vzla. Univ. Oriente.*50 - 2, pp. 183 - 208.

Díaz-Díaz, O. & A. Cárdenas-Oliva. 2012. Primer registro de un arenicólido (Annelida: Polychaeta: Arenicolidae) para Venezuela. *Bol. Centro Invest. Biol*., 46(1): 63-71.

Díaz-Díaz, O., V. Vanegas-Espinosa; A. Cárdenas-Oliva; I. Liñero-Arana. 2012. Orbiniidae Hartman, 1942 (Annelida: Polychaeta) de las costas de Venezuela. *Biota Colombiana*. 13(1): 3 - 20.

Diaz-Diaz, O., D. Bone & A. Lopez-Ordaz. 2014. Polychaetes associated to soft bottoms, from Los Roques, Venezuela: Scolecida. *PANAMJAS*, 9(4): 301-311.

Díaz–Díaz, O. & N. Rozbaczylo. 2021. *Poliquetos bentónicos en Chile asociados a hábitats vulnerables.* Diaz–Díaz, O. & N. Rozbaczylo (eds.). Santiago, Chile, 204 pp.

Díaz-Díaz, O, D. Bone & A. López-Ordaz. 2016. Poliquetos de fondos blandos del golfo de Venezuela: Clado Scolecida. *Bol. Inst. Oceanogr. Venezuela*. 55 (2): 22-33.

Díaz-Díaz, O., D. Bone. & C.T. Rodríguez. 2017. Estado del Conocimiento de los poliquetos de Venezuela. *Pub. Esp. Bol. Inst. Oceanogr. Venezuela*, 127-143.

Egremy-Valdez, A. 2009. 13. Cossuridae Day, 1963. 149 – 152. En: Poliquetos (Annelida: Polychaeta) de México y América Tropical. Eds. de León-González J.A., J.R. Bastida-Zavala, L.F. Carrera-Parra, M.E. García-Garza, A. Peña-Rivera, S.I. Salazar-Vallejo y V. Solís-Weiss. Universidad Autónoma de Nuevo León, Monterrey, México, 737 pp.

Ewing, R.M. 1984a. Familia Capitellidae. 2(14): 1-47. In: Taxonomic guide to the polychaetes of the northern Gulf of Mexico. Eds. J.M. Uebelacker, P.G. Johnson & B.A. Vittor. Final Report to the Mineral Management Service, contract 14-12-001-29091. Barry A. Vittor & Associates, Inc., Mobile, Alabama, 7 Vols.

Ewing, R.M. 1984b. Family Cossuridae Day, 1963. 4: 1-6. In Taxonomic Guide to the Polychaetes of the Northern Gulf of Mexico. Eds. J.M. Uebelacker & P.G. Johnson. Final Report to the Minerals Management Service, contract 14-12-001-29091. Barry A. Vittor & Associates, Inc., Mobile, Alabama, 7 Vols.

Fauchald, K. 1972. Benthic polychaetous annelids from deep water off Western Mexico and adjacent

areas in the Eastern Pacific Ocean. *Allan Hancock Foundation University of Southern California*, 7: 1–155.

Fauvel, P. 1925. Sur les Ophéliens des côtes de France. *Bull. Soc. Zool. France*, 50: 77-88.

Fauvel, P. 1928. Annélides Polychètes nouvelles de l'Inde. II. *Bull. Mus. Hist. Nat. Paris*, 34(2): 159–165.

García-Garza, M.E. & J.A. De León-González. 2011. Review of the Capitellidae (Annelida, Polychaeta) from the Eastern Tropical Pacific region, with notes on selected species. *ZooKeys,* (151): 17-52.

Grube, A.E. 1863. Beschreibung neuer oder wenig bekannter Anneliden. Sechster Beitrag. *Arch. Nat., Berlin*. 29: 37-69

Hartman, O. 1944. Polychaetous Annelids. *Allan Hancock Atl. Exp*., 3: 1-33.

Hartman, O. 1947. Polychaetous Annelids Part VII. Capitellidae. *Allan Hancock Pacific Expeditions, California*, 10: 391-481.

Hartman, O. & K. Fauchald. 1971. Deep–water benthic polychaetous annelids off New England to Bermuda and other North Atlantic Areas. Part II. *Allan Hancock Monogr. Mar. Biol.*, 6: 1–327.

Hartmann–Schröder, G. 1965. Die Polychaeten des Sublitorals. IN: Hartmann–Schröder, G. and Gerd Hartmann, Zur Kenntnis des Sublitorals der chilenischen Küste unter besonderer Berücksichtigung der Polychaeten und Ostracoden. (Mit bemerkungen über den Einfluss sauerstoffarmer Strömungen auf die Besiedlung von marien Sedimenten.). *Mitt. Hamb. Zool. Mus. Inst*., 62: 59–305.

Hartmann-Schröder, G. 1971. Annelida, Borstenwürmer, Polychaeta 1-594. IN: Dahl, Maria and Peus, Fritz (Ed.). Vol. 58. Tierwelt Deutschlands und der angrenzenden Meeresteile nach ihren Maermalen und nach ihrer Lebensweise. Gustav Fischer Verlag. Jena. Pp: 594.

Hobson, K.D. & K. Banse. 1981. Sedentariate and archiannelid polychaetes of British Columbia and Washington. *Can. Bull. Fish. Aqua. Sci.,* 209: 144 pp.

Hutchings, P. & A. Murray. 1984. Taxonomy of Polychaetes from the Hawkesbury River and the southern estuaries of New South Wales, Australia. *Rec. Aust. Mus*., 3, 1–118. http://dx.doi.org/10.3853/j.0812–7387.3.1984.101

Jiménez, M. & I. Liñero. 1993. Estructura del macrozoobentos del área de Jose, Edo. Anzoátegui, Venezuela. *Bol. Inst. Oceanogr. Venezuela. Univ. Oriente*. 32 (1 & 2): 57-168.

Johnston, G. 1840. Miscellanea Zoologica British Annelids. *Ann. Mag. Nat. Hist.,* 1(4): 368-375,

Kinberg, J.G.H. 1866 [or 1867]. Annulata nova. [Continuatio.]. *Öfver. König. Veten. Akad. Förhand. Stockholm*. 23(9): 337-357

Kongsrud, J.A.; Rapp, H.T. 2012. *Nicomache* (*Loxochona*) *lokii* sp. nov. (Annelida: Polychaeta: Maldanidae) from the Loki's Castle vent field: an important structure builder in an Arctic vent system. *Polar Biol.,* 35(2), 161-170.

Kudenov, J.D. 1985. Four New Species of Scalibregmatidae (Polychaeta) from the Gulf of Mexico, with Comments on the Familial Placement of *Mucibregma* Fauchald and Hancock. *Proc. Biol. Soc. Wash.,* 98(2): 332-340.

Kudenov, J.D. & J.A. Blake. 1978. A review of the genera and species of the Scalibregmidae (Polychaeta) with descriptions of one new genus and three new species from Australia. *J. Nat. Hist*., 12:4, 427-444,

Kükenthal, W. 1887. Ueber das Nervensystem der Opheliaceen. *Jen. Zeit. Natur*., 20: 511-580.

Langerhans, P. 1881. Ueber einige canarische Anneliden. *Nova Acta Leop. Carol*. 42: 93-142.

León–González, J.A. De & J.A. Rodríguez. 1996. Orbiniidae (Polychaeta) from soft bottom of the western coast of Baja California Peninsula, Mexico. *Bull. Mar. Sci*., 59 (1): 169–174.

Light, W.J. 1974. Occurrence of the Atlantic maldanid Asychis elongata (Annelida, Polychaeta) in San Francisco Bay, with comments on its synonymy. *Proc. Biol. Soc. Wash.,* 87:175–184.

Light, W.J. 1991 Systematic revision of the genera of the polychaete subfamily Maldaninae Arwidsson (sic). *Ophelia Suppl.,* 5:133–146.

Liñero-Arana, I. 1996. Capitellidae (Annelida: Polychaeta) from the north-eastern coast of Venezuela. *Caribb. Mar. Stud*. 5: 51-57.

Liñero Arana, I. & O. Díaz Díaz. 2010. A new species of Cossuridae (Annelida: Polychaeta) from Venezuela. *Interciencia*, 35 (10): 789 - 792.

Mackie, A.S.Y. 1987. A review of the species currently assigned to the genus *Leitoscoloplos* Day, 1977 (Polychaeta: Orbiniidae), with descriptions of species newly referred to Scoloplos Blainville, 1828. *Sarsia*, 72: 1–28.

Martínez, A., M. Di Domenico & K. Worsaae. 2013. Evolution of cave *Axiokebuita* and *Speleobregma* (Scalibregmatidae: Annelida). *Zool. Scr.,* 42(6): 623–636.

Nogueira, J. de Matos & A. Rizzo. 2001. A new species of *Branchiomaldane* (Polychaeta: Arenicolidae) from the State of Sao Paulo, south-eastern Brazil. *J. Mar. Biol. Ass. U.K.*, 81(3): 415-421.

Orrhage, L. 1993. On the microanatomy of the cephalic nervous system of Nereidae (Polychaeta) with a preliminary discussion of some earlier theories on the segmentation of the polychaete brain. *Acta Zool*. 74(2): 145-172.

Pamungkas, J., C.J.Glasby, G.B. Read, S.P. Wilson & M.J. Costello. 2019. Progress and perspectives in the discovery of polychaete worms (Annelida) of the world. *Helgoland Marine Research*, 73 (4): 1–10.

Pettibone, M. 1957. North American genera of the family Orbiniidae (Annelida: Polychaeta), with descriptions of new species. *J. Wash. Acad. Sci*., 47 (5): 159–167

Pocklington, P. & Fournier, J.A. 1987. *Axiokebuita millsi*, new genus, new species, (Polychaeta: Scalibregmatidae) from eastern Canada. *Bull. Biol. Soc. Wash.,* 7: 108–113.

Quatrefages, A. de. 1850. Études sur les types inférieurs de l'embranchement des annelés. Mémoire sur le système nerveux des annélides proprement dites. *Ann. Sci. Nat. Paris*. Série 3, 14: 329-398.

Quatrefages, A. de. 1866. On the Classification of the Annelides, *An. Mag. Nat. Hist*., 17(97): 1-24.

Rathke, H. 1843. Beiträge zur Fauna Norwegens. *Nov. Act. Acad. Caes. Leopol. Carol. Nat. Curios, Breslau & Bonn*. 20: 1–264.

Rouse, G.W. & K. Fauchald. 1997. Cladistics and polychaetes. *Zool. Scr*., 26(2): 139–204.

Rouse, G. & F. Pleijel. 2001. Polychaetes. Oxford University Press, Oxford.

Rozbaczylo, N. & I. Zamorano. 1970. *Euzonus* (*Thoracophelia*) *heterocirrus* n. sp. (Polychaeta: Opheliidae). *Not. Mens. Mus. Nac. Hist. Nat*., 71: 6–10.

Salazar Vallejo, S. & O. Díaz-Díaz. 2009. Maldanidae. Poliquetos (Annelida: Polychaeta) de México y América Tropical.2, pp. 291 - 310. de León-González JA, JR Bastida-Zavala, LF Carrera-Parra, ME García-Garza, A Peña-Rivera, SI Salazar-Vallejo y V Solís-Weiss (Eds)Universidad Autónoma de Nuevo León, Monterrey, México, 751 pp.

Salazar Vallejo, S. & O. Díaz-Díaz. 2021. Maldanidae. Poliquetos (Annelida: Polychaeta) de México y América Tropical.2, *En prensa*. de León-González JA, JR Bastida-Zavala, LF Carrera-Parra, ME García-Garza, A Peña-Rivera, SI Salazar-Vallejo y V Solís-Weiss (Eds)Universidad Autónoma de Nuevo León, Monterrey, México, *En prensa*.

Santos, S. L. 1977. A new species of *Travisia* (Polychaeta, Opheliidae) from Tampa Bay, Florida. Proc. Biol. Soc. Wash., 89(49): 559-564.

Solís–Weiss, V. & K. Fauchald. 1989. Orbiniidae (Annelida: Polychaeta) from mangrove root–mats in Belize, with a revision of protoariciin genera. *Proc. Biol. Soc. Wash*., 102:772–792.

Solís–Weiss, V., M. Hermoso–Salazar, A. Barbosa–López & P. Hernández–Alcántara. 2009. 33. Orbiniidae Hartman, 1942: 379–390. En de León–González JA, JR Bastida–Zavala, LF Carrera–Parra, ME García–Garza, A Peña–Rivera, SI Salazar–Vallejo y V Solís–Weiss (Eds). *Poliquetos (Annelida: Polychaeta) de México y América Tropical.* Universidad Autónoma de Nuevo León, Monterrey, México, 737 pp.

Taylor, J.L. 1984 Family Orbiniidae Hartman, 1942. In: JM Uebelacker & PG Johnson (eds) *Taxonomic guide to the polychaetes of the Northern Gulf of Mexico*. Vol 5. Barry A Vittor and Assoc Inc Mobile Alabama, pp 1–38.

Verrill, A. E. 1873. XVIII. Report upon the invertebrate animals of Vineyard Sound and the adjacent waters, with an account of the physical characters of the region. Report on the condition of the sea fisheries of

the south coast of New England [later becomes Rep. U.S. Comm. Fish., 1: 295-778

Wolf, P.S. 1984. Family Maldanidae Malmgren, 1867. 2(15): 1–21. J.M. Uebelacker, P.G. Johnson & B.A. Vittor. (eds), *Taxonomic Guide to the Polychaetes of the Northern Gulf of Mexico*. Final Report to the Mineral Management Service, contract 14-12-001-29091. Barry A. Vittor & Associates, Inc., Mobile, Alabama, 7 Vols.

Zhadan, A., A. Stupnikova & T. Neretina. 2015. Orbiniidae (Annelida: Errantia) from Lizard Island, Great Barrier Reef, Australia with notes on orbiniid phylogeny. *Zootaxa*, 4019 (1): 773–801.

Recibido: 04 Agosto 2021
Aceptado: 15 Septiembre 2021