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# The polyclads (Platyhelminthes: Polycladida) from the Tropical Eastern Pacific: Commented checklist and description of a new species

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**Abstract.** In the Tropical Eastern Pacific (TEP), while knowledge of the order Polycladida is longstanding, at the moment no study has synthesized how many and which species are known from this region. In this work, a new species of polyclad from the Oaxaca coast, *Callioplana marianae* sp. nov., is described. It is characterized by a beige background with light brown and white pigmentation, nipple-shaped nuchal tentacles, cerebral and tentacular eyes, an oval seminal vesicle, a penis papilla armed with a filiform stylet, and a tripartite Y-shaped Lang's vesicle. An exhaustive review of polyclad studies in the TEP over 173 years (1851–2024) yielded a checklist of 82 species belonging to 53 genera and 22 families have been recorded, with 53 species (66.25%) first described in the region. The countries with the highest number of recorded species are Mexico (45 spp.), Ecuador (18 spp.), Costa Rica (10 spp.), Panama (10 spp.), and Peru (7 spp.). The family with the most species in the region was Leptoplanidae (9 spp.). The best represented genera were *Leptoplana* (5 spp.) and *Paraplanocera* (4 spp.). *Planocera pellucida*, *Paraplanocera oligoglena*, and *Pseudobiceros splendidus* are species with pantropical distribution. *Koinostylochus burchami* and *Armatoplana panamensis* have the deepest known distributions at 70 and 73 meters, respectively.

**Keywords.** Bibliographic revision, *Callioplana*, flatworms, Leptoplanidae, *Paraplanocera*.

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## Introduction

The order Polycladida Lang, 1884, traditionally has been traditionally included within the class Turbellaria Ehrenberg, 1831 in the phylum Platyhelminthes Minot, 1876; however, currently Turbellaria is considered a paraphyletic group due to the lack of valid characters establishing its monophyly. Ehlers (1986) reorganized the group to include Polycladida within the Rhabditophora Ehlers, 1985 clade, based on the presence of rhabdites, a glandular-muscular adhesive system, and multiciliate end cells present in protonephridia. Based on phylogenetic inferences, polyclads occupy a relatively basal branching position in the clade (Laumer *et al*. 2015).

Polyclads are dorsoventrally flattened, non-segmented flatworms (Hyman 1951) that inhabit a wide range of environments, including semi-terrestrial (Newman & Cannon 1997), freshwater (Faubel 1983), and predominantly marine environments where these flatworms are found in both pelagic and benthic zones (Freeman 1933; Hyman 1951; Faubel 1984a). Benthic polyclads are distributed from the supralittoral zone (Newman & Cannon 2003) to the bathyal zone (2660 meters) (Quiroga *et al.* 2006). They are particularly diverse on rocky coasts and coral reefs, and often form symbiosis with other invertebrates such as sponges, cnidarians, mollusks, crustaceans, and echinoderms (Hyman 1951; Pineda-López & González-Bulnes 1984; Newman & Cannon 2003; Ramos-Sánchez *et al.* 2019, 2021).

Worldwide, ~977 polyclad species have been described, distributed in 181 genera and 43 families. Of these species, approximately 516 belong to the suborder Acotylea Lang, 1884 (characterized by the absence of a ventral sucker), while 461 are classified within the suborder Cotylea Lang, 1884 (characterized by the presence of a ventral sucker located posterior to the female gonopore) (Martín-Durán & Egger 2012; Tyler *et al.* 2006–2023). The polyclad fauna of the Tropical Eastern Pacific was for more than a century almost exclusively studied by North American (e.g., Hyman) or European (e.g., Faubel) researchers (Brusca 1980). It is only in recent years that local researchers started such studies. However, at the moment there is no synthetic study of the number and identity of the species from this region.

In this work a new species of polyclad from Oaxaca coast is described and a commented checklist based on an exhaustive bibliographic revision of polyclad studies from Tropical Eastern Pacific, encompassing 173 years (1851–2024), is presented.

## Material and methods

The Tropical Eastern Pacific (TEP) is a biogeographic region defined oceanographically by warm, low-salinity surface waters overlying a strong and shallow thermocline (>27.5°C) (Fiedler & Talley 2006). The TEP extends from the Gulf of California southwards to Punta Aguja, Peru (Hastings 2000; Salazar-Vallejo & Londoño-Mesa 2004). The TEP region has been divided into different biogeographic provinces based on the distribution of various taxa (e.g., coral reefs, decapod crustaceans, fishes), with the most commonly used proposal being that by Spalding *et al.* (2007), which comprises three marine provinces: the Warm Temperate Northeast Pacific, the Tropical East Pacific, and the Galapagos; and twelve marine ecoregions.

The checklist of polyclads from the TEP presented in this document was compiled through a bibliographic review of studies conducted in this region. This information was used to construct a list of valid names and synonyms of polyclads in the area. The systematic arrangement and names were validated using the WoRMS database (2024). To determine the geographical distribution of polyclads in the TEP, a reference was made to the species type locality and occurrences recorded in one or more locations within the TEP, specifying both the species type locality and the sites where it is distributed. In addition, the type of distribution of polyclads in the area was indicated using the terms such as local, disjunct, widespread, pantropical or cosmopolitan distribution. The type of habitat in which the species was collected was also categorized using categories such as benthic, epibiont, interstitial, fouling, pelagic or symbiotic fauna.

Specimens of the newly described polyclad species from Oaxaca were deposited in the Platyhelminthes Section of the Scientific Collection of the Laboratory of Marine Invertebrate Systematics (OAX-CC-249-11), Universidad del Mar (UMAR), campus Puerto Ángel, Oaxaca, Mexico.

**Abbreviations of collectors**

AMRM = Areli Marisol Ríos Martínez
MB = Mahetzi Benítez
MRS = Mariela Ramos-Sánchez
NMP = Nery Mora Pérez

## Results

### *Systematic annotated list of the species of polyclads distributed in the Tropical Eastern Pacific*

Clade Rhabditophora Ehlers, 1985
Order Polycladida Lang, 1884
Suborder Acotylea Lang, 1884
Family Callioplanidae Hyman, 1953
Genus *Callioplana* Stimpson, 1857

***Callioplana marianae*** sp. nov.
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Figs 1–3

**Diagnosis**

*Callioplana marianae* sp. nov. is characterized by a beige background coloration with light brown and white pigmentation that gives it a reticulated appearance, nipple-shaped nuchal tentacles, cerebral and tentacular eyes, absence of marginal eyes, a folded pharynx located slightly posterior to the first third of the body, separated gonopores, an oval seminal vesicle located posterior to the free prostatic vesicle that presents a striated internal glandular lining, a penis papilla armed with a filiform stylet, and a tripartite Lang's vesicle located posterior to the male gonopore.

**Etymology**

This species is named after the author's beloved mother Mariana Sánchez.

**Type material**

**Holotype**

MEXICO • 1 ♂ (as sagittal sections); southern Mexican Pacific, Oaxaca, Zipolite, Camarón Beach; 15°39′43″ N, 96°31′33.6″ W; depth 0.5 m; 25 Mar. 2017; MRS, MB, AMRM, NMP leg.; in rocky intertidal; reproductive structures in two slides; UMAR PLAT–046.

**Paratypes**

MEXICO • 8 ♂♂, 6 (as whole assemblies), 1 (as front section); same data as for holotype; UMAR PLAT–047A–D, UMAR PLAT–048.

**Type locality**

Camarón Beach, Zipolite, Oaxaca, Mexico.

**Description of external features**

**Holotype** (♂ UMAR PLAT–046)

Color. The background color is beige with brown to olive green; the periphery is slightly translucent with light brown and white pigmentation; the reticulate coloration pattern radiates from the central region of the pharynx to the periphery of the body (Fig. 1A), the ventral region is white. Specimens stained with Mayer's carmalum are pink (Fig. 1C–D).

Body. Elliptical (Figs 1A–D, 3A), 15–20 mm long (n = 5, μ = 18, SD = 2) and 10–12 mm wide (n = 5, μ = 11, SD = 1).

Tentacles. Rudimentary nipple-shaped nuchal tentacles (Figs 1F, 3B) are located in the anterior margin of the body, the distance between tentacles being 0.6 –0.9 mm (n = 3, μ = 0.7, SD = 0.16).

Eyes. Marginal eyes absent; with 17–25 (n = 3, μ = 20, SD = 3) tentacular eyes, diagonally distributed, anterior and posterior to the base of the nuchal tentacles (Figs 1F, H, 3A–B); with 17–36 (n = 3, μ = 22, SD = 7) cerebral eyes distributed in an elongate fashion beginning sparsely at the posterior margin of the brain and widening forward (Figs 1H, 3B).

Brain. Bilobed, 0.2–0.6 mm (n = 3, μ = 0.4, SD = 0.28) long and 0.2–0.7 mm (n = 3, μ = 0.5, SD = 0.31) wide; globuli cell masses oval-shaped, located in the anterior region of the brain (Figs 1E, 3B).

Digestive system. The pharynx is relatively small and sparsely folded; located slightly posterior to the first third of the body at 5 mm (n = 3, μ = 0.5, SD = 0.31) from the anterior margin of the body (Figs 1G, 3A), 1–1.3 mm (n = 3, μ = 1.2, SD = 0.19) from the male gonopore; the mouth is located in the central region of the pharynx.

Gonopores. Separated, located in the last third of the body (Fig. 3D). Male gonopore at 6–6.3 mm (n = 3, μ = 6.2, SD = 0.21) from the anterior margin and 1–1.3 mm (n = 3, μ = 1.2, SD = 0.19) from the pharynx. The female gonopore (Fig. 2F–G) is positioned posterior to the male gonopore at 0.5–0.8 mm (n = 3, μ = 0.6, SD = 0.02) of distance.

**Description of internal features**

Male reproductive system. The male gonopore is located in the last third of the body; the rest of the male reproductive system is oriented toward the anterior part of the male gonopore; it has spermiducal ducts that are oriented toward the anterior region of the body and extend to the last third of the pharynx and subsequently descend toward the posterior region of the body. A prominent oval-free prostatic vesicle (Figs 1I, 2D, 3C–D), with internal ridged glandular lining (Figs 2D, 3C), is located dorsal to the seminal vesicle (Figs 2A, D, 3C). Oval seminal vesicle (Figs 2D, 3C–D). Penis papilla is short (Figs 1I, 2F), 94 μm long, armed with a long filiform sclerosed stylet (Figs 2B, E, G, 3C–D), measuring 200–400 μm (n = 3, μ = 300, SD = 141.42) in length. The male atrium is widened (Figs 2G, 3C).

Female reproductive system. The oviduct, oriented toward the anterior region of the body, surrounds the pharynx (Fig. 3A) and connects directly to the proximal end region of the vagina; the vagina is

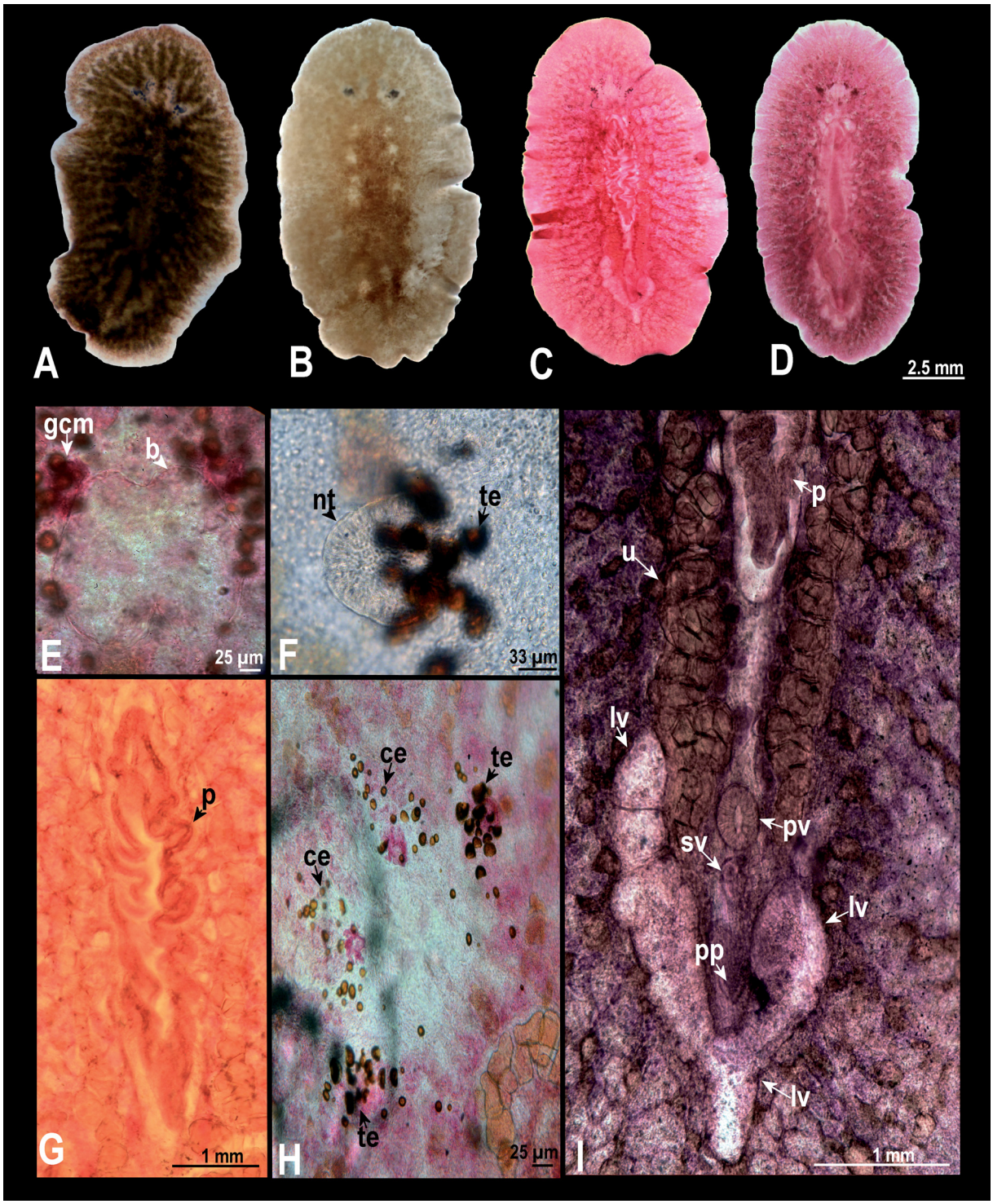


**Fig. 1.** *Callioplana marianae* sp. nov., paratype, ♂ (UMAR PLAT–047). **A**. Specimen in vivo. **B**. Specimen preserved in ethanol. **C–D**. Specimen stained in Mayer's carmalum and cleared in methyl salicylate. **E–I**. Details of C, in whole mount. **E–F**, **H**. Anterior region of the body. **E**. Brain. **F**. Nuchal tentacle. **G**. Pharynx. **H**. Tentacular and cerebral eyes. **I**. Male and female reproductive system. Abbreviations: b = brain; ce = cerebral eyes; gcm = globuli cell masses; lv = Lang's vesicle; nt = nuchal tentacle; p = pharynx; pp = penis papilla; pv = prostatic vesicle; sv = seminal vesicle; te = tentacular eyes; u = uterus.

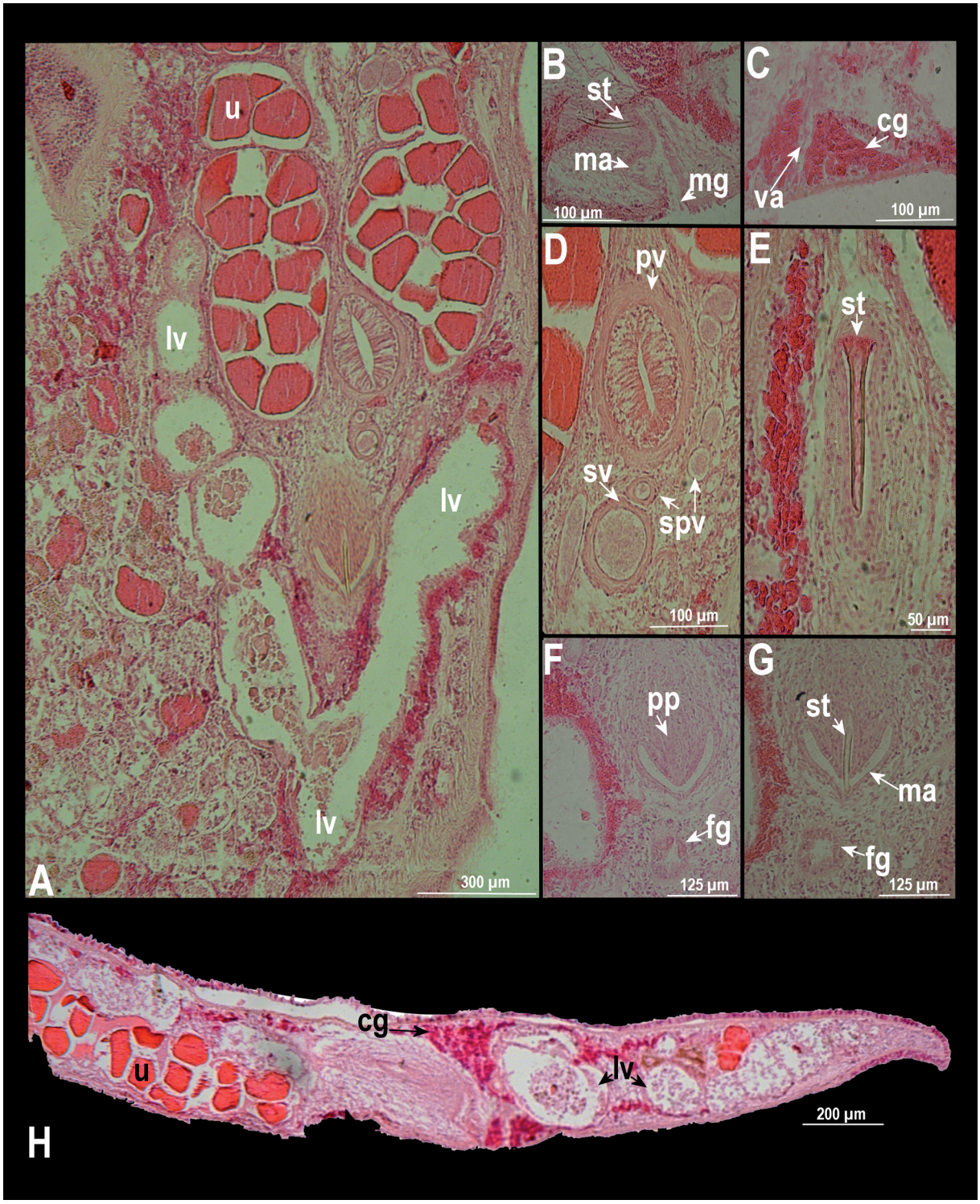


**Fig. 2.** *Callioplana marianae* sp. nov. **A**, **D**–**G**. Paratype, ♂ (UMAR-PLAT–048). **B**–**C**, **H**. Holotype, ♂ (UMAR-PLAT–046). **A**, **D**–**G**. Male and female reproductive system, in frontal histological sections. **B**–**C**, **H**. Male and female reproductive system, in sagittal sections. Abbreviations: cg = cement gland; fg = female gonopore; lv = Lang's vesicle; ma = male atrium; mg = male gonopore; pp = penis papilla; pv = prostatic vesicle; spv = spermiducal vesicle; sv = seminal vesicle; st = stylet; u = uterus; va = vagina.

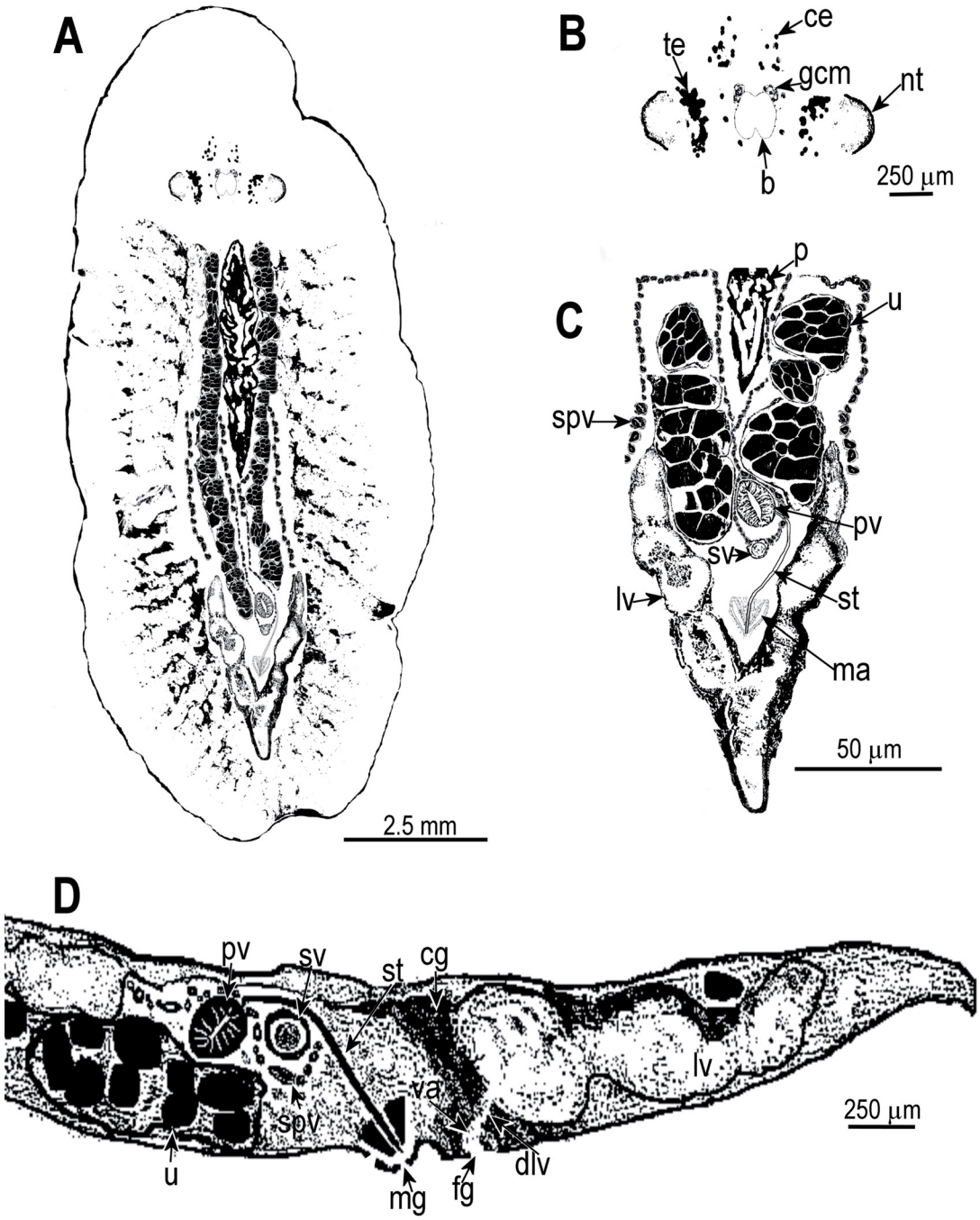


**Fig. 3.** *Callioplana marianae* sp. nov. **A**–**B**. Paratype, ♂ (UMAR PLAT–047). **C**. Holotype, ♂ (UMAR PLAT–046). **D**. Paratype, ♂ (UMAR PLAT–048). **A**. Diagrammatic representation of complete specimen. **B**. Diagrammatic representation of nuchal tentacle and eyes. **C**. Diagrammatic representation of the male and female reproductive systems, in frontal histological sections. **D**. Diagrammatic representation of the male and female reproductive systems, in sagittal section. Abbreviations: b = brain; ce = cerebral eyes; cg = cement gland; dlv = duct of Lang's vesicle; fg = female gonopore; gcm = globuli cell masses; lv = Lang's vesicle; ma = male atrium; mg = male gonopore; nt = nuchal tentacle; p = pharynx; pv = prostatic vesicle; spv = spermiducal vesicle; st = stylet; sv = seminal vesicle; te = tentacular eyes; u = uterus; va = vagina.

**Table 1.** Comparison of the morphological characters of *Callioplana marianae* sp. nov. with other two species of the genus.

| Taxa | ***Callioplana marginata*** | ***Callioplana evelinae*** | ***Callioplana marianae*** sp. nov. |
|---|---|---|---|
| **References** | Stimpson 1857: 4, 11; Yeri & Kaburaki 1918: 31–34, pl. 1 fig. 1, text figs 35–37 | Marcus 1954: 476–479, 485, figs 71–76 | This study |
| **Type locality** | ? Oshima Island, Japan | San Sebastian Island, Brazil | Camarón Beach, Oaxaca, Mexico |
| **Distribution** | Referred by Stimpson as Ousima Island, Sunosaki and Osaka, Japan | San Sebastian Island, Brazil | Only known from Oaxaca, Mexico |
| **Habitat** | Under rocks; depth 1.25 m | Intertidal, breakwater zone; between woods, coarse sand and rocks; sharing habitat with algae of the genus *Padina*, polychaetes as *Polygordius* and cephalochordates | Intertidal, breakwater zone; under rocks |
| **Body (Long × wide mm)** | Oval (50–30 × 15–7) | Oval (10 × 4) | Elliptical (15–20 × 10–12) (Figs 1A–D, 3A) |
| **Dorsal coloration and colour pattern** | Black-brown with a reddish-orange margin (Stimpson 1857); velvety black, reddish-brown margin (Yeri & Kaburaki 1918) | Color ivory, with small brownish spots condensed into three fine longitudinal grooves; transverse red stripes (juveniles) or black (adults) in front of tentacles; black spots on the anterior margin giving the appearance of marginal eyes | Beige background coloration, with light brown and white pigmentation that produce a reticulated appearance (Fig. 1A–B) |
| **Nuchal tentacles** | Conical, orange in the apical region (Yeri & Kaburaki 1918) | Pointed, brown colored in the apical region | Rudimentary nipple-shaped (Figs 1F, 3B) |
| **Prostatic vesicle morphology and position** | Oval, located anterior and dorsal to the seminal vesicle (Yeri & Kaburaki 1918) | Oval, located ventral to the seminal vesicle | Oval, anterior to the seminal vesicle (Figs 1I, 2D, 3C–D) |
| **Penis papilla** | Elongated and slender cylindrical, covered by a sheath (Yeri & Kaburaki 1918) | Elongate | Short (Fig. 2F) |
| **Stylet** | Absent | Absent | Present (Figs 2B, G, 3C–D) |
| **Lang's vesicle** | Double or bifurcated, anterior to the male gonopore | Double or bifurcated, anterior to the male gonopore | Tripartite, posterior to the male gonopore (Figs 1I, 2A, 3C–D) |

sparsely developed (Figs 2C, 3D), oriented toward the posterior region of the body, cement glands are abundant. Lang's vesicle tripartite is Y-shaped (Figs 1I, 2A, 3C); the proximal ends are oriented towards the anterior region of the body and reach the last third of the oviduct, while the distal end is oriented towards the posterior region of the female gonopore.

**Taxonomic remarks**

Within the TEP, *Callioplana marianae* sp. nov., *Hylocelis californica* (Heath & McGregor, 1912), and *Interplana sandiegensis* (Boone, 1929) share a tripartite Lang's vesicle. However, *Callioplana marianae* has a free prostatic vesicle (Figs 2D, 3D), whereas *H. californica* and *I. sandiegensis* have an interpolated prostatic vesicle. Additionally, *Callioplana marianae* possesses nuchal tentacles (Figs 1H, 3B) and a penis papilla (Fig. 2F), features that relate it more closely to the family Callioplanidae than to others within the suborder Acotylea.

The family Callioplanidae has 14 valid genera, and the new species described here belongs to the genus *Callioplana* and is established as *Callioplana marianae* sp. nov., due to the presence of nuchal tentacles, cerebral and tentacular eyes and a highly developed Lang's vesicle; this last character is absent in the genera *Asolenia* Hyman, 1959, *Crasiplana* Hyman, 1955, *Discostylochus* Bock, 1925, *Kaburakia* Bock, 1925, *Meixneria* Bock, 1913, *Okakarus* Holleman, 2007, *Parastylochus* Bock, 1913, *Tokiphallus* Faubel, 1983, and *Trigonoporus* Lang, 1884.

*Callioplana marianae* sp. nov. is further distinguished from the genus *Koinostylochus* Faubel, 1983, which has a simple and oval Lang's vesicle, in contrast to the tripartite and highly developed Lang's vesicle of the new species. Additionally, *Callioplana marianae* lacks marginal eyes, a feature that separates it from the genera *Ancoratheca* Prudhoe, 1982, *Munseoma* Bulnes, Faubel & Park, 2005 and *Neostylochus* Yeri & Kaburaki, 1920, all of which have marginal eyes.

The genus *Callioplana* was established by Stimpson (1857) and amended by Yeri & Kaburaki (1918). It is characterized by the presence of nuchal tentacles, cerebral and tentacular eyes, a rod-shaped penis papilla (or "a rod-shaped muscular extension of the ejaculatory duct, with an outward bulge" as was mentioned by Faubel 1983) and a highly developed Lang's vesicle.

Previously, two species were described in *Callioplana*: *C. marginata* Stimpson, 1857 from Japan, and *C. evelinae* Marcus, 1954 from San Sebastian Island, Brazil. Both species differ from *C. marianae* sp. nov. in the color and pattern of dorsal coloration, the position of the prostatic vesicle (Table 1), and essentially in the morphology of a Lang's vesicle (tripartite and Y-shaped in *C. marianae* vs bifurcated in *C. marginata* and *C. evelinae*) and a penis papilla (armed with a filiform stylet in *C. marianae*, vs unarmed in *C. marginata* and *C. evelinae*).

**Distribution and habitat**

Tropical Eastern Pacific. Central coast of Oaxaca: Camarón Beach, Zipolite, Oaxaca, Mexico. Intertidal, the polyclads were found under rocks in the breakwater zone.

Genus *Koinostylochus* Faubel, 1983

***Koinostylochus burchami*** (Heath & McGregor, 1912)

*Planocera burchami* Heath & McGregor, 1912: 461–462, pl. 13 fig. 9, pl. 15 fig. 27, pl. 18 fig. 44 (description).

*Discosolenia washingtonensis* Freeman, 1933: 133–136, pl. 20 figs 27–28, pl. 21 fig. 29, pl. 23 fig. 40 (type locality: Monterey Bay, California, United States).

*Pseudostylochus burchami* – Hyman 1953a: 356, 358–359, figs 125–126. — Brusca 1980: 70–72 (identification keys); 2005: 69 (checklist, new record from Rocas Consag, Baja California Sur, Mexico).
*Koinostylochus burchami* – Faubel 1983: 60 (new combination).

**Distribution**

The species is found from Puget Sound to the Revillagigedo Islands in the Mexican Pacific, including locations such as San Juan Island in Puget Sound, Depoe Bay in Oregon, and various sites along the California coast such as San Francisco Bay, Monterey Bay, and Anacapa Island. It is also recorded in Baja California, specifically Roca Consag in Baja California Sur, Mexico, and Clarion Island near Manzanillo, Colima, Mexico.

**Habitat**

Benthic. The species inhabits depths ranging from 18 m to 70 m (Heath & McGregor 1912; Freeman 1933; Hyman 1953a).

**Remarks**

The species was initially described as *Planocera burchami* by Heath & McGregor (1912) in Monterey Bay, California, and later as *Discosolenia washingtoniensis* by Freeman (1933) in Puget Sound. Hyman (1953a) reviewed specimens from these localities and from the Gulf of California, along with the original descriptions by Heath & McGregor (1912) and Freeman (1933), and concluded that they were the same species, thus establishing all specimens as *Pseudostylochus burchami*. Faubel (1983) subsequently transferred the species to the genus *Koinostylochus* based on the presence of a prostatic vesicle with a smooth glandular lining dorsal to the male atrium and an inert penis papilla.

Freeman (1933) described *Koinostylochus burchami* as having a male reproductive apparatus with a short, sharp penis papilla armed with small spines; however Hyman (1953a), after reviewing specimens from the same locality and the description of the species by Freeman (1933), stated that this character is absent and considered it an error, Hyman (1953a) also noted that the presence of the two deep pits observed by Heath & McGregor (1912: pl. 18 fig. 44) is at the superficial level because in the sagittal sections of the reproductive system, they are not observed. Therefore, a thorough revision of the biological material of the species is suggested.

Family Cestoplanidae Lang, 1884
Genus *Eucestoplana* Faubel, 1983

***Eucestoplana cuneata*** (Sopott-Ehlers & Schmidt, 1975)

*Cestoplana cuneata* Sopott-Ehlers & Schmidt, 1975: 210–212, pl. 9 fig. a–c, pl. 10 fig. a–b (type locality: Santa Cruz Island, Galapagos Archipelago, Ecuador).

*Eucestoplana cuneata* – Faubel 1983: 93–95 (new combination).
*Cestoplana cuneata* – Westheide 1991: 44 (mentioned only).

**Distribution**

Santa Cruz Island, Galapagos Archipelago, Ecuador.

**Habitat**

Interstitial.

**Remarks**

The species was transferred to the genus *Eucestoplana*, proposed by Faubel (1983), and is characterized by scattered frontal eyes-spots. The male reproductive system features a true seminal vesicle and a tubular penis stylet, housed in an elongated male atrium and the female complex lacks Lang's vesicle.

Family Cyptocelidae Laidlaw, 1903
Genus *Cryptocelis* Lang, 1884

***Cryptocelis insularis*** Hyman, 1953

*Cryptocelis insularis* Hyman, 1953b: 186–187, 200, figs 3–4 (type locality: Tagus Cove, Isabela Island, Galapagos Archipelago, Ecuador).

**Distribution**

Tagus Cove, Isabela Island, Galapagos Archipelago, Ecuador.

**Habitat**

Benthic (sandy bottom, at depths of 18–36 m).

**Remarks**

*Cryptocelis insularis* is distinguished from all previously described valid species of *Cryptocelis* by its scarcity of eyes, the limitation of the marginal eyes to the anterior body region, and the division of the eosinophilous and cyanophilous part of the prostatic vesicle into narrow transverse chambers.

Family Euplanidae Marcus & Marcus, 1966
Genus *Aprostatum* Bock, 1913

***Aprostatum clippertoni*** (Hyman, 1939)

*Euplana clippertoni* Hyman, 1939a: 4–6, figs 9–12 (type locality: Clipperton Island, France).

*Aprostatum clippertoni* – Faubel 1983: 35 (new combination).

**Distribution**

Clipperton Island.

**Habitat**

Benthic (under rocks to the south of the landing place of the island).

**Remarks**

Faubel (1983) transfers *Euplana clippertoni* to the genus *Aprostatum*, because the species has a male reproductive system with a penis papilla armed with a pointed tubular stylet and female reproductive system with Lang's vesicle; characters absent in the genus *Euplana*.

Genus *Euplanina* Sopott-Ehlers & Schmidt, 1975

***Euplanina horrida*** Sopott-Ehlers & Schmidt, 1975

*Euplanina horrida* Sopott-Ehlers & Schmidt, 1975: 204–207, pl. 7 fig. a–c (type locality: Santa Cruz Island, Galapagos Archipelago, Ecuador).

*Euplanina horrida* – Faubel 1983: 33–36, fig. 3e (identification keys). — Westheide 1991: 44 (mentioned only).

**Distribution**

Santa Cruz Island, Galapagos Archipelago, Ecuador.

**Habitat**

Interstitial (coarse intertidal sediments) or rocks.

**Remarks**

Faubel (1983) considered *E. horrida* a very primitive species due to its of any penis papilla and seminal vesicle, its very simplified male tract, and a female system with Lang's vesicle connected with the exterior by a Lang's duct (ductus vaginalis). Between the two female apertures, an accessory female organ opens to the exterior independently.

Genus *Euplanoida* Faubel, 1983

***Euplanoida pacificola*** (Plehn, 1896)

*Leptoplana pacificola* Plehn, 1896: 153–155, figs 7–9, pl. 13 fig. 10 (type locality: Valparaíso, Chile).

*Discoplana pacificola* – Bock 1913: 220 (new combination).
*Euplana pacificola* – Hyman 1953a: 332–333, figs 87–89 (new combination, description and new record from Point San Marcial reef, Baja California Sur, Miramar Beach, Guaymas, Sonora, Mexico).
*Euplanoida pacificola* – Faubel 1983: 33–36, fig. 3e (new combination, identification keys). — Brusca 2005: 69 (checklist).

**Distribution**

Valparaíso, Chile; Coast of Peru; Point San Marcial reef, Baja California Sur, Miramar Beach, Guaymas, Sonora, Mexico.

**Habitat**

Fouling (adhered to the keel of a vessel (Plehn 1896)), benthic (Hyman 1953a).

**Remarks**

Plehn (1896) initially described *Euplanoida pacificola* in Valparaíso, Chile, after collecting specimens on the keel of a ship. The species was subsequently recorded along the coast of Peru, initially considered to be a variety of *E. pacificola*. Hyman (1953a) later reported it from the coast of the Gulf of California, identifying the species as a Mexican variant. However, Hyman (1953a) overlooked possible morphological differences in the reproductive system and the geographic distribution. She argued that such variations and geographic distribution did not justify separation into distinct species.

Based on a review of the descriptions and illustrations provided by Plehn (1896) and Hyman (1953a), this study suggests a detailed review and comparison of the biological material assigned to *Euplanoida pacificola*, as differences were found in the distribution of the cerebral and tentacular eyes, the morphology of the pharynx, the penis papilla and Lang's vesicle (review the work of Ramos-Sánchez *et al*. 2019). In addition, it is necessary to review the structure identified as Lang's vesicle, since Plehn (1896) describes it as a bursa copulatrix.

***Euplanoida*** cf. ***pacificola*** (fide Ramos-Sánchez, Bahia & Bastida-Zavala, 2019)

*Euplanoida* cf. *pacificola* – Ramos-Sánchez *et al.* 2019: 33–37, figs 2a–k, 3a–e (locality: Camarón, Puerto Ángel, Estacahuite and Yerbabuena beaches, Oaxaca, Mexico).

**Distribution**

Camarón, Puerto Ángel, Estacahuite and Yerbabuena beaches, Oaxaca*;* southern Mexican Pacific.

**Habitat**

Benthic, littoral to sublittoral (12 m); under rocks, associated with green seaweed, bryozoans and chitons.

**Remarks**

The separation between *Euplanoida* cf. *pacificola* and the nominal species is difficult, mainly due to the ambiguous information in the original description, the possible artifacts from the process of fixation and/or different life stages of the specimens, and the color variations between the specimens reviewed by Plehn (1896), Hyman (1953a) (see remarks on *Euplanoida pacificola*).

Genus *Paraprostatum* Faubel & Sluys, 2007

***Paraprostatum echinolittorinae*** Faubel & Sluys, 2007

*Paraprostatum echinolittorinae* Faubel & Sluys in Faubel *et al.*, 2007: 430–433, figs 1, 2a–b, 4 (type locality: Puerto Ángel, Oaxaca, Mexico).

*Paraprostatum echinolittorinae* – Lee *et al*. 2021: 1–17 (new record from Naos Island at the Pacific entrance of the Panama Canal).

**Distribution**

Playa de los Muertos, Puerto Vallarta, Jalisco, Puerto Ángel, Oaxaca, México; Manuel Antonio National Park, Guanacaste, Costa Rica; Naos Island at the Pacific entrance of the Panama Canal, Punto Chocolatera, Salinas, Ecuador.

**Habitat**

Commensal (mantle cavities of *Cerithium stercusmuscarum* Valenciennes, 1832, *Echinolittorina modesta* (R.A. Philippi, 1846), *E. apicina* (Menke, 1851), *E. conspersa* (R.A. Philippi, 1847), *E. tenuistriata* (D. Reid, 2002), *Lottia mesoleuca* (Menke, 1851), *Nerita scabricosta* Lamarck, 1822, *N. funiculata* Menke, 1850, *Planaxis planicostatus* G.B. Sowerby I, 1825, *Tegula pellisserpentis* (W. Wood, 1828)).

**Remarks**

*Paraprostatum echinolittorinae* is characterized by a male reproductive system with a long stylet enclosed by a strong muscular bulb; a long vagina partially provided with circular muscle fibers and epithelial cilia, communicating with a bilateral uterus; absence of Lang's vesicle; cerebral eyes and presence of nuchal tentacular knobs.

Genus *Semonia* Plehn, 1896

***Semonia bauliensis*** Soutullo, Cuadrado & Noreña, 2021

*Semonia bauliensis* Soutullo *et al.*, 2021: 369–370, fig. 4b–e (type locality: Carbón Beach, Las Baulas National Marine Park of Guanacaste, Costa Rica, 10°20′53.4″ N, 85°51′44.5″ W).

**Distribution**

Carbón Beach, Las Baulas National Marine Park of Guanacaste, Costa Rica.

**Habitat**

Benthic, low intertidal, below stones on sand.

**Remarks**

The genus *Semonia* currently comprises two described species: *S. maculata* Plehn, 1896 and *S. bauliensis*, *S. maculata* has an ivory background color, with honey brown coloration in the pharynx and reproductive system areas. Nuchal tentacles, tentacular eyes, and cerebral eyes are present. The genital atrium is common, and the male reproductive system consists of a seminal vesicle and a short, rod-shaped penis papilla, lacking a prostatic vesicle. The female reproductive system consists of an elongated, S-shaped vagina, gradually widening distally, without Lang's vesicle.

Family Faubelidae Özdikmen, 2010
Genus *Amyris* Marcus & Marcus, 1968

***Amyris favis*** Sopott-Ehlers & Schmidt, 1975

*Amyris favis* Sopott-Ehlers & Schmidt, 1975: 195, pl. 1 fig. a–c (type locality: Santa Cruz Island, Galapagos Archipelago, Ecuador).

*Amyris favis* – Faubel 1983: 108–111, fig. 34f (identification keys). — Westheide 1991: 44 (mentioned only).

**Distribution**

Santa Cruz Island, Galapagos Archipelago, Ecuador.

**Habitat**

Interstitial.

**Remarks**

Marcus & Marcus (1968) initially established the genus *Amyris* within the family Planocerida Poche, 1926, characterizing it by the presence of a seminal vesicle, interpolated prostatic vesicle and a cuticularized cirrus without spines, in addition to the presence of a Lang's vesicle. Subsequently, Faubel (1983) transferred the genus to the family Notoplanidae based on the morphology of the prostatic vesicle.

Özdikmen (2010) mentioned that the species is included in the family Notocirridae (family that includes the genera *Amyris*, *Chiliplana*, *Copidoplana*, *Diplandros*, *Faubelus*, *Notoplehnia*, *Triadomma* and *Tripyloplana*); however, he did not establish the criteria for its reassignment. Özdikmen (2010) proposed renaming the family Notocirridae due to its invalidity under the rule of homonymy, being a junior homonym of *Notocirrus* Schmarda, 1861 (a name proposed for polychaetes of the genus *Notocirrus*), and in accordance with article 60 of the International Code of Zoological Nomenclature, fourth edition (ICZN 1999), he proposed to replace the junior homonym *Notocirrus* Faubel, 1983 with the nomen novum *Faubelus*. However, *Amyris favis* should not be included in this family, because the diagnostic characters do not correspond to those established in the family and instead it should be considered as a member of Notoplanidae as established by Faubel (1983).

Genus *Diplandros* Hyman, 1953

***Diplandros singularis*** Hyman, 1953

*Diplandros singularis* Hyman, 1953a: 341–343, figs 101–105 (type locality: La Jolla, California).

*Diplandros singularis* – Faubel 1983: 108–111, fig. 34d (identification keys).

**Distribution**

San Clemente Island, La Jolla, California; La Ensenada, Baja California, Mexico.

**Habitat**

Benthic.

**Remarks**

*Diplandros singularis* has cerebro-tentacular eyes and a double male reproductive system located in the anterior part of the paired male gonopore. In addition, it has an interpolated prostatic vesicle and a Lang's vesicle oriented towards the anterior region of the body.

Hyman (1953a) was the first to describe the species, placing it in the family Leptoplanidae Stimpson, 1857. However, she noted that the internal morphological arrangement of *Diplandros* is based on the internal plan of *Notoplanides* (review the comments of *Amyris favis*).

Genus *Tripyloplana* Faubel, 1983

***Tripyloplana virgae*** (Sopott-Ehlers & Schmidt, 1975)

*Copidoplana virgae* Sopott-Ehlers & Schmidt, 1975: 202–203, pl. 6 fig. a–c (type locality: Santa Cruz Island, Galapagos Archipelago, Ecuador).

*Tripyloplana virgae* – Faubel 1983: 108–109, 115, fig. 34g (new combination).
*Copidoplana virgae* – Westheide 1991: 44 (mentioned only).

**Distribution**

Santa Cruz Island, Galapagos Archipelago, Ecuador.

**Habitat**

Benthic (rock pool).

**Remarks**

*Tripyloplana virgae* are described by Sopott-Ehlers & Schmidt (1975) within the genus *Copidoplana*. Faubel (1983) transferred the species to the genus *Tripyloplana* (family Notoplanidae), based on the presence of a separate male and female atrium; a character that in the genus *Copidoplana* is determined as a common genital atrium. Review the remarks of *Amyris favis* on the change of family.

Family Gnesiocerotidae Marcus & Marcus, 1966
Genus *Gnesioceros* Diesing, 1862

***Gnesioceros sargassicola*** (Mertens, 1833)

*Planaria sargassicola* Mertens, 1833: 13–14, pl. 1, figs 4–6 (type locality: Sargasso Sea 20° N–24° N, 30° W–76° W).
*Stylochus mertensi* Diesing, 1850: 216 (Atlantic Ocean between 21°–35° N and 36°–38° W) (description).
*Stylochus pelagicus* Moseley, 1877: 23 (description).

*Stylochus sargassicola* – Ehrenberg 1836: 67 (description).
*Planocera sargassicola* – Örsted 1844: 48 (description).
*Gnesioceros mertensi* – Diesing 1862: 571 (description).
*Stylochoplana sargassicola* – Graff 1892: 207–213, pl. 9 figs 1–5 (description).
*Pelagoplana sargassicola* – Bock 1913: 306 (description).
*Gnesioceros sargassicola* – Hyman 1939a: 146 (new record, common in the Gulf of Mexico, Caribbean, and North Atlantic). — Marcus & Marcus 1968: 48–51, figs 45–49 (description and new record from Piscadera Bay, Curacao, Brazil; Puerto Rico, Florida, Central Atlantic Ocean). — Cheng & Lewin 1975: 518 (new record, on the surface of the sea near La Paz, Baja California Sur, Mexico). — Faubel 1983: 119–121, figs 38a–c, 39 (description and new record from Caribbean Sea, Sargasso Sea 20°N–42°N, 30°W–76°W). — Prudhoe 1989: 69 (review). — Hooge & Newman 2009: 417 (review). — Cuadrado *et al.* 2021: 32–33, fig. 7l (description and new record from Gran Canaria Island and Tenerife Island, Canaria Islands).

**Distribution**

Cosmopolitan distribution. Bermuda; Gulf of Mexico; Caribbean Sea; La Paz Bay, Baja California Sur; off West African coast (21°–35° N, 36°–38° W) (Mertens 1832); off West African coast (9°21′ N, 18°25′ W and 5°48′ N, 14°20′ W) (Moseley 1877); West Africa and Madeira (Graff 1892); dredged in about 2 meters at Boa Vista, Cape Verde Island (Laidlaw 1906).

**Habitat**

Epibiont (commonly found on *Sargassum* C.Agardh, *Halimeda* J.V.Lamouroux, *Rhizophora* L., *Thalassia* Banks ex König and *Ulva* L.); coastal surface and epipelagic; pelagic (neustal, hyponeustal organism), associated with *Halobates* Eschscholts, 1822; or benthic (sandy bottom).

**Remarks**

This polyclad is common on *Sargassum* and is found on floating weeds in various parts of the world. Marcus & Marcus (1968) recorded it as an epibiont species on seaweeds of the genera *Halimeda*, *Rhizophora*, *Thalassia*, and *Ulva*. They also associated it with habitats such as sandy bottom, sandy shore with reef debris, and sandy flat with *Cymodocea* K.D.König and *Thalassia*.

Cheng & Lewin (1975), using zooplankton samples, identified a pelagic polyclad species in the Bay of La Paz, Baja California Sur, which they named *G. sargassicola.* However, their record is considered questionable in this study due to the lack of a detailed description of the specimens.

Family Hoploplanidae Smith, 1961
Genus *Hoploplana* Laidlaw, 1902

***Hoploplana luracola*** Smith, 1961

*Hoploplana luracola* Smith, 1961: 69–70, pl. 16 figs 1–4 (type locality: Balboa Park, Panama, 9°0′ N, 79°30′ W).

**Distribution**

Balboa Park, Panama.

**Habitat**

Commensal (*Nerita scabricosta*).

**Remarks**

A distinctive feature of the genus *Hoploplana* is the absence of a seminal vesicle, with highly developed spermiducal bulbs and a short stylet attached directly to the prostatic vesicle (Laidlaw 1902). A thorough review the biological material of the species is recommended, as Smith (1961) gave a not very detailed description and in the illustrations of the male reproductive system, it is observed that the stylet is positioned dorsal to the prostatic vesicle, this prostatic vesicle is elongated, pointed and connected to the spermiducal bulbs through an ejaculatory duct (see Smith 1961: pl. 16 fig. 4).

Family Ilyplanidae Faubel, 1984
Genus *Zygantroplana* Laidlaw, 1906

***Zygantroplana ups*** Marcus & Harry, 1982

*Zygantroplana ups* Marcus & Harry, 1982: 171–180, figs 1–3, 12 (type locality: Puerto Don Juan, Baja California, Mexico).

*Zygantroplana ups* – González & Salazar-Vallejo 1996: 283–286, fig. 1a–d (new record from La Paz Bay, Baja California Sur).

**Distribution**

Puerto Don Juan, Punta de Malo, Bahía de los Ángeles, Baja California and La Paz Bay, Baja California Sur, Mexico.

**Habitat**

Symbiont (found in the mantle cavity of *Myrakeena angelica* (Rochebrune, 1895), *Lottia atrata* (P.P. Carpenter, 1864), *L. mitella* (Menke, 1847), *L. dalliana* (Pilsbry, 1891) and oysters of the family Ostreidae Rafinesque, 1815).

**Remarks**

The genus *Zygantroplana* was established by Laidlaw (1906), characterized by an oval-elongated body, absence of nuchal tentacles, a common gonopore, and lack of armament in the penis papilla (Laidlaw 1906; Marcus & Harry 1982). Currently, the genus comprises two valid species: *Z. verilli* Laidlaw, 1906 and *Z. ups* (Tyler *et al.* 2006–2023).

Initially, the genus was placed in the family Leptoplanidae and later transferred by Faubel (1983) to the family Ilyplanidae. However, it is suggested to verify the generic status and family classification of the species, as Marcus & Harry (1982) described the presence of an interpolated granular vesicle (granule

vesicle (prostate) = interpolated prostatic vesicle), a character absent in the family Ilyplanidae according to Faubel (1983), as well as an armed penis papilla with a stylet. Additionally, a review of the structure described by Marcus & Harry (1982) as uteri is recommended, as they present a morphology similar to the Lang's vesicle found in *Bivesiculoplana lamothei* Pineda-López & González-Bulnes, 1984. It is also advised to conduct a thorough review of the specimens registered by González & Salazar-Vallejo (1996) as *Z. ups*, as the redescribed features by these authors do not match those of the nominal species.

Family Latocestidae Laidlaw, 1903
Genus *Eulatocestus* Faubel, 1983

***Eulatocestus galapagensis*** (Hyman, 1953)

*Latocestus galapagensis* Hyman, 1953b: 183–185, 198, figs 1–2 (type locality: Black Beach, Floreana Island, Galapagos Archipelago, Ecuador).

*Eulatocestus galapagensis* – Faubel 1983: 64 (new combination).

**Distribution**

Black Beach, Floreana Island, Santiago Island and south of Seymour Island, Galapagos Archipelago, Ecuador.

**Habitat**

Benthic.

**Remarks**

Hyman (1953b) initially described the species as *Latocestus galapagensis*; however, Faubel (1983) transferred it to the genus *Eulatocestus* based on the morphology of the prostatic vesicle. The latter exhibits a thick glandular coating, consisting of a network of follicles (see Hyman 1953b: 199, fig. 2); whereas in the genus *Latocestus* Plehn, 1896, the prostatic vesicle shows a rigid and irregular glandular lining or digitiform (see Hyman 1953a: 276, fig. 3).

*Eulatocestus galapagensis* has an elongate, grayish-brown body, the body margin surrounded by a band of marginal eyes, cerebro-frontal eyes arranged in two bands, and frontal eyes arranged in a fan-shaped pattern between the brain region and the anterior end. The pharynx is located in the last third of the body. The gonopores are located at the end of the posterior region of the body. The male reproductive system features spermiducal vesicles and spermiducal ducts oriented towards the anterior-posterior region of the body, oval free prostatic vesicle, and an inert conical penis papilla. The female reproductive system features a vagina and an oval Lang's vesicle, oriented towards the posterior region of the body.

Genus *Latocestus* Plehn, 1896

***Latocestus mexicana*** (Hyman, 1953)

*Alleena mexicana* Hyman, 1953a: 275–275, figs 1–3 (type locality: Gulf of California, Mexico).

*Alleena mexicana* – Brusca 1980: 70–71, fig. 4.1 (identification keys); 2005: 69 (checklist). — Lamothe-Argumedo *et al*. 1997: 15 (new record from El Carrizalillo, Oaxaca, Mexico).
*Latocestus mexicana* – Faubel 1983: 63 (new combination).

**Distribution**

Los Ángeles Bay, Willard Island, San Luis Gonzaga Bay, Ángel de la Guarda Island, Puerto Refugio, Baja California; San Ignacio Lagoon, Puerto Loreto (Puerto Escondido); San Carlos, Guaymas, Sonora; Puerto Peñasco, Sonora; Punta Piaxtla, Sinaloa; El Carrizalillo, Oaxaca, Mexico.

**Habitat**

Benthic.

**Remarks**

Hyman (1953a) described the species as *Alleena mexicana*. The genus *Alleena* was established by Marcus (1947) in the family Latocestidae based on the elongated body shape and the perpendicularly oriented male reproductive system. However, Faubel (1983) considered these characters questionable and insufficient to establish the genus; therefore, he assigns *Alleena* Marcus, 1947 as a synonym of *Latocestus*. *Latocestus mexicana* has an elongated body with gray coloration; a band of marginal eyes distributed in the first third of the body; cerebral eyes, scarce tentacular and marginal eyes distributed in a fan shape; elongated and scarcely branched pharynx positioned in the last third of the body, with the oral opening located in the last third of the pharynx, the main intestine occupying two-thirds of the body and is positioned anterior to the pharynx. The male reproductive tract has spermiducal bulbs, and an oval prostatic vesicle lined with digitiform epithelium and positioned directly above the penis papilla, the latter being inert. The female reproductive system has a short female atrium, a tubular vagina, and a thin, elongated Lang's vesicle.

***Latocestus viridis*** Bock, 1913

*Latocestus viridis* Bock, 1913: 64–6, figs 1a–d, 2, pl. 3 fig. 1 (type locality: San José, Panama).

**Distribution**

San José, Panama.

**Habitat**

Benthic.

**Remarks**

*Latocestus viridis* has an elongated body with rounded anterior and posterior region; dull green coloration, with slight yellowish-green pigmentation in the upper region (often in stripes, in preserved organisms) (see Bock 1913: 64), ventral region with faint pink pigmentation; marginal eyes distributed on the periphery of the whole body, frontal eyes; male reproductive system with spermiducal vesicles and spermathecal ducts; ovoid prostatic vesicle, inert penis papilla, and female reproductive system with an S-shaped vagina, and narrow, sparsely muscular Lang's vesicle.

Genus *Latoplana* Faubel, 1983

***Latoplana levis*** (Hyman, 1953)

*Mexistylochus levis* Hyman, 1953a: 293–294, fig. 27 (type locality: Puerto Peñasco, Sonora, Mexico).

*Ommatoplana levis* – Hyman 1955a: 72 (new combination); 1955b: 9 (description). — Brusca 1980: 70, fig. 4.3 (identification keys); 2005: 70 (checklist).
*Latoplana levis* – Faubel 1983: 64 (new combination).

**Distribution**

Puerto Peñasco, Sonora, Mexico.

**Habitat**

Benthic.

**Remarks**

*Latoplana levis* was originally described by Hyman (1953a) within the genus *Mexistylochus* Hyman, 1953. Hyman (1955a) later transferred it to the genus *Ommatoplana* Laidlaw, 1903, and finally, Faubel (1983) transferred the species to the genus *Latoplana*. The genus is characterized by a prostatic vesicle lined with a ray-shaped or digitiform epithelium. A revision of the morphology of the reproductive system of *L. levis* is suggested because some of the characters described (prostatic vesicle and Lang's vesicle) are similar to those described in the genus *Latocestus*.

Family Leptoplanidae Stimpson, 1857
Genus *Bivesaculosuteri* Ramos-Sánchez, Bahia & Bastida-Zavala, 2019

***Bivesaculosuteri marcelae*** Ramos-Sánchez, Bahia & Bastida-Zavala, 2019

*Bivesaculosuteri marcelae* Ramos-Sánchez *et al.*, 2019: 37–41, figs 4a–h, 5a–e, 6a–l (type locality: Agua Blanca Beach, Puerto Escondido, Oaxaca, Mexico).

**Distribution**

Agua Blanca Beach, Puerto Escondido, Oaxaca, Mexico.

**Habitat**

Epibiont (in *Padina* Adans.–*Jellyella* Taylor & Monks, 1997).

**Remarks**

*Bivesaculosuteri marcelae* is characterized by an oval to circular body, cerebral and tentacular eyes, absence of marginal eyes, and pyriform nuchal tentacles. The male reproductive system features a poorly differentiated interpolated prostatic vesicle, an oval and prominent seminal vesicle, spermiducal vesicles, and cylindrical sclerotized stylet with acicular tip. The female reproductive system features a uterine duct, a paired uterine sac, ovoid and strongly muscularized uterine vesicles, a muscularized vaginal pore located posteriorly to the female gonopore, a vaginal duct, an oval Lang's vesicle, and poorly developed duct of Lang's vesicle.

Genus *Bivesiculoplana* Pineda-López & González-Bulnes, 1984

***Bivesiculoplana lamothei*** Pineda-López & González-Bulnes, 1984

*Bivesiculoplana lamothei* Pineda-López & González-Bulnes, 1984: 27–29, figs 2–8 (type locality: Chamela Bay, Jalisco, Mexico).

*Bivesiculoplana lamothei* – Lamothe-Argumedo *et al.* 1997: 15 (checklist). — Ramos-Sánchez *et al.* 2019: 43–48, figs 7a–k, 8a–d, 9a–i (description and new record from Agua Blanca, El Aguete, Puerto Ángel, Boca Vieja, Coyula, Oaxaca, Mexico).

**Distribution**

Punta Pérula Beach, Las Rosadas, El Negrito, La Manzanillas, Jalisco; Azul Beach, Michoacán; La Ropa Beach, La Barrita, Guerrero; El Carrizalillo Beach, Agua Blanca, El Aguete, Puerto Ángel, Boca Vieja, Coyula, Oaxaca, Mexico.

**Habitat**

Ectocomensal (mantle cavity of *Fissurella gemmata* Menke, 1847, *F. decemcostata* J.H. McLean, 1970, *Lottia pediculus* (R.A. Philippi, 1846), *L. discors* (R.A. Philippi, 1849), *Siphonaria* G.B. Sowerby I, 1823 and *Ancistromesus mexicanus* (Broderip & G.B. Sowerby I, 1829)).

**Remarks**

*Bivesiculoplana lamothei* is a Leptoplanidae ectocomensal of gastropods, characterized by an oval body with a granular dorsal surface (subepidermal), digitiform or circular nuchal tentacles, cerebral and tentacular eyes lack of marginal eyes, and an elongate and sparsely branched pharynx. Gonopores are separate; the male reproductive system features an oval sparsely muscled seminal vesicle, and a sclerotized filiform stipe; the female reproductive tract features paired fusiform Lang's vesicles and a heavily muscled vagina.

Genus *Leptoplanella* Faubel, 1983

***Leptoplanella californica*** (Woodworth, 1894)

*Stylochoplana californica* Woodworth, 1894: 50, figs 1–2 (type locality: Gulf of California Mexico (26°48′0″ N, 110°45′22″ W).

*Parviplana californica* – Hyman 1953a: 314 (new combination and new record from California). – Faubel 1984a: 165–167 (identification keys).

**Distribution**

La Paz Bay, Baja California Sur, and pelagic environment in the Gulf of California and off the coast of Sinaloa, Mexico.

**Habitat**

Pelagic obligate.

**Remarks**

Due to the presence of the species in the pelagic habitat, Woodworth (1984) and Faubel (1984a) determined *Leptoplanella californica* as a pelagic obligate species. Woodworth (1894) originally described the species as *Stylochoplana californica*, based on immature organisms, characterizing the external morphology of the body and scarcely the internal morphology of the species; Woodworth described a cuneiform body, the presence of nuchal tentacles, a short penis papilla and a bursa copulatrix (= Lang's vesicle). Subsequently, Hyman (1953a) made a redescription of the species and reassigned it to the genus *Parviplana* as *Parviplana californica*, based on the length of the body, the arrangement of the eyes and the external morphology of the reproductive complex. Subsequently, Faubel (1984b) reassigned the species to the genus *Leptoplanella*, and made a complete redescription of the external and internal morphology of the male and female reproductive systems, in which he determined the presence of a penis papilla armed with a sclerotized and conspicuous stipe, as well as the seminal vesicle.

Genus *Longiprostatum* Hyman, 1953

***Longiprostatum ricketts*** Hyman, 1953

*Longiprostatum ricketts* Hyman, 1953a: 300–301, figs 37–38 (type locality: Los Ángeles Bay, Baja California).

*Longiprostatum ricketts* – Brusca 2005: 69 (checklist).

**Distribution**

Bahía de los Ángeles, Baja California.

**Habitat**

Benthic.

**Remarks**

*Longiprostatum rickettsi* is a species characterized by tentacular, cerebral, frontal, and marginal groups of eyes distributed only in the anterior region of the body, a very long and narrow prostatic vesicle, with a sclerotized diaphragm separating its lumen from that of the penis papilla and with a sclerotic lining and seminal vesicle and Lang's vesicle, both of which are present but reduced.

Genus *Parviplana* Hyman, 1953

***Parviplana hymani*** Faubel, 1983

*Parviplana hymani* Hyman, 1953a: 312–315, figs 60–61 (type locality: Tomales Haed, Marin Country, California, United States).
*Parviplana hymani* Faubel, 1983: 86–87 (new name).

*Parviplana hymani* – Brusca 2005: 69 (new record from Gulf of California, Mexico, checklist).

**Distribution**

Newport Bay and Tomales Haed, Marin Country, California; Gulf of California, Mexico.

**Habitat**

Benthic (on a rocky shore, among a mass of sponge and bryozoans).

**Remarks**

*Parviplana hymani* lacks nuchal tentacles, has an ejaculatory duct through the prostatic vesicle, and has a bulbous vagina. In the WoRMS database, *Parviplana californica* is listed as a junior synonym of *Parviplana hymani* and *Leptoplanella californica* (= *Stylochoplana californica*). However, this classification is not correct. Hyman (1953a) described a new genus, *Parviplana*, and moved *Leptoplanella californica* (= *Stylochoplana californica*) into this genus, creating the combination *Parviplana californica*. In the same publication, a new specimen was also described under that name. However, Faubel (1983) proposed a new specific epithet, *Parviplana hymani*, which invalidated the synonyms *Parviplana californica* and *Stylochoplana californica* for this species.

Family Mucroplanidae Faubel, 1983
Genus *Mucroplana* Sopott-Ehlers & Schmidt, 1975

***Mucroplana caelata*** Sopott-Ehlers & Schmidt, 1975

*Mucroplana caelata* Sopott-Ehlers & Schmidt, 1975: 208–210, pl. 8 fig. a–b (type locality: Santa Cruz Island, Galapagos Archipelago, Ecuador).

*Mucroplana caelata* – Faubel 1983: 41–42, fig. 5 (identification keys). — Westheide 1991: 44 (mentioned only).

**Distribution**

Santa Cruz Island, Galapagos Archipelago, Ecuador.

**Habitat**

Interstitial (coarse intertidal sediments) or rocks.

**Remarks**

*Mucroplana caelata* could be considered a very primitive species because the most unique organizational feature within the polyclads: the proximal concentration of the extraepithelial prostatic glands. The family Mucraplanidae is characterized by the absence of a true prostatic vesicle, but it presents a peculiar structure in the distal ejaculatory duct, which expands to form a bulbous organ. This organ can assume the function of a seminal vesicle by storing sperm (Faubel 1983).

Family Notocomplanidae Litvaitis, Bolaños & Quiroga, 2019
Genus *Notocomplana* Faubel, 1983

***Notocomplana mexicana*** (Hyman, 1953)

*Phaenocelis mexicana* Hyman, 1953a: 298–300, figs 34–36 (type locality: Miramar Beach, Guaymas, Sonora, Mexico).

*Phaenocelis mexicana* – Brusca 1980: 69–71, fig. 4.5 (identification keys); 2005: 69 (checklist).
*Notocomplana mexicana* – Faubel 1983: 114 (new combination, identification keys).

**Distribution**

Portuguese Bend, California; San Ignacio Lagoon, Baja California Sur, Miramar Beach, Guaymas; San Carlos Bay, Sonora, Mexico.

**Habitat**

Benthic.

**Remarks**

*Notocomplana mexicana* is characterized by marginal eyes distributed in the first third of the body, cerebro-tentacular eyes, and a pharynx oriented towards the anterior region of the body. Its reproductive system features a seminal vesicle and a tubular prostatic vesicle, spermiducal ducts and vesicles, short penis papilla, and elongated Lang's vesicle oriented towards the posterior region of the body. Hyman (1953a) described the species as *Phaenocelis mexicana*; while Faubel (1983) transferred the species to the genus *Notocomplana*; however, he did not establish the criteria for this reassignment.

***Notocomplana saxicola*** (Heath & McGregor, 1912)

*Leptoplana saxicola* Heath & McGregor, 1912: 457, 467–470, pl. 12 fig. 4, pl. 14 figs 19, 21, pl. 16 fig. 30 (type locality: Monterey Bay, California, United States).

*Notoplana saxicola* – Hyman 1953a: 316–319, figs 66–67 (new combination and new record from La Paz Bay, Baja California Sur).

**Distribution**

Monterey Bay, McGinities, Huntington Beach, California Pacific Grove, La Paz Bay, Baja California Sur.

**Habitat**

Benthic.

**Remarks**

Heath & McGregor (1912) made the first description of the species, determining it as *Leptoplana saxicola*; later Hyman (1953a) transferred the species to the genus *Notocomplana* based on the presence of a prominent vesicle. The present study suggests an exhaustive revision of the organisms described by these authors, due to the variants in the position and morphology of Lang's vesicle and the orientation of the pharynx, described below:

1. The organisms described by Heath & McGregor (1912) have an oval Lang's vesicle positioned anterior to the female gonopore and oriented toward the anterior region of the body; and a pharynx oriented toward the posterior region of the body (Heath & McGregor 1912: pl. 12 fig. 4; pl. 16 fig. 30).
2. Specimens described by Hyman (1953a) have an oval Lang's vesicle positioned posterior to the female gonopore and oriented toward the posterior region of the body; and a pharynx oriented toward the anterior region of the body (Hyman 1953a: 316, 320, figs 66, 68).

Family Planoceridae Poche, 1926
Genus *Planocera* Blainville, 1828

***Planocera pellucida*** (Mertens, 1833)

*Planocera gaimardi* Blainville, 1828: 579 (description).
*Planaria velellae* Lesson, 1830: 453–454 (description).
*Planaria pellucida* Mertens, 1833: 8 (type locality: ? Atlantic Ocean).
*Planaria oceanica* Darwin, 1844: 246–247, pl. 5 fig. 1 (description).
*Stylochoplana tenera* Stimpson, 1857: 11 (description).
*Stylochus pelagicus* Moseley, 1877: 23–29 (description).
*Planocera simrothi* Graff, 1892: 190, 200–205 (description).

*Planocera pellucida* – Örsted 1844: figs 20–21 (new combination). — Woodworth 1894: 49–50 (new record from Central America, off the coast of Oaxaca (at the surface, 8 p.m.; 13°33′30″ N, 97°57′30″ W). — Faubel 1983: 77–79, figs 20–21a–b (re-description and new record from Red Sea).
*Carenoceraeus oceanica* – Schmarda 1859: 14 (description).
*Planaria pellucida* – Prudhoe 1950: 710–713 (new record from Atlantic Ocean, Cape of Good Hope and north of Cape Verde Island; Sargasso Sea; east of Ushuaia; Southern Ocean; India Ocean, Port Natal, S. Africa; Pacific Ocean, west coast of New Guinea, south of Galapagos Island, Juan Fernandez Island, Chilean coast, Japan).

**Distribution**

Central America, off the coast of Oaxaca; the Red Sea, the Indian Ocean, the northern and southern regions of the Atlantic Ocean in the northern and southern region of the latter, and the Pacific Ocean.

**Habitat**

Pelagic and symbiont (occupies the mantle cavity of *Janthina janthina* (Linnaeus, 1758) (Faubel *et al.* 2007: 429)), preferably in 18°C water mass.

**Remarks**

Faubel (1983) redescribed the species from samples belonging to the neuston, collected in the Red Sea and the central and southern region of the Atlantic Ocean. The species is characterized by a translucent elongated body with a light yellowish-brown granular pigmentation on the dorsal region, cerebral and tentacular eyes, the latter distributed in the periphery (only in the internal region) of the nuchal tentacles, and central pharynx with an oral opening located at the end of the last third of the pharynx. The male reproductive system has spermiducal vesicles, spermiducal bulbs, a seminal vesicle and a prostatic vesicle, and a cirrus sac armed with sclerotial spines. The female reproductive system has a bulbous vagina and lacks Lang's vesicle.

***Planocera tridentata*** Hyman, 1953

*Planocera tridentata* Hyman, 1953b: 188–191, 203–205, figs 5–7 (type locality: Gardner Bay, Española Island, Galapagos Archipelago, Ecuador).

**Distribution**

Gardner Bay, Española Island, Galapagos Archipelago, Ecuador.

**Habitat**

Benthic.

**Remarks**

The species is characterized by a circular body with indeterminate, apparently translucent dorsal coloration, cerebral eyes distributed in two groups and arranged in a line, and tentacular eyes located at the base of the conspicuous nuchal tentacles; central pharynx scarcely folded; male reproductive system features an elongate oval seminal vesicle, an ovoid prostatic vesicle, and a cirrus sac armed with small spines and three conspicuous teeth. The female reproductive system features a muscular female atrium with a scalloped tissue of sclerotized appearance, and a elongate vagina oriented towards the anterior region of the body.

Genus *Paraplanocera* Laidlaw, 1903

***Paraplanocera angeli*** Soutullo, Cuadrado & Noreña, 2021

*Paraplanocera angeli* Soutullo *et al.*, 2021: 368–369, fig. 3b–d (type locality: Playa Langosta Beach, Las Baulas National Marine Park of Guanacaste, Costa Rica).

**Distribution**

Playa Langosta Beach, Las Baulas National Marine Park of Guanacaste, Costa Rica.

**Habitat**

Benthic.

**Remarks**

Prudhoe (1945: 197–198, figs 1–2) divided the genus into two groups based on the internal morphology of the male reproductive system and thereby reduced the genus to three species (*P. oligoglena* (Schmarda, 1859), *P. aurora* Laidlaw, 1903, and *P. marginata* Meyer, 1922), these groups were characterized by the following characters:

Group 1: Cirrus cavity lined with numerous spines (comparatively they are largest near the male atrium); the spermiducal duct (= the seminal vesicle canals) opens into the ventral wall of the prostatic vesicle.

Group 2: Cirrus cavity lined with numerous small spines with a pair of conspicuous sclerotized projections (teeth); the spermiducal duct opens into the prostatic duct just before entering the cirrus sac.

However, Hyman (1955b) and Faubel (1983) considered the criteria proposed by Prudhoe (1945) for species reduction to be inadequate. They argued that these criteria lacked a thorough review of characters, presented unsatisfactory descriptions, and omitted certain features, in particular the presence or absence of accessory prostatic vesicles and the glandular pouch of the male atrium. The latter character was used by Kato (1936) to divide the species of the genus into two groups (Prudhoe 1945). Consequently, Faubel (1983) validated ten species for the genus (*P. oligoglena*, *P. aurora*, *P. discus* (Willey, 1897), *P. fritillata* Hyman, 1959, *P. langii angi* (Laidlaw, 1902), *P. marginata*, *P. misakiensis* Yeri & Kaburaki, 1918, *P. oceanica* (Hyman, 1953), *P. rotumanensis* Laidlaw, 1903 and *P. rubrisfasciata* Kato, 1937). Recently, two new species have been added: *Paraplanocera angeli* (Soutullo *et al*. 2021) and *Paraplanocera oligoglenoides* (Ramos-Sánchez *et al*. 2019); however, the present study suggests a detailed review of the existing biological material for the described species in the genus together with the re-evaluation of each of the characteristics that define the species. *Paraplanocera angeli* has a translucent coloration pattern, a cirrus sac that lacks sclerotized adenoids, and a smooth, ciliated Lang's vesicle (Soutullo *et al*. 2021).

***Paraplanocera oceanica*** (Hyman, 1953)

*Aquaplana oceanica* Hyman, 1953b: 191–193, 204, 206, 208, figs 8–11 (type locality: Tagus Cove, Isabela Island, Galapagos Archipelago, Ecuador).

*Paraplanocera oceanica* – Faubel 1983: 76 (new combination).

**Distribution**

Tagus Cove, Isabela Island, Galapagos Archipelago, Ecuador.

**Habitat**

Benthic (sandy bottom).

**Remarks**

*Paraplanocera oceanica* was described by Hyman (1953b) as *Aquaplana oceanica*. Hyman does not include it in the genus *Paraplanocera* due to the presence of an elongated cirrus papilla. However, Faubel (1983) proposed that the morphology of this structure could be due to the organisms having been fixed after a copulation process (because during copulation, the cirrus protrude through the male gonopore) and that this structure is a proper elongation of the cirrus sac (see Faubel 1983: 76); therefore, Faubel transferred the species to the genus *Paraplanocera*, citing additional characteristics such as the presence of a prominent Lang's vesicle, a bursa copulatrix, absent seminal vesicle, and nuchal tentacles.

*Paraplanocera oceanica* has a cirrus sac with an elongated penis papilla that is armed with small spines in the terminal region (Hyman 1953b).

***Paraplanocera oligoglena*** (Schmarda, 1859)

*Stylochus oligoglenus* Schmarda, 1859: 34, pl. 7 fig. 77 (type locality: South coast of Sri Lanka, Indian Ocean).
*Stylochus amphibolus* Schmarda, 1859: 34, pl. 7, fig. 78 (description).

*Planocera amphibola* – Lang 1884: 444 (description).
*Paraplanocera oligoglena* – Stummer-Traunfels 1933: 3552–3556, figs 123–125 (new combination). — Prudhoe 1985: 109, fig. 90 (identification keys). — Hyman 1953a: 353, figs 118–124 (description and new record from Coronado Islands, Baja California; Punta San Marcial reef, La Paz Bay, Baja California Sur and Miramar Beach, Sonora, Mexico); 1954: 333 (Hilo, Hawaii); 1955a: 75–78, fig. 4c (description and new record from Kwajalein Atoll, South Loi Island, Marshall Islands). — Brusca 1980: 70 (identification keys). — Soutullo *et al.* 2021: 366–367, fig. 2b–d (description and new record from Carbón Beach, Las Baulas National Marine Park of Guanacaste, Costa Rica).

**Distribution**

Pantropical distribution. Sri Lanka, Christmas Island, Quobba Beach, Australia, archipelagos of Polynesia, Micronesia and Melanesia; Hilo, Hawaii, west coast of Japan. On the Mexican Pacific coast, it has been recorded in the Coronado Islands, Baja California; Punta San Marcial reef, La Paz Bay, Baja California Sur and Miramar Beach, Sonora, Mexico; Carbón Beach in Las Baulas National Marine Park of Guanacaste, Costa Rica.

**Habitat**

Benthic.

**Remarks**

*Paraplanocera oligoglena* has been recorded from the Indo-West Pacific (Schmarda 1859; Stummer-Traunfels 1933; Hyman 1954, 1955a; Prudhoe 1978; Ken-Ichi *et al*. 1991). In the Mexican Pacific, *P. oligoglena* has been recorded from Isla Coronado, Baja California; Punta San Marcial reef, Baja California Sur and Playa Miramar, Sonora (Hyman 1953a; Brusca 1980; Lamothe-Argumedo *et al.* 1997); it has also been recorded from Carbon Beach, in Las Baulas National Marine Park of Guanacaste, Costa Rica (Soutullo *et al.* 2021), therefore it is considered a circumtropical species.

*Paraplanocera oligoglena* was described by Schmarda (1859), as *Stylochus oligoglenus*, *Planocera amphibola*, *Stylochus amphibolus*. Later Stummer-Traunfels (1933) made a revision of the specimens described by Schmarda (1859) under these taxa, establishing them as *Paraplanocera oligoglena*. The species is characterized by an oval body with smooth dorsal coloration brown, cerebral eyes and tentacular eyes, surrounding the base of the nuchal tentacles, and a pharynx with four or five lobes. The male reproductive system features a prostatic vesicle, ducts and paired spermiducal bulbs, accessory prostatic vesicles, a cirrus sac armed with spines and a pair of conspicuous teeth, and a male atrium with a glandular pouch. The female reproductive system features a bulbous vagina, a short female atrium, an elongate oval bursa copulatrix oriented towards the anterior region of the female gonopore, with a thick muscular wall and posteriorly presenting a very scalloped lining, and an elongate Lang's vesicle oriented towards the anterior region of the female gonopore.

***Paraplanocera oligoglenoides*** Ramos-Sánchez, Bahia & Bastida-Zavala, 2019.

*Paraplanocera oligoglenoides* Ramos-Sánchez *et al.*, 2019: 48–53, figs 10a–h, 11a–h (type locality: Agua Blanca Beach, Puerto Escondido, Oaxaca, Mexico, 15°43′58″ N, 96°48′40.21″ W).

**Distribution**

Agua Blanca, Camarón, Panteón and Puerto Ángel Beaches and in Cacaluta Bay, Oaxaca. This is the first record of the genus from the southern Mexican Pacific.

**Habitat**

Benthic, littoral to sublittoral (12 m); under rocks, associated with encrusting bryozoans, green seaweed and chitons.

**Remarks**

*Paraplanocera oligoglenoides* differs from *P. oligoglena* in the dorsal coloration pattern, the number of cerebral eyes, the intramuscular content of the surrounding spaces of the cirrus sac cavity, the epithelium of the accessory prostatic vesicle, and the orientation, position and morphology of the vagina and bursa copulatrix (see discussion of Ramos-Sánchez *et al.* 2019). *Paraplanocera oligoglenoides* has a cirrus sac with spines distributed throughout the sac, paired conspicuous teeth, and lacks a penis papilla. It's Lang's vesicle is situated dorsal to the bursa copulatrix (sagittal view). The species also features a folded-elongate pharynx, with the mouth situated in the last third of the pharynx.

Genus *Spinicirrus* Hyman, 1953

***Spinicirrus inequalis*** Hyman, 1953

*Spinicirrus inequalis* Hyman, 1953a: 347, 350–353, figs 114–117 (type locality: Pardita Island, La Paz Bay, Baja California Sur, Mexico).

*Spinicirrus inequalis* – Brusca 2005: 69 (checklist).

**Distribution**

Pardita Island, La Paz Bay, Baja California Sur, Mexico.

**Habitat**

Benthic.

**Remarks**

*Spinicirrus inequalis* is characterized by an elongated body with a rounded anterior end, cerebral eyes arranged in two groups and distributed in a rounded shape and tentacular eyes distributed in two continuous bands; without nuchal tentacles. The male reproductive system lacks bulbs and spermiducal vesicles, presents a cirrus sac armed with teeth; in sagittal view, a glandular pouch is observed positioned in the anterior region of the spermiducal vesicles, with teeth distributed in two groups: a pair in the region posterior to the glandular pouch and approximately two pairs in the region anterior to the male atrium (Hyman 1953a: 352, fig. 117); in ventral view, these spines are distributed in two groups: one formed by a pair of teeth and the second group presents a total of 15 teeth (Hyman 1953a: 352, fig. 116). The species also has an oval digitiform prostatic vesicle. The female reproductive system presents a dorsally positioned vagina without Lang's vesicle. Hyman (1953a) schematized an elongated sac anterior to the vagina, however, the functionality of this structure is unknown. Hyman (1953a) suggested collecting

more specimens to better define the specific composition of the reproductive system of the species, as well as its systematic position within the family Planoceridae.

Family Pseudostylochidae Faubel, 1983
Genus *Monosolenia* Hyman, 1953

***Monosolenia asymmetrica*** Hyman, 1953

*Monosolenia asymmetrica* Hyman, 1953a: 359–362, figs 127–129 (type locality: Cabo San Lucas, Baja California Sur).

*Monosolenia asymmetrica* – Brusca 2005: 69 (checklist).

**Distribution**

Cabo San Lucas, Baja California Sur, Mexico.

**Habitat**

Benthic.

**Remarks**

The species is characterized by an oval-oblong body. It has 20–26 cerebral eyes distributed in two lines towards the region anterior to the tentacular eyes, which are distributed circularly; it has 20–25 tentacular eyes and lacks nuchal tentacles. The male reproductive system features a bulbous seminal vesicle, a pyriform prostatic vesicle, and a short and inert conical penis papilla. The female reproductive system features an asymmetrical female gonopore positioned to the left of the central axis of the body (position based on the scheme proposed by Hyman 1953a: 360, fig. 127), a moderately long female atrium, a narrow Lang's duct, and an elongate, deeply lobed Lang's vesicle.

Genus *Ommatoplana* Laidlaw, 1903

***Ommatoplana mexicana*** (Hyman, 1953)

*Mexistylochus tuberculatus* Hyman, 1953a: 291–293, figs 25–26 (type locality: Miramar Beach, Guaymas, Sonora, Mexico).

*Ommatoplana mexicana* – Hyman 1955a: 74 (new combination, new name); 1955b: 9 (new combination). — Faubel 1983: 69 (identification keys). — Brusca 2005: 69 (checklist).

**Distribution**

Cabeza Ballena Point, Baja California Sur, Miramar Beach, Guaymas, Sonora, Mexico.

**Habitat**

Benthic.

**Remarks**

*Ommatoplana mexicana* was described by Hyman (1953a) as *Mexistylochus tuberculatus*. However, through a comprehensive review of the reproductive system of two specimens from Saipan Island, Northern Mariana Islands (western Pacific), Hyman (1955a, 1955b) determined that these specimens were assignable to the genus *Ommatoplana*, and that *Mexistylochus* is synonymous to *Ommatoplana*.

Initially Hyman (1953a) did not place the species within the genus *Ommatoplana* because the original specimen was incomplete.

*Ommatoplana mexicana* is characterized by an oval body with brown dorsal coloration, with white blunt-ended protuberances (tubercles); marginal eyes distributed throughout the body margin, cerebral eyes, frontal eyes, and tentacular eyes arranged in a circular fashion and with approximately 30 eyes each. The elongate pharynx occupies two-thirds of the body and has approximately 20 pharyngeal lobes. The male reproductive system features a tripartite seminal vesicle, a prominent oval prostatic vesicle located horizontally to the seminal vesicle and an inert conical penis papilla protected by a penis sheath. The female reproductive system features a muscular ductus vaginalis with scalloped inner walls and a pore posterior to the female gonopore, a tubular female atrium, and an elongated vagina oriented towards the posterior region of the body and Lang's vesicle is absent.

Family Stylochidae Stimpson, 1857
Genus *Cryptostylochus* Faubel, 1983

***Cryptostylochus sesei*** Soutullo, Cuadrado & Noreña, 2021

*Cryptostylochus sesei* Soutullo *et al.*, 2021: 364–366, fig. 1a, d–f (type locality: Playa Carbón, Las Baulas National Marine Park of Guanacaste, Costa Rica, 10°20′53.4″ N, 85°51′44.5″ W).

**Distribution**

Playa Carbón, Las Baulas National Marine Park of Guanacaste, Costa Rica.

**Habitat**

Benthic, low intertidal, under stones and sand.

**Remarks**

*Cryptostylochus* currently comprises four species: *C. coseirensis* (Bock, 1925), *C. hullensis* Faubel & Gollasch, 1996, *C. koreensis* Bulnes, Faubel & Park, 2005 and *C. sesei*. *Cryptostylochus sensei* has a dark yellow background color densely mottled with orange. It features nuchal tentacles at the end of the first third of the body, and cerebral and tentacular eyes. The male reproductive system contains a muscular seminal vesicle, a monoglandular prostatic vesicle, and a penis papilla housed in a well-developed heart-shaped atrium. The female reproductive system consists of an internal vagina and an external vagina, but lacks a Lang's vesicle.

Genus *Imogine* Girard, 1853

***Imogine mexicanus*** Salgado-Maldonado & López-Jiménez, 1980

*Imogine mexicanus* Salgado-Maldonado & López-Jiménez, 1980: 14–15, 22–28, figs 1–4, 5a–c, 6–8 (type locality: San Blas Nayarit, Mexico).

**Distribution**

San Blas Nayarit, Mexico.

**Habitat**

Symbiont (mantle cavities of *Crassostrea corteziensis* (Hertlein, 1951)).

**Remarks**

*Imogine mexicanus* is characterized by an ovoid body. In vivo the species exhibits greenish-brown coloration with black pigments distributed homogeneously in the dorsal region; ventrally it is light brown with a reddish halo towards the posterior end of the body denoting the female genital pore. Post-fixation the dorsal coloration becomes grayish with black dots. The species has cerebral eyes, marginal eyes distributed throughout the periphery of the body, and tentacular eyes distributed at the base of the conspicuous nuchal tentacles. The male reproductive system features an elongate tripartite seminal vesicle, an ovoid prostatic vesicle, and an inert penis papilla protected by a penis sheath. The female reproductive system has a tubular vagina.

Genus *Stylochus* Ehrenberg, 1813

***Stylochus mistus*** Ramos-Sánchez, Carrasco-Rodríguez, García-Madrigal & Bastida-Zavala, 2021

*Stylochus mistus* Ramos-Sánchez *et al.*, 2021: 304–309, figs 2a–f, 3a–g, 4a–g, 5a–c (type locality: Tangolunda, Bahías de Huatulco, Oaxaca, Mexico).

**Distribution**

Tropical Eastern Pacific. Central coast of Oaxaca: Tangolunda Bay, Bahías de Huatulco, Oaxaca.

**Habitat**

Fouling. The polyclads were found inside the shells of *Paraconcavus pacificus* (Pilsbry, 1916), which were part of the fouling of a marine sensor (SeapHOx®), at a depth of approximately 20–25 m.

**Remarks**

*Stylochus mistus* has a beige background color with scant orange to light brown pigmentation, and black transverse spots which, when fused, give the appearance of lines, mainly in the anterior marginal region of the body. The nuchal tentacles are orange, and the body margin is orange or pink. The species has marginal, tentacular, and cerebral eyes. Its gonopores are separated. The male reproductive system features prominent prostatic vesicle, which is oval, and polyglandular, an elongayed and prominent seminal vesicle, and a short the penis papilla. The female reproductive system features a scarcely developed, narrow, and short vagina, oriented towards the anterior region of the body, and lacks a Lang's vesicle.

***Stylochus tripartitus*** Hyman, 1953

*Stylochus tripartitus* Hyman, 1953a: 281–284, figs 10–12 (type locality: Pacific Grove, California).

**Distribution**

From Coos Bay, Oregon, to El Mogote, Baja California Sur.

**Habitat**

Epibiont and benthic (kelp rhizoids and under shore rocks).

**Remarks**

*Stylochus tripartitus* is characterized by a light brown coloration covered with brown streaks, marginal eyes distributed in the first third of the anterior region of the body, tentacular and cerebral eyes, and nuchal tentacles. The male reproductive system features a tripartite seminal vesicle and a small penial papilla. The female reproductive system lacks a Lang's vesicle. *Stylochus tripartitus* is one of the

two Californian species of the genus *Stylochus* with a tripartite seminal vesicle. The other species is *S. exiguus* Hyman, 1953, which is very small and has marginal eyes that surround the body margin. *Stylochus tripartitus* differs from *S. mistus* primarily in color and coloration pattern.

Subgenus *Stylochus* (*Stylochus*) Ehrenberg, 1813

***Stylochus* (*Stylochus*) *atentaculatus*** Hyman, 1953

*Stylochus atentaculatus* Hyman, 1953a: 283–286, figs 14–17 (type locality: San Mateo Beach, California, United States).

*Stylochus atentaculatus* – Brusca 2005: 70 (new record from San Lorenzo Channel, La Paz Bay, Baja California Sur, Mexico, checklist).

**Distribution**

San Mateo, Charleston, Cape Arago State Park, Oregon; San Nicolas Island, California, United States; San Lorenzo Channel, La Paz Bay, Baja California Sur, Mexico.

**Habitat**

Benthic (collected in rocky hollows in San Mateo, California, at a depth of 51.2064 m on San Nicolas Island, California; between 5.48 and 9.11 m in the San Lorenzo Channel, Gulf of California; in the intertidal zone in Oregon).

**Remarks**

*Stylochus* (*Stylochus*) *atentaculatus* is characterized by an elongate oval body with a dark brown coloration with dots, marginal eyes distributed throughout the periphery of the body, cerebral eyes arranged in two lines and tentacular eyes distributed in a circular manner, and round nuchal tentacles. Hyman (1953a) described that the nuchal tentacles is only present in juveniles and in adult organisms this character is not observed; Hyman considered that in adult specimens the tentacles are fused with the dorsal surface. The male reproductive system features a simple (not tripartite) an elongated seminal vesicle, a prominent oval prostatic vesicle; wide male atrium. The female reproductive system has a tubular female atrium, an elongated and prominent vagina, with the central region of the vagina characterized by a highly scalloped muscular wall.

Family Stylochoplanidae Faubel, 1983
Genus *Alloioplana* Plehn, 1896

***Alloioplana delicata*** Plehn, 1896

*Alloioplana delicata* Plehn, 1896: 142–143, pl. 9 figs 3–5, pl. 13 fig. 1 (type locality: Paita, Peru).

*Alloioplana delicata* – Reyes *et al.* 2020: 3 (checklist).

**Distribution**

Paita, Piura, Peru (5°4′12.45″ S, 81°8′50.96″ W) (sensu Reyes *et al.* 2020).

**Habitat**

Benthic.

**Remarks**

*Alloioplana delicata* has nuchal tentacles, and cerebral and tentacular eyes. The male reproductive system features a seminal vesicle, and a penis papilla armed with a long and pointed stylet. The female reproductive system lacks Lang's vesicle.

***Alloioplana stylifera*** (Hyman, 1953)

*Zygantroplana stylifera* Hyman, 1953a: 308–309, figs 53–54 (type locality: Puerto Refugio, Ángel de la Guardia Island, Baja California, Mexico).

*Alloioplana stylifera* – Faubel 1983: 101 (new combination, identification keys). — Brusca 2005: 69 (checklist).

**Distribution**

Puerto Refugio, Ángel de la Guardia Island, Baja California; Tiburón Island, Sonora, Mexico.

**Habitat**

Benthic.

**Remarks**

*Alloioplana stylifera* was initially described by Hyman (1953a) within the genus *Zygantroplana*, while Faubel (1983) transferred it to the genus *Alloioplana*, based on the presence of separate gonopores, a seminal vesicle, an interpolated prostatic vesicle, an armed penis papilla, and Lang's vesicle. *Alloioplana stylifera* is characterized by an oblong body with a truncated posterior end, absence of nuchal tentacles, presence of cerebro-tentacular eyes, an elongated pharynx, and separate gonopores located in the terminal region of the body. The seminal vesicle are rudimentary, the penis papilla is armed with a thin and prominent stylet (in proportion of the same size as the vagina), the elongated tubular vagina is oriented towards the posterior-dorsal region of the body.

Genus *Armatoplana* Faubel, 1983

***Armatoplana panamensis*** (Plehn, 1896)

*Leptoplana panamensis* Plehn, 1896: 151–153, pl. 10 figs 3–5, 10–11, pl. 13 fig. 11 (type locality: Gulf of Panama).

*Stylochoplana panamensis* – Laidlaw 1903: 308 (new combination). — Bock 1913: 179 (description). — Hyman 1953a: 301–304, figs 39–41 (new record from Santa Barbara Island, Catalina Island, Newport Harbor, California; Guaymas, Sonora, Mexico). — Brusca 1980: 70, fig. 4.6 (new record from Gulf of California, identification keys); 2005: 69 (checklist).

**Distribution**

Southern California to southern Gulf of Panama. Santa Barbara Island, Catalina Island, Newport Harbor, California; Guaymas, Sonora, Mexico and Gulf of Panama.

**Habitat**

Benthic and fouling (rocks, sandy bottom at 73.152 m depth off Santa Catalina Island and on floating pilings and buoys in Newport Harbor, California).

**Remarks**

Plehn (1896) described the species, whose type locality is the Gulf of Panama. Later, Hyman (1953a) recorded it in California and Guaymas, Sonora, Mexico. Hyman (1953a) observed morphological and size variations in the seminal vesicle, prostatic vesicle, and the distance between the ejaculatory duct and the seminal vesicle; however, she determined these differences as a possible intraspecific variation and assigned the specimens to *A. panamensis* based on the arrangement and distribution of the eyes, the presence of a long-curved stipe, and an elongated Lang's vesicle, described in the nominal species.

The present study, based on the revision and comparison of the diagnoses and schemes made by Plehn (1896) and Hyman (1953a), found a difference in the coloration pattern of the species. Plehn (1986) described a dark grayish-brown coloration with a pattern composed of three dark longitudinal lines (Plehn 1986: figs 3, 10–11). This pattern was not observed or described in the specimens of Hyman (1953a), who mentions a grayish dorsal coloration. In addition to the morphological variations previously determined by Hyman (1953a), we suggest an exhaustive review of the material described by both authors.

Genus *Emprosthopharynx* Bock, 1913

***Emprosthopharynx opisthoporus*** Bock, 1913

*Emprosthopharynx opisthoporus* Bock, 1913: 161–165, figs 28a–b, 29–30, pl. 5 fig. 9 (type locality: Galapagos Archipelago, Ecuador).

*Emprosthopharynx opisthoporus* – Bock 1925: 48, 61–63, 84, figs 18–22, pl. 2a figs 5–7 (description).

**Distribution**

Galapagos Archipelago, Ecuador; Taboga and Taboguilla Islands, Panama; Gilbert Islands, Kiribati, Indian Ocean.

**Habitat**

Ectocomensal (associated with the shell of *Petrochirus californiensis* Bouvier, 1895).

**Remarks**

*Emprosthopharynx opisthoporus* is a species characterized by a translucent yellow coloration with a brownish body margin (postfixation coloration), cerebral, tentacular and submarginal eyes, the latter distributed in the first third of the body. The pharynx is located in the first third of the body, oriented towards the anterior region. The separate gonopores are positioned in the last third of the body. The male reproductive system features an oval seminal vesicle and an interpolated prostatic vesicle oriented towards the anterior region of the body, and a conical, short and inert penis papilla. The female reproductive system has a vagina oriented towards the posterior region of the body (it is worth mentioning that the female structures of the species were not fully developed).

*Emprothopharynx opisthoporus* was described by Bock (1913) and collected as a free-living species, which shares substrate with *Petrochirus californiensis* in the Galapagos Archipelago. Subsequently, it was later recorded in Panama associated with the shell of *P. californiensis* on Taboga Island; *Emprothopharynx opisthoporus* are located on the sand and in the Taboguilla Islands on the same pagurid at 9 m depth; he determined the association as ectocommensalism, he observed that the polyclad lodges in the cavity of the shell, to move away from the light and seek protection; later Bock (1913) recorded the species in the Gilbert Islands; however, he did not make a detailed description of the specimens (Prudhoe 1968).

***Emprosthopharynx rasae*** Prudhoe, 1968

*Emprosthopharynx rasae* Prudhoe, 1968: 408–411, figs 1–3 (type locality: Kaneohe Bay, Oahu, Hawaiian Islands, United States).

*Emprosthopharynx rasae* – Pineda-López 1981: 67–72, figs 16–18 (description and new record between the María Madre and Isabela Islands, Nayarit, Mexico). — Lamothe-Argumedo *et al*. 1997: 15 (checklist).

**Distribution**

Hawaiian Islands and between the María Madre and Isabela Islands, Nayarit, Mexico.

**Habitat**

Symbiont (*Calcinus latens* (Randall, 1840)).

**Remarks**

*Emprosthopharynx rasae* was collected on shells of *Trochus intextus* Kiener, 1850 occupied by the hermit crab *Calcinus latens*. The worm is found around the abdomen of the pagurid, usually in the spiral cavity of the shell. The frequency of occurrence of the association is about one per 25–30 pagurids. *Emprosthopharynx rasae* differs from *E. opisthoporus* in dorsal coloration, distribution of submarginal eyes, and morphology of the seminal vesicle.

Prudhoe (1968) described the species in the Hawaiian Islands, noting its reddish-brown coloration with light margins and slight specks and spots that appear to be ovaries distributed under the body wall, a lack of nuchal tentacles, a prsence of submarginal eyes distributed throughout the body, sparse cerebral and tentacular eyes, a sparsely folded pharynx located immediately posterior to the brain, and gonopores separated and positioned in the last third of the body. The male reproductive tract features a seminal vesicle and pyriform prostatic vesicle oriented towards the anterior region of the body, anda a short inert penis papilla. The female reproductive tract has a bulbous vagina oriented towards the posterior region of the body and lacks Lang's vesicle.

Pineda-López (1981) recorded the species in the islands of Nayarit, Mexico (Lamothe-Argumedo *et al.* 1997), associated with a pagurid at a depth between 80 and 90 m. However, this author suggests a revision of more organisms because in his specimen he found variations in the size of the pharynx, and in the number of cerebral eyes, and he did not revise the male and female reproductive system of the specimens recorded for Nayarit.

Genus *Interplana* Faubel, 1983

***Interplana sandiegensis*** (Boone, 1929)

*Planocera sandiegensis* Boone, 1929: 33, pl. 2 fig. 6, p1. 3 fig. 10 (type locality: La Jolla, California, United States).

*Alloioplana sandiegensis* – Hyman 1953a: 349–350, figs 111–113 (new combination). — Brusca 1980: 70 (identification keys); 2005: 69 (new record from Corona del Mar, California; Espíritu Santo, San Gabriel Bay, Baja California Sur, Mexico).
*Interplana sandiegensis* – Faubel 1983: 104 (new combination).

**Distribution**

Corona del Mar, San Diego Bay, La Jolla, California; Punta Marcial reef, Baja California Sur; Puerto Peñasco, Sonora, Mexico.

**Habitat**

Benthic.

**Remarks**

*Interplana sandiegensis* was initially included in the genus *Planocera* characterized by the absence of a seminal vesicle, Hyman (1953a) later transferred it to the genus *Alloioplana*. However, as *Alloioplana* is characterized by the absence of nuchal tentacles and Lang's vesicle, Faubel (1983) subsequently transferred the species to the genus *Interplana*.

*Interplana sandiegensis* has a light brown coloration and dark brown spots, with an olive-green variant in some specimens; an oval body rounded anteriorly and slightly pointed posteriorly, nuchal tentacles, tentacular and cerebral eyes, and a pharynx located in the central region of the body, slightly oriented towards the anterior region of the body. The male reproductive system features an elongated oval seminal vesicle, an oval interpolated prostatic vesicle, and a cirrus sac armed with elongated sclerotized teeth located in the dorsal and ventral region of the cirrus (Hyman 1953a: 348, fig. 112). Faubel (1983) described this structure as a complex feature of the penis papilla ("complicated armed penis stylet") and named it a stylet. The female reproductive system has a bulbous vagina positioned anterior to the female gonopore and a tripartite Lang's vesicle positioned posterior to the female gonopore.

Genus *Phaenoplana* Faubel, 1983

***Phaenoplana longipenis*** (Hyman 1953)

*Stylochoplana longipenis* Hyman, 1953a: 305–307, figs 46–48 (type locality: Playa Miramar, Guaymas, Sonora, Mexico).

*Stylochoplana longipenis* – Brusca 1980: 70, fig. 4.6 (identification keys); 2005: 69 (checklist).
*Phaenoplana longipenis* – Faubel 1983: 104 (new combination).

**Distribution**

Point Fermin, San Pedro, California, Santa Catalina Island, Newport Bay, California, United States; Miramar Beach, Sonora, Mexico (southern California to southern Gulf of California).

**Habitat**

Benthic and epibiont (found on rocky shores of Miramar beach; as epibionts of *Cladophora* Kütz. seaweed populations and in the rhizoids of phaeophyte seaweed (kelp)).

**Remarks**

Initially, *P. longipenis* was described by Hyman (1953a) in the genus *Stylochoplana*. Later, Faubel (1983) proposed the genus *Phaenoplana* and transferred the species to this genus. The characters Faubel (1983) proposed for the separation of the genera are: a conical penis papilla and a rudimentary oval Lang's vesicle for *Stylochoplana*, and a rod-like penis papilla and a horseshoe-like Lang's vesicle for the genus *Phaenoplana*. However, *P. longipenis* presents an elongated cylindrical penis papilla (which by morphology could be considered rod-like) and an elongated oval Lang's vesicle (different from a horseshoe-like shape). Based on this discrepancies, the present study suggests a complete revision and analysis of the characters that define both genera.

*Phaenoplana longipenis* has an elongated body, with rounded anterior and posterior terminal region, grayish dorsal coloration, cerebral and tentacular eyes present, and a central pharynx oriented slightly towards the anterior region of the body. The male reproductive tract features seminal vesicle and an interpolated prostatic vesicle, the latter with an elongated tubular morphology forming a pronounced V-shaped curvature, and an inert elongated cylindrical penis papilla, structures oriented towards the anterior region of the body. The female reproductive tract has a bulbous vagina, elongated Lang's duct and a prominent elongated oval an Lang's vesicle, all oriented towards the posterior region of the body.

Family Theamatidae Marcus, 1949
Genus *Theama* Marcus, 1949

***Theama occidua*** Sopott-Ehlers & Schmidt, 1975

*Theama occidua* Sopott-Ehlers & Schmidt, 1975: 8–11, fig. 3, pl. 4 figs a–c, pl. 5 figs a–c (type locality: Galapagos Archipelago, Ecuador).

*Eutheama occidua* – Faubel 1983: 97 (new combination, identification keys).
*Theama occidua* – Westheide 1991: 43–44 (mentioned only). — Curini-Galletti *et al*. 2008: 82–83, fig. 1c.

**Distribution**

James Bay and Caleta Negra (Curini-Galletti *et al.* 2008), Fernandina, Isabela, Genovesa, Bartholomew, San Cristobal, Hood and Santa Cruz Islands, Galapagos, Ecuador.

**Habitat**

Interstitial.

**Remarks**

*Theama occidua* was originally described by Sopott-Ehlers & Schmidt (1975). Subsequently, Faubel (1983) established the genus *Eutheama* and determined *T. occidua* as the type species, based on an unarmed penis papilla; however, Curini-Galletti *et al.* (2008) conducted a detailed review of the reproductive system of the species and observed the presence of a small sclerotized area in the internal ejaculatory duct. Based on this character, they transferred the species back to the genus *Theama* and established *Eutheama* as a junior synonym of the genus *Theama*.

Suborden Cotylea Lang, 1884
Family Boninniidae Bock, 1923
Genus *Boninia* Bock, 1923

***Boninia oaxaquensis*** Ramos-Sánchez, Bahia & Bastida-Zavala, 2020

*Boninia oaxaquensis* Ramos-Sánchez, Bahia & Bastida-Zavala, 2020: 51–56, figs 2a–i, 3a–b, 4a–e (type locality: Panteón Beach, Puerto Ángel, Oaxaca, Mexico).

**Distribution**

Central coast of Oaxaca: Agua Blanca, San Agustinillo, Panteón, Estacahuite Beaches and Cacaluta Bay. This is the first record of the genus for the Tropical Eastern Pacific.

**Habitat**

Benthic, littoral to sublittoral (2–10 m). Specimens of *Boninia* were collected under rocks, frequently in tide pools, in groups of three to six specimens on each rock and alongside chitons and seaweeds.

**Remarks**

*Boninia oaxaquensis* is assigned to the genus *Boninia* based on prostatoid organs symmetrically surrounding the male gonopore. *Boninia oaxaquensis* presents 14–66 (n = 24, μ = 36, SD = 26) cerebral eyes and 36–126 (n = 24, μ = 78, SD = 45) marginal eyes, has between 16–24 (n = 24) prostatoid organs arranged in one girdle, and its habitat is in the littoral to sublittoral zone (2–10 m), under rocks in tide pools and sublittoral rocks.

Currently, the genus comprises seven valid species *B. antillarum* (Hyman 1955c), *B. divae* Marcus & Marcus, 1968, *B. mirabilis* Bock, 1923, *B. neotethydis* Curini-Galletti & Campus, 2007, *B. oaxaquensis*, *B. uru* Tsuyuki, Oya & Kajihara 2022, and *B. yambarensis* Tsuyuki, Oya & Kajihara 2022. Authors such as Bock (1923), Hyman (1955a), Marcus & Marcus (1968), Curini-Galletti & Campus (2007), and Ramos-Sánchez *et al.* (2020) have suggested that the key diagnostic characters for defining species within the genus are: the number of prostatoid organs, the arrangement and number of their girdles, which are distributed on each side of the penis papillae, the distribution and number of cerebral eyes and marginal eyes, and the habitat.

***Boninia*** sp. (fide Soutullo, Cuadrado & Noreña 2021)

*Boninia* sp. – Soutullo *et al.* 2021: 376–377, fig. 9a–e (locality: Playa Carbón and Playa Langosta, Las Baulas National Marine Park of Guanacaste, Costa Rica).

**Distribution**

Playa Carbon and Playa Langosta, Las Baulas National Marine Park of Guanacaste, Costa Rica.

**Habitat**

Benthic, one of the most abundant genera in the intertidal zone of the park.

**Remarks**

Soutullo *et al.* (2021) recorded *Boninia* sp. on the basis of external morphology and coloration pattern; however, because the specimens were damaged, they were unable to make a specific identity.

Genus *Traunfelsia* Sopott-Ehlers & Schmidt, 1975

***Traunfelsia*** sp. (fide Sopott-Ehlers & Schmidt 1975)

*Traunfelsia* sp. – Sopott-Ehlers & Schmidt 1975: 25–26, pl. 12 fig. a–d (locality: Galapagos Archipelago, Ecuador). — Westheide 1991: 44.

**Distribution**

Fernandina, Isabela, Santa Cruz, Floreana Islands, Galapagos Archipelago, Ecuador.

**Habitat**

Interstitial (intertidal zone coarse sediment).

**Remarks**

*Traunfelsia* sp. was described by Sopott-Ehlers & Schmidt (1975). Westheide (1991) conducted a study of the invertebrate meiofauna in the Galapagos archipelago, where he recorded the presence of the species as part of the interstitial fauna. However, he did not make a complete description of the organisms, limiting his determination only to the generic level.

Family Eurylepidae Lang, 1884
Genus *Prostheceraeus* Schmarda, 1859

***Prostheceraeus fitae*** Soutullo, Cuadrado & Noreña, 2021

*Prostheceraeus fita* Soutullo *et al.*, 2021: 374–376, fig. 8b–e (type locality: Langosta Beach, Las Baulas National Park of Guanacaste, Costa Rica).

**Distribution**

Playa Langosta, Las Baulas National Park of Guanacaste, Costa Rica.

**Habitat**

Benthic.

**Remarks**

*Prostheceraeus fitae* has white and black stripes with a yellow central line, a much more delicate stipe compared to other species in the genus, and a long and narrow male atrium. The genus *Prostheceraeus* currently comprises 19 valid species, most of them distributed in the North Atlantic and Mediterranean (Soutullo *et al.* 2021), while three species *P. fitae*, *P. nigricornus* Schmarda, 1859, and *P. panamensis* Woodworth, 1894 are found in the Pacific Ocean.

***Prostheceraeus nigricornus*** Schmarda, 1859

*Prostheceraeus nigricornus* Schmarda, 1859: 31, pl. 6 fig. 71 (type locality: Paita, Peru).

**Distribution**

Paita, Peru.

**Habitat**

Benthic.

**Remarks**

Schmarda (1859) made a partial description of the species. It is characterized by an oval-oblong body with a reddish-yellow dorsal region, with numerous spots, conspicuous nuchal pseudotentacles, cerebral eyes arranged in a circle, and tentacular eyes distributed over the pseudotentacles. The reproductive system is located in the central region of the body, featuring a long and conspicuous penis papilla.

Family Pericelidae Laidlaw, 1902
Genus *Pericelis* Laidlaw, 1902

***Pericelis ernesti*** Hyman, 1953

*Marcusia ernesti* Hyman, 1953a: 296–298, figs 32–33 (type locality: Gulf of California, Mexico).

*Pericelis ernesti* – Hyman 1955d: 263 (new combination). — Soutullo *et al.* 2021: 373, fig. 6b–e (new record from Playa Carbón Beach, in Las Baulas National Marine Park of Guanacaste, Costa Rica, 10°20′53.4″ N, 85°51′44.5″ W). — Tsuyuki *et al.* 2021: 1–15 (mention only).

*Marcusia ernesti* – Lamothe-Argumedo *et al.* 1997: 15 (new record from Guaymas, Sonora, Mexico).

**Distribution**

Punta Marcial, Cabo Pulmo National Park, Baja California Sur; Puerto Peñasco, Sonora; Clarión Island, Revillagigedo Island, Manzanillo, Colima, México; Playa Carbón Beach, in Las Baulas National Marine Park of Guanacaste, Costa Rica.

**Habitat**

Benthic.

**Remarks**

*Pericelis ernesti* was initially established by Hyman (1953a) within the suborder Acotylea (family Cryptocelidae) as *Marcusia ernesti*. Hyman (1953a) described it as a very peculiar acotyleo that presents characteristics of the suborder Cotylea, such as the distribution of the marginal eyes and the presence of a cement bag in the cement glands, which are emptied by a pair of ducts (see Hyman 1953a: 287), structures that sensu Hyman (1953a) are characteristic of the genera *Pericelis* and *Enchiridium* Bock, 1913 (suborder Cotylea). Hyman (1955d: 263) later transferred the species to the genus *Pericelis* (family Pericelidae, suborder Cotylea) based on the arrangement of the eyes, the coloration pattern (reticulate), the presence of a ventral sucker, and the reexamination of the male and female reproductive system. Faubel (1984b) subsequently reestablished the species as *M. ernesti* and transferred it to the family Anonymidae Lang, 1884, but did not mention the criteria for the reestablishment of the species, only mentioning that Hyman (1953a) overlooked the presence of a sucker. Prudhoe (1985) established *Marcusia* Hyman, 1953 as a junior synonym of the genus *Pericelis*, but did not substantiate the criteria for this decision. On the other hand, Cuadrado *et al.* (2021), through a molecular analysis based on the 28S marker, validated the separation of *Marcusia* (represented by *Marcusia alba*) from the genus *Pericelis*. This finding contrasts with Tsuyuki *et al.* (2021) who determined *Marcusia* as a junior synonym of *Pericelis* based on a molecular analysis based on the concatenation of the 18S and 28S genes. Therefore, the present study suggests a comprehensive review of the biological material of the 12 species of *Pericelis*.

***Pericelis nazahui*** Ramos-Sánchez, Bahia & Bastida-Zavala, 2020

*Pericelis nazahui* Ramos-Sánchez *et al.*, 2020: 62–68, figs 8a–i, 9a–b, 10a–f (type locality: Yerbabuena Beach, Oaxaca, Mexico, 15°44′55.4″ N, 96°7′48.2″ W).

**Distribution**

Central coast of Oaxaca: Panteón and Yerbabuena beaches and Cacaluta Bay.

**Habitat**

Benthic, sublittoral (2–10 m). The specimens were collected under rocks, found in groups of two to three individuals per rock and alongside blue sponges, seaweed, polychaetes, and chitons.

**Remarks**

*Pericelis nazahui* lacks a reticular or spotted coloring pattern, but has a brown dorsal surface, with the central region of the body, the margin, and the cerebral region appearing slightly grey, whitish, or beige, and two slightly faint beige lines, each line going from the cerebral region to the pseudotentacles. It has

a common gonopores, a scarce internal glandular epithelium, and lacks glandular epithelium in the penis papilla. The female reproductive system features paired uterine vesicles.

***Pericelis sigmeri*** Ramos-Sánchez, Bahia & Bastida-Zavala, 2020

*Pericelis sigmeri* Ramos-Sánchez *et al.*, 2020: 57–62, figs 5a–j, 6a–c, 7a–f (type locality: Cacaluta Bay, Oaxaca, Mexico, 15°43′12.08″ N, 96°9′49.08″ W).

**Distribution**

Cacaluta Bay, Oaxaca, Mexico.

**Habitat**

Benthic, sublittoral (3–10 m). Specimens were collected under rocks, found in pairs, alongside seaweed and chitons.

**Remarks**

*Pericelis sigmeri* is brown, with a color variation to grey or beige. It has black spots and irregular specks of brown and white, with the white specks being notably larger; black spots are mainly concentrated in the central region of the body. Specimens are characterized by a dorsal white spot located in the brain region. The ventral coloration is translucent, with whitish coloration over the pharynx and the reproductive region. It has a common gonopore, the papilla of the penis has internally a glandular epithelium of dense consistency.

***Pericelis*** sp. 7 (fide Newman & Cannon 2003)

*Pericelis* sp. 7 – Newman & Cannon 2003: 70 (locality: Galapagos Archipelago).

**Distribution**

Galapagos Archipelago.

**Habitat**

Benthic (under rock).

**Remarks**

*Pericelis* sp. 7 was recorded by Newman & Cannon (2003) as an undescribed species of the genus, from the Galapagos Archipelago. The specimen is characterized by a beige dorsal surface with white and dark mottles with dense black dots.

Family Prosthiostomidae Lang, 1884
Genus *Enchiridium* Bock, 1938

***Enchiridium magec*** Cuadrado, Moro & Noreña, 2017

*Enchiridium magec* Cuadrado *et al.*, 2017: 45–47, figs 3a–f, 11d (type locality: El Balito, Tenerife, Canary Archipelago, Spain).

*Enchiridium magec* – Soutullo *et al.* 2021: 374–376, fig. 4b–e (new record from Carbón Beach, Las Baulas National Park of Guanacaste, Costa Rica (10°20′53.4″ N, 85°51′44.5″ W)).

**Distribution**

El Balito, Tenerife, Canary Archipelago, Spain; Carbón Beach, Las Baulas National Park of Guanacaste, Costa Rica.

**Habitat**

Benthic, rocky substrates, at depths of 4–20 meters or low intertidal, below stones on sand.

**Remarks**

*Enchiridium magec* is a species described in the Atlantic Ocean in the Canary Archipelago by Cuadrado *et al.* (2017) and subsequently recorded in the Pacific Ocean in Guanacaste Costa Rica by Soutullo *et al.* (2021). *Enchiridium magec* is characterized by an elongated body with a smooth dorsal surface. The background color is yellow with cream dots and dark brown spots in the central area, forming a continuous longitudinal midline. The species possesses cerebral eyes and a tubular pharynx. The male reproductive system features a single male gonopore, anterior to the female, with an elongated penis papilla armed with a long tubular stylet, two interpolated prostatic vesicles included in a very characteristic muscular bulb, and a seminal vesicle surrounded by a second muscular bulb. The female reproductive system presents a short, posteriorly oriented vagina, surrounded by cement glands. The present study considers the species' record on the west coast of Central America as questionable and suggests a review of the material and the mechanisms of interoceanic dispersal of the species.

***Enchiridium punctatum*** Hyman, 1953

*Enchiridium punctatum* Hyman, 1953a: 385–387, figs 60–61 (type locality: Laguna Beach, California, United States).

*Enchiridium punctatum* – Brusca 1980: 73, fig. 4.10 (new record from southern California and Gulf of California); 2005: 69 (new record from Point Arguello, California, United States and Espiritu Santo, Baja California Sur, Mexico).

**Distribution**

Laguna Beach, Corona del Mar, Newport Bay, Redondo, Point Arguello, California, United States; Espíritu Santo Island, Baja California Sur, Mexico. The species therefore appears distributed along the southern part of the California coast and in the Gulf of Mexico.

**Habitat**

Benthic.

**Remarks**

The species is characterized by an elongated body with a dorsal coloration white with cream, with a pattern of black and brown spots, cerebral eyes arranged in two groups, marginal eyes distributed throughout the body, and a tubular pharynx. The male reproductive system oriented towards the posterior region of the body, features an oval seminal vesicle and accessory seminal vesicles, and a penis papilla armed with a sclerosed stipe. The female reproductive system is oriented towards the anterior region of the body, comprising a tubular vagina and a female atrium with glandular pouches (Hyman 1953a; Brusca 1980, 2005).

Genus *Euprosthiostomum* Bock, 1925

***Euprosthiostomum adhaerens*** Bock, 1925

*Euprosthiostomum adhaerens* Bock, 1925: 3–4 (type locality: Panama).

**Distribution**

Panama.

**Habitat**

Benthic.

**Remarks**

*Euprosthiostomum adhaerens*, established by Bock (1925), is characterized by an elongated body, marginal eyes distributed in the anterior region of the body, and the presence of frontal eyes. The male reproductive system features two separate small prostatic vesicles and a seminal vesicle, and an elongated penis papilla armed with a tubular stylet. However, it is suggested to collect topotypic material and thus make a detailed description of the species.

Genus *Prosthiostomum* Quatrefages, 1845

***Prosthiostomum multicelis*** Hyman, 1953

*Prosthiostomum multicelis* Hyman, 1953a: 384–386, figs 158–159 (type locality: San Gabriel Bay, Baja California Sur, Mexico).

*Prosthiostomum multicelis* – Brusca 1980: 73, fig. 4.9 (new record from southern California and Gulf of California); 2005: 70 (new from record Espíritu Santo, San Gabriel Bay, Baja California Sur, Mexico).

**Distribution**

Pacific Northeast Temperate; Santa Catalina Island, California, United States; Puerto Refugio, Ángel de la Guarda Island, Baja California; San Gabriel Bay, Baja California Sur, Mexico.

**Habitat**

Benthic.

**Remarks**

*Prosthiostomum multicelis* is characterized by an elongated body with a rounded anterior edge and a blunt posterior region. Its dorsal surface is white or yellow, with a coloration pattern composed of orange speckles. The dorsal axis has a brownish line extending from the brain region to the third of the body, with yellow margins (Brusca 1980). Marginal eyes are distributed in the first third of the body, cerebral eyes are present and a conspicuous tubular pharynx. The male reproductive system is oriented towards the posterior region of the body, comprises oval accessory seminal vesicles, an elongate prostatic vesicle positioned posterior to seminal vesicles, and a penis papilla armed with a prominent stylet. The female reproductive system is oriented towards the anterior region of the body and features a tubular vagina.

***Prosthiostomum parvicelis*** Hyman, 1939

*Prosthiostomum parvicelis* Hyman, 1939b: 6–8, 13, figs 13–15 (type locality: Sullivan Bay, Santiago Island, Galapagos Archipelago, Ecuador).

*Prosthiostomum parvicelis* – Hyman 1953b: 193–194, 208, figs 12–14 (description).

**Distribution**

Sullivan Bay, Santiago Island; Cartago Bay, Isabela Island, Galapagos Island, Ecuador.

**Habitat**

Benthic (at a depth of 14.63 and 18.23 m on a sandy bedrock bottom).

**Remarks**

Hyman (1953b) recorded *Prosthiostomum parvicelis* as one of the most common polyclad species in the Galapagos Archipelago. The species has an elongated body with sparse marginal eyes distributed in the anterior region of the body, cerebral eyes and tubular pharynx positioned posterior to the cerebral eyes. The male reproductive system features a male gonopore anterior to the seminal vesicle, which as a prominent oval morphology, paired accessory vesicles positioned anterior to the seminal vesicle, spermiducal ducts oriented towards the posterior region of the body, and a penis papilla armed with a stylet. Hyman (1939a, 1953b) made a partial description of the female reproductive system in which she only schematized the position of the female gonopore and the distribution of the cement glands. It is recommended to review the type material of the species to provided a detailed redescription of the female reproductive system, together with the collection of new specimens to determine the coloration of these specimens.

***Prosthiostomum*** cf. ***parvicelis*** (fide Ramos-Sánchez, Carrasco-Rodríguez, García-Madrigal & Bastida-Zavala 2021)

*Prosthiostomum* cf. *parvicelis* – Ramos-Sánchez *et al.* 2021: 309–315, figs 6a–f, 7a–f, 8a–c (locality: La Tijera and San Agustinillo Beaches, Oaxaca, Mexico).

**Distribution**

Tropical Eastern Pacific. Central coast of Oaxaca: La Tijera and San Agustinillo Beaches.

**Habitat**

Fouling. This species is found inside and around empty shells of the barnacle *Megabalanus peninsularis* (Pilsbry, 1916) which encrust the surf zone of the rocky coast.

**Remarks**

The distinction between *Prosthiostomum* cf. *parvicelis* and the nominal species is difficult, mainly due to the limited information provided in the original description and redescription by Hyman (1939b, 1953b). In the original description and redescription of *P. parvicelis*, Hyman (1939b, 1953b) characterized only the male reproductive system of her specimens focusing on everted structures and the reproductive system in lateral position. *Prosthiostomum* cf. *parvicelis* has a light brown color with dark brown to dark green spots distributed around the body, while the dorsal region lacks pigmentation. It has three longitudinal lines, two of which are conglomerate brown to dark green spots distributed from the anterior to posterior region of the body, separated by a thin line without pigmentation. The vagina is oriented towards the anterior region of the body.

***Prosthiostomum sancum*** Du Bois-Reymond Marcus, 1965

*Prosthiostomum sancum* Du Bois-Reymond Marcus, 1965: 131–134, figs 4–6 (type locality: Paita, Piura, Peru).

*Prosthiostomum sancum* – Reyes *et al.* 2020: 3 (Paita, Piura, Peru, 5°4′50.1″ S, 81°6′13.4″ W, checklist).

**Distribution**

Northern Paita, Piura, Peru.

**Habitat**

Benthic, in the intertidal zone on rocky shore under a rock.

**Remarks**

*Prosthiostomum sancum* has a dorsal region with brown and black spots forming two dark bands, a cerebral region without pigmentation, and cerebral and marginal eyes present. The male reproductive system features a penis papilla armed with a curved stylet, and paired accessory seminal vesicles.

Family Pseudocerotidae Lang, 1884
Genus *Pseudobiceros* Faubel, 1984

***Pseudobiceros bajae*** (Hyman, 1953)

*Pseudoceros bajae* Hyman, 1953a: 365–366, figs 135–136 (type locality: Puerto Peñasco, Sonora, Mexico).

*Pseudoceros bajae* – Brusca 1980: 72 (identification keys).
*Cryptobiceros bajae* – Faubel 1984b: 215 (new combination, identification keys).
*Pseudobiceros bajae* – Newman & Cannon 1994: 240 (new combination). — Soutullo *et al.* 2021: 373–374, fig. 7b–f (new record from Carbón and Langosta Beaches, Las Baulas National Park of Guanacaste, Costa Rica).

**Distribution**

La Paz Bay, Baja California Sur, Puerto Peñasco and Miramar Beach, Guaymas, Sonora, Mexico; Carbón and Langosta Beaches, Las Baulas National Park of Guanacaste, Costa Rica.

**Habitat**

Benthic; low intertidal, under stones on sand and in intertidal pools under stones (Soutullo *et al.* 2021).

**Remarks**

*Pseudobiceros bajae* is characterized by an oval-elongate body tapered in the posterior region, a black coloration with whitish speckles, pseudotentacles, a sparsely branched pharynx, and a double male reproductive system with an unarmed penis papilla and lacking a cement glandular pouch. Hyman (1953a) described the species as *Pseudoceros bajae*. Latre, Faubel (1984b) established it as the type species of the genus *Cryptobiceros* Faubel, 1984, determining it as *Cryptobiceros bajae*, based on the smooth dorsal surface, the double male reproductive system with unarmed penis papilla, the female reproductive system, and the presence of tentacular and cerebral eyes. Subsequently, Newman & Cannon (1994) proposed a new combination for the species and determined it as *Pseudobiceros bajae*, based on the dorsal coloration pattern, the morphology of the pharynx, the eyes, the pseudotentacles and the anatomy of the reproductive system. However, in *Pseudobiceros* the determinant character of the

genus is the presence of an armed penis papilla, a character absent in *Pseudobiceros bajae*, therefore, an exhaustive revision of the determinant characters of the species is suggested.

***Pseudobiceros splendidus*** (Lang, 1884)

*Pseudoceros superbus* Lang, 1884: 540, pl. 5 fig. 5, pl. 21 figs 2, 14, pl. 22 figs 1–3, 6, pl. 30 fig. 18 (type locality: Mediterranean).

*Pseudoceros evelinae* Marcus, 1950: 81–84, 178, pl. 18, figs 152–157 (description, record form Forte de Itaipú, Santos, São Paulo, Brazil).

*Pseudobiceros periculosus* Newman & Cannon, 1994: 251–252, fig. 40a–c (description, new record from North Heron Island, Great Barrier Reef, Australia).

*Pseudobiceros hymanae* Newman & Cannon, 1997: 350–352, figs 5a–c, 12d (description, record from Heron Island, Great Barrier Reef, Australia).

*Pseudoceros superbus* – Plehn 1896: 171 (new record from Galapagos Archipelago). — Verrill 1900: 596, pl. 70 fig. 5 (new record from Bermuda).

*Pseudoceros splendidus* – Stummer-Traunfels 1933: 3487 (new combination, new name). — Hyman 1939c: 19, 24; 1955c: 137 (new record from Ricon Beach, Puerto Rico). — Prudhoe 1989: 87 (new record from Mozambique, Africa).

*Pseudobiceros evelinae* – Faubel 1984b: 216 (new combination, identification keys). — Bahia *et al.* 2014: 506, fig. 9a–i (description, new record from Praia das Conchas, Cabo Frio, Brazil (22°52′33.05″ S, 41°58′39.27″ W). — Litvaitis *et al.* 2019: 883–888 (new combination).

*Pseudobiceros splendidus* – Faubel 1984b: 216 (new combination, identification keys). — Litvaitis *et al.* 2019: 883–888, fig. 9a (new record from Mid Turtle Shoal, Hawk Channel, and Fort Pierce, Florida, USA).

*Pseudoceros evelinae* – Litvaitis *et al*. 2019: 883–888, fig. 9 (new combination).

*Pseudobiceros periculosus* – Litvaitis *et al.* 2019: 883–888, fig. 9c (new combination).

*Pseudobiceros hymanae* – Litvaitis *et al.* 2019: 883–888, fig. 9b (new combination).

**Distribution**

Pantropical distribution. This species appears to be widely distributed, having been recorded in the Mediterranean, Bermuda, Florida, Puerto Rico, Brazil, Mozambique, Vietnam and the Galapagos archipelago.

**Habitat**

Under rocks and associated with colonial ascidians (botrylloid compound, family Didemnidae Giard, 1872 and of the genus *Symplegma* Herdman, 1886) and dark purple sponges (Verril 1900; Bahia *et al.* 2014).

**Remarks**

*Pseudobiceros splendidus* is part of a group of pseudocerotids (Newman & Cannon 1997) characterized by a black dorsal coloration with an orange submarginal band and black border (review Litvaitis *et al*. 2019), and small white dots on the dorsal surface (Lang 1884). The species was initially described as *Pseudoceros superbus* by Lang (1884) and later renamed *Pseudobiceros splendidus* by Stummer-Traunfels (1933) to avoid confusion with another species of the same name (Marcus 1950). Subsequently, transferred to *Pseudobiceros* by Faubel (1984b), due to its double male reproductive system. Litvaitis *et al.* (2019), based on molecular analysis and coloration pattern, established *Pseudobiceros periculosus*, *Pseudobiceros evelinae*, and *Pseudobiceros hymanae* as junior synonyms of *Pseudobiceros splendidus*.. Its geographic distribution suggests it may be one of the few truly cosmopolitan polyclads species and evidence of strong intraspecific cohesion.

***Pseudobiceros*** sp. 6 (fide Newman & Cannon, 2003)

*Pseudobiceros* sp. 6 – Newman & Cannon 2003: 84 (locality: Galapagos Archipelago).

**Distribution**

Galapagos Archipelago.

**Habitat**

Benthic.

**Remarks**

Newman & Cannon (2003) only made a photographic record of the dorsal region of *Pseudobiceros* sp. 6, which exhibits a coloration similar to that of *Pseudoceros bicuti* Ramos-Sánchez, Bahia & Bastida-Zavala, 2020 (see below). Therefore, the present study suggests the collection of these specimens for a detailed description of the external and internal characters of the species.

Genus *Pseudoceros* Lang, 1884

***Pseudoceros bicuti*** Ramos-Sánchez, Bahia & Bastida-Zavala, 2020

*Pseudoceros bicuti* Ramos-Sánchez *et al.*, 2020: 68–74, figs 11a–f, 12a–b, 13a–d (type locality: Cacaluta Bay, Oaxaca, Mexico, 15°43′12.1″ N, 96°9′49.1″ W).

**Distribution**

Panteón Beach, Puerto Ángel, Dos Hermanas Beach and Cacaluta Bay, Huatulco, Oaxaca.

**Habitat**

Benthic, sublittoral (0.5–2 m) (under rocks, in corals of the genus *Pocillopora* Lamarck, 1816).

**Remarks**

*Pseudoceros bicuti* has a black coloration with yellow and white dots, and cerebral and tentacular eyes. The male reproductive system features a prominent seminal vesicle, and the penis papilla presents a penis sheath and is armed with a sclerosed stipe. The female reproductive system lacks Lang's vesicle.

***Pseudoceros mexicanus*** Hyman, 1953

*Pseudoceros mexicanus* Hyman, 1953a: 363–364, figs 132–134 (type locality: Puerto Peñasco, Sonora, Mexico).

*Pseudoceros mexicanus* – Brusca 1980: 72, fig. 4.8 (identification keys); 2005: 70, fig. 4.8. (new record from Guaymas, Sonora, Mexico).

**Distribution**

Puerto Peñasco, Guaymas, Sonora; Gulf of California, Mexico.

**Habitat**

Benthic (under rocks in the low intertidal).

**Remarks**

*Pseudoceros mexicanus* was only partially described by Hyman (1953a), who only characterized the external morphology of the species, since none of the specimens had a developed reproductive system. *Pseudoceros mexicanus* has an elongated oval body with a blunt posterior end and a brown or dark purple dorsal region, marginal eyes in the anterior region, tentacular eyes and cerebral eyes distributed in circular form, pseudotentacles; pharynx located in the first third of the body with approximately 15 pharyngeal lobes. Brusca (1980) later recorded the species in the Gulf of California, describing a brown to dark purple or reddish-purple coloration, with a reddish orange margin and a dorsal coloration pattern composed of scattered white speckles. We suggest a thorough revision and comparison of the biological material determined by Hyman (1953a) and Brusca (1980) for the area. Additionally, we suggest the collection of topotypic material and a redescription of the species to corroborate if the coloration variants and the coloration pattern are part of an intraspecific variation or indicate the presence of two distinct species.

***Pseudoceros*** sp. (fide Gamboa-Contreras & Tapia-García 1998)

*Pseudoceros* sp. – Gamboa-Contreras & Tapia-García 1998: 108 (locality: Gulf of Tehuantepec).

**Distribution**

Gulf of Tehuantepec, Oaxaca, Mexico.

**Habitat**

Benthic

**Remarks**

Gamboa-Contreras & Tapia-García (1998), conducted oceanographic collections in the Gulf of Tehuantepec, compiling a list of benthic invertebrates. In this inventory, they recorded the presence of the genus *Pseudoceros* for that area; however, they did not provide a description or characterization of the species, nor did they includ photographic record of it.

Genus *Thysanozoon* Grube, 1840

***Thysanozoon estacahuitensis*** Ramos-Sánchez, Bahia & Bastida-Zavala, 2020

*Thysanozoon estacahuitensis* Ramos-Sánchez *et al.*, 2020: 75–76, figs 14a–h, 15a–g (type locality: Estacahuite Beach, Puerto Ángel, Oaxaca).

**Distribution**

Central coast of Oaxaca: Estacahuite Beach. This is the first record of the genus for the southern Mexican Pacific.

**Habitat**

Benthic, sublittoral (4 m), under a rock, associated with seaweeds.

**Remarks**

*Thysanozoon estacahuitensis* has light beige background color with a black pigmentation, which is mostly concentrated along the central axis of the body. The species features sub-triangular and robust dorsal papillae with black pigmentation that diminishes towards their basal regions; the dorsal papillae are scarce, distributed mainly in the central region of the body, becoming less numerous towards the marginal and posterior region of the body. The cerebral eyes are arranged in a semicircular shape.

***Thysanozoon*** sp. (fide Brusca 1980)

*Thysanozoon* sp. – Brusca 1980: 72–73 (locality: Puerto Peñasco, Sonora).

**Distribution**

Gulf of California, Mexico.

**Habitat**

Benthic.

**Remarks**

Brusca (1980) made a partial description of *Thysanozoon* sp., determining that the generic character is the presence of dorsal papillae. The species is characterized by an oval body with a rounded posterior body margin. The dorsal surface has a brown to purple dorsal coloration with pale pigmentation and white and purple-brown speckles; the body margin is reticulate with white and light purple stripes. The dorsal papillae have white spots, small dorsal papillae with yellow pigmentation. The species possesses prominent nuchal tentacles, as well as tentacular and cerebral eyes. The pharynx is long and narrow, located in the first third of the body.

## *Polyclads incertae sedis*

***Glossostoma nematoideum*** LeConte, 1851

*Glossostoma nematoideum* LeConte, 1851: 319 (type locality: Isthmus of Panama).

*Glossostoma nematoideum* – Diesing 1862: 573 (mentioned only). — Lang 1884: 611 (mentioned only). — Faubel 1984b: 236 (identification keys).

**Distribution**

Isthmus of Panama.

**Habitat**

Benthic.

**Remarks**

LeConte (1851), Lang (1884), and Faubel (1984b) included the species within Polycladida; however, Faubel (1984b) determined it as a species incertae sedis. The taxon is characterized by a vermiform body, ten eyes on both sides of the anterior region of the body, and small tentacles. Given this sparse description, the present study suggests collecting specimens of this taxon and to confirm its taxonomic identity.

***Thyphlolepta extensa*** LeConte, 1851

*Thyphlolepta extensa* LeConte, 1851: 319 (type locality: Isthmus of Panama).

*Thyphlolepta extensa* – Diesing 1862: 522 (mentioned only). — Lang 1884: 611 (mentioned only). — Faubel 1984b: 240 (identification keys).

**Distribution**

Isthmus of Panama.

**Habitat**

Benthic.

**Remarks**

LeConte (1851) and Diesing (1862) classified *Thyphlolepta extensa* as a species incertae sedis within the Turbellaria clade, while Lang (1884) and Faubel (1984b) placed the taxon within the order Polycladida, classifying it as a species incertae sedis. However, none of these authors made any comments that could be taken into account to amend the status of the species. LeConte (1851) made a partial description of the species, in which he described a flat body, a purple or light brown dorsal coloration, and intestinal tubes. The present study suggests the collection of specimens of the species to make a complete redescription of the species, as well as to define the status of the species.

Suborder Acotylea Lang, 1884
Family Cestoplanidae Lang, 1884
Genus *Cestoplana* Lang, 1884

***Cestoplana nexa*** Sopott-Ehlers & Schmidt, 1975

*Cestoplana nexa* Sopott-Ehlers & Schmidt, 1975: 213–214, pl. 11 fig. a–d (type locality: Santa Cruz Island, Galapagos Archipelago, Ecuador).

*Cestoplana nexa* – Faubel 1983: 92 (identification keys). — Westheide 1991: 44 (mentioned only).

**Distribution**

Santa Cruz Island, Galapagos Archipelago, Ecuador.

**Habitat**

Interstitial (coarse intertidal sediments) or rocks.

**Remarks**

Faubel (1983) considered *C. nexa* as a species incertae sedis; arguing that Sopott-Ehlers & Schmidt (1975) only made a partial description of the species, based on external morphological characteristics; they only described an elongated and slender body shape and the distribution of eyes spots. The present study suggests a complete description of the species.

Family Leptoplanidae Stimpson, 1857
Genus *Leptoplana* Ehrenberg, 1831

***Leptoplana discus*** (LeConte, 1851)

*Elasmodes discos* LeConte, 1851: 319 (type locality: Isthmus of Panama).

*Leptoplana discus* – Faubel 1984b: 236 (new combination).

**Distribution**

Isthmus of Panama.

**Habitat**

Benthic.

**Remarks**

LeConte (1851) poorly described the external morphology of *Leptoplana discus*, focusing solely on its coloration and the number of eyes (without indicating the type of eyes), and did not include any character of the reproductive complex, nor did he make a diagram of the morphology of the species. Faubel (1984b) designated it as a species incertae sedis, due to the lack of characters that define the species. Therefore, it is recommended that the biological material be reviewed to corroborate the status of the species.

***Leptoplana ophryoglena*** (Schmarda, 1859)

*Polycelis ophryoglena* Schmarda, 1859: 20, pl. 3 fig. 41 (type locality: Paita, Peru).

*Leptoplana ophryoglena* – Diesing 1862: 526 (new combination). — Faubel 1984b: 237 (identification keys).

**Distribution**

South of Paita, on the Peruvian coast.

**Habitat**

Benthic.

**Remarks**

Schmarda (1859) provided a brief description of the species, including characteristics of body shape, coloration and distribution of marginal and cerebral eyes. Regarding the reproductive complex, he only mentioned the presence of separate gonopores. Faubel (1984b) determines it as a species incertae sedis.

***Leptoplana striata*** Schmarda, 1859

*Leptoplana striata* Schmarda, 1859: 17, pl. 2 fig. 34 (type locality: Paita, Peru).

*Leptoplana striata* – Faubel 1984b: 237 (identification keys).

**Distribution**

Paita, Peru.

**Habitat**

Pelagic (floating free in the Pacific in Paita in Peru).

**Remarks**

Schmarda (1859) only described the external morphology of the species, so Faubel (1984b) assigns it as incertae sedis.

***Leptoplana taenia*** (Schmarda, 1859)

*Centrostomum taenium* Schmarda, 1859: 24, pl. 5, fig. 54 (type locality: Paita, Peru).

*Leptoplana taenia* – Lang 1884: 894 (new combination). — Faubel 1984b: 237 (identification keys).

**Distribution**

Paita Peru.

**Habitat**

Benthic.

**Remarks**

Schmarda (1859) made a partial description of the species, as well as a diagram in which he represented the external morphology of the organism. This illustration revealed a cylindrical pharynx, distinctive character of the superfamily Euryleptoidea within the suborder Cotylea. Subsequently, Lang (1884) reassigned the species, determining it as *L. taenia*. However, he did not establish or determine the characteristics based on the original description; reason for which Faubel (1983) established it as incertae sedis.

Suborden Cotylea Lang, 1884
Family Euryleptidae Lang, 1884
Genus *Prostheceraeus* Schmarda, 1859

***Prostheceraeus panamensis*** Woodworth,1894

*Prostheceraeus panamensis* Woodworth, 1894: 51, figs 3–4 (type locality: Gulf of Panama).

**Distribution**

Gulf of Panama.

**Habitat**

Benthic (reef coast).

**Remarks**

Woodworth (1894) described *P. panamensis* based on poorly preserved organism, providing only information on its coloration pattern and a diagram of the anterior region of the body (arrangement of cerebral and tentacular eyes). Faubel (1984b) assigned it as a species incertae sedis. However, based on the anterior morphology of the body represented in the diagram of the species and the coloration pattern, it is considered that this species could belong to the superfamily Pseudocerotoidea Faubel, 1984, for which reason, the present study recommends the collection of topotypic material and a redescription of the species.

## *Historical review*

After an exhaustive literature search, 51 works detailing and/or documenting the presence of polyclads in the TEP were reviewed. This analysis spanned a period of 173 years (1851–2024), revealing intermittent study of polyclads over time (Figs 4–5). Pioneers in this field were LeConte (1851) and Schmarda (1859), who described the first seven species in the Isthmus of Panama (3) and Paita, Peru (4), respectively. Woodworth (1894) contributed two new species and a record in the Gulf of California, the central coast of Oaxaca, and the Isthmus of Panama. Plehn (1896) continued this legacy with the description of two new species and a record for Paita, Peru, and one in the Galapagos Archipelago, followed by Bock (1913), who contributed two new species, one in the Galapagos Archipelago and another in San José, Panama. After a lapse of 12 years, Bock (1925) described a species for Panama. Seventeen years later, Hyman (1939a, 1939b) marked a milestone by initiating the systematic study of polyclads in the TEP, describing two insular species, one on Clipperton Island (1) and another in the Galapagos Archipelago (1); her work evolved over time, describing 20 new species and making three additional records between the Gulf of California and the Galapagos Archipelago (Hyman 1953a, 1953b). These pioneering contributions laid the groundwork for subsequent research, such as that of Cheng & Lewin (1975), who recorded the first

pelagic polyclad in La Paz, Baja California Sur, Mexico, and Sopott-Ehlers & Schmidt (1975), who described eight new worm species for the Galapagos Archipelago.

Five years later, Brusca (1980) expanded the record with the discovery of two new polyclad species in the Gulf of California. In parallel, Pineda-López (1981) left his mark by documenting an insular species in Nayarit, Mexico. This finding marked the beginning of a series of significant discoveries in the region, as Salgado & López (1981), Marcus & Harry (1982), and Pineda-López & González-Bulnes (1984) contributed to the description and records of three species on the coasts of Nayarit, Baja California, and Jalisco, Mexico, respectively.

Fourteen years passed until Gamboa-Contreras & Tapia-García (1998) recorded a hitherto undescribed species of *Pseudoceros* in the Gulf of Tehuantepec, Mexico. Another five years later, in 2003, Newman & Cannon surprised the scientific community by documenting two previously unknown species, one

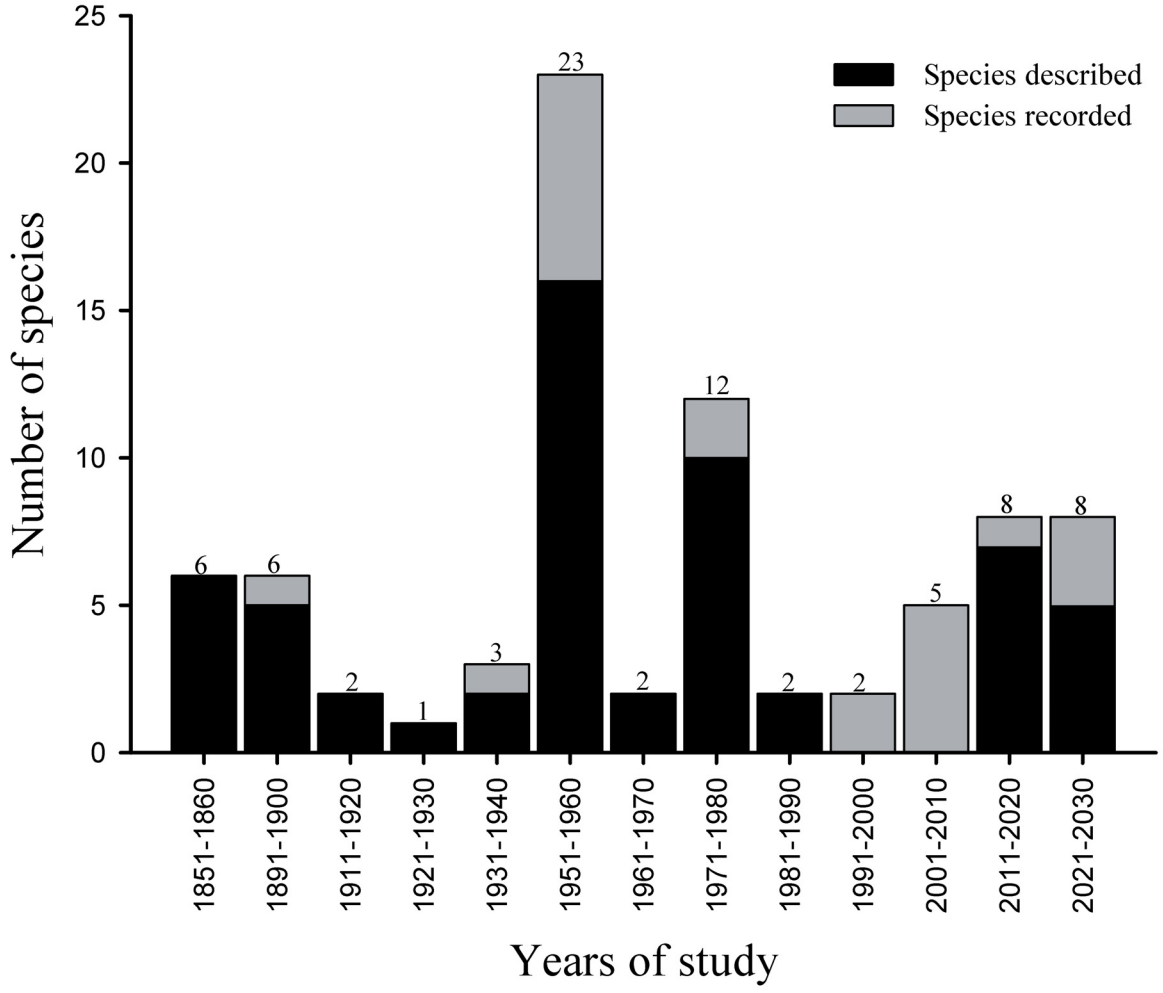


**Fig. 4.** State of knowledge of the polyclads and frequency of described and recorded species by decade in the Tropical Eastern Pacific.

belonging to the genus *Pericelis* and another to the genus *Pseudobiceros*, in the Galapagos Archipelago. The momentum of discoveries continued, as Brusca (2005) expanded his contribution by recording five additional species for the Gulf of California. The discovery of polyclads evolved with Faubel *et al.* (2007), who enriched knowledge by describing a new species in Jalisco, Mexico.

In the last 12 years, a notable advancement in understanding the biodiversity of polyclads has been documented. Ramos-Sánchez *et al.* (2019, 2020, 2021), Lee *et al.* (2021), and Soutullo *et al.* (2021) have played a crucial role in this progress by detailing 13 new species and contributing six additional records on the coasts of Oaxaca, Mexico, as well as in the regions of Costa Rica and the Panama Canal. This body of research has not only significantly expanded our understanding of the presence and variety of polyclads in this region but has also solidified the ongoing importance of research in this field.

### *Numeralia by countries, states, and distribution*

The polyclad fauna of TEP is composed of 82 species, belonging to two suborders, Acotylea (50 species) and Cotylea (24 species), and eight taxa incertae sedis. These species are distributed across 22 families (17 of Acotylea and five of Cotylea) and 53 genera (41 of Acotylea, 10 of Cotylea, two genera incertae

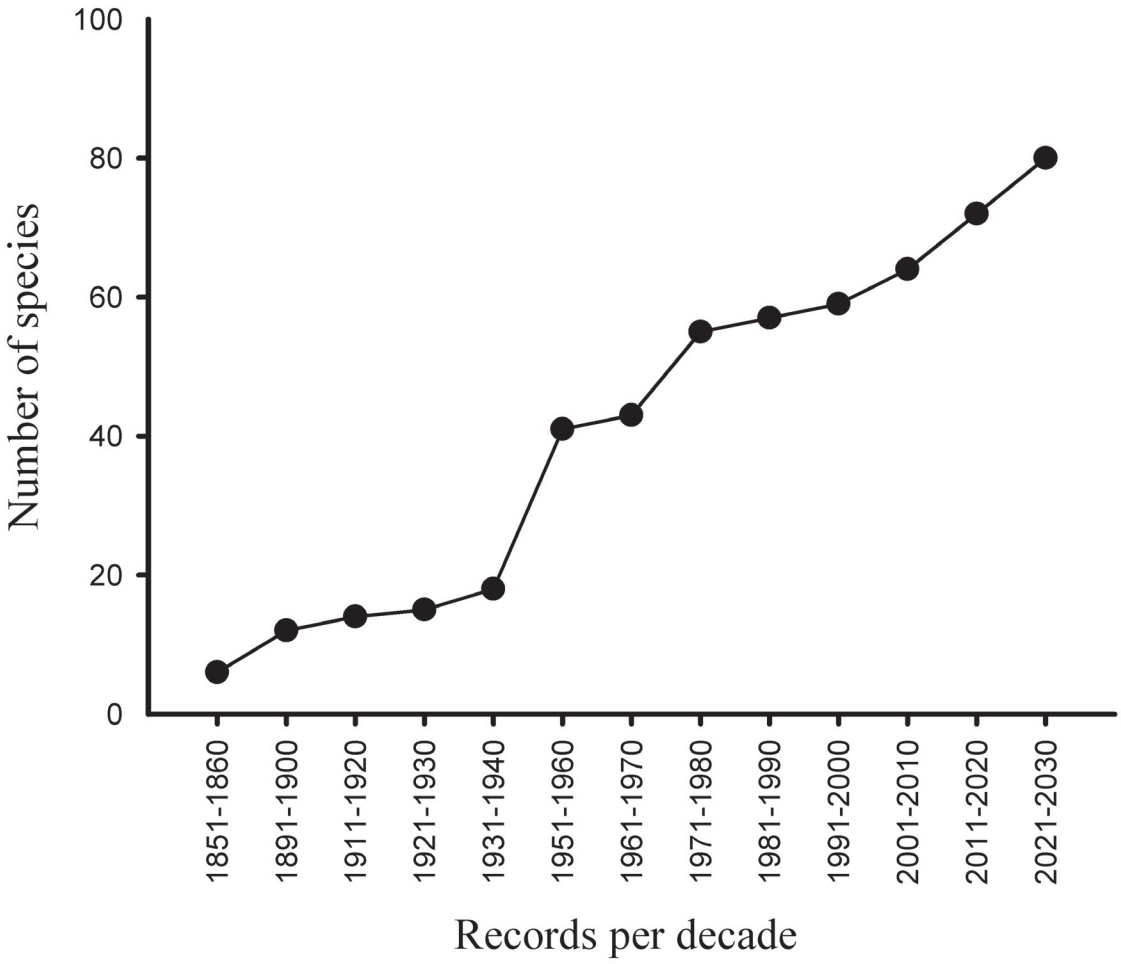


**Fig. 5.** State of knowledge of the polyclads described and recorded in the Tropical Eastern Pacific; species accumulation curve by decade.

sedis). Of the 82 species, 65 have valid taxonomic status, eight are catalogued as incertae sedis, six are characterized to genus level, two are undescribed species but are classified as close (confer) to the nominal species, and this study includes the description of a new species for the coast of Oaxaca, Mexico. Within Acotylea, the families with the highest species richness are Leptoplanidae (nine species), Planoceridae, and Stylochoplanidae (seven each), and Euplanidae (six), and the most species-rich genera are *Leptoplana* (five species) and *Paraplanocera* (four). In the suborder Cotylea, the families with the highest species richness are Prosthiostomidae and Pseudocerotidae (seven species each), while the most species-rich genera are *Pericelis* and *Prosthiostomum* (four species each one).

Regarding the distribution of these species, 53 of them have their type locality and single record in the TEP. On the other hand, 21 species exhibit a disjunct distribution, covering two localities, while six have a wide distribution in the region, including three or more localities. It is important to note that *Enchiridium magec*, *Planocera pellucida*, *Paraplanocera oligoglena* and *Pseudobiceros splendidus* show an interoceanic and pantropical distribution, which raises doubts about their records in the TEP.

The species of polyclads recorded from TEP are not distributed homogeneously. The Pacific coast of Mexico hosts 45 species (described and recorded). Within Mexico, Baja California Sur (17 species) and Oaxaca (16 species) are the states with the highest number of species recorded, followed by Sonora (14), Baja California (9), Nayarit, Jalisco, and Colima (two species each), and Sinaloa, Michoacán, and Guerrero (one species each). After Mexico, Ecuador is the next country in species richness, with 18 species, 17 of which are from Galapagos Archipelago and one from continental Ecuador (Salinas). Costa Rica and Panama each harbor 10 species, recorded from Guanacaste (northwest of Costa Rica) and the Gulf of Panama. Peru has seven species recorded from Paita, and one species was recorded from Clipperton Island.

In Mexico, 31 species have their type localities distributed across 10 of the 11 states that make up the Mexican Pacific coast. Notably, Oaxaca stands out as the type locality of 13 of the 16 species of polyclads present in this state. Likewise, the Galapagos Archipelago is a type locality of 16 of the 18 species distributed in that region. Panama has been designated as a type locality for 8 of the 10 species distributed in the country. Paita, Peru, stands out as the type locality of 6 of the 7 recorded species. Finally, Guanacaste, Costa Rica, has been identified as the type locality for 5 of the 10 species present in that area (Fig. 6).

### *Numeralia by habitats and bathymetry*

The polyclads that inhabit the TEP are distributed in the pelagic zone and in the benthic zone, where they are found under rocks, between coral rock interspaces, or in association with other invertebrates or seaweed. The largest number of species (65) have been recorded in benthic habitats; of these, 57 are free-living species found under rocks or on dead corals; seven species are interstitial, three have been categorized as symbionts (without specifying the symbiotic relationship), two species as commensals, two ectocomensal, and one as epibiont of barnacles, gastropods or seaweed. Additionally, two species are pelagic and two species are considered part of the fouling. Only six species have been recorded occupying two or more environments (benthic or pelagic) or substrates (rock, other invertebrates, or seaweed) (Table 2).

Bathymetric analysis revealed variability in the vertical distribution of these flatworms. In terms of bathymetry, of the 64 species distributed in the benthos, 13 species have a greater vertical distribution range, of which *Prosthiostomum parvicelis* reaches a depth of 18 meters, while *Enchiridium magec* 20 meters, *Stylochus mistus* 25 meters, *Cryptocelis insularis* 36 meters, and *Stylochus* (*Stylochus*) *atentaculatus* 51 meters. The greatest distribution depths have been recorded for *Koinostylochus burchami* and *Armatoplana panamensis*, found at 70 and 73 meters respectively.

## Discussion

The literature focused on the species of polyclads recorded from the Tropical Eastern Pacific (TEP) is predominantly comprised of alpha taxonomy descriptions, an area of knowledge fundamental to understanding the richness and distribution patterns of these flatworms, as well as the diversity and complexity of marine communities and systems (Tosetto *et al.* 2023). This baseline information can be very useful when the presence/absence of polyclads is an indicator of habitat health (Rawlinson 2008), because these flatworms are sensitive to environmental disturbances (e.g., salinity changes, variations in oxygen concentration, temperature sensitivity, etc.) and are considered potential bioindicators of polluted environments (Lin *et al.* 2017) or regions threatened by anthropogenic drivers causing biodiversity loss (Tosetto *et al.* 2023).

In the TEP region, the records of polyclads extend from the Gulf of California to Paita, Peru. The marine province of the Tropical Eastern Pacific has the greatest species richness of polyclads (52 species). Although these results are consistent with the central paradigm that species richness decreases with increasing latitude (Canning-Clode 2009), it is necessary to point out that polyclads have received limited attention from researchers worldwide, as they are considered fragile organisms and problematic to collect and identify (Quiroga *et al.* 2004). This means that the records pattern in the TEP is restricted to localities where the species were recorded for the first time and frequently on a unique occasion, typically in easily accessible areas with greater sampling efforts (e.g., La Paz Bay, Baja California Sur or Puerto Ángel and surroundings, Oaxaca). For these reasons, any discussion of the distribution patterns

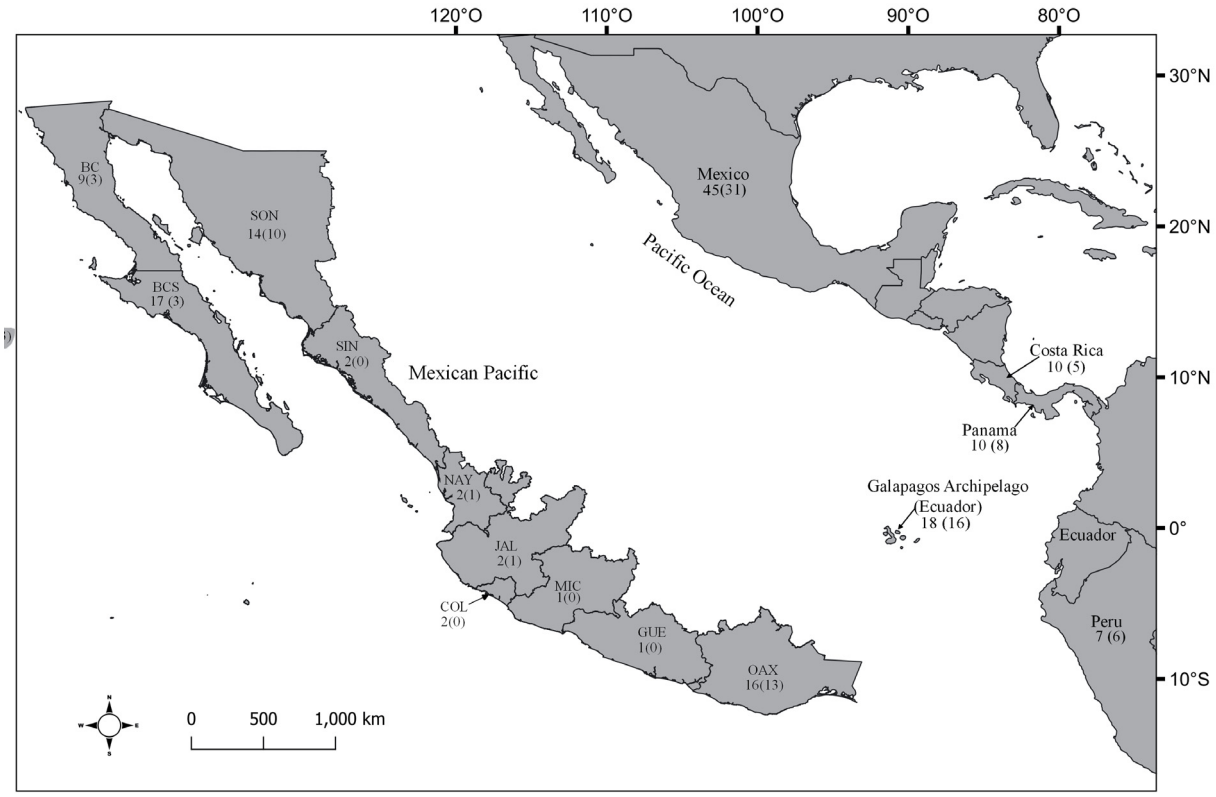


**Fig. 6.** Historical records of polyclads species distribution in the Tropical Eastern Pacific. The number outside the parentheses indicates the total number of described and recorded species, while the number inside the parentheses indicates those with a type locality in the area.

**Table 2** (continued on next two pages). Distribution and habitat of the polyclads in the Tropical Eastern Pacific (sensu Hastings 2000; Salazar-Vallejo & Londoño-Mesa 2004). The symbols indicate the countries of distribution (•), specifying whether the country includes any area with a type locality (+) or if the information is unknown or doubtful (?).

| Species | Country | | | | | | Habitat/Distribution |
|---|---|---|---|---|---|---|---|
| | Mexico | Costa Rica | Panama | Ecuador | Peru | Other Area | |
| *Alloioplana delicata* | | | | | •+ | | Benthic/Local |
| *Alloioplana stylifera* | •+ | | | | | | Benthic/Local |
| *Amyris favis* | | | • | | | | Interstitial/Local |
| *Aprostatum clippertoni* | | | | | | Clipperton Island+ | Benthic/Local |
| *Armatoplana panamensis* | • | | •+ | | | California | Benthic-Fouling / Disjunct |
| *Bivesaculosuteri marcelae* | •+ | | | | | | Epibiont/Local |
| *Bivesiculoplana lamothei* | •+ | | | | | | Ectocomensal/Local |
| *Boninia oaxaquensis* | •+ | | | | | | Benthic/Local |
| *Boninia* sp. | | •+ | | | | | Benthic/Local |
| *Callioplana marianae* sp. nov. | •+ | | | | | | Benthic/Local |
| *Cryptocelis insularis* | | | | •+ | | | Benthic/Local |
| *Cryptostylochus sesei* | | •+ | | | | | Benthic/Local |
| *Diplandros singularis* | •+ | | | | | | Benthic/Local |
| *Emprosthopharynx opisthoporus* | | | | •+ | | Indian Ocean | Ectocomensal/ Widespread |
| *Emprosthopharynx rasae* | • | | | | | Hawaiian Islands+ | Symbiont/Disjunct |
| *Enchiridium magec* | | • | | | | Canary Archipelago+ | Benthic/Disjunct |
| *Enchiridium punctatum* | • | | | | | California+ | Benthic/Disjunct |
| *Eucestoplana cuneata* | | | | •+ | | | Interstitial/Local |
| *Eulatocestus galapagensis* | | | | •+ | | | Benthic/Local |
| *Euplanina horrida* | | | | •+ | | | Interstitial/Local |
| *Euplanoida pacificola* | • | | | | • | Chile+ | Fouling-Benthic/ Widespread |
| *Euplanoida* cf. *pacificola* | • | | | | | | Benthic/Local |
| *Euprosthiostomum adhaerens* | | | •+ | | | | Benthic/Local |
| *Gnesioceros sargassicola* | • | | | | | Sargasso Sea+ | Pelagic/Epibiont/ Benthic/Cosmopolitan |
| *Hoploplana luracola* | | | •+ | | | | Commensal/Local |
| *Imogine mexicanus* | •+ | | | | | | Symbiont/Local |
| *Interplana sandiegensis* | • | | | | | California+ | Benthic/Disjunct |
| *Koinostylochus burchami* | • | | | | | California+ | Benthic/Widespread |

**Table 2** (continued). Distribution and habitat of the polyclads in the Tropical Eastern Pacific (sensu Hastings 2000; Salazar-Vallejo & Londoño-Mesa 2004). The symbols indicate the countries of distribution (•), specifying whether the country includes any area with a type locality (+) or if the information is unknown or doubtful (?).

| Species | Country | | | | | | Habitat/Distribution |
|---|---|---|---|---|---|---|---|
| | Mexico | Costa Rica | Panama | Ecuador | Peru | Other Area | |
| *Latocestus mexicana* | •+ | | | | | | Benthic/Widespread |
| *Latocestus viridis* | | | •+ | | | | Benthic/ Local |
| *Latoplana levis* | •+ | | | | | | Benthic/ Local |
| *Leptoplanella californica* | •+ | | | | | | Pelagic obligate/ Local |
| *Longiprostatum ricketts* | •+ | | | | | | Benthic/Local |
| *Monosolenia asymmetrica* | •+ | | | | | | Benthic/Local |
| *Mucroplana caelata* | | | | •+ | | | Interstitial/Local |
| *Notocomplana mexicana* | •+ | | | | | California | Benthic/Widespread |
| *Notocomplana saxicola* | • | | | | | California+ | Benthic/Disjunct |
| *Ommatoplana mexicana* | •+ | | | | | | Benthic/Disjunct |
| *Paraplanocera angeli* | | •+ | | | | | Benthic/Local |
| *Paraplanocera oceanica* | | | | •+ | | | Benthic/Local |
| *Paraplanocera oligoglena* | • | • | | | | Sri Lanka+ | Benthic/Pantropical |
| *Paraplanocera oligoglenoides* | •+ | | | | | | Benthic/Local |
| *Paraprostatum echinolittorinae* | •+ | • | | • | | | Commensal/Widespread |
| *Parviplana hymani* | • | | | | | California+ | Benthic/Disjunct |
| *Pericelis ernesti* | •+ | • | | | | | Benthic/Widespread |
| *Pericelis nazahui* | •+ | | | | | | Benthic/Local |
| *Pericelis sigmeri* | •+ | | | | | | Benthic/Local |
| *Pericelis* sp. 7 | | | | • | | | Benthic/Local |
| *Phaenoplana longipenis* | •+ | | | | | California | Benthic-Epibiont/ Disjunct |
| *Planocera pellucida* | • | | | | | ? Atlantic Ocean+ | Pelagic-Symbiont/ Pantropical |
| *Planocera tridentata* | | | | •+ | | | Benthic/Local |
| *Prostheceraeus fitae* | | •+ | | | | | Benthic/Local |
| *Prostheceraeus nigricornus* | | | | | •+ | | Benthic/Local |
| *Prosthiostomum multicelis* | •+ | | | | | California | Benthic/Widespread |
| *Prosthiostomum parvicelis* | | | | •+ | | | Benthic/Local |
| *Prosthiostomum* cf. *parvicelis* | • | | | | | | Fouling/Local |

**Table 2** (continued). Distribution and habitat of the polyclads in the Tropical Eastern Pacific (sensu Hastings 2000; Salazar-Vallejo & Londoño-Mesa 2004). The symbols indicate the countries of distribution (•), specifying whether the country includes any area with a type locality (+) or if the information is unknown or doubtful (?).

| Species | Country | | | | | | Habitat/Distribution |
|---|---|---|---|---|---|---|---|
| | Mexico | Costa Rica | Panama | Ecuador | Peru | Other Area | |
| *Prosthiostomum sancum* | | | | | •+ | | Benthic/Local |
| *Pseudobiceros bajae* | •+ | • | | | | | Benthic/Widespread |
| *Pseudobiceros splendidus* | | | | • | | Mediterranean+, wider Caribbean, Brazil, Indo-Pacific | Benthic/Pantropical |
| *Pseudobiceros* sp. 6 | | | | •+ | | | Benthic/Local |
| *Pseudoceros bicuti* | •+ | | | | | | Benthic/Local |
| *Pseudoceros mexicanus* | •+ | | | | | | Benthic/Local |
| *Pseudoceros* sp. | • | | | | | | Benthic/Local |
| *Semonia bauliensis* | | •+ | | | | | Benthic/Local |
| *Spinicirrus inequalis* | •+ | | | | | | Benthic/Local |
| *Stylochus mistus* | •+ | | | | | | Fouling/Local |
| *Stylochus tripartitus* | • | | | | | California+ | Epibiont-Benthic/ Disjunct |
| *Stylochus (Stylochus) atentaculatus* | • | | | | | California+ | Benthic/Disjunct |
| *Theama occidua* | | | | •+ | | | Interstitial/Local |
| *Thysanozoon estacahuitensis* | •+ | | | | | | Benthic/Local |
| *Thysanozoon* sp. | •+ | | | | | | Benthic/Local |
| *Traunfelsia* sp. | | | | •+ | | | Interstitial/Local |
| *Tripyloplana virgae* | | | | •+ | | | Benthic/Local |
| *Zygantroplana ups* | •+ | | | | | | Symbiont/Local |
| **Incertae sedis** | | | | | | | |
| *Cestoplana nexa* | | | | •+ | | | Interstitial/Local |
| *Glossostoma nematoideum* | | | •+ | | | | Benthic/Local |
| *Leptoplana discus* | | | •+ | | | | Benthic/Local |
| *Leptoplana ophryoglena* | | | | | •+ | | Benthic/Local |
| *Leptoplana striata* | | | | | •+ | | Pelagic/Local |
| *Leptoplana taenia* | | | | | •+ | | Benthic/Local |
| *Prostheceraeus panamensis* | | | •+ | | | | Benthic/Local |
| *Thyphlolepta extensa* | | | •+ | | | | Benthic/Local |

of the polyclads from the TEP must await an improvement in the knowledge of polyclads in areas where their study has been scarce (e.g., Central Mexican Pacific) or practically non-existent (e.g., part of Central America, Colombian Pacific).

An exhaustive compilation and review of the species recorded from TEP region was carried out, revealing the presence of 82 species, 53 genera, and 22 families of polyclads. The suborder Acotylea presented the highest number of species (50), contradicting Prudhoe's (1985) assertion that Cotylea species exhibit the highest species richness in low latitudes. However, this contradictory result likely stems from the authors' bias in collecting from only a few habitats, mainly "under rocks" or "coral rocks" (57 of the 82 species). While 11 species were associated with other organisms (barnacles, gastropods, or seaweed), seven species were found in the rocky intertidal breakwater zone or from interstitial habitat. Only two species were found in the pelagic habitat. The almost non-existent studies of polyclads from coral reefs explain the lesser number of Cotylea species recorded from TEP (Newman & Cannon 1996a, 1996b).

The history of description and records of polyclad species for the TEP clearly demonstrates the need to recognize the total richness of polyclads in the region through systematic and exhaustive collecting, expanding the coverage to poorly explored environments and greater depths. For these reasons, is recommended to explore other habitats ignored in the past, such as the coastal lagoons, the mangrove forests, coral reefs, deep soft bottoms, and man-made structures such as docks, buoys, and ship hulls.

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