

## TWO NEW STYLOCHID FLATWORMS (PLATYHELMINTHES: POLYCLADIDA) FROM THE SOUTHERN GREAT BARRIER REEF, AUSTRALIA

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**ABSTRACT.** - Two new stylochid flatworms, *Stylochus (Imogine) lesteri*, new species, and *S. (Stylochus) stellatus*, new species (Platyhelminthes, Polycladida) are described from Heron and One Tree Islands, southern Great Barrier Reef, Australia. These new species differ from other Pacific stylochids in their colour pattern, eye arrangement and details of their male reproductive anatomy.

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### INTRODUCTION

Stylochid flatworms are generally known as pests of commercially important bivalves such as rock and pearl oysters, mussels and giant clams (Stead, 1907; Pearse & Wharton, 1938; Galleni, 1976; Galleni et al.; 1980; Littlewood & Marsbe, 1990; Chintala & Kennedy, 1993; Newman et al., 1993). Although these flatworms are widespread from the Mediterranean, Red Sea, Atlantic and Indo-Pacific oceans, little is known about the distribution of these flatworms in Australian waters.

Newman & Cannon (1994) recorded nine unidentified acotyleans from the Great Barrier Reef, Australia. However, only one stylochid has been described from Australasian waters, *Stylochus (Stylochus) vigilax* Laidlaw, 1904.

This study describes two new stylochids, *Stylochus (Imogine) lesteri*, new species, and *Stylochus (Stylochus) stellatus*, new species, from the southern Great Barrier Reef, Australia.

### MATERIALS AND METHODS

Worms were hand collected from under rubble at the reef crest at Heron Island (23° 27' S, 151° 55' E) and One Tree Island (23° 30' S, 152° 05' E), southern Great Barrier Reef,

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Australia. Live animals were retained in the laboratory in two litre plastic containers and photographed.

Specimens were coaxed onto filter paper, fixed on frozen polyclad fixative, FCA- PG, PP (see Newman & Cannon, 1995), and preserved in 70% EtOH for histological preparations. Whole mounts were stained with Mayer's haemalum, dehydrated in graded alcohols, cleared in xylene and mounted in Canada balsam. Longitudinal serial sections of the reproductive regions were prepared by embedding tissue in 56°C Paraplast, cutting at 6-8  $\mu$ m and staining with haematoxylin and eosin.

Drawings and measurements were made by K.A.J. with the aid of a camera lucida. Measurements are expressed for the types as length mm x width mm. All material was collected and photographed by L.J. Newman and A.E. Flowers. Specimens are lodged at the Queensland Museum: wholmounts are designated WM, serial sections LS and whole animals in 70% alcohol S.

## DESCRIPTION

### *Stylochus (Imogine) lesteri*, new species (Figs. 1A-D, 3A)

**Material examined.**- Holotype - WM, (QM G210702), reef crest, One Tree Island, Australia, 15 Sep.1992.

Paratype - LS, (QM G210703), reef crest, One Tree Island, 15 Sep.1992.

**Description.**- Body rounded oval, thick and fleshy, margin indented, blunt posteriorly (Figs. 1A, 3A). Dorsally mottled pale orange and light brown with dark brown irregular flecks of microdots, entire surface covered with scattered dark brown dots, larger animal darker in colour. Margin transparent with opaque white and dark brown flecks. Nuchal tentacles colourless and transparent. Ventrally beige without markings. Size of living animals: 65 mm x 40 mm and 30 mm x 20 mm, both mature.

Nuchal tentacles long and narrow, 2.6 mm apart, retractile, about 0.5 mm wide (Fig. 1B). Marginal eyes along the entire margin: densely packed along the anterior margin in four to five rows anteriorly, becoming more scattered posteriorly in two to three rows. Cerebral eyes numerous, embedded in epidermis, scattered between and posteriorly to the nuchal tentacles, extending only slightly anteriorly into frontal eyes which are less numerous and scattered. Few eyes around the base of nuchal tentacles, about 50 tentacular eyes within the tentacles.

Pharynx large about 3/4 body length, situated mid-body with about 24 complex, ruffled pharyngeal folds, mouth in anterior part of pharynx (Fig. 1C). Gonopores separate, posterior to the pharynx, about 0.4 mm between pores and 1.8 mm between female pore and posterior margin. Vas deferens extend anteriorly along the entire length of pharynx.

**Reproductive system - Male.** - Seminal vesicle tripartite; ventro-lateral lobes and central lobes muscular, approximately equal size, 0.79 mm long x 0.53 mm wide (Fig. 1D). Ejaculatory duct coiled, joins prostatic duct before the penis. Prostate large, 1.04 mm long x 0.6 mm wide, oval with numerous narrow ducts leading into the lumen, epithelium folded,

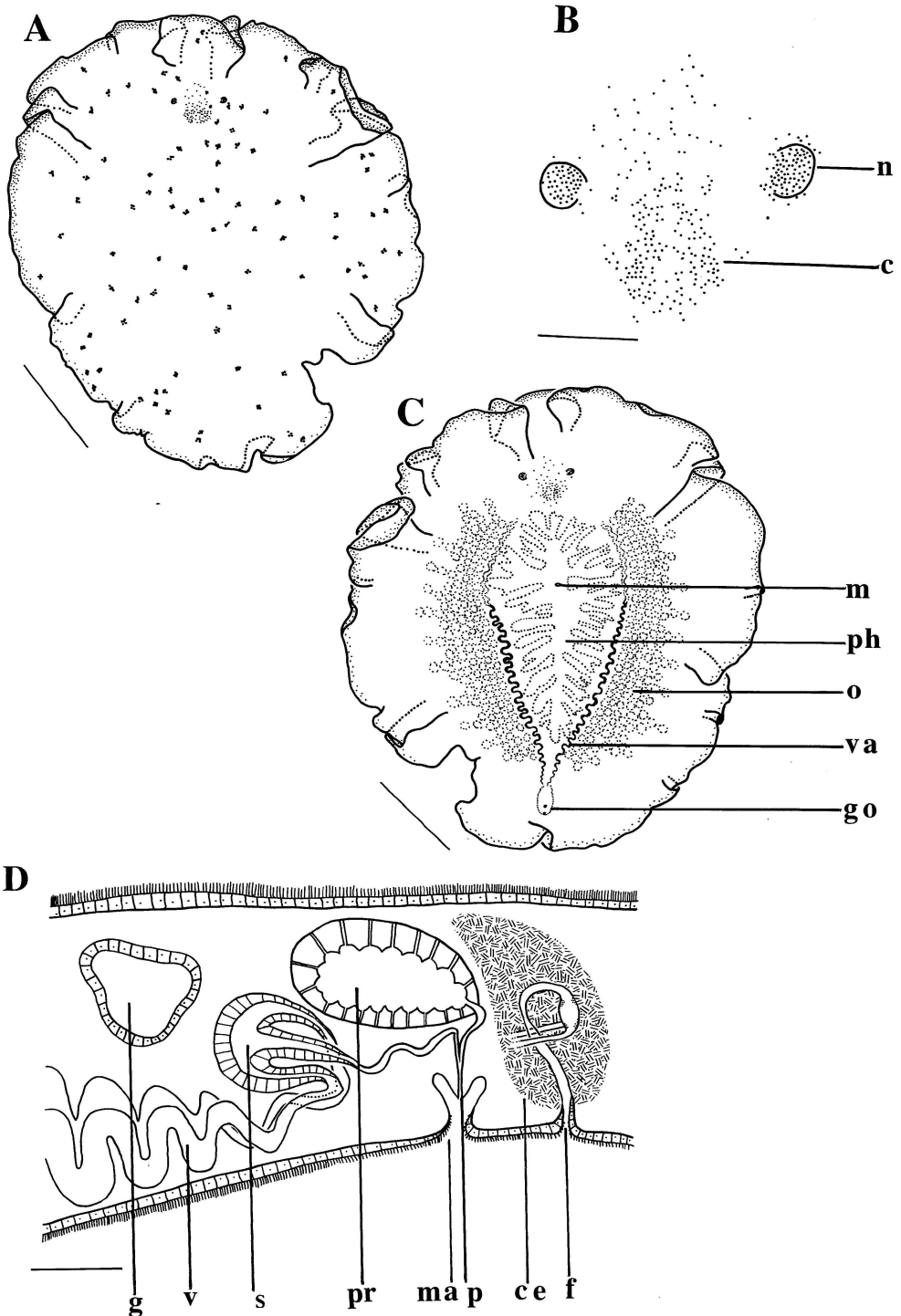


Fig. 1. *Stylochus (Imogine) lesteri*, new species. A, dorsal surface; B, arrangement of the dorsal eyes; C, morphology of the ventral surface; D, diagrammatic reconstruction of the reproductive system (c - cerebral eyes, ce - cement glands, f - female antrum, g - gut diverticula, go - gonopores, m - mouth, ma - male antrum, n - nuchal tentacles, o - oviducts, p - penis papillae, ph - pharynx, pr - prostatic vesicle, s - seminal vesicle, v - vagina, va - vas deferens). Scales: A, C = 5 mm, B = 1 mm, D = 0.5 mm.

extracapsular glands not apparent. Prostatic duct long. Penis simple, papilla small, 0.16 mm long, in a deep, narrow male antrum.

**Female.**- Uteri on either side of the pharynx, curve dorsally and join at the distal end of the vagina (Fig. 1D). Vagina long, muscular and narrow. Cement glands extensive. Female antrum deep and narrow.

**Diagnosis.**- Belonging to the subgenus *Imogine* with tripartite seminal vesicle. Body up to 65 mm long x 45 mm wide, pale orange and light brown with an irregular pattern of dark brown flecks, margin transparent, eyes around the margin, about 50 eyes within each nuchal tentacle, cerebral eyes extending only slightly anteriorly, prostate larger than seminal vesicle.

**Etymology.**- Named in honour of Dr. R.J.G. Lester, Parasitology Department, University of Queensland.

**Distribution.**- Rare, found under boulders at the reef crest, One Tree Island, southern Great Barrier Reef, Australia.

**Remarks.** - Faubel (1983), Prudhoe (1989) and Newman et al. (1993) recognised 28 species of *Stylochus* within the subgenus *Imogine* (with a tripartite seminal vesicle). These species can be clearly separated into two groups based on the arrangement of their marginal eyes. In 10 of these species, eyes are found along the entire margin. Seven species are found along Atlantic coastal areas and are considered geographically distant. The remaining three species can be separated from *S. (I.) lesteri* by morphological characteristics: *S. (I.) arenosus* Willey, 1897 and *S. (I.) orientalis* Bock, 1913 possess cerebral eyes in distinct clusters (not scattered into frontal eyes); *S. (I.) exiguus* Hyman, 1953 possesses a posterior notch.

***Stylochus (Stylochus) stellatus*, new species**  
(Figs 2A-D, 3B)

**Material examined.**- Holotype - WM, (QM G210704), reef crest, Heron Island, Australia, 26 Jun.1991.

Paratype - LS, (QM G210705), reef crest, Heron Island, 21 Jan.1992; S, (QM G210706), One Tree Island, 15 Aug.1993.

**Description.**- Body broadly oval, body thick, stiff and fleshy, margin indented, blunt posteriorly (Fig. 2A, 3B). Dorsal surface pale orange-cream with numerous brown spots, each spot composed of dark brown concentric microdots, smaller and more numerous spots towards the margin. Nuchal tentacles colourless and transparent, appear black due to concentration of eyes. Ventrally cream without markings. Size of mature living animals 50 mm x 30 mm to 35 mm x 25 mm.

Nuchal tentacles small, retractile, varying in shape from short and conical to bumps (Fig. 2B). Marginal eyes along the entire margin: densely packed along the anterior margin in four to five rows anteriorly, becoming more scattered posteriorly into three rows. Cerebral eyes numerous, embedded in epidermis, scattered between the nuchal tentacles, not extending into frontal eyes. Nuchal tentacles with about 100 eyes each, concentrated near tips of tentacles.



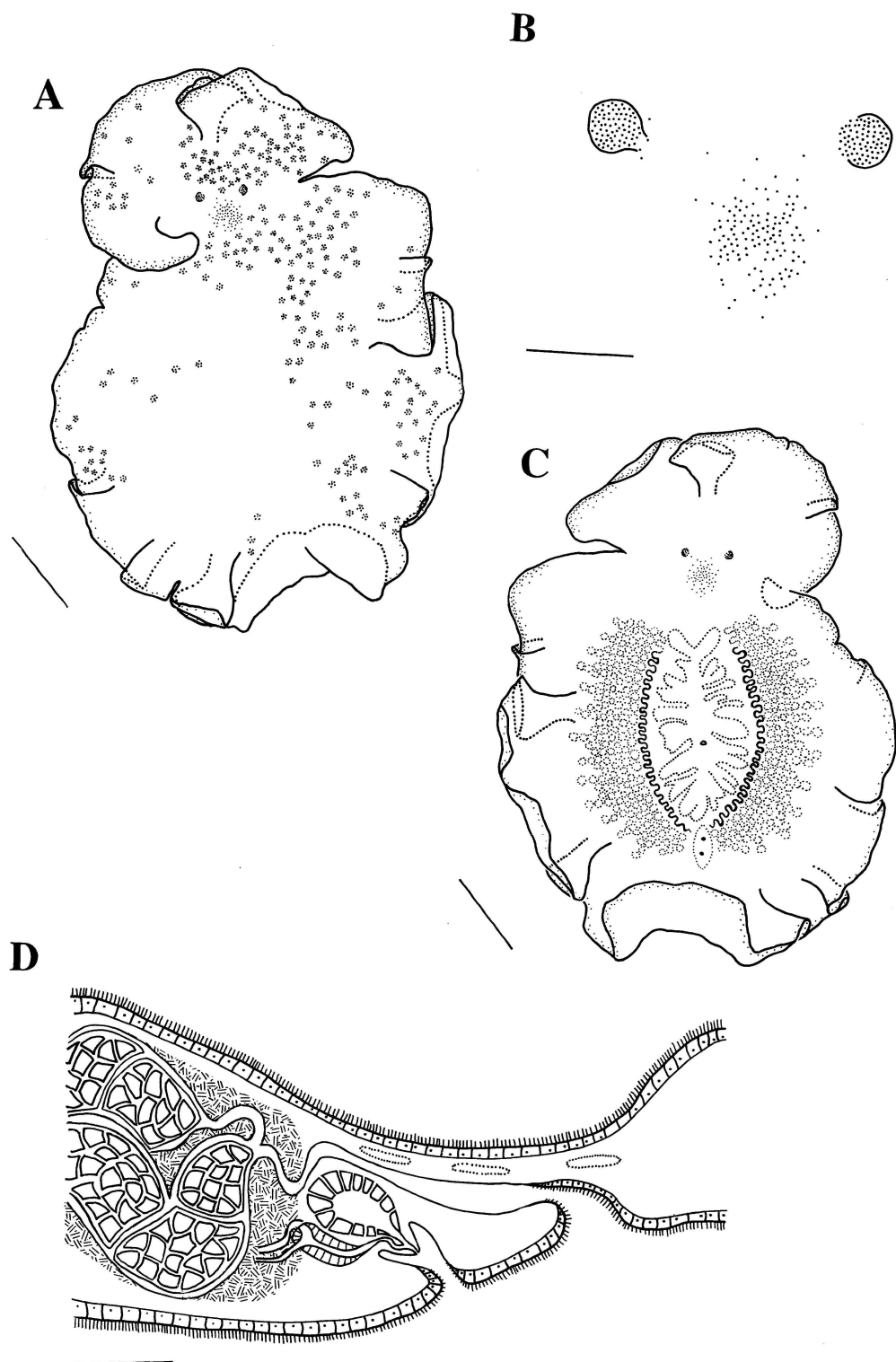


Fig. 2. *Stylochus (Stylochus) stellatus*, new species. A, dorsal surface; B, arrangement of the dorsal eyes; C, morphology of the ventral surface; D, diagrammatic reconstruction of the reproductive system. Scales: A, C = 5 mm, B = 1 mm, D = 0.5 mm.

Pharynx central, about 1/3 body length, situated mid-body, with about 20 complex, ruffled pharyngeal folds, mouth slightly posterior to mid-line of pharynx (Fig. 2C). Gonopores separate, posterior to the pharynx, about 0.8 mm between pores and 5.3 mm between female pore and posterior margin. Vas deferens extend anteriorly along the entire length of pharynx.

*Reproductive system - Male.* - (Fig. 2D). Seminal vesicle small, single, oblong, 0.22 mm long x 0.12 mm wide. Ejaculatory duct short, coiled, joins prostatic duct before the penis. Prostate large, 0.45 mm long x 0.18 mm wide, over twice the size of the seminal vesicle, oval with numerous narrow ducts leading into the lumen, epithelium folded, extracapsular

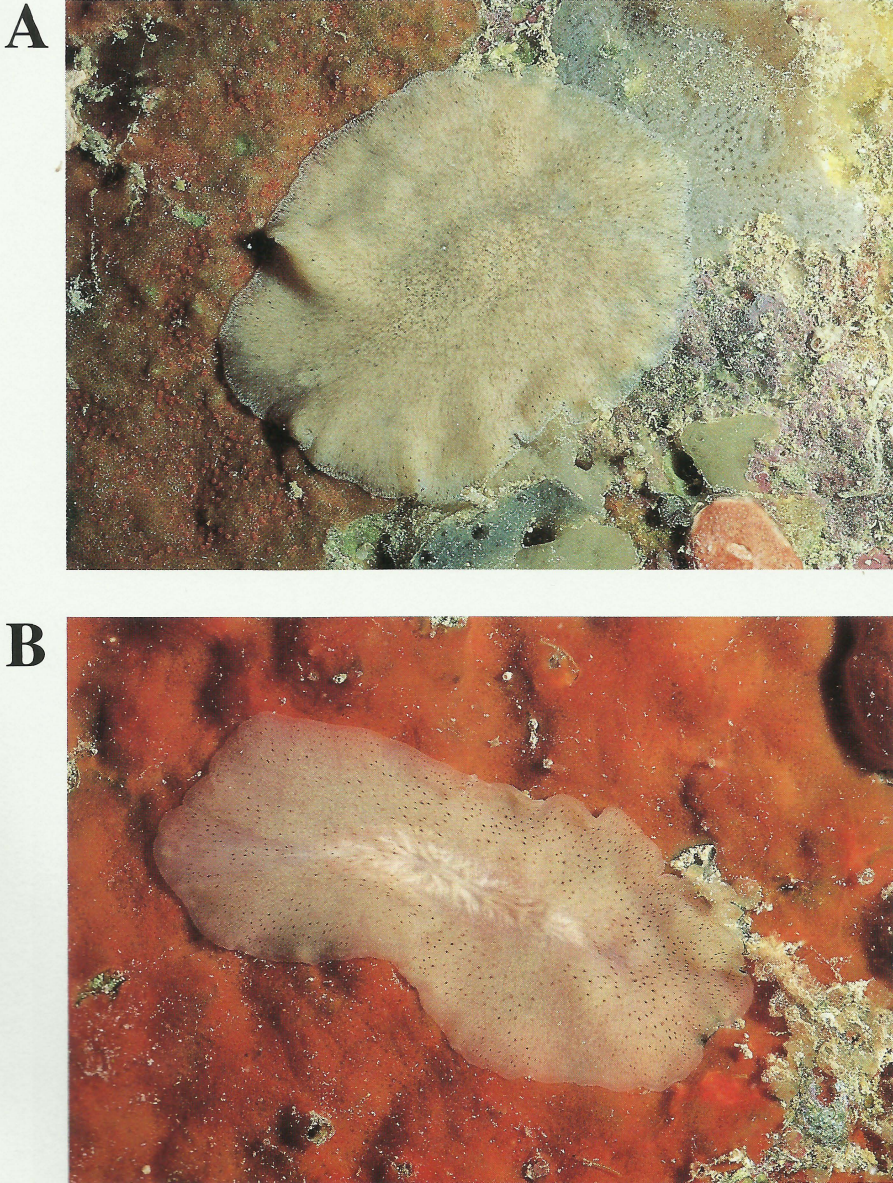


Fig. 3 Live stylochids. A, *Stylochus (Imogine) lesteri*, new species, Holotype, QM G210702, One Tree Island; B, *Stylochus (Stylochus) stellatus*, new species, Paratype, QM G210706, Heron Island.

glands not apparent. Prostatic duct short. Penis simple, papilla small, 0.16 mm long, in a deep, narrow male antrum.

**Female.**- Oviducts large, full of eggs. Uteri on either side of the pharynx, running posteriorly to the female pore, joining the distal end of the vagina. Female antrum long, narrow, leading into a narrow, long vagina; cement glands extensive.

**Diagnosis.**- Belonging to the subgenus *Stylochus* with a single seminal vesicle. Body relatively large, up to 50 mm long x 30 mm wide, orange-cream dorsally with an even pattern of dark brown spots composed of concentric microdots, eyes around the entire margin, 100's of eyes within each nuchal tentacle, no frontal eyes, prostate more than twice the size of the seminal vesicle.

**Etymology.** - Named *stellatus* = spotted (L. mas.) for its spotted pattern.

**Distribution.** - Rare from under boulders at the reef crest, Heron and One Tree Islands, southern Great Barrier Reef.

**Remarks.**- According to Faubel (1983) 19 species of *Stylochus*, subgenus *Stylochus* (with a single seminal vesicle), are recognised. As in the subgenus *Imogine*, these species also can be clearly separated into two groups based on the arrangement of the marginal eyes. In four species, eyes are found along the entire margin. Hyman (1953) described three of these species, *S. (S.) atentaculatus*, *S. (S.) californicus* and *S. (S.) insolitus* from California. The other species, *S. (S.) suesensis* Ehrenberg, 1831, is only known from the Red Sea and possesses frontal eyes (absent in *S. (S.) stellatus*).

The present species differs from *S.(S.) atentaculatus* since it is pale orange-cream with distinct brown spots and not dark brown; the cerebral eyes are in one cluster between the nuchal tentacles and not in two elongate posterior clusters and mature specimens do not lack nuchal tentacles. *S.(S.) californicus* possesses frontal eyes which extend to the anterior margin and are not present in *S.(S.) stellatus*. *S.(S.) insolitus* is also easily distinguished from *S.(S.) stellatus* since it is narrow, elongate with a single row of marginal eyes and has a transverse brown bar across the nuchal tentacles.

## DISCUSSION

Clearly, there appears to be two taxonomic groups within the subgenera *Imogine* and *Stylochus*; those with eyes around the entire margin and those with only anteriorly eyes (Newman et al., 1993). We believe *Imogine* (with tripartite seminal vesicle) deserves to be raised to generic rank and that the genus *Stylochus* be reserved for those worms with a single seminal vesicle.

Although few records exist of stylochids in tropical coral reef waters, Newman and Cannon (1994; pers. obs.) believe the diversity of these flatworms is much higher. With concentrated sampling effort and use of a new polyclad fixative (Newman & Cannon, 1995), we estimate that many more species will be discovered. Future studies need to focus on the taxonomy, biology (feeding and reproductive) and distribution of these flatworms in order to determine their role in coral reef ecosystems.



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