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SOME POLYCLAD TURBELLARIANS NEW TO THE FAUNA 586 OF THE AUSTRALIAN COASTS

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SUMMARY

This paper is a contribution to the knowledge of the polyclad turbellarians of the Australian coasts. Of the eleven species encountered and belonging to five known genera, one acotylean, *Hoploplana rosea*, and three cotylean species, one *Acanthozoon* and two *Pseudoceros*, are new, whilst six species have been described hitherto, but are new to the Australian fauna. Two specimens of the remaining form are very young, but appear to be unidentifiable stylochids.

INTRODUCTION

The collection described below was made by Neville Coleman, principally in 1972, and deposited in the Australian Museum, Sydney. With the exception of one specimen from Queensland, one from South Australia and another from New South Wales, the material was obtained from various localities along the shores of Western Australia. It is contained in 13 tubes, and unfortunately most of the forms are each represented by only one specimen, hence descriptions of the cotylean species, with one exception, are directed towards external features, with some observations made from a study of internal organs, as seen in whole mounts cleared in methyl salicylate.

A brief historical account of the earlier Australian studies of polyclad flatworms was given by Haswell (1907), who also added nine new species to the polyclad fauna of the eastern coast of Australia. This was followed by Bock's (1913) descriptions of two new species of the genus *Pseudoceros* from Western Australia. Subsequently, Stummer-Traunfels (1933) redescribed the type-material of species found in Australia by Schmarda (1859). Hyman (1954) added two new species of *Pseudoceros* from the Great Barrier Reef, and finally in 1959 she added seven more species to those known from the coast of New South Wales. Moreover, in a book by K. Gillett and F. McNeil (1959), there is on p. 112 a coloured plate of four kinds of polyclad turbellarians, which were unnamed, and which appear to have been found on the Great Barrier Reef. It seems that the figures from top to bottom represent: *Pseudoceros ferrugineus* Hyman, 1959; *Pseudoceros fuscopunctatus* sp.nov. (described below); *Pseudoceros corallophilus* Hyman, 1954, and *Pseudoceros bedfordi* Laidlaw, 1902.

SYSTEMATIC ACCOUNT

ACOTYLEA

Family Stylochidae Stimpson, 1851

An undetermined genus and species Fig. 1

LOCALITY: Western Australia (on rubble in 25ft. at Hall's Bank, Fremantle, 13 April, 72.)

MATERIAL: 1 juvenile specimen (AM. reg.no. W5481)

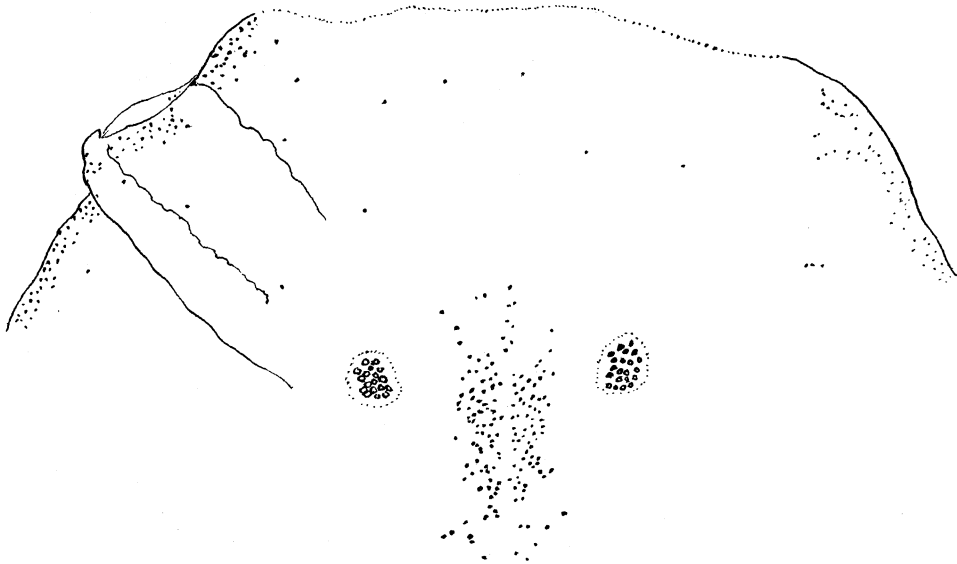


Fig. 1 Stylochid. Arrangement of eyes in anterior region (dorsal view).

This specimen is juvenile and rather obovate in outline, although the body is damaged along the anterior margin. It measures 12 mm in length and 9 mm in maximum width, which occurs in the middle region of the body. The ruffled pharynx is everted through the mouth and forms a rosette just behind the middle of the body. As shown in fig. 1, eyes are arranged in a compact cluster inside each of a pair of nuchal tentacles situated at about the first quarter of the body-length. Between the clusters of tentacular eyes lie the cerebral eyes, which are distinctly smaller and disposed in two irregular elongate groups. Marginal eyes encircle the body; anteriorly they are arranged in three or four irregular rows, but diminish gradually to a single row of widely-separated eyes along the posterior margin. There are also a few widely-scattered frontal eyes. No primordium of the reproductive system has been made out.

A second specimen, also immature, of what is probably the same species was collected at:

LOCALITY: Western Australia (on muddy bottom in 55 ft., Sulphur Rock Windmill, Channel,/Cockburn Sound (ca. 32°5'S., 115°40'E.), 16 Jan., 72.)

This specimen (AM. reg. no. W.5241) is likewise obovate, measuring 20 mm in length and 16 mm in maximum width. The pharynx is about two-thirds of the total length of the body, extending from close behind a pair of distinct nuchal tentacles to near the posterior end of the body. The distribution of the eyes is almost exactly like that of the small form described above, except that the marginal eyes behind the middle of the body are very sparse, difficult to make out, and might readily be overlooked. This difficulty in observing the posterior marginal eyes might suggest that in young specimens of this species these eyes may be seen around the entire margin of the body, but as the worms become larger so their marginal eyes tend to disappear in the posterior region of the body. If variation of this kind does generally occur in the distribution of the marginal eyes among members of the family Stylochidae, it is very important at the present time, because a number of genera and species belonging to this family have been differentiated from one another primarily on the basis of whether or not marginal eyes encircle the body. Unfortunately, little is understood of morphological variation in polyclads, as each of the majority of known species is recognized only from the description of one specimen.

Family Hoploplanidae Stummer-Traunfels, 1933

Hoploplana rosea sp. nov. Fig. 2 a-c.

LOCALITY: South Australia (living on bryozoan at 45 ft., Onkaparinga (35°9'S., 138°29'E.), 25 Feb., 72.)

MATERIAL: 1 specimen (holotype) (AM.reg.no. W. 5243)

The body is nearly discoid and measures 7 mm long and 6 mm wide. Its dorsal surface is densely covered with relatively long transparent papillae, which measure up to 0.6 mm in length in the middle region of the body and gradually become shorter towards the margins. The ground-colour of this surface is a very pale yellow, but between the papillae the surface is tinged with deep pink arising from large rhabdites lying in the epidermis, so that the dorsal surface of a specimen cleared in methyl salicylate appears to be spotted with small transparent areas (fig.2a). A colour transparency of the living worm shows the dorsal surface of the body to be pinkish, but the margins carry rectangular specks of brownish pigment. The under surface of the body is greyish.

The dorsal epithelium is rather deep between the papillae, and each cell is packed with a large pinkish rhabdite, but the ventral epidermis is without such rhabdites and lacks coloration. The papillae arise from the dorsal basement-membrane and are covered with an epithelium without rhabdites, but well provided with cilia. Each papilla is filled with a very loose parenchyma.

A pair of well-separated, blunt, nuchal tentacles are situated at about 3 mm from the anterior margin of the body. Tentacular eyes form a ring at the base of each tentacle, and cerebral eyes lie in two somewhat scattered clusters in front of the level of the tentacles, and a single eye occurs on each side of the median line between the tentacles (fig.2b).

The mouth lies centrally on the ventral surface of the body. It opens into a pharyngeal chamber containing a relatively large pharynx with four pairs of deep lateral pockets, as is usual in the genus *Hoploplana*.

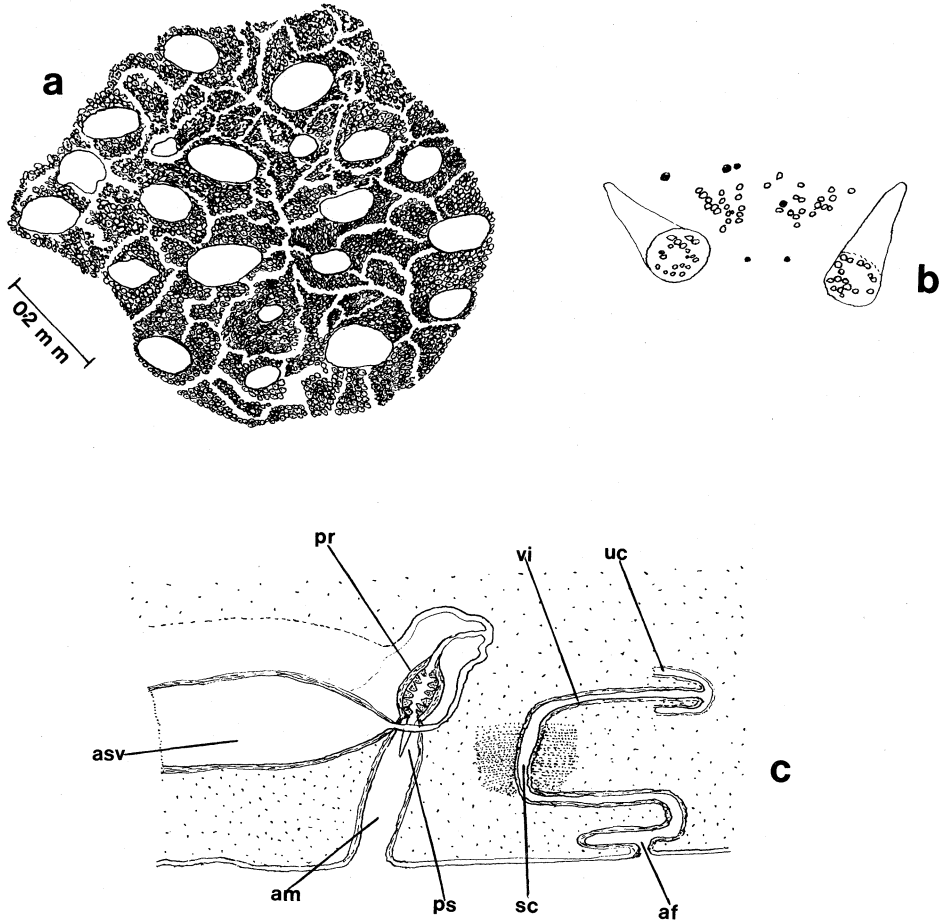


Fig. 2. *Hoploplana rosea* n. sp. (a) Distribution of pigment and papillae on dorsal surface of cleared specimen; (b) Arrangement of cerebral and tentacular eyes (dorsal view); (c) Sagittal section through copulatory complexes (diagrammatic).

Lettering on figures:

am., antrum masculinum; *af.*, antrum fenininum; *asv.*, accessory seminal vesicle; *pr.*, prostatic organ; *pp.*, penis-papilla; *ps.*, penis-stylet; *psh.*, penis-sheath.; *sc.*, shell-chamber; *sg.*, shell-glands; *uc.*, uterine canal; *vi.*, vagina interna; *v.s.*, vesicula seminalis.

The reproductive system is typical of the genus. The testes lie close to the ventral body wall, whereas the ovaries are placed dorsally to, or between, the intestinal branches. The vasa deferentia open into a pair of elongate muscular accessory seminal vesicles, disposed obliquely to the median line, and from each of which a narrow, thin-walled sperm-duct runs inwardly, passing through the mass of "shell"-glands investing the vagina. In the median line, the sperm-ducts unite to form a short ejaculatory duct, which passes into a small pyriform prostatic organ lined with a tall glandular epithelium. Attached to the distal end of the prostatic organ, there is a straight stylet, about as long as the prostatic organ. This stylet lies in a long antrum masculinum, which has only a thin muscular wall and opens to the exterior at about 1.6 mm from the hinder margin of the body.

The female aperture is situated at about 0.24 mm behind the male pore. It leads into a shallow antrum femininum, which soon passes into a relatively long "shell"-chamber. At the junction of this chamber and the antrum, the female canal widens considerably, but the cavity is depressed dorso-ventrally. From this cavity, the "shell"-chamber forms an anteriorly-directed curve and behind the male antrum it recurves posteriorly to open into the vagina interna, which is lined with tall vacuolate cells. At the inner end of the vagina interna, the short uterine canals unite to open into it. These canals extend anteriorly only as far as the hinder level of the pharynx.

Of the papillate species of the genus *Hoploplana*, the present form resembles more closely *H. rubra* Kato, 1944, from Japan and *H. californicum* Hyman, 1953, from southern California. It differs from *H. rubra*, however, in having as many cerebral eyes as there are tentacular eyes, in having a straight penis-stylet, in not having a "cyanophilous secretion pouch" situated between the "shell"-chamber and the vagina interna, and in having a dorsal epidermis well endowed with rhabdites. From *H. californicum*, the present species may be differentiated primarily by the absence of a thick musculature to the male antrum and by the more arcuate course of the vagina.

Hoploplana is a genus that ranges widely in the northern hemisphere and is known to extend from the tropical to temperate waters in both the Pacific and Atlantic Oceans. In the southern hemisphere it is little known, having been found hitherto only at Sao Paulo on the coast of Brazil (Marcus, 1950). A fact of ecological interest is that certain species of the genus have a tendency to live as commensals in the mantle-cavity of bivalve molluscs.

Family PLANOCERIDAE Stimpson, 1857

Paraplanocera oligoglana (Schmarda, 1859). Fig. 3 a-b.

LOCALITY: Western Australia (under coral slab in 6 ft. at Blow Holes, Quobba (24°23'S., 113°24'E.), 22 June, 72.)

MATERIAL: 2 specimens (AM. reg. no. W.5476)

One of the two early mature specimens is badly damaged. The complete specimen is somewhat discoid and measures about 15 mm in length and 12 mm in width. The body is whitish, but in the middle region between the tentacles and the female copulatory complex the dorsal surface is speckled with blackish dots, with a further layer of similar markings situated deeper in the parenchyma above the pharyngeal pocket.

These specimens bear a strong superficial resemblance to *Planocera langii* Laidlaw, 1902, from the Laccadive Islands, Indian Ocean, but both Kato (1943) and Prudhoe (1945) have independently concluded that *P. langii* is synonymous with *Paraplanocera oligoglana*. Hyman (1953), however, did not agree with this synonymy, because the ducts

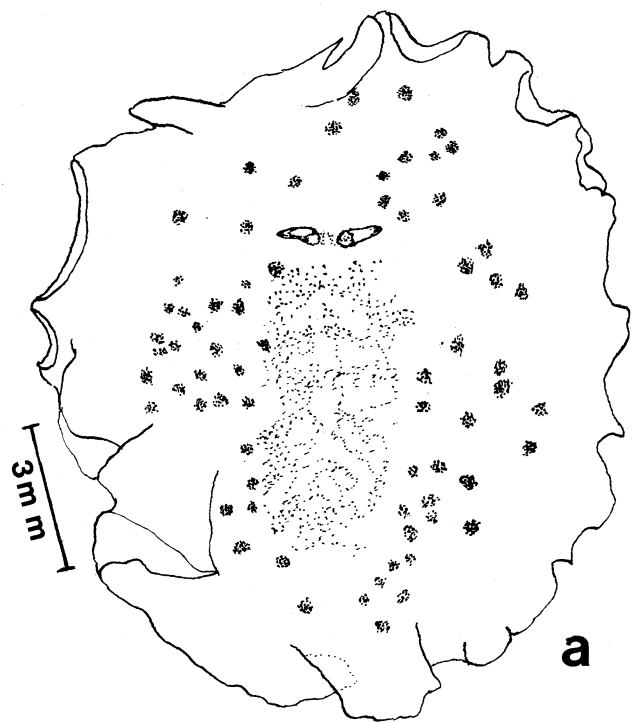


Fig. 3. *Paraplanocera oligoglana*. (a) Dorsal view; (b) Arrangement of cerebral and tentacular eyes.

from the paired seminal vesicles open through an ejaculatory duct into the prostatic organ in *P. oligoglana* and not separately into the prostatic duct, as in *P. langii*. This gives rise to a controversial point, because, as Hyman says, Stummer-Traunfels (1933) redescribed the type-specimens of *P. oligoglana*, but he actually stated that the ascending ejaculatory duct opens into a funnel-shaped antechamber of the prostatic organ, which corresponds to a short ductus granulosus. If the "ductus granulosus" were to be interpreted as a prostatic duct then the difference would be merely a supposed one. The fact is that in *P. oligoglana* the ejaculatory duct usually enters the prostatic duct at its junction with the prostatic organ, but if the male complex be contracted it might therefore seem that the ejaculatory duct opened into the prostatic organ at this junction, but if the prostatic organ and its efferent duct be protracted then the ejaculatory duct would probably appear to enter the prostatic duct. Regarding the characteristic of *P. langii*, from Laidlaw's description of the male complex it is clear that he did not understand its structure fully, and it is reasonable to assume that he probably mistook the openings of the pair of accessory prostatic organs for those of the ducts running from the accessory seminal vesicles.

Having again studied the question of the synonymy of *Paraplanocera oligoglana*, the present writer does not retract his earlier opinion on this problem, and further considers *Paraplanocera fritillata* Hyman, 1959, also to be a synonym of *P. oligoglana*. This species appears to be very widely distributed in the tropical and subtropical region of the Pacific and Indian Oceans, and its occurrence in similar regions in Australian waters is probably common.

COTYLEA

Family PSEUDOCERIDAE Lang, 1884

Pseudoceros flavomarginatus Laidlaw, 1902

LOCALITY: Queensland (on reef in 25 ft., Barren I., Yeppoon (ca. 23°5'S., 150°42'E.), Dec., 72)

MATERIAL: 1 specimen (AM. reg. no. W.5431)

This specimen is oval, rounded on the anterior and posterior margins, and measures 28 mm in length and up to 16 mm in width. Dorsally the worm is smooth and velvety black, with a fairly broad whitish marginal band, about 1.5 mm wide, and which is slightly tinged with orange. The under surface of the body is ash-grey, with a distinct tinge of brown in the median region, and gradually becoming darker towards the margins of the body, where in the submarginal zones the colour is greyish black, enclosed in a light-coloured marginal band, a continuation of the dorsal band and of similar width.

The anterior margin of the body bears a deep median notch, at the base of which lies a pair of retracted tentacles that are deep black, thus obscuring the arrangement of the eyes, even when the specimen is cleared in methyl salicylate. Just behind the tentacles dorsally there is a pigment-free area, enclosing two elongate clusters of cerebral eyes which almost merge together to form a somewhat cuneate mass. As only one specimen is available no attempt has been made to decolorize it to enable the arrangement of the tentacular eyes to be observed.

Ventrally, at about 5 mm behind the anterior margin of the body, the mouth leads into the middle of the pharyngeal chamber containing a much-folded pharynx. The ventral sucker is small and situated at about 9 mm behind the mouth.

A pair of symmetrically-disposed male pores lies in the median field, at about 4 mm posteriorly to the mouth, and closely following them the female pore lies in the median line.

Laidlaw's original account is very brief, and it might be suggested that it is too inadequate for the recognition of the species, but however brief the description the present specimen fits it very well. Kato (1944) considers that the Japanese *Pseudoceros luteomarginatus* Yeri & Kaburaki, 1918, is a synonym of *P. flavomarginatus*, but at the moment there must be some doubt about this synonymy because *P. luteomarginatus* has a submarginal band of clear yellow and a marginal band of russet-brown. Nevertheless, it now seems that the range of *P. flavomarginatus* extends from the Laccadive Islands in the Indian Ocean to the Great Barrier Reef and indicates a very wide distribution in the Indo-Pacific region.

***Pseudoceros gratus* Kato, 1937**

Eurylepta striata Schmarda, 1859, nec *Eurylepta striata* (Kelaart, 1858) Collingwood, 1876.

Pseudoceros striatus: Stummer-Traunfels, 1933, nec *P. striatus* (Kelaart, 1858) Lang, 1884.

Pseudoceros strigosus Marcus, 1950.

LOCALITY: Western Australia (under a coral slab in 4 ft. at Blow Holes, Quobba (24°23'S., 113°24'E.), 22 June, 72.)

MATERIAL: 3 specimens (AM. reg. no. W.5458)

These specimens are much distorted by curling during fixation, but it has been possible to make out the coloration and markings quite readily. The largest specimen is 20 mm in length, but is apparently immature. Dorsally, in both living and preserved specimens, the body is white and marked with three longitudinal black or brownish-black bands, a median one and a lateral pair. The wide median band commences immediately behind the cluster of cerebral eyes, but does not quite reach to the hinder end of the body. In the largest specimen, the central black band carries a median whitish streak in its anterior half, but in the smallest specimen a similar whitish streak extends the whole length of the band. This appears to indicate that as the worms become older, so the whitish streak in the median black band tends to disappear. Each lateral black band commences immediately behind the tentacular fold on the respective side and extends posteriorly to join its partner from the other side close behind the median band. Further, the entire margin of the body is bordered by a narrow black band. The ventral surface is whitish and without any markings. The tentacular folds are also darkish.

The cerebral eyes form a somewhat triangular cluster, the arrangement of which, together with the eyes in the well-developed tentacular folds, very closely resembles that depicted by Kato (1937), except that the eyes are less numerous in the present specimens, which is to be expected since they are not fully grown.

Pseudoceros gratus very closely resembles *Eurylepta striata* Schmarda, 1859, but its coloration is different, for the ground-colour of Schmarda's form is yellowish or somewhat loamy, and the bands are brownish. The difference in coloration, however, does not invalidate the conclusion of Hyman (1959) that these two species are synonymous.

In describing *Pseudoceros habroptilus* from Vanikoro Island in the Solomons, Hyman (1959) mentions only its coloration and markings and makes no observations on its other features or on its similarity with other species of *Pseudoceros*, merely stating that the "colour pattern is sufficiently distinctive." *P. habroptilus* is in fact probably identical with *P. gratus*, but, because the original specimen is badly damaged, to be more certain further specimens from the Solomon Is. are needed for comparison with the Japanese form.

P. gratus has been recorded from Ceylon and Japan, and its occurrence in Western Australia suggests that it is widely distributed in the Indo-West Pacific region.

***Pseudoceros fuscopunctatus* sp. nov.** Figs 4 a-c; 5 a-c.

LOCALITIES: Western Australia (under rock in silty mud in 4 ft., Dunsborough (33°36'S., 115°04'E.), 29 Nov., 71; under rock at low tide, Gantheaume, Broome (18°S., 122°E.), 22 Nov., 72.)

MATERIAL: 2 specimens (AM. reg.nos. W.5242 (holotype) (Dunsborough), W.5435 (paratype) (Broome)).

The specimen from Dunsborough (Fig. 4a) is somewhat elongate oval and measures about 18 mm in length and 8 mm in width along much of its body. The ground-colour of the dorsal surface is pearly white, with transverse languettes of black along the margins. Portions of the black coloration appear to be accumulations of diffuse pigment extending dorso-ventrally through the parenchyma. In the median field, extending from behind the tentacles to the posterior region of the body, there is a broad band of irregular brown or golden-brown spots.

The anterior marginal tentacles are well defined and carry several irregular rows of eyes ventrally along the inner or median side of each tentacle (fig. 4b). The cerebral eyes are arranged in a rounded cluster (fig. 4c) situated in the median line, immediately behind the tentacles.

The mouth is situated centrally, at about 0.5 mm behind the cerebral eye-cluster, and opens into the anterior region of the pharyngeal chamber, which contains a pharynx in the form of an elongate muscular structure measuring about 1.8 mm long and showing little evidence of the plication typical of the pseudoceric polyclads. The ventral sucker lies at about 7 mm from the anterior end of the body.

There is no indication of the presence of copulatory complexes.

In Gillett and McNeil (1959; 112) there is an excellent coloured figure (second specimen from top of plate) of this new form, to which no name was attached.

The body of the specimen from Gantheaume (fig. 5a) is elongate oval and rounded at both extremities. It is 11 mm in length and 7 mm in maximum width, which occurs at about the middle of the body. The coloration of the dorsal surface of the preserved specimen is yellowish white, with a number of blackish spots of varying size disposed in the marginal zones. The black pigment forming these spots is better seen when the specimen is cleared. It appears to occur in the parenchyma and becomes diffused into the epithelium of the dorsal and ventral walls of the body. On the other hand, a copy of a colour-transparency shows that in life the worm has almost exactly the colour and markings of the specimen from Dunsborough and is, no doubt, specifically identical with it. A pair of well-developed elongate marginal tentacles is situated anteriorly. They measure about 1.3 mm in length and contain a number of eyes, many of which lie in the basal region of each tentacle and others in the lateral regions. A compact rounded mass of small eyes lies above the cerebral organ situated close behind the tentacles.

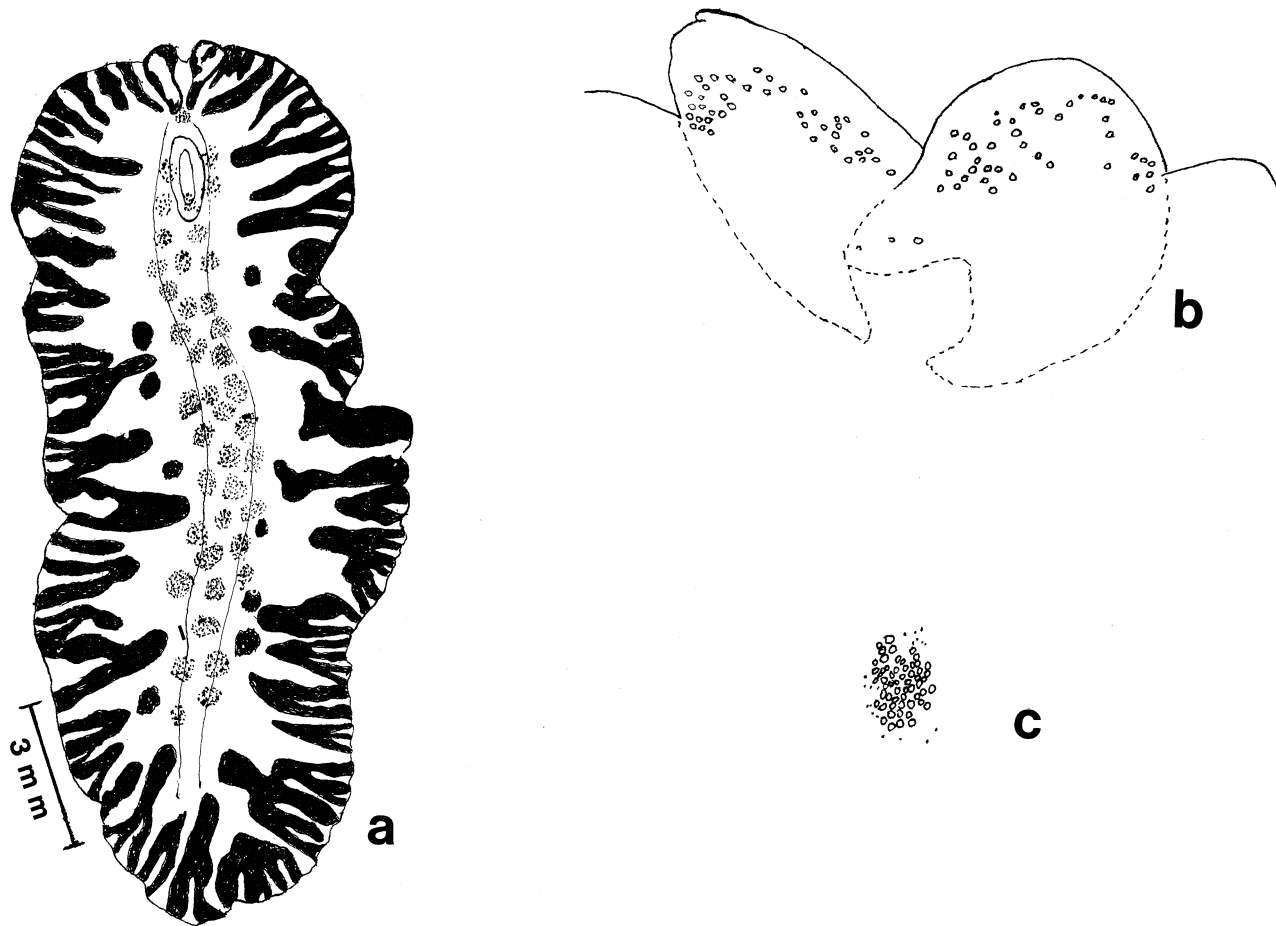


Fig. 4. *Pseudoceros fuscopunctatus* n.sp. (a) Dorsal view; (b) tentacular eyes (ventral view); (c) Cerebral eyes (dorsal view).

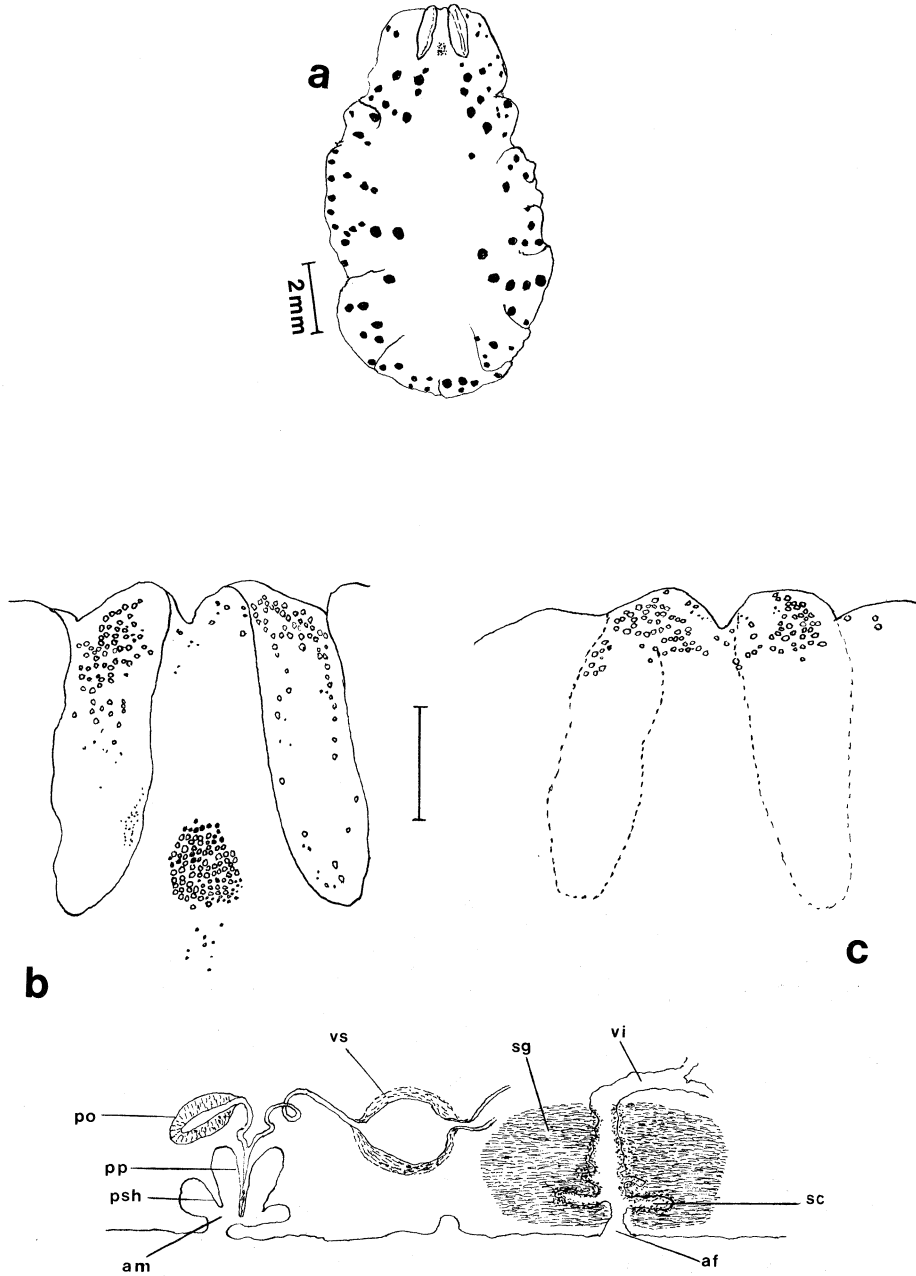


Fig. 5. *Pseudoceros fuscopunctatus* n.sp. (a) Dorsal view of cleared specimen; (b) Arrangement of cerebral and tentacular eyes (dorsal view); (c) Arrangement of tentacular eyes (ventral view).

Fig. 6c. Sagittal section through copulatory complexes (diagrammatic).

A small indistinct ventral sucker lies in the hinder half of the body. The mouth is situated at about 1.5 mm from the anterior margin of the body and opens into the middle of the pharyngeal chamber. The latter contains a small pharynx measuring about 1.2 mm in length. The intestinal branches anastomose freely to reach the periphery of the body. After opening into the pharynx, the intestinal trunk gives rise to a trio of anteriorly-directed branches, one passing along the median line dorsally to the pharynx, whilst the other two pass alongside the pharynx to unite with the median branch ventrally to the cerebral eye-cluster. At about 0.29 mm behind the mouth lies the male pore and at a similar distance behind the male pore lies the female pore. The testes and ovaries intermingle dorsally to, and between, the intestinal branches. The copulatory complexes are fully developed, and the penis-papilla is armed with a stout stylet.

Since the superficial features of this polyclad are distinctive enough for specific determination, it has not been thought necessary to section its copulatory complexes. In the cleared specimen the complexes seem to be indistinguishable from those of other species of *Pseudoceros*. Nevertheless, it is perhaps worthy of note that a small globular seminal vesicle lies close in front of the vagina. Situated antero-laterally to the seminal vesicle, there is an elongate independent prostatic organ with thick walls and a relatively narrow lumen. The length of this organ is about twice the diameter of the seminal vesicle. Beneath the distal end of the prostatic organ, lies a large globular antrum masculinum, into which projects the penis-papilla. The antrum femininum is less than half as spacious as the male antrum.

The outstanding feature of this species is the presence of laterally-disposed patches of black pigment, which extend through the parenchyma from the upper to the lower surface of the body. Other characters which may be specific are the bulbous antrum masculinum, and the short pharynx which bears a strong superficial resemblance to the euryleptid type.

It will be noted that the superficial features of these two preserved specimens are so different as to suggest that they represent two different species. In fact, for a time it was thought that they were, and only after seeing duplicate colour-transparencies of the two living specimens was it realized that they were specifically identical. The only feature in coloration in which the two preserved specimens agreed was the diffusion of black pigment through the parenchyma from the dorsal surface to the ventral surface of the body. This feature is most unusual among polyclads, but it tends to support the specific identity of these two specimens.

The preserved specimen W.5442 (fig. 4a) was, when first examined, very much like the living animal in coloration and markings, but later the ground-colour and the central markings disappeared.

***Pseudoceros leptostictus* Bock, 1913.**

LOCALITY: Western Australia (on reef at low tide, Warroora (23°29'S., 113°48'E.), 28 June, 72)

MATERIAL: 1 specimen (AM. reg. no. W.5457).

This specimen is much contorted, but it bears a very strong resemblance to the original alcohol-preserved specimen of this species inasmuch as the dorsal surface is of a sandy yellow, but brighter yellow in the median line, becoming a reddish yellow towards the margins. The black stippling over the dorsal surface of the original specimen forms a fine network in the present specimen. Around the entire margin there is a band of quadrangular blackish markings bounded by a thin band of yellow. In a

colour-transparency of the living worm, the dorsal surface is brownish, with a narrow median band of white, from which the ground colour becomes progressively darker towards the margins of the body. A number of small whitish spots are scattered over the dorsal surface. The extreme margin of the worm is whitish and encloses a darkish band of similar width. There is a noticeable difference in the coloration of the present specimen when living and when preserved. In the preserved condition the ventral surface is whitish with a blackish margin.

It seems that *P. leptostictus* has so far been found only on the coast of Western Australia, for Bock's original specimen was taken at a depth of 72 feet, off Cape Joubert in 1911.

***Pseudoceros colemani* sp. nov.** Fig. 6 a-c.

LOCALITY: New South Wales (on Sycozoa in 25 ft., Shiprock, Port Hacking (34°04'S., 157°08'E.), Dec., 72.)

MATERIAL: 1 mature (holotype) and 3 juvenile (paratypes) specimens (AM. reg. no. W. 5434).

The body is more or less discoid and measures about 9 mm in length and 8 mm in maximum width in the largest specimen, which is mature. Marginal tentacles are represented by a pair of distinct folds in the anterior margin. A well-developed ventral sucker is situated more or less in the middle of the body. The dorsal surface is smooth, but the ventral surface bears a series of shallow superficial ridges forming half rings in the posterior half of the body and arranged concentrically.

The coloration of the dorsal surface is dark ash-grey, owing to minute pigment granules in the epidermis, and where areas of this epidermis have been sloughed off the body is colourless, thereby giving the surface a mottled appearance. In the median field of the dorsal surface, close behind the tentacles, the colour is deeper than on the remainder of the surface, with the extreme margin of the body provided with a thin band of black, which is wider on the tentacles. Ventrally, the body is somewhat lighter in colour than the dorsal surface. In a colour-transparency of the living animal the body is obovate and shows the dorsal surface to be reddish brown, with whitish spots, and with marginal folds showing the under surface of the body to be greyish.

The cerebral eyes are disposed more or less in a triangular group, with the apex directed anteriorly, and containing 18 to 23 eyes. A pair of widely-separated eyes lies in front of the main group. The tentacular eyes are not numerous and occur only on the median side of each tentacle. These eyes do not meet in the median line between the tentacles.

A rather small pharynx appears to form a ruffle around the mouth, which is situated close behind the cerebral eye-cluster. A short distance behind the mouth lies the male pore, with the female opening somewhat nearer to the pore than to the ventral sucker.

The dorsal epithelium is rather tall, but gradually becomes less so towards the margin of the body. Ventrally, the height of the marginal epithelium is similar to that on the dorsal side, but towards the median line the epithelium gradually becomes lower. Rhabdites are numerous in the dorsal epithelium, but in the ventral epithelium they are scarce, except in the marginal areas.

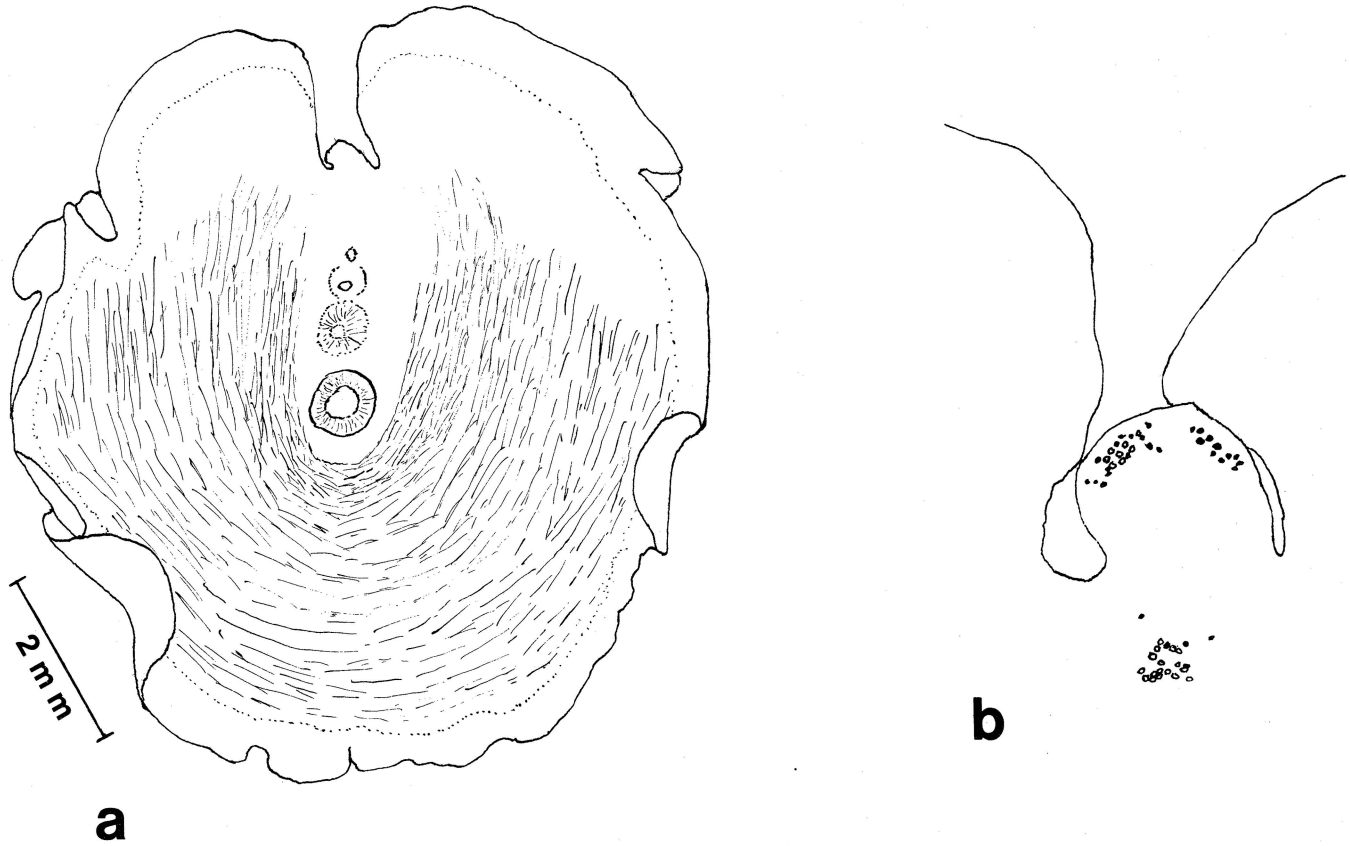


Fig. 6. *Pseudoceros colemani* n.sp. (a) Ventral view: (b) Arrangement of cerebral and tentacular eyes (dorsal view).

The testes are disposed in the ventral parenchyma and are distinctly separated from the ovaries which lie dorsally to the intestinal branches. The vasa deferentia run dorsally to the ovaries from behind the ventral sucker, and extend forward to the level of the copulatory organs, where they curve towards the median line to unite and form a short ejaculatory duct. This duct opens into a bulbous seminal vesicle, from which it winds anteriorly to join with the prostatic duct at the base of the penis-papilla. Lying above the papilla is a small pyriform prostatic organ, which is only about one-half as large as the seminal vesicle. The penis-papilla is relatively large and armed with a strong straight stylet. Both the papilla and its stylet lie within a well-developed penis-pocket, which through a penis-sheath opens into a spacious male antrum.

The female complex is typical of the genus *Pseudoceros*. Its external opening leads into a relatively wide antrum femininum, which opens into a less dilated region of the vagina invested with a globular mass of "shell"-glands and represents the "shell"-chamber. From this chamber, the vagina interna is directed dorsally and posteriorly to be soon joined by the uterine canals. At this junction the vagina is terminated, and the uterine canals are directed posteriorly, but beneath the ovaries.

This form bears some resemblance to *Pseudoceros periphaeus* Bock, 1913, originally taken at Cape Joubert, W. Australia, but its main feature is, however, the presence on the ventral surface of the body of a series of shallow folds or ridges disposed in concentric semi-circles, a feature which is so far unique among species of the genus *Pseudoceros*. The animal is named *Pseudoceros colemani* in honour of Mr. Neville Coleman, who collected the material.

***Acanthozoon albopunctatus* sp. nov. Fig. 7.**

LOCALITY: Western Australia (in 35 ft., three-mile reef, City Beach, Perth, 16 March, 72.)

MATERIAL: 1 specimen (holotype) (AM. reg. no. W.5240)

The body of this specimen is oval, but rounded at both ends, and measures about 22 mm in length and 13 mm in maximum width. Its dorsal surface is black, with a broad whitish marginal band. The area covered by black pigment bears numerous small whitish spots, each of which is enclosed in a short blunt papilla or tubercle, which is transparent and without pigment. The whitish spots appear to be short dorsal diverticula of the intestinal branches extending into the papillae. The ventral surface is ashy grey, becoming darker towards the margins, and without whitish spots or tubercles. Its margin, however, carries a whitish band similar in width to that of the upper surface. The dorsal and ventral marginal bands are separated from one another by a narrow black line on the extreme edge of the body.

The anterior margin of the body is notched between the tentacles, and 7 mm behind this notch lies the mouth. The dorsal and ventral whitish marginal bands do not appear on the tentacles. The ventral sucker is situated a little posteriorly to the middle of the body, in fact, 7 mm behind the mouth.

The specimen appears to be immature, and no indication of genital pores are visible on the ventral surface.

The feature of this species in the genus *Acanthozoon* is the deep whitish marginal band, apparent on both dorsal and ventral surfaces, but which is actually divided into two bands by a thin black line on the extreme margin of the body.

MATERIAL: 3 specimens (AM. reg. nos. W.5447, W.5482, W.5483).

The specimen from Gun Is. is mature and measures about 25 mm in length and 17 mm in maximum width, whereas the specimens from Hall's Bank are immature and measure 14 mm long and 10 mm wide, and 10 mm long and 7 mm wide. In the smallest specimen the ventral sucker is centrally placed, but in the largest specimen it lies well behind the middle of the body. In the mature specimen the pharynx is 8 mm in length and immediately behind it lie two symmetrically-placed male pores. The female pore occurs at the tip of a prominence placed in the median line immediately behind the male pores, and about 3 mm behind this lies the ventral sucker.

According to Bock (1923), the type-specimen of this species has a ground-colour of pale yellow speckled with greenish grey. The papillae are lighter in colour. The finely-drawn papilla-points are coloured with fine blackish pigment-granules. The papillae themselves are otherwise scarcely provided with such granules. On the upper surface of the body between the papillae is to be found a layer of tiny black pigment-granules sparse towards the margins, but dense in the middle zone of the body. In this specimen, Bock states that the cerebral eyes are clearly separated into two groups which merge anteriorly. In the largest of the present specimens the cerebral eyes are also disposed in two groups, but they are so arranged as to give the impression that they form a single oval group with a median posterior cleft reaching to the middle of the cluster, as shown in fig. 8.

This species was known hitherto to occur only in sand and calcareous algae in 20 to 30 metres at Masatierra Island, one of the Juan Fernandez group off the coast of Chile. The present specimens agree so well with Bock's description of the external features of *Thysanozoon skottsbergi* that the present writer has no hesitation in assigning them to this species. The ground-colour of these specimens is tawny dorsally, and whitish and without pigment ventrally. The tawny ground-colour is punctated with grey. The papillae are lighter in colour, and the fine drawn-out papilla-tips are blackish. A colour-transparency of the largest specimen shows the ground-colour of the upper surface of the living animal is of a brownish red, speckled with whitish spots of variable size, and edged with a thin marginal band of white. The distinct papillae are lighter in colour, and their tips are much darkened with black. The marginal tentacles are also darkened with fine black granules. The cerebral eyes appear to lie in a colourless median area situated just behind the tentacles.

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The following text is extremely faint and illegible. It appears to be a list or a series of entries, possibly related to a technical or scientific study. The text is too light to transcribe accurately, but it seems to contain several lines of information per entry, possibly including names, dates, or descriptions.