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Preptetos and *Neopreptetos* (Digenea: Lepocreadiidae) from Australian marine fishes

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Abstract. The genera *Preptetos* Pritchard, 1960 and *Neopreptetos* Machida, 1982 are redefined. The following species are described and/or recorded from marine fishes. From the Great Barrier Reef: *Preptetos caballeroi* Pritchard, 1960 in *Naso annulatus*, *N. brevirostris* and *N. vlamingii*; *P. xesuri* (Yamaguti, 1940) in *Zebrasoma veliferum* and *Z. scopas*; *Preptetos cannoni* Barker, Bray et Cribb, 1993 in *Siganus doliatus* and *S. fuscescens*; *Preptetos laguncula* sp. n. in *Naso unicornis* (type-host); *P. impar* sp. n. in *Lutjanus erythropterus* (type-host) and *L. malabaricus*; *Neopreptetos arusettae* Machida, 1982 in *Pomacanthus semicirculatus*; and *N. kurochkini* (Toman, 1989) in *Chaetodontoplus meredithi*. From southwestern Australia: *Preptetos rotto* sp. n. in *Nelusetta ayraudi* (type-host), *Neosebastes pandus*, *Oplegnathus woodwardi* and *Pagrus auratus*. The new combination *Preptetos trulla* (Linton, 1907) (originally *Distomum* then *Lepocreadium*) is made and the species *Lepocreadium areolatum* (Linton, 1900) is considered likely to belong in *Preptetos*.

The Lepocreadiidae is one of the major families found in marine fishes in all oceans. This paper is one of a series in which we are attempting to document the lepocreadiid fauna of Australian marine fishes. Earlier contributions include: Barker et al. (1993) and Bray et al. (1993, 1994, 1996). This article covers two closely related lepocreadiine genera, *Preptetos* Pritchard, 1960 and *Neopreptetos* Machida, 1982, which are restricted to shallow water fishes of warmer oceans. The status, and certain biological characteristics of both genera are discussed below.

MATERIALS AND METHODS

The digeneans were collected from freshly killed fish and were fixed by being pipetted into nearly boiling 5 % formalin. Whole mounts were stained with Mayer's acid haemalum or Mayer's paracarmine, cleared in methyl salicylate or beechwood creosote and mounted in Canada balsam. Serial sections were stained in eosin and Mayer's haemalum. Measurements are quoted as ranges with means in parentheses and are in micrometres. The following abbreviations are used: BM(NH), the British Museum (Nat. Hist.) collection at The Natural History Museum, London; QM – Queensland Museum collection, Brisbane; IPCAS – Institute of Parasitology, Academy of Sciences of the Czech Republic, České Budějovice.

RESULTS

Family Lepocreadiidae Odhner, 1905
Subfamily Lepocreadiinae Odhner, 1905

Genus *Preptetos* Pritchard, 1960

Diagnosis: Body elongate oval to lageniform. Tegument spinous. Eye-spot pigment present. Oral sucker subterminal, subglobular. Prepharynx short to long. Pharynx oval. Oesophagus long. Intestinal bifurcation in posterior forebody. Caeca reach well into post-testicular region. Testes two, symmetrical to oblique in mid-hindbody. External seminal vesicle without associated gland-cells. Cirrus-sac small, confined to forebody, to large, reaching into hindbody; oval to elongate oval. Internal seminal vesicle oval to subglobular. Pars prostatica vesicular, oval. Ejaculatory duct long to short. Genital pore in posterior forebody or lateral to ventral sucker. Ovary pretesticular, lobed (usually 3–4 lobes), occasionally weakly lobed or entire. Seminal receptacle canalicular. Uterus lateral and anterior to ovary, mainly sinistral. Vitellarium follicular, reaching to ventral sucker or into forebody. Excretory pore terminal. Vesicle curves between testes; reaches into forebody.

Type-species *P. caballeroi* Pritchard, 1960, by original designation.

Discussion: *Preptetos* is very similar to *Lepocreadium* Stossich, 1903, the major character distinguishing them being the course of the excretory vesicle, which passes between the testes, to the right of the ovary, terminal genitalia and ventral sucker and then across the forebody finishing adjacent to or just overlapping the left caecum close to the intestinal bifurcation in *Preptetos*. This feature results in the tendency for the testes to be oblique to symmetrical and the uterus to be mainly on the left of the body. Both features were considered diagnostic by Pritchard (1960). The ovary is usually lobate (usually 3–5 lobes). Saoud and Ramadan (1985) suggested that *Preptetos* should be considered a synonym of *Pseudocreadium* Layman, 1930. We suggest, however, that *Pseudocreadium* is characterised by a broadly

oval body shape, symmetrical testes, a 'bunch-of-grapes-like' or acinous ovary and an excretory pore occurring dorsally between the caecal extremities; characteristics which separate it from *Preptetos*.

Lepocreadium trulla (Linton, 1907) exhibits both major characteristics of *Preptetos*. The excretory system, as illustrated by Sogandares-Bernal and Hutton (1960, Fig. 14), appears to be just as described above, and the ovary is described as three-lobed by Linton (1910) although some of the illustrations in the literature do not show this clearly. We have examined specimens recently collected from *Ocyurus chrysurus* from Kingston, Jamaica by D. T. J. Littlewood (BM(NH) 1995.9.26.1–5) and can confirm the trilobate condition of the ovary. Overstreet (1969) stated that the anterior extent of the excretory vesicle varied between the pharyngeal level and a level just posterior to the intestinal bifurcation. We consider that these features show that this species should now be redesignated *Preptetos trulla* (Linton, 1907) comb. n.

Lepocreadium areolatum (Linton, 1900), as described by Stunkard (1969), has an identical excretory vesicle to *Preptetos* spp., but the ovary is described as 'notched, but not lobed'. Sogandares-Bernal and Hutton (1960, fig. 3) figured the course of the excretory vesicle in a species 'probably the same as *L. caballeroi*' which is also identical to that of *Preptetos*. Stunkard (1980) considered that 'there is reason to regard' *L. caballeroi* a synonym of *L. areolatum*, and we consider it possible that this latter species should be considered a member of *Preptetos* (see status list, Table 1, and records, Table 2).

Preptetos caballeroi Pritchard, 1960 Fig. 1

Synonyms: *Preptetos pritchardae* Toman, 1989 nec Ahmad, 1984; *Preptetos xesuri* of Bray et al. (1993) in part.

Type material: United States National Parasite Collection.

Type locality: Waikiki, Hawaii.

Type host: *Naso hexacanthus*.

Material studied: ex *Naso annulatus* (Quoy et Gaimard), Acanthuridae. Intestine. Heron Island, Queensland, Australia (23°27'S, 150°55'E, 10/1/1996). QM 212855; ex *Naso brevirostris* (Valenciennes), Acanthuridae. Intestine. Heron Island, Queensland, Australia (23°27'S, 150°55'E, 21/1/1994). QM 212737-9, BM(NH) 1995.11.22.1-2; *Naso vlamingii* (Valenciennes), Acanthuridae. Intestine. Heron Island, Queensland, Australia (23°27'S, 150°55'E, 3/1/1996). QM 212856-61, BM(NH) 1996.2.20.6-8, IPCAS D-347.

Description: For measurements see Table 3. Genital pore in these specimens is adjacent to antero-sinistral margin of ventral sucker. Ovary is always distinctly trilobed. Excretory system is always retained within arch of caeca at intestinal bifurcation, and has indented margin in this region (Fig. 1).

Discussion: We (Bray et al. 1993) considered that this species was a synonym of *P. xesuri* (Yamaguti, 1940), along with *P. pritchardae* Toman, 1989 nec Ahmad, 1984. Having now seen specimens from further *Naso* species, we feel that it would be wise to recognise the species based on the following observations. Examination of Table 3 and Bray et al. (1993) will show that, compared with *P. xesuri* at Heron Island, *P. caballeroi* is relatively narrower, with an excretory vesicle which does not reach anterior to the intestinal bifurcation and has an indented margin, anteriorly at least. Other features which may differ are the relative sizes of the suckers and pharynx (smaller in *P. caballeroi*), the relatively more anterior intestinal bifurcation, the relatively smaller gonads and the anterior extent of the vitelline fields only just reaching into the forebody. The position of the genital pore may be slightly different. These differences are significant in comparing our specimens, as they have all been fixed in the same way, without pressure. Worms fixed in other ways may give other impressions. Apparently, Yamaguti (1970) has displaced the anterior extent of the excretory vesicle by flattening, and in most descriptions flattening has made the worm appear relatively broad, or may have distorted the usually distinctly trilobed ovary. *Preptetos pritchardae* Toman, 1989 nec Ahmad, 1984 appears to be indistinguishable from *P. caballeroi*, although of a larger size, and having a sucker-ratio which is greater than we have found (although overlapping Pritchard's (1960) figures).

Preptetos xesuri (Yamaguti, 1940) Pritchard, 1960 Figs. 2, 3

Synonyms: *Opechona xesuri* Yamaguti, 1940; *Lepocreadium xesuri* (Yamaguti, 1940) Montgomery, 1957.

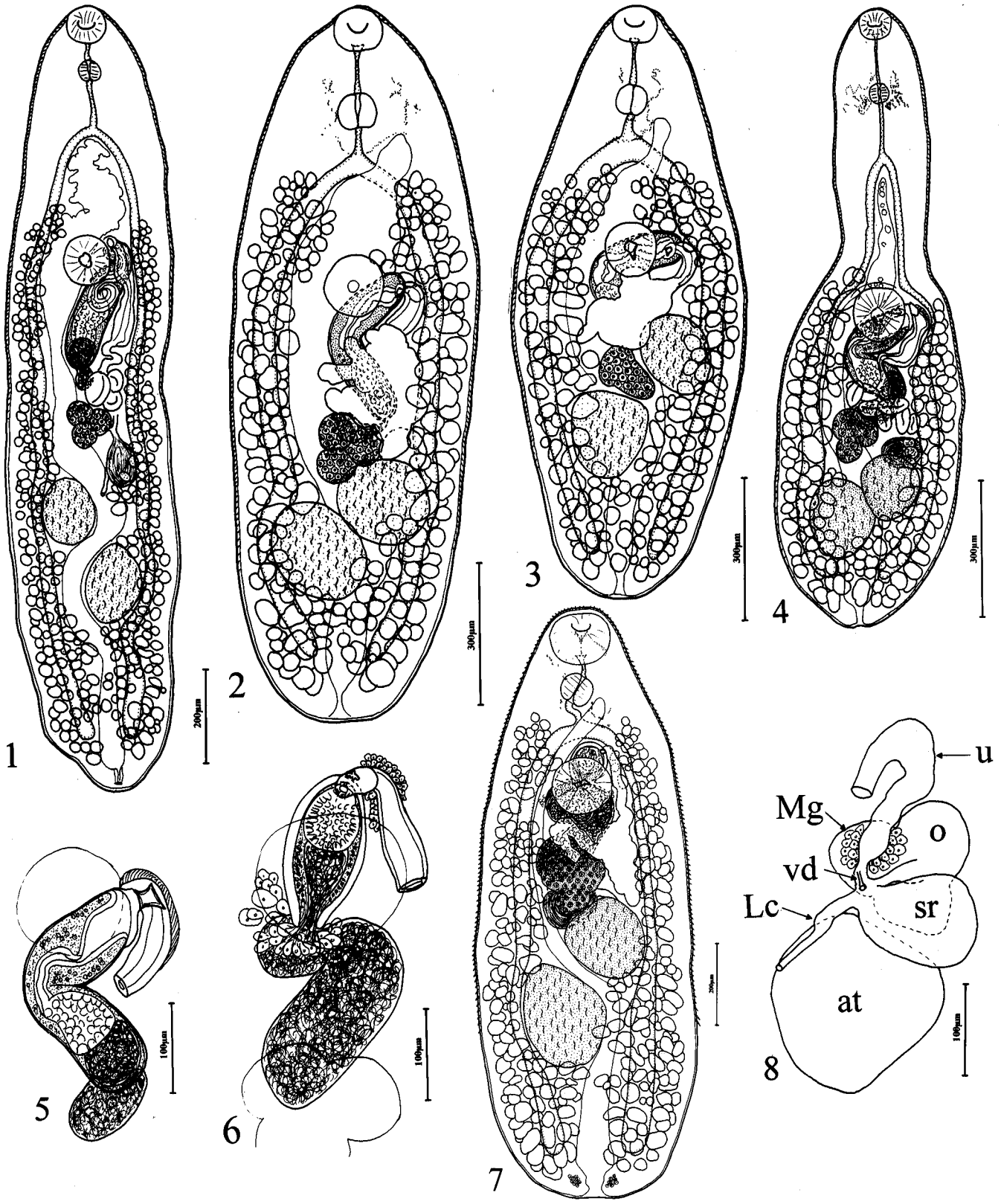
Type material: In Yamaguti Helminthological Collection.

Type locality: Hamazima, Mie Prefecture, Japan.

Type host: *Xesurus scalprum*.

Material studied: ex *Zebrasoma veliferum* (Bloch), Acanthuridae. Intestine. Heron Island, Queensland, Australia (23°27'S, 150°55'E, January 1993, 4/1/1996). QM 212740-6, BM(NH) 1995.11.22.3-5; ex *Zebrasoma scopas* (Cuvier), Acanthuridae. Intestine. Heron Island, Queensland, Australia (23°27'S, 150°55'E, Jan. 1993). QM 212747.

Description: Measurements see in Table 3. Genital pore lateral to mid-ventral sucker in all specimens (Fig. 2).



Figs. 1–8. Fig. 1. *Preptetos caballeroi* Pritchard, ventral view of specimen from *Naso brevirostris*. **Figs. 2, 3.** *Preptetos xesuri* (Yamaguti) from *Zebrasoma veliferum*. **Figs. 2.** Ventral view, with uterus in outline only; and external seminal vesicle obscured by ovary. **Fig. 3.** Ventral view of anomalous specimen, with uterus in outline only; and external seminal vesicle obscured by uterus. **Figs. 4, 5.** *Preptetos laguncula* sp. n. from *Naso unicornis*. **Fig. 4.** Ventral view. **Fig. 5**. Terminal genitalia. **Figs. 6–8.** *Preptetos impar* sp. n. from *Lutjanus erythropterus*. **Fig. 6.** Terminal genitalia. **Fig. 7.** Ventral view, with uterus in outline only. **Fig. 8.** Proximal female system, dorsal view. **Abbreviations:** at – anterior testis; Lc – Laurer's canal; Mg – Mehlis' gland; o – ovary; sr – seminal receptacle; u – uterus; vd – vitelline duct.

Table 1. Status list of species of *Preptetos* Pritchard, 1960 (species in bold considered valid).

Species	Comment
***P. caballeroi* Pritchard, 1960**	Valid
***P. cannoni* Barker, Bray et Cribb, 1993**	Valid
P. chaetodoni Madhavi, 1972	To *Neohypocreadium*, see Bray et al. (1994).
P. cylindricus Wang, 1989	Possible synonym of *Lepocreadium clavatum*, see Bray et al. (1993).
P. elongatum (Nagaty, 1942) Pritchard, 1960	Probably *Preptetos*, neither Nagaty (1942) nor Saoud and Ramadan (1985) described the excretory system.
***P. impar* sp. n.**	Valid
***P. laguncula* sp. n.**	Valid
***P. madrasensis* Ahmad, 1982**	Valid
P. overstreeti Ahmad, 1984	Similar to *Neohypocreadium chaetodoni*: is genital pore dorsal?
***P. pritchardae* Ahmad, 1984 *nec* Toman, 1989**	Valid
P. pritchardae Toman, 1989 nec Ahmad, 1984	Syn. of *P. caballeroi*, present study.
***P. rotto* sp. n.**	Valid
***P. trulla* (Linton, 1907) comb. n.**	Valid
***P. xesuri* (Yamaguti, 1940) Pritchard, 1960**	Valid
Lepocreadium areolatum (Linton, 1900) Stunkard, 1969	The course of the excretory vesicle is similar to that found in *Preptetos* (see Sogandares-Bernal and Hutton (1960, Fig. 3 – probably *L. caballeroi*; Stunkard 1969, fig. 1) the ovary is described as 'notched, but not lobed'.

One specimen, not included in Table 3, is aberrant, with ovary between testes (Fig. 3). Measurements of this worm are: Body 1,208 × 483, width 40 % of length. Oral sucker 77 × 88. Ventral sucker 110 × 104. Sucker ratio 1 : 1.18. Forebody 451 long; 37 % of body-length. Prepharynx 84. Pharynx 71 × 65. Oral sucker/pharynx width ratio 1 : 1.35. Oesophagus 39. Intestinal bifurcation to ventral sucker 180. Anterior testis 180 × 148. Posterior testis 187 × 161. Post-testicular region 250 long; 21 % of body-length. Eggs 70 × 38. Cirrus-sac 187 × 77. Genital pore sinistral to ventral sucker. Ovary 103 × 116; between testes, 135 from ventral sucker. Anteriormost vitelline extent 129 anterior to ventral sucker.

Discussion: The worm with the ovary between the testes is being treated, *pro tem*, as an anomalous specimen of *P. xesuri*.

The other specimens from *Zebrasoma* spp. are morphologically rather uniform, with regard particularly to the position of the genital pore, and the vitellarium which reaches almost to, and occasionally to, the intestinal bifurcation. The genital pore lateral to the ventral sucker is an important feature of *Preptetos cannoni* Barker, Bray et Cribb, 1993 from *Siganus lineatus* (Siganidae) and *Pomacentrus bankanensis* (Pomacentridae) from Heron Island (Barker et al. 1993, Bray et al. 1993). It can now be distinguished from *P. xesuri* by its more anterior vitellarium (reaching to level between intestinal bifurcation and pharynx) and by the sucker ratio (1 : 0.88–1.04 in *P. cannoni*).

Preptetos cannoni Barker, Bray et Cribb, 1993

Material studied: ex *Siganus doliatus* Cuvier, Siganidae. Intestine. Heron Island, Queensland, Australia (23°27'S, 150°55'E, Jan. 1993). BM(NH) 1996.2.20. 9-10; ex *S. fuscescens* (Houttuyn), Siganidae. Intestine. Heron Island, Queensland, Australia (23°27'S, 150°55'E, Jan. 1993). BM(NH) 1996.2.20.11-12.

Discussion: These specimens do not differ significantly from those described from *Siganus lineatus* by Barker et al. (1993). These findings constitute new host records for both of these *Siganus* species.

Preptetos laguncula sp. n. Figs. 4, 5

Material studied: ex *Naso unicornis* (Forskal), Acanthuridae. Intestine. Heron Island, Queensland, Australia (23°27'S, 150°55'E, 12/1/1993). Holotype QM 212748. Paratype BM(NH) 1995.11.22.6.

Description: Based on 2 whole-mounts. For measurements see Table 3. Body bipartite lageniform, with narrower forebody, broader hindbody and narrow

'waist' just anterior to ventral sucker (Fig. 4). Tegument spinous; spines small; closely packed posteriorly to level of testes, sparser posteriorly. Eyespot pigment granules scattered around pharynx. Oral sucker subglobular; subterminal. Ventral sucker rounded. Prepharynx long; narrow. Pharynx subglobular; small. Oesophagus long. Intestinal bifurcation in mid-forebody. Caeca narrow anteriorly, wider in hindbody; terminate blindly in middle of post-testicular region.

Testes two; oval, entire; oblique contiguous, in posterior half of hindbody. Post-testicular region short. External seminal vesicle oval, dorsal to uterus and proximal cirrus-sac. Cirrus-sac recurved, claviform; reaches 135–142 into hindbody (Fig. 5). Internal seminal vesicle subglobular. Pars prostatica pyriform, vesicular; lined with anuclear cell-like bodies. Ejaculatory duct long, narrow proximally, wider distally; aperture very wide; thick-walled. Pars prostatica and ejaculatory duct surrounded by gland-cells embedded in fibrillar connective tissue. No cirrus seen. Genital atrium large, pocketed; thick-walled. Genital pore large, sinistral to mid-ventral sucker.

Ovary trilobed; antero-dextral and close to anterior testis. Seminal receptacle oval; antero-dorsal to anterior testis. Mehlis' gland antero-dorsal to ovary. Laurer's canal probably opens dorsally to ovary (not clearly seen). Uterus mainly pre-ovarian, ventral to proximal cirrus-sac. Eggs few; tanned, probably operculate; large. Metraterm about half length of cirrus-sac; thick-walled; ensheathed distally by narrow fibrous capsule; enters genital atrium from left. Vitellarium follicular; anterior extent just anterior to ventral sucker; lateral fields dorsal, lateral and ventral to caeca, encroaching towards uterus and gonads; confluent dorsally and ventrally in post-testicular region.

Excretory pore terminal. Vesicle I-shaped; narrow posteriorly, soon widens, passes dorsally to testes, dorso-dextral to ovary, dextral to cirrus-sac, dorso-dextral to ventral sucker; terminates blindly just posterior to intestinal bifurcation; contains numerous small globular corpuscles.

Discussion: This species is distinguished from all other members of the genus by its bipartite lageniform body-shape. The anterior position of the intestinal bifurcation and the genital pore lateral to the ventral sucker are also useful distinguishing characters.

Etymology: Latin: laguncula = a little bottle or flask, referring to the body shape.

Preptetos impar sp. n. Figs. 6–8

Material studied: ex *Lutjanus erythropterus* (Bloch) (type-host), Lutjanidae. Intestine. Lizard Island, Queensland, Australia (14°40'S, 154°28'E, Nov. 1988). QM holotype 212749, paratypes 212750-53. BM(NH) 1995.11. 23.1-4; IPCAS D-346; ex *L. malabaricus* (Schneider), Lutjanidae. Intestine. Lizard Island, Queensland, Australia (14°40'S, 154°28'E, Nov. 1988). QM 212755.

Description: Based on 11 measured whole-mount specimens (see Table 3). Body elongate pyriform, narrower anteriorly (Fig. 7). Tegument spinous; spines large, reach almost to posterior extremity. Eye-spot pigment scattered in forebody. Pre-oral lobe short. Oral sucker subglobular; subterminal. Ventral sucker transversely oval; of similar size to oral sucker. Prepharynx distinct. Pharynx subglobular. Oesophagus distinct. Intestinal bifurcation in posterior forebody. Caeca terminate blindly close to posterior margin.

Testes two; oblique, separated by excretory vesicle, in mid-hindbody; oval, entire, somewhat flattened on margins adjacent to excretory vesicle. External seminal vesicle large, overlapping ovary; elongate saccular, coiled; surrounded by gland-cells distally. Cirrus-sac small, pyriform, overlaps ventral sucker by 26–116 (16–87 (62) % of ventral sucker length), not reaching into hindbody (Fig. 6). Internal seminal vesicle flask-shape, overlaps pars prostatica. Pars prostatica vesicular, oval; lined with anuclear cell-like bodies, apparently fed by gland cells just outside proximal end of cirrus-sac and surrounding internal seminal vesicle. Ejaculatory duct short. Cirrus not seen. Genital atrium distinct. Genital pore antero-sinistral to ventral sucker, just posterior to intestinal bifurcation.

Ovary trilobed; just posterior to ventral sucker or occasionally overlapping; pretesticular. Seminal receptacle large, oval; dorsal to posterior part of ovary and overlapping anterior testis. Mehlis' gland dorsal to ovary. Laurer's canal passes sinistrally from junction of oviduct and duct of seminal receptacle, opens dorsally just sinistral to anterior part of anterior (i.e. left) testis (Fig. 8). Uterus relatively small, sinistral to ovary and external seminal receptacle. Eggs not numerous; tanned; probably operculate. Metraterm of similar length to cirrus-sac; with muscular walls; ensheathed in gland-cells distally; enters genital atrium from left. Vitellarium follicular; anterior extent at oesophagus level; lateral fields dorsal, lateral and ventral to caeca, not encroaching over gonads; almost confluent in post-testicular region, with occasional median follicles.

Excretory pore terminal. Vesicle I-shaped; narrow initially, widens, passes between testes, dextral to ovary, external seminal vesicle and ventral sucker, passes across body just anterior to cirrus-sac, ventral to left caecum and terminates to left of pharynx.

Discussion: The cirrus-sac of *P. impar* is much smaller than that of *P. elongatum, P. caballeroi, P. xesuri, P. laguncula* or *P. cannoni*, and its contents are rather different, particularly in the length of the ejaculatory duct.

Table 2. Records of *Preptetos* spp. (Reference numbers in parentheses, in bold if it contains descriptive matter.

Parasite	Host family	Host species	Localities
***P. caballeroi* Pritchard, 1960** [*P. pritchardae* Toman, 198 *nec* Ahmad, 1984; *P. xesuri* of Bray et al. (1993) in part]	Acanthuridae	*Naso annulatus*	Hawaii (**23**) Great Barrier Reef (**41, 44**)
		Naso brevirostris	Hawaii (**20, 23**) Seychelles (**36**) Japan (**38**) Great Barrier Reef (**44**)
		Naso hexacanthus	Hawaii (**17, 20, 23**) Japan (**38**)
		Naso lituratus	Japan (**38**)
		Naso tuberosus	Japan (**38**)
		Naso unicornis	Hawaii (**20**), Japan (**38**)
		Naso vlamingii	Japan (**38**) Great Barrier Reef (**44**)
	Labridae	*Thalassoma duperreyi*	Hawaii (**20**)
***P. cannoni* Barker, Bray et Cribb, 1993**	Siganidae	*Siganus doliatus*	Great Barrier Reef (**44**)
		Siganus fuscescens	Great Barrier Reef (**44**)
		Siganus lineatus	Great Barrier Reef (**40**)
	Pomacentridae	*Pomacentrus bankanensis*	Great Barrier Reef (**41, 42**)
P. elongatum (Nagaty, 1942) Pritchard, 1960 [*Pseudocreadium elongata* Nagaty, 1942; *Lepocreadium elongatum* (Nagaty, 1942) Manter, 1945]	Acanthuridae	*Acanthurus sohal*	Red Sea (**10, 33**)
***P. impar* sp. n.**	Lutjanidae	*Lutjanus erythropterus*	Great Barrier Reef (**44**)
		Lutjanus malabaricus	Great Barrier Reef (**44**)
***P. laguncula* sp. n.**	Acanthuridae	*Naso unicornis*	Great Barrier Reef (**44**)
***P. madrasensis* Ahmad, 1982**	Fistulariidae	*Fistularia villosa*	Bay of Bengal (**29**)
P. overstreeti Ahmad, 1984	Chaetodontidae	*Chaetodon pictus*	Arabian Sea (**31**)
***P. pritchardae* Ahmad, 1984 *nec* Toman, 1989**	Teraponidae	*Terapon theraps*	Arabian Sea (**31**)
***P. rotto* sp. n.**	Monacanthidae	*Nelusetta ayraudi*	SW Australia (**44**)
	Scorpaenidae	*Neosebastes pandus*	SW Australia (**44**)
	Oplegnathidae	*Oplegnathus woodwardi*	SW Australia (**44**)
	Sparidae	*Pagrus auratus*	SW Australia (**44**)

continues on p. 215

The three other members of the genus, *P. madrasensis*, *P. overstreeti* and *P. pritchardae* Ahmad, 1984 nec Toman, 1989 each have a relatively small cirrus-sac, but each has a much longer ejaculatory duct and a smaller external seminal vesicle. In these three species the excretory vesicle does not reach anteriorly to the intestinal bifurcation. *P. overstreeti* and *P. pritchardae* each have a four-lobed ovary and *P. overstreeti* has multilobed testes. *P. pritchardae* has a more anterior genital pore and vitelline extent; and the cirrus-sac does not overlap the ventral sucker. In *P. madrasensis* the cirrus-sac does not overlap the ventral sucker, the vitellarium does not reach the intestinal bifurcation and the ventral sucker is smaller than the oral sucker. *P. trulla* is the other *Preptetos* species reported from lutjanid fishes, but it differs in body-shape and length of cirrus-sac.

Etymology: Latin: impar = unequal, no match for, refers to the small cirrus-sac.

Preptetos rotto sp. n. Figs. 9, 10, 12–14

Material studied: ex *Nelusetta ayraudi* (Quoy et Gaimard) (type-host), Monacanthidae. Gall-bladder. Off

Table 2 – continued

***Preptetos trulla* (Linton, 1907) comb. n.** [*Distomum trulla* Linton, 1907; *Lepocreadium trulla* (Linton, 1907) Linton, 1910]	Lutjanidae	*Ocyurus chrysurus*	Bermuda (**4**, **13**) Florida (**5**, 6, **11**, **19**, **21**) Bimini (16, **19**) Puerto Rico (**18**, 32) Belize (26) Jamaica (43, 44)
		Lutjanus aya	Louisiana (14, 15)
		Lutjanus buccanella	Bimini (16)
		Lutjanus blackfordi	Florida (24)
		Lutjanus griseus	Puerto Rico (39)
		Lutjanus jocu	Colombia (34)
		Lutjanus purpureus	Colombia (34)
		Lutjanus synagris	Colombia (**27**, 34)
		Rhomboplites aurorubens	Puerto Rico (**18**)
	Sparidae	*Calamus calamus*	Florida (**5**)
			Bahamas (14)
	Pomacentridae	*Chromis multilineatus*	Puerto Rico (32)
	Labridae	*Lachnolaimus maximus*	Colombia (**27**)
***P. xesuri* Yamaguti, 1940) Pritchard, 1960** [*Opechona xesuri* Yamaguti, 1940; *Lepocreadium xesuri* (Yamaguti, 1940) Montgomery, 1957]	Acanthuridae	*Acanthurus bleekeri*	Okinawa (35)
		Xesurus scalprum	Japan (**9**)
		Zebrasoma scopas	Great Barrier Reef (**44**)
		Zebrasoma veliferum	Great Barrier Reef (**44**)
	Pomacentridae	*Parma polylepis*	Great Barrier Reef (**41**, 42)
Lepocreadium areolatum (Linton, 1900) Stunkard, 1969 [*Distomum areolatum* Rudolphi, 1809 of Linton, 1900; *Distomum* sp. of Linton, 1901; *L. ovalis* Manter, 1931; *L. micropogoni* Pearse, 1949; *L. caballeroi* Sogandares-Bernal et Hutton, 1960]	Bothidae	*Paralichthys dentatus*	Chesapeake Bay (37)
	Percichthyidae	*Morone americana*	Massachusetts (**1**, **22**)
			Chesapeake Bay (25)
		Morone saxatilis	Chesapeake Bay (25)
	Haemulidae	*Orthopristis chrysoptera*	N. Carolina (**3**)
	Labridae	*Tautogolabrus adspersus*	Massachusetts (**28**)
	Sciaenidae	*Bairdiella chrysoura*	N. Carolina (**3**)
		Menticirrhus saxatilis	Massachusetts (**8**, **19**, 30)
		Micropogonias undulatus	N. Carolina (**3**, **12**)
		Sciaenops ocellata	N. Carolina (**3**)
	Labridae	*Lagodon rhomboidalis*	N. Carolina (**7**, **19**)
		Stenotomus chrysops	Massachusetts (**2**)
	Tetraodontidae	*Sphoeroides maculatus*	Massachusetts (**28**)

References: **1** – Linton (1900); **2** – Linton (1901); **3** – Linton (1905); **4** – Linton (1907); **5** – Linton (1910); **6** – Manter (1930); **7** – Manter (1931); **8** – Linton (1940); **9** – Yamaguti (1940); **10** – Nagaty (1942); **11** – Manter (1947); **12** – Pearse (1949); **13** – Hanson (1950); **14** – Sparks (1957); **15** – Sparks (1958); **16** – Sogandares-Bernal (1959); **17** – Pritchard (1960); **18** – Siddiqi and Cable (1960); **19** – Sogandares-Bernal and Hutton (1960); **20** – Pritchard (1963); **21** – Overstreet (1969); **22** – Stunkard (1969) ; **23** – Yamaguti (1970); **24** – Nahhas and Powell (1971); **25** – Paperna and Zwerner (1976); **26** – Fischthal (1977); **27** – Velez (1979); **28** – Stunkard (1980); **29** – Ahmad (1982); **30** – Stunkard (1983); **31** – Ahmad (1984); **32** – Dyer et al. (1985); **33** – Saoud and Ramadan (1985); **34** – Velez (1987); **35** – Dyer et al. (1988); **36** – Toman (1989); **37** – Jansen and Burreson (1990); **38** – Machida and Uchida (1990); **39** – Dyer et al. (1992); **40** – Barker et al. (1993); **41** – Bray et al. (1993); **42** – Barker et al. (1994); **43** – Nahhas and Carlson (1994); **44** – Present study.

Table 3. Measurements of *Preptetos* spp.

Species	*Preptetos xesuri*		*Preptetos caballeroi*			*Preptetos laguncula* sp. n.	*Preptetos impar* sp. n.	
Host	*Zebrasoma veliferum*	*Zebrasoma scopas*	*Naso brevirostris*	*Naso vlamingii*	*Naso annulatus*	*Naso unicornis*	*Lutjanus erythropterus*	*Lutjanus malabaricus*
n	9	1	5	9	1	2	10	1
Length	1,081–1,746 (1,481)	1.666	1,526–1,741 (1,636)	1,253–1,749 (1,463)	1.398	1,215–1,351	894–2,210 (1,356)	1.105
Width	428–682 (535)	583	346–392 (365)	308–406 (340)	316	396–406	338–660 (522)	418
Width as % of length	29–43 (36)	35	21–26 (22)	22–25 (23)	23	30–33	26–52 (40)	38
Oral sucker	71–102 × 84–116 (85 × 100)	93 × 122	66–75 × 76–78 (71 × 77)	68–77 × 77–90 (71 × 83)	66 × 83	60–64 × 66–73	97–130 × 15–152 (117 × 139)	103 × 123
Ventral sucker	97–155 × 102–161 (122 × 120)	137 × 128	103–109 × 94–106 (106 × 100)	102–135 × 96–122 (110 × 103)	96 × 91	118 × 114–118	90–158 × 97–167 (128 × 140)	103 × 122
Sucker-ratio	1:1.19–1.39 (1.20)	1:1.05	1:1.21–1.38 (1.30)	1:1.14–1.36 (1.24)	1.1	1:1.62–1.73	1:0.84–1.13 (1.00)	1:0.99
Forebody length	381–515 (460)	507	458–555 (496)	439–560 (493)	514	541–607	297–452 (363)	309
Forebody as % of body-length	27–39 (31)	30	29–32 (30)	30–36 (34)	37	45	16–33 (28)	28
Prepharynx	37–88 (66)	71	32–52 (42)	26–64 (46)	55	95	0–77 (29)	32
Pharynx	64–95 × 66–97 (79 × 81)	95 × 97	45–48 × 47–53 (47 × 51)	39–52 × 45–63 (44 × 52)	45 × 46	38–42 × 45–46	52–93 × 59–96 (71 × 76)	52 × 59
Oral sucker/ pharynx width ratio	1:1.20–1.29 (1.23)	1:1.26	1:1.45–1.62 (1.50)	1:1.33–1.80 (1.59)	1:1.80	1:1.47–1.59	1:1.54–2.31 (1.85)	1:2.08
Oesophagus	29–64 (44)	57	62–104 (85)	64–109 (85)	84	92–111	42–77 (54)	55
Intestinal bifurcation to ventral sucker	142–213 (184)	180	213–287 (242)	206–283 (243)	257	251–288	62–135 (89)	64
Caecal ends to posterior extremity	90–168 (131)	148–155	98–155 (116)	95–142 (117)	88	76–105	70–129 (103)	97–103
Anterior testis	155–251 × 142–225 (194 × 175)	211 × 160	137–180 ×106–116 (149 × 110)	116–181 × 97–126 (138 × 105)	111 × 107	156–159 ×135–137	149-258×123-238 (192 × 181)	153 × 148
Posterior testis	180–270 × 142–229 (224 × 166)	245 × 193	162–180 × 103–127 (171 × 118)	135–167 × 102–129 (146 × 110)	141 × 103	175–181 × 143–159	180-258 × 130-241 (223 × 178)	192 × 142
Posttesticular region length	193–406 (304)	390	325–380 (348)	200–374 (273)	225	127–153	138–346 (255)	229
Posttesticular region as % of body-length	16–24 (20)	23	20–22 (21)	16–22 (19)	16	10–11	10–22 (19)	21

Continues on p. 217

Table 3 – continued

Species	*Preptetos xesuri*		*Preptetos caballeroi*			*Preptetos laguncula* sp. n.	*Preptetos impar* sp. n.	
Cirrus-sac	233–354 × 77–122 (291 × 94)	292 × 97	259–332 × 71–91 (296 × 83)	264–348 × 71–109 (290 × 83)	303 × 75	211–216 × 76–79	90–148 × 58–95 (116 × 81)	116 × 64
Ovary	129–155 × 109–135 (142 × 126)	180 × 142	84–115 × 84–103 (102 × 92)	77–109 × 66–109 (94 × 89)	85 × 86	95–115 × 80–95	109–171 × 100–193 (141 × 148)	158 × 119
Ventral sucker to ovary	79–270 (180)	225	196–251 (229)	161–307 (200)	215	137–153	[–19]*–109 (56)	64
Ventral sucker to ovary as % of body-length	7–18 (12)	14	13–15 (14)	12–18 (14)	15	11	[–1.5]*–7.2 (4.1)	5.8
Anterior extent of vitellarium to ventral sucker	134–222 (176)	241	29–97 (70)	52–129 (97)	82	31–41	70–175 (125)	93
Eggs	67–73 × 32–48 (70 × 41)	73–74 × 41–42	76–88 × 38–54 (81 × 44)	69–83 × 38–56 (78 × 47)	86–89 × 39–42	73–80 × 35–38	51–64 × 22–35 (56 × 29)	57–59 × 24–25

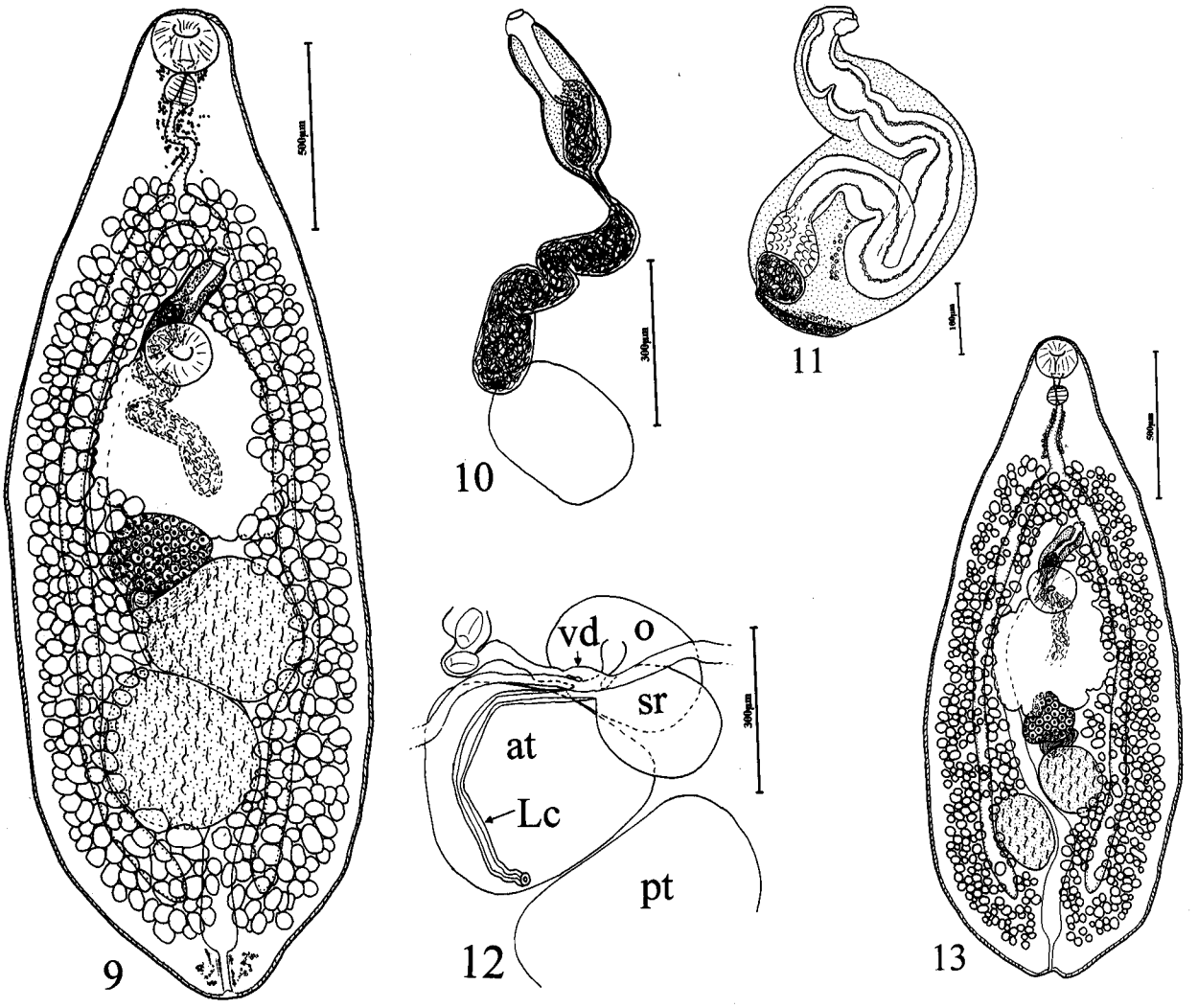
* Negative numbers indicate that the ovary overlaps the ventral sucker.

Rottnest Island, Western Australia (32°01'S, 115°28'E, 8/12/1994). QM holotype 212756, paratypes 212757-9. BM(NH) paratypes1995.11.23.5-7; ex *Neosebastes pandus* (Richardson), Scorpaenidae. Gall-bladder. Off Rottnest Island, Western Australia (32°01'S, 115°28'E, 8/12/1994). QM 212760, BM(NH) 1995.11.23.9; ex *Oplegnathus woodwardi* (Waite), Oplegnathidae. Gall-bladder. Off Rottnest Island, Western Australia (32°01'S, 115°28'E, Dec. 1994). QM 212761, BM(NH) 1995.11.23.8; ex *Pagrus auratus* (L.), Sparidae. Gall-bladder. Off Rottnest Island, Western Australia (32°01'S, 115°28'E, 15/12/1994). QM 212762, BM(NH) 1995.11.23.10.

Description: Based on 12 adults and one immature specimen as whole-mounts and 1 set of serial sections. Measurements in Table 4. Body pyriform; narrower anteriorly (Figs. 9, 13, 14). Tegument strongly spinous; spines in regular rows, reach to posterior extremity. Eye-spot pigment granules sparse, scattered in forebody parenchyma. Oral-sucker subglobular; subterminal. Ventral sucker rounded; slightly smaller to slightly larger than oral sucker. Prepharynx distinct, mostly in posterior concavity of ventral sucker. Pharynx relatively small. Oesophagus long. Intestinal bifurcation in mid-forebody. Caeca reach into posttesticular region, but not to posterior extremity.

Testes two; oval, flattened on contiguous surfaces, entire or slightly irregular; oblique, contiguous or slightly separated, in mid-hindbody. Post-testicular region short. External seminal vesicle long, convoluted tubular, reaches well posterior to ventral sucker and lies dorsal to uterus reaching almost to or overlapping ovary; anterior extremity lies dorsal to ventral sucker where it narrows, passing into base of cirrus-sac through narrow duct. Cirrus-sac elongate oval with slight median constriction, rectilinear (Fig. 10), occasionally pyriform, when internal seminal vesicle is replete with sperm (Fig. 14). Internal seminal vesicle subglobular to oval. Pars prostatica vesicular, small; lined with anuclear cell-like bodies. Ejaculatory duct relatively short, wide, rectilinear or gently curved, with wide aperture. Genital atrium distinct, wide. Genital pore sinistral, overlying left caecum at a level just posterior to intestinal bifurcation; aperture wide.

Ovary oval, entire to weakly trilobate (Figs. 9, 13, 14); obliquely pretesticular, contiguous with anterior testis. Seminal vesicle canalicular; oval, large, dorsal to ovary and anterior testis. Mehlis' gland dorso-sinistral to ovary. Laurer's canal runs from seminal vesicle, over dorsal surface of anterior testis to open close to pos- terior margin of anterior testis (Fig. 12). Uterus pre-ovarian, intercaecal, large, overlaps ventral sucker. Eggs numerous, large, operculate. Metraterm slightly shorter than cirrus-sac, clearly differentiated; passes dorsally to cirrus-sac, enters genital atrium dorsally to male duct. Vitellarium follicular; follicles numerous; anterior



Figs. 9–13. Figs. 9, 10, 12. *Preptetos rotto* sp. n. from *Nelusetta ayraudi.* **Fig. 9.** Ventral view, with uterus in outline only. **Fig. 10.** Terminal genitalia. **Fig. 11.** *Neopreptetos arusettae* Machida from *Pomacanthus semicirculatus.* Cirrus-sac. **Fig. 12.** Proximal female system, dorsal view. **Fig. 13.** *Preptetos rotto* sp. n. from *Neosebastes pandus*, ventral view, with uterus in outline only. **Abbreviations:** at – anterior testis; Lc – Laurer's canal; o – ovary; pt – posterior testis; sr – seminal receptacle; vd – vitelline duct.

extent at about level of posterior oesophagus; lateral fields lateral and ventral to caeca with few follicles scattered dorsally in region anterior to ovary only, confluent in broad band at level of intestinal bifurcation; overlaps gonads slightly ventrally, but not dorsally; confluent in post-testicular region or separated by excretory vesicle.

Excretory pore terminal. Vesicle I-shaped, initially a short narrow duct, forms wider tube, passes dorsally over sinistral edge of posterior testis, then passes obliquely dorsally to testicular junction, then dextrally to anterior testis, ovary, uterus, ventral sucker and cirrus-sac, terminates just posterior to intestinal bifurcation.

Discussion: The excretory system of this worm is similar to that which characterises the genus *Preptetos*, but it does not always force the testes apart in a similar fashion to most *Preptetos* spp. The ovary is not deeply lobate, as is usual for *Preptetos*; in fact, in many specimens it appears to be entire. In other specimens there is weak, but discernable, trilobation. Although clearly not a typical member of the genus, we consider *Preptetos* the best repository for this species. As far as we are aware, this is the first record of a member of this genus from the gall-bladder, which is clearly the normal site of infection in this case.

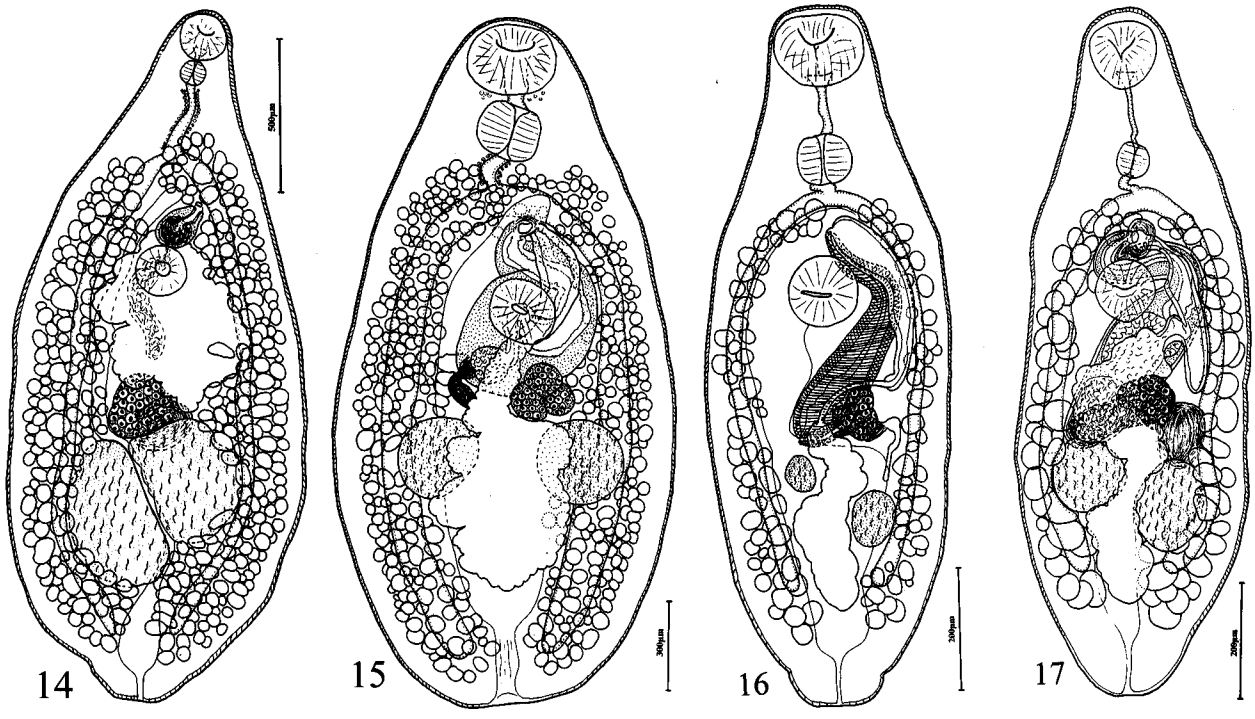
The worms from *Pagrus auratus* are distinctly smaller than those from the other hosts, but the proportions are more or less the same and the morphology indistinguishable.

This is a member of the group of worms with relatively small cirrus-sacs, confined to the forebody or just

Table 4. Measurements of *Preptetos rotto* sp. n.

Host	*Nelusetta ayraudi*	*Neosebastes pandus*	*Oplegnathus woodwardi*	*Pagrus auratus*
n	6	2	2	2
Length	2,544–2,840 (2,647)	1,956–2,131	2,194–2,266	1,189–1,208
Width	922–1,091 (1,005)	684–859	935–941	437–489
Width as % of length	36–41 (38)	35–40	41–43	37–40
Oral sucker	163–184 × 181–211 (176 × 197)	124–128 × 138–142	142–161 × 155–162	89–97 × 97–103
Ventral sucker	174–198 × 179–200 (186 × 192)	148–161 × 148–162	167–174 × 167–174	116–117 × 116
Sucker-ratio	1:0.95–0.99 (0.97)	1:1.07–1.14	1:1.07–1.08	1:1.13–1.20
Forebody	827–999 (871)	684–762	753–757	457–473
Forebody as % of length	32–35 (33)	35–36	33–35	38–40
Prepharynx	0–19	6–13	0–3	6–10
Pharynx	90–115 × 93–109 (98 × 103)	71–72 × 64–71	88–89 × 84	45 × 52–58
Oesophagus	206–261 (246)	200–225	193–213	128–148
Intestinal bifurcation to ventral sucker	312–431 (343)	283–316	283–287	167–193
Caecal ends to posterior extremity	214–300 (249)	245–291	200–354	97–146
Anterior testis	385–464 × 328–425 (417 × 398)	213–229 × 212	319–399 × 303–348	107–129 × 109–128
Posterior testis	438–534 × 367–473 (490 × 431)	219–256 × 180–211	397–457 × 276–399	122–155 × 98–116
Post–testicular region	361–478 (435)	351–393	365–456	225–236
Post–testicular region as % of length	14–18 (16)	16–20	17–20	19–20
Cirrus-sac	264–322 × 103–120 (286 × 110)	193–206 × 73–77	161–238 × 97–117	126–129 × 45–46
Ovary	209–283 × 251–312 (237 × 275)	129–161 × 129–174	180–219 × 216–233	79–82 × 90–97
Ventral sucker to ovary	270–341 (312)	204–270	235–245	116–128
Ventral sucker to ovary as % of length	10–13 (12)	10–13	10–11	10–11
Vitellarium to ventral sucker	380–502 (422)	324–374	354–374	193–213
Egg	70–79 × 34–38 (75 × 37)	67–70 × 38–41	66–76 × 32–38	67–76 × 32–38

overlapping the ventral sucker, which includes *P. madrasensis, P. overstreeti, P. pritchardae* and *P. impar*. The ovary of all of these species is distinctly lobate (3–4, or multilobate). In *P. madrasensis* the external seminal vesicle is short and does not reach into the hindbody, the testes are separated, the oesophagus is short, the sucker ratio (1 : 0.66–0.69) differs and the eggs are smaller (49–55 × 30–35) (Ahmad 1982). In *P. overstreeti* the testes are lobate and separated, the sucker ratio differs (1 : 1.36–1.40) and the genital pore is median, close to the ventral sucker (Ahmad 1984). Bray et al. (1994) considered it similar to *Neohypocreadium chaetodoni* (Madhavi, 1982). In *P. pritchardae* the external seminal vesicle is short and does not reach into the hindbody, the testes are separated, the oesophagus is short, the sucker ratio differs (1 : 0.70–0.71) and the vitellarium reaches to the oral sucker (Ahmad 1984). *P. impar* has a very short ejaculatory duct, the testes are separated, the eggs are smaller (51–64 × 22–35), the genital pore is adjacent to the ventral sucker, the



Figs. 14–17. Fig. 14. *Preptetos rotto* sp. n. from *Oplegnathus woodwardi*, ventral view, with uterus in outline only. **Fig. 15.** *Neopreptetos arusettae* Machida from *Pomacanthus semicirculatus*, ventral view, with uterus in outline only. **Figs. 16, 17.** *Neopreptetos kurochkini* (Toman) from *Chaetodontoplus meredithi*, ventral view, uterus in outline only. **Fig. 16.** Specimen lacking sperm; note very thick wall of cirrus-sac. **Fig. 17.** Specimen with sperm.

prepharynx is usually longer and the excretory vesicle reaches anteriorly to the intestinal bifurcation.

Etymology: 'Rotto' is the local nickname of Rottnest Island, near which all of these specimens were collected.

KEY TO SPECIES OF *PREPTETOS*

1 Cirrus-sac long, reaching well into hindbody, often overlapping ovary 2
– Cirrus-sac short, in forebody or overlapping ventral sucker 7
2 Body oval to elongate oval 3
– Body lageniform ..... *P. laguncula*
3 Ovary trilobed. Eggs < 80 long 4
– Ovary 4–5 lobed. Eggs large, > 86 .... *P. elongatum*
– Ovary 'notched, not lobed'. Eggs very large, > 110 .. .. *L. areolatum*
4 Body relative squat, with truncate posterior end. Vitellarium reaching to pharynx level. Eggs small, < 64 long ..... *P. trulla*
– Body oval to elongate oval. Vitellarium rarely to pharynx level. Eggs > 66 5
5 Body oval. Excretory vesicle crosses left caecum in forebody. Vitellarium reaches well into forebody .. 6
– Body elongate oval. Excretory vesicle does not cross caeca in forebody. Vitellarium reaches just into forebody ..... *P. caballeroi*
6 Vitellarium to level between intestinal bifurcation and pharynx. Sucker ratio 1 : 0.88–1.04 *P. cannoni*
– Vitellarium may just reach to intestinal bifurcation. Sucker ratio 1 : 1.10–1.47 ..... *P. xesuri*
7 Ovary deeply lobate. In intestine 8
– Ovary entire or weakly lobate. In gall-bladder .... *P. rotto*
8 Ovary 4-lobed 9
– Ovary 3-lobed 10
9 Oral sucker larger than ventral sucker. Testes entire. Genital pore extracaecal. Vitellarium to oral sucker ..... *P. pritchardae*
– Oral sucker smaller than ventral sucker. Testes lobed. Genital pore intracaecal. Vitellarium to about level of intestinal bifurcation ..... *P. overstreeti*
10 Sucker ratio 1 : 0.66–0.69. Vitellarium reaches just to intestinal bifurcation. Ejaculatory duct long. Excretory vesicle not crossing caeca in forebody .... *P. madrasensis*
– Sucker ratio 1 : 0.84–1.13. Vitellarium reaches to oesophageal level. Ejaculatory duct short. Excretory vesicle crosses left caecum in forebody ... *P. impar*

Genus ***Neopreptetos*** Machida, 1982

Synonym: *Apolemichthytrema* Toman, 1989

Body oval. Tegument spination present. Eye-spot pigment not seen. Oral sucker subglobular, subterminal. Prepharynx short. Pharynx subglobular. Oesophagus short. Intestinal bifurcation in mid-forebody. Caeca reach well into post-testicular region. Testes two, symmetrical to oblique, in mid-hindbody. External seminal vesicle lacking surrounding gland-cells. Cirrus-sac large, reaching into hindbody; elongate claviform. Internal seminal vesicle subglobular. Pars prostatica vesicular, oval. Ejaculatory duct long. Genital pore median, in posterior forebody. Ovary trilobed, pretesticular. Seminal receptacle canalicular. Uterus reaches between and posteriorly to testes, almost to posterior extremity. Vitellarium follicular, reaches into forebody. Excretory pore terminal. Vesicle reaches well into forebody, with rectilinear path. Type-species *N. arusettae* Machida, 1982, by original designation.

Discussion: Toman (1992) recognised that his genus *Apolemichthytrema* was identical to *Neopreptetos* and declared it a synonym, although maintaining the validity of both type-species, without discussion. The genus differs from *Preptetos* most notably in the extension of the uterus between the testes and almost to the posterior extremity. The records of members of this genus are summarised in Table 5.

Neopreptetos arusettae Machida, 1982 Figs. 11, 15

Type material: National Science Museum, Tokyo, Nos. NSMT-Pl 2432 (holotype), 2343, 2476.

Type locality: Palau, Caroline Islands.

Type host: *Pomacanthus* [as *Arusetta*] *xanthometopon*

Material studied: ex *Pomacanthus semicirculatus* (Cuvier), Pomacanthidae. Intestine. Heron Island, Queensland, Australia (23°27'S, 150°55'E, 17 and 21/1/1992). QM 212763-8, BM(NH) 1195.11.23.11-14.

Description: Based on 10 measured specimens (Table 6). Body pyriform to oval (Fig. 15). Tegument spinous throughout; spines denser anteriorly. Eye-spot pigment very sparse. Oral sucker transversely oval, subterminal. Ventral sucker rounded; smaller than oral sucker. Prepharynx short, distinct. Pharynx subglobular. Oesophagus longer than prepharynx. Intestinal bifurcation in mid-forebody. Caeca terminate blindly well anterior to posterior extremity.

Testes two; oval to rounded, entire; more or less symmetrical in mid-hindbody, separated by uterus. External seminal vesicle small, somewhat arcuate, overlapping posterior edge of cirrus-sac. Cirrus-sac large, relatively thin-walled; widest proximally; reaches well into hindbody overlapping ovary (Fig. 11). Internal seminal vesicle small, subglobular to oval. Pars prostatica vesicular, pyriform; lined with anuclear cell-like bodies. Ejaculatory duct very long; muscular; complexly convoluted and folded; internal wall papillate. Cirrus not seen. Genital atrium distinct. Genital pore large; submedian, just posterior to intestinal bifurcation.

Ovary trilobed, usually distinctly; in anterior hindbody just antero-median to left testis. Seminal receptacle globular, dorsal to ovary; not always seen. Mehlis' gland dorsal to ovary. Laurer's canal runs posteriorly opening dorsally to left testis. Uterus runs posteriorly (filling much of intercaecal post-testicular region) then between testes, overlapping their median edges ventrally, then dextral to ovary. Eggs numerous; tanned, some appear operculate. Metraterm slightly shorter than cirrus-sac; wide and distinctly muscular; passes ventrally to cirrus-sac; enters genital atrium from left. Vitellarium follicular; anterior extent at level of oesophagus; lateral fields dorsal, lateral and ventral to caeca; confluent dorsally to intestinal bifurcation; nearly confluent or separated by excretory vesicle in post-uterine region.

Table 5. Records of *Neopreptetos* spp. (References numbers in parentheses, in bold if descriptive matter is included).

Parasite	Host family	Host species	Location
Neopreptetos arusettae **Machida, 1982**	Pomacanthidae	*Pomacanthus sexstriatus*	Palau Islands (**1**)
		P. xanthometopon	Palau Islands (**1**)
		P. imperator	Ryuku Islands, Japan (**1**)
		P. semicirculatus	Ryuku Islands, Japan (**1**) Great Barrier Reef (**3**)
Neopreptetos kurochkini **(Toman, 1989) Toman, 1992** [*Apolemichthytrema kurochkini* Toman, 1989]	Pomacanthidae	*Apolemichthys trimaculatus* *Chaetodontoplus meredithi*	Seychelles (**2**) Great Barrier Reef (**3**)

References: 1. Machida (1982); 2. Toman (1989); 3. Present study.

Table 6. Measurements of *Neopreptetos* spp.

Species	*Neopreptetos arusettae*	*Neopreptetos kurochkini*
Host	*Pomacanthus semicirculatus*	*Chaetodontoplus meredithi*
Number of specimens measured	10	3
Length	1,415 – 1,972 (1,750)	1,008 – 1,161
Width	605 – 967 (765)	388 – 412
Width as % of length	36 – 50 (44)	33 – 41
Pre-oral lobe	13 – 28 (19)	13 – 26
Oral sucker	129 – 205 × 171 – 264 (179 × 227)	109 – 116 × 110 – 148
Ventral sucker	117 – 169 × 122 – 180 (151 × 157)	109 – 122 × 106 – 116
Sucker-ratio	1:0.66 – 0.75 (0.69)	1:0.78 – 0.96
Forebody length	552 – 722 (663)	348 – 417
Forebody as % of body-length	37 – 39 (38)	35 – 36
Prepharynx	5 – 42 (17)	58 – 84
Pharynx	122 – 167 × 129 – 179 (155 × 160)	71 – 91 × 57 – 97
Oral sucker/pharynx width ratio	1 : 1.26 – 1.54 (1.42)	1 : 1.53 – 1.93
Oesophagus	45 – 122 (76)	13 – 23
Intestinal bifurcation to ventral sucker	193 – 256 (230)	87 – 104
Caecal terminations to posterior extremity	79 – 142 (116)	166 – 219
Testes	122 – 229 × 119 – 241 (176 × 165)	62 – 161 × 50 – 129
Posttesticular region	399 – 607 (522)	219 – 261
Posttesticular region as % of body-length	28 – 32 (30)	22 – 23
Cirrus-sac	380 – 567 × 187 – 341 (450 × 267)	361 – 412 × 97 – 134
Overlap of cirrus-sac into hindbody	142 – 270 (196)	190 – 225
Genital pore to ventral sucker	109 – 135 (121)	30 – 52
Ovary	116 – 167 × 133 – 180 (142 × 152)	85 – 103 × 77 – 90
Ventral sucker to ovary	45 – 149 (90)	37 – 103
Ventral sucker to ovary as % of body-length	3 – 8 (5)	4 – 9
Eggs	51 – 57 × 25 – 32 (53 × 28)	53 – 59 × 27 – 32
Anterior extremity of vitellarium to ventral sucker	241 – 312 (283)	79 – 96

Excretory pore terminal. Vesicle I-shaped; narrow initially, then widening; runs dorsal to uterus and median edges of testes, dextral to ovary and ventral sucker; then terminates dorsally to left caecum at about level of intestinal bifurcation.

Discussion: There is rather a discrepancy between Machida's (1982) description of the male terminalia and those of our specimens. He described a very long everted cirrus covered with tubercles, an elongate pars prostatica and a straight ejaculatory duct. We presume that our worms would show this condition when the cirrus is extended: our specimens were not fixed under pressure as were Machida's. The papillate lining of the ejaculatory duct in our specimens presumably becomes the tuberculate outer wall of the cirrus on eversion. The features distinguishing the only other species described in the genus, *N. kurochkini* (Toman, 1989), are discussed below.

Neopreptetos kurochkini (Toman, 1989) Toman, 1992
Fig. 16–17

Synonym: *Apolemichthytrema kurochkini* Toman, 1989

Type material: Meguro Parasitological Museum, Tokyo, Collection no. 19148.

Type locality: Mare Anglaise, Mahe, Seychelles.

Type host: *Apolemichthys trimaculatus.*

Table 7. Summary of host-specificity in *Preptetos* and *Neopreptetos* spp.

Oioxenic species		
Parasite	Host species	
Preptetos elongatum	*Acanthurus sohal*	Acanthuridae: Perciformes
*Preptetos laguncula**	*Naso unicornis*	Acanthuridae: Perciformes
*Preptetos madrasensis**	*Fistularia villosa*	Fistulariidae: Gasterosteiformes
*Preptetos overstreeti**	*Chaetodon pictus*	Chaetodontidae: Perciformes
*Preptetos pritchardae**	*Terapon theraps*	Teraponidae: Perciformes
Stenoxenic species (strict)		
Parasite	Host group	
– to generic level		
Preptetos impar	*Lutjanus*	Lutjanidae: Perciformes
Neopreptetos arusettae	*Pomacanthus*	Pomacanthidae: Perciformes
– to familial level		
Neopreptetos kurochkini	Pomacanthidae	Perciformes
Stenoxenic species (predominant)		
Parasite	Main host group	Other hosts
– to generic level		
Preptetos caballeroi	*Naso* (Acanthuridae: Perciformes)	Labridae: Perciformes
Preptetos cannoni	*Siganus* (Siganidae: Perciformes)	Pomacentridae: Perciformes
– to familial level		
Preptetos xesuri	Acanthuridae	Pomacentridae: both Perciformes
Preptetos trulla	Lutjanidae	Other perciform families
– to ordinal level		
Lepocreadium areolatum	Perciformes	Pleuronectiformes, Tetraodontiformes
Euryxenic species		
Parasite	Host groups	
Preptetos rotto	Tetraodontiformes, Scorpaeniformes, Perciformes	

* Based on one record only

Material studied: ex *Chaetodontoplus meredithi* Kuiter, Pomacanthidae. Intestine. Heron Island, Queensland, Australia (23°27'S, 150°55'E, 9/1/1992, 11/7/1995). QM 212769-70, BM(NH) 1995.11.23.15.

Description: Based on 3 specimens, measurements in Table 6. Body oval, narrower anteriorly (Fig. 17). Tegument spinous throughout; spines denser anteriorly. Eyespot pigment not seen. Many gland-cells embedded in parenchyma of forebody. Oral sucker subglobular to transversely oval, subterminal. Ventral sucker rounded; smaller than oral sucker. Prepharynx long. Pharynx subglobular. Oesophagus shorter than prepharynx. Intestinal bifurcation in posterior forebody. Caeca terminate blindly just posterior to testes.

Testes two; rounded, entire; symmetrical to oblique in mid-hindbody, separated by uterus. External seminal vesicle saccular, rectilinear. Cirrus-sac long, claviform, curved; reaches just past ovary; wall thick with oblique musculature; in specimen lacking sperm cirrus-sac wall very thick (Fig. 16). Internal seminal vesicle subglobular. Pars prostatica vesicular, subglobular; lined with anuclear cell-like bodies. Ejaculatory duct long; coiled. Cirrus not seen. Genital atrium distinct. Genital pore median, about half way between intestinal bifurcation and ventral sucker.

Ovary trilobed; in anterior hindbody, pretesticular, slightly sinistral. Seminal receptacle globular, dorso-sinistral to ovary. Mehlis' gland dorso-sinistral to ovary. Laurer's canal runs posteriorly opening dorsally just

Table 8. Distribution of *Preptetos and Neopreptetos* spp. (numbers in body of table refer to numbers of literature records).

Parasite	FAO Major Fishing Areas																	
	Atlantic Ocean								Indian Ocean		Pacific Ocean						Southern Oceans		
	18	21	27	31	34	37	41	47	51	57	61	67	71	77	81	87	48	58	88
1. *Preptetos caballeroi*									1		6		4	8					
2. *Preptetos cannoni*													5						
3. *Preptetos elongatum*									2										
4. *Preptetos impar*													2						
5. *Preptetos laguncula*													1						
6. *Preptetos madrasensis*										1									
7. *Preptetos overstreeti*									1										
8. *Preptetos pritchardae*									1										
9. *Preptetos rotto*										4									
10. *Preptetos trulla*				28															
11. *Preptetos xesuri*											2		3						
12. *Lepocreadium areolatum*		11		7															
13. *Neopreptetos arusettae*											2		3						
14. *Neopreptetos kurochkini*									1				1						
Total		1		2					5	2	3		7	1					

FAO Major Fishing Areas: Atlantic Ocean and adjacent seas: **18 Arctic Sea , 21 North-west, 27 North-east, 31 West Central, 34 East Central, 37 Mediterranean and Black Seas, 41 South-West, 47 South-East.** Indian Ocean: **51 West, 57 East.** Pacific Ocean and adjacent seas: **61 North-west, 67 North-east, 71 West Central, 77 East Central, 81 South-west, 87 South-East.** Southern oceans: **48 Atlantic, Antarctic,** 58 Indian Ocean, Antarctic, **88 Pacific, Antarctic.**

anterior to left testis. Uterus runs posteriorly to testes, between testes and to right of ovary. Eggs relatively few; tanned, operculate. Metraterm originates just anterior to ovary; wide and distinctly muscular; passes ventro-sinistrally to cirrus-sac; enters genital atrium from left, surrounded by muscular sphincter distally. Vitellarium follicular; anterior extent at level of intestinal bifurcation; lateral fields dorsal, lateral and ventral to caeca; almost confluent dorsally in forebody, not confluent in post-testicular region.

Excretory pore terminal. Vesicle I-shaped; narrow initially, then widening; runs dorsal to uterus and testes, and dextral to cirrus-sac and ventral sucker; terminates at about level of intestinal bifurcation.

Discussion: This species differs from *N. arusettae* in the thicker, more muscular wall of the cirrus-sac, the relatively short oesophagus and long prepharynx, the greater sucker-ratio, the more posterior anterior limit of the vitelline fields at about the intestinal bifurcation, the short post-testicular region and the short caeca. Our worm differs from Toman's (1989) description of *N. kurochkini* in the relatively much longer cirrus-sac and the prepharynx being longer than the oesophagus. The cirrus in Toman's description is everted to a great length (presumably due to flattening at fixation), and this, in our opinion, explains the difference in cirrus-sac size (as in *N. arusettae* – see above).

CONCLUSIONS

Preptetos

This genus is close to the rather wide concept of *Lepocreadium* Stossich, 1903, which is found in the literature. We have moved one species of *Lepocreadium* to *Preptetos* (i.e. *P. trulla* comb. n.) and we suggest that a further species probably belongs in this genus (i.e. *L. areolatum*). The species divides into two groups, based on the size of the cirrus-sac. In the type-species, *P. caballeroi*, and in *P. cannoni, P. elongatum, P. laguncula, P. trulla, P. xesuri* and probably *Lepocreadium areolatum*, the cirrus-sac is long, claviform and extends a considerable distance into the hindbody. On the other hand, in *P. madrasensis, P. overstreeti, P. pritchardae, P. impar* and *P. rotto* the cirrus-sac is relatively small, rather oval or pyriform, and does not reach into the

hindbody, sometimes not even overlapping the anterior margin of the ventral sucker. Many records are from acanthurid fishes (36 %, particularly the long cirrus-sac forms) and from lutjanids (37 %, due to the many records of *P. trulla*) and the remainder are mainly in other perciforms (Tables 2, 7). The genus appears to be restricted to the warmer, shallow waters of Pacific, Indian and Atlantic Oceans (Table 8). The life-cycle is unknown.

Neopreptetos

The two known species of this genus are found only in angelfishes (Pomacanthidae) from the Indo-West Pacific Region (Tables 5, 7 and 8). Morphologically, they are somewhat atypical for the Lepocreadiidae, in having much of the uterus post-testicular. The life-cycle is unknown.

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