Digeneans (Platyhelminthes) of the peacock sole, *Pardachirus pavoninus* (Lacépède, 1802) (Pleuronectiformes, Soleidae) off New Caledonia

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ABSTRACT
Proctotrematoides synapturae Machida, 2005 and *Macvicaria pardachiri* n. sp. are described from the flatfish *Pardachirus pavoninus* (Lacépède, 1802) obtained from the fish market of Nouméa, New Caledonia. The species of *Proctotrematoides* Yamaguti, 1938 are listed and compared with *P. synapturae*. *Macvicaria pardachiri* n. sp. differs from its congeners in a combination of characters including the saccular internal seminal vesicle, the unlobed gonads, the size and number of the eggs, the details of the vitelline distribution in the forebody and other ratios.

KEY WORDS
Digenea,
Monorchiidae,
Opecoelidae,
New Caledonia,
new species.

RÉSUMÉ
Digènes (Platyhelminthes) de la sole ocellée Pardachirus pavoninus *(Lacépède, 1802) (Pleuronectiformes, Soleidae) en Nouvelle-Calédonie.*
Proctotrematoides synapturae Machida, 2005 et *Macvicaria pardachiri* n. sp. sont décrits de la sole *Pardachirus pavoninus* (Lacépède, 1802) obtenue du marché aux poissons de Nouméa, Nouvelle-Calédonie. Une liste des espèces de *Proctotrematoides* Yamaguti, 1938 est fournie et comparée à *P. synapturae*. *Macvicaria pardachiri* n. sp. diffère de ses congénères par une combinaison de caractères incluant une vésicule séminale interne sacculaire, des gonades non lobées, la taille et le nombre des œufs, le détail de la distribution des glandes vitellogènes à l'avant du corps et d'autres rapports.

MOTS CLÉS
Digenea,
Monorchiidae,
Opecoelidae,
Nouvelle-Calédonie,
espèce nouvelle.

INTRODUCTION

The soleid flatfish *Pardachirus pavoninus* (Lacépède, 1802) is a widespread Indo-Pacific species. Although of some general interest as it produces a shark repelling toxin (Williams & Gong 2007), it has, as far as we are aware, never been reported as a host of digeneans. This paper, therefore, constitutes the first report of digeneans from this host. It is also the first report of a parasite from a sole in New Caledonia (Justine 2010).

MATERIAL AND METHODS

Locally fished soles are rarely seen at the fish market of Nouméa (New Caledonia). On one occasion, only, have we found two very fresh specimens of *Pardachirus pavoninus* (total length 190-200 mm, weight 95-125 g). At dissection, we noted that their diet was exclusively composed of large polychaetes. Digeneans were collected live, immediately fixed in nearly boiling saline and then transferred to 80% ethanol (Cribb & Bray 2010). Whole-mounts were stained with Mayer's paracarmine, cleared in beechwood creosote and mounted in Canada balsam. Measurements were made through a drawing tube on an Olympus BH-2 microscope, using a Digicad Plus digitising tablet and Carl Zeiss KS100 software adapted by Imaging Associates, and are quoted in micrometres.

ABBREVIATIONS

NHMUK — The Natural History Museum, London (formerly BMNH, British Museum of Natural History);
MNHN — Muséum national d'Histoire naturelle, Paris.

SYSTEMATICS

Class TREMATODA Rudolphi, 1808
Subclass DIGENEA Carus, 1863
Order PLAGIORCHIIDA La Rue, 1957
Suborder MONORCHIATA
Olson, Cribb, Tkach, Bray & Littlewood, 2003
Superfamily MONORCHIOIDEA Odhner, 1911
Family MONORCHIIDAE Odhner, 1911
Subfamily MONORCHIINAE Odhner, 1911
Genus *Proctotrematoides* Yamaguti, 1938

Proctotrematoides synapturae Machida, 2005
(Figs 1; 2)

VOUCHER SPECIMENS. — MNHN JNC3302, JNC3303-1-4, NHMUK 2012.2.15.1-3.

HOST SPECIES AND LOCALITY. — *Pardachirus pavoninus* (Lacépède, 1802), Soleidae, peacock sole, fish market, Nouméa, New Caledonia (03/02/2011).

SITE. — Digestive tract.

PREVALENCE. — 2/2.

TYPE HOST AND LOCALITY. — *Synaptura marginata*, Nago, Okinawa Prefecture, Japan.

RECORDS. — 1. Machida (2005); 2. Present study.

HOSTS. — Pleuronectiformes: Soleidae: *Brachirus orientalis* (Bloch & Schneider, 1801) (as *Synaptura orientalis*) (1), *Pardachirus pavoninus* (Lacépède, 1802) (2), *Synaptura marginata* Boulanger, 1900 (1).

LOCALITIES. — Ishigaki-jima, Okinawa Prefecture, Japan (1), Nago, Okinawa Prefecture, Japan (1), Palau, western Caroline Islands, Micronesia (1), Nouméa, New Caledonia (2).

DESCRIPTION

Based on 11 whole-mounts, all measured (see Table 1). Body elongate oval, maximum width at level of ovary, narrowing anteriorly (Fig. 1). Tegument spinous to about level of testis. Oral sucker oval, subterminal. Prepharynx short, mostly or totally in posterior concavity of oral sucker. Pharynx oval, relatively small. Oesophagus long. Intestinal bifurcation just posterior to mid-forebody. Caeca reaching to about mid-post-testicular region.

Testis single, equatorial or just post-equatorial; oval, entire. Cirrus-sac claviform, curved, reaching into hindbody to ovary. Internal seminal receptacle saccular, oval, small. Pars prostatic short, narrow, gland-cell ducts enter distally. Ejaculatory duct long, muscular, armed with filament-like weak spines, not always seen. Genital atrium distinct, not spined, with flask-shaped posterior sac, with numerous long spines (Fig. 2). Genital pore in posterior forebody, slightly sinistral.

Ovary rounded, pretesticular, in anterior hindbody. Mehlis' gland dorsal to ovary. Seminal receptacle not detected. Laurer's canal opens dorsally to ovary. Uterus filling most of post-testicular space and reaching dorsally to testis, sinistral to ovary and narrows before entering terminal organ at its mid-length. Terminal organ oval, bipartite: proximal part oval, often containing fibrous material and occasionally eggs: distal part forming a duct lined with large spines, but spines shorter than those in genital sac. Eggs numerous, small, tanned, operculate. Vitellarium consisting of two small fields of follicles in anterior hindbody, lateral to gonads.

Excretory pore terminal, vesicle I-shaped, reaching to ventral sucker level.

Remarks

We find that this form is indistinguishable from *Proctotrematoides synapturae* originally reported from soleid flatfish by Machida (2005) from the coast of Japan. The flask-like armed genital sac is a diagnostic feature of the genus.

The species described in the genus *Proctotrematoides* are listed below. As can be seen the majority of definitive hosts are eels (order Anguilliformes – 54% of records) and flatfishes (Pleuronectiformes – 38%). Two species only are reported in perciforms. We have developed a tabular key to the species of the genus based on measurements given in the descriptions and some ratios derived from illustrations (Table 2). Apart from the type species, *Proctotrematoides pisodontophidis* Yamaguti, 1938, we are relying on one description and, usually, one illustration, so that little indication of variation is available. To compensate for this deficiency, in initial comparisons, ratios derived from one illustration are increased by 10% either side of the calculated figure, and if there is no overlap with our specimens, we consider this a useful differentiating feature.

The following is a list of the other nominal species of *Proctotrematoides* with a brief discussion of the features distinguishing them from *P. synapturae*.

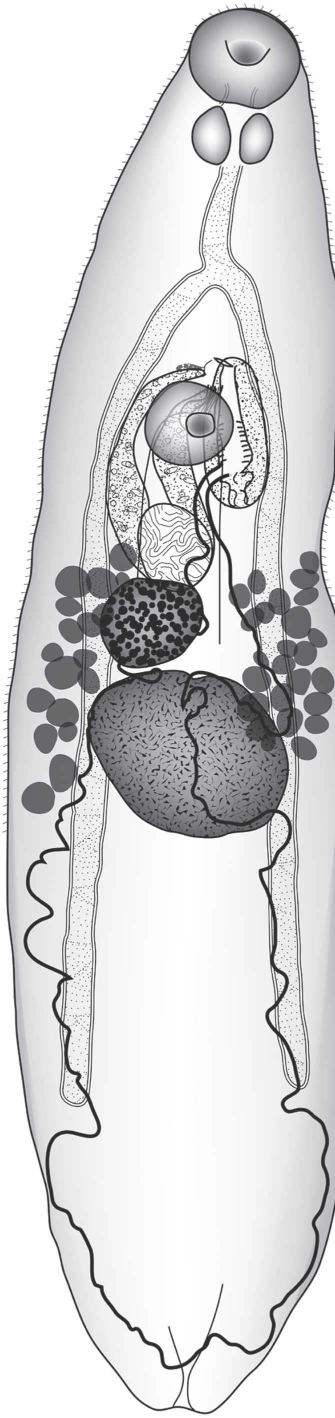

Fig. 1. — *Proctotrematoides synapturae* Machida, 2005, ventral view. Scale bar: 500 µm.

Table 1. — Dimensions of *Proctotrematoides synapturae* Machida, 2005 from *Pardachirus pavoninus* (Lacépède, 1802). N = 11. Abbreviations: *, % of body-length; **, % of post-testicular distance.

	min.	max.	mean
Length	1165	1793	1467
Width	274	426	347
Forebody length	323	481	398
Oral sucker length	92	123	109
Oral sucker width	99	141	118
Prepharynx length	0	20	5
Pharynx length	52	81	67
Pharynx width	70	104	84
Oesophagus length	74	137	107
Intestinal bifurcation to ventral sucker	84	158	117
Pre-vitelline distance	455	712	582
Pre-genital pore distance	307	463	385
Pre-ovarian distance	495	735	612
Pre-testicular distance	562	859	708
Long vitelline field length	206	353	269
Short vitelline field length	165	293	219
Ventral sucker length	91	111	102
Ventral sucker width	90	116	103
Cirrus-sac length	227	330	288
Cirrus-sac width	74	124	99
Ventral sucker to ovary	80	149	114
Ovary length	86	132	112
Ovary width	83	138	109
Testis length	140	217	186
Testis width	137	233	186
Post-testicular distance	411	740	567
Post-vitelline distance	436	772	618
Post-uterine distance	27	82	47
Post-caecal distance	165	406	285
Post-ovarian distance	558	935	745
Egg length	23	27	25
Egg width	13	18	15
Width %*	21.1	27.3	23.8
Forebody %*	25.0	28.9	27.2
Sucker length ratio	0.81	1.21	0.94
Sucker width ratio	0.77	1.00	0.88
Pharynx: oral sucker width ratio	0.68	0.75	0.71
Oral sucker length %*	5.87	9.34	7.52
Pharynx length %*	3.87	5.55	4.61
Ventral sucker length %*	5.73	8.53	7.06
Oesophagus length %*	5.89	8.32	7.26
Pre-vitelline distance %*	36.8	43.2	39.8
Pre-genital pore distance %*	25	28	26
Pre-ovarian distance %*	39	45	42
Pre-testicular distance %*	46	51	48
Long vitelline field length %*	14.6	21.6	18.4
Ovary length %*	6.79	9.39	7.68
Testis length %*	10.0	15.2	12.8
Cirrus-sac length %*	16.6	21.6	19.8
Ventral sucker to ovary %*	6.28	9.17	7.69
Intestinal bifurcation to ventral sucker %*	25.6	34.6	29.1
Post-testicular distance %*	35.0	42.8	38.4
Post-vitelline distance %*	37.3	45.0	41.9
Post-uterine distance %*	1.72	6.32	3.27
Postcaecal distance %**	30.8	59.0	49.3
Postcaecal distance %*	14.5	22.4	19.7
Post-ovarian distance %*	48	54	51

Proctotrematoides pisodontophidis Yamaguti, 1938 (type species)

Type host and locality. — *Pisodonophis cancrivorus* (Richardson, 1848), Inland Sea, Japan.

Records. — 1. Yamaguti (1938), 2. Hoshina (1951), 3. Wang *et al.* (1983).

Definitive hosts. — Anguilliformes: Ophichthidae: *Pisodonophis cancrivorus* (1), *Ophichthus apicalis* (Anonymous [Bennett], 1830) (3); Anguillidae: *Anguilla japonica* (Temminck & Schlegel, 1847) (2).

Metacercarial hosts. — Bivalvia: Pholadomyoida: Laternulidae Hedley, 1918: *Laternula liautaudi* (Mittre, 1844) (as *Laternula kamakurana* Pilsbry, 1895) (2) (as *Laternula pechiliensis* Grabau & King, 1928) (3); Bivalvia: Veneroida: Pharidae Adams & Adams, 1858: *Sinonovacula constricta* (Lamarck, 1818) (3).

Localities. — Inland Sea, Japan (1), Chiba, Japan (2), Ninghai, Zhejiang Province, China (3).

Remark

All descriptions indicate that the ventral sucker is placed relatively posteriorly in this species, as indicated by forebody length data. It appears that Wang *et al.* (1983) also reported "*Laeniods locepedi*" as a host, and we believe this could refer to the gobiid genus *Taenioides* Lacépède, 1800, an unlikely host for this species.

Proctotrematoides anguillae Qiu & Tong *in* Shen & Qiu, 1995

Record. — Shen & Qiu (1995).

Host. — Anguilliformes: Anguillidae: *Anguilla japonica*.

Locality. — Hebei Province, Qinhuangdao, China.

Remark

Proctotrematoides anguillae differs in pre-genital pore and pre-ovarian distances. There is no indication that an atrial sac is present.

Proctotrematoides gymnothoracis Shen, 1990

Record. — Shen (1990).

Host. — Anguilliformes: Muraenidae: *Siderea picta* (Ahl, 1789) (as *Gymnothorax pictus*).

Locality. — Hainan Island, China.

Remark

Proctotrematoides gymnothoracis is similar to *P. synapturae* according to the criteria used in the key, but differs in the genital atrium being at the posterior margin of the ventral sucker and in the (apparent) lack of an atrial sac (Shen 1990). These features must place the generic designation of this species in doubt.

Proctotrematoides diacanthi Zaidi & Khan, 1977

Record. — Zaidi & Khan (1977).

Host. — Perciformes: Serranidae: *Epinephelus diacanthus* (Valenciennes, 1828).

Locality. — Arabian Sea, Karachi, Pakistan.

Remark

Proctotrematoides diacanthi is similar to *P. synapturae*, but probably has a longer forebody, a more anteriorly situated vitellarium and longer caeca.

Proctotrematoides indicum Ahmad & Gupta, 1985

Record. — Ahmad & Gupta (1985).

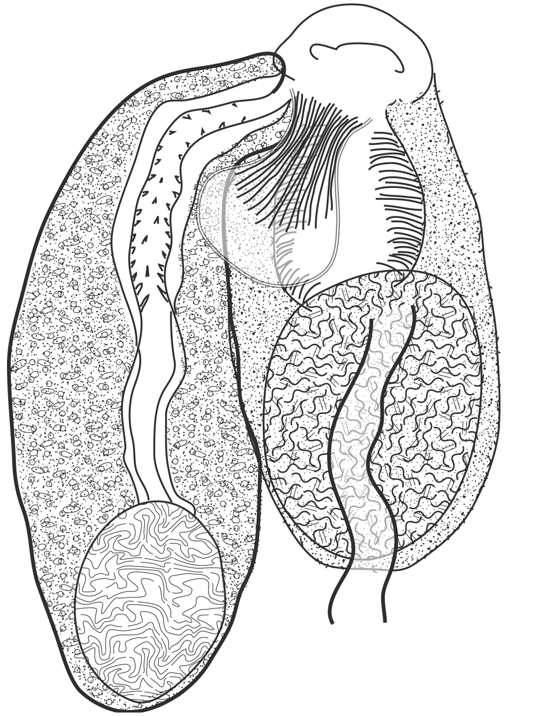

Fig. 2. — *Proctotrematoides synapturae* Machida, 2005, detail of terminal genitalia including atrial sac. Scale bar: 200 µm.

Host. — Perciformes: Stromateidae: *Pampus argenteus* (Euphrasen, 1788) (as *Stromateus cinereus*).

Locality. — Puri coast, Orissa, Bay of Bengal, India.

Remark

Proctotrematoides indicum differs in the gonads being much more posteriorly situated, as evidenced by pre-ovarian, pre-testicular, post-ovarian and post-testicular distances. The caeca also are much longer.

Proctotrematoides kuwaiti Sey & Nahhas, 1997

Type host and locality. — *Brachirus orientalis*, Kuwait, Persian Gulf.

Record. — Sey & Nahhas (1997).

Hosts. — Pleuronectiformes: Bothidae: *Pseudorhombus arsius* (Hamilton, 1822); Soleidae: *Brachirus orientalis* (Bloch & Schneider, 1801) (as *Synaptura orientalis*).

LOCALITY. — Kuwait, Persian Gulf.

REMARK

Proctotrematoides kuwaiti differs in pre-vitelline distance: the vitellarium is almost solely in the forebody.

Proctotrematoides ophichthi Fischthal & Thomas, 1969

RECORD. — Fischthal & Thomas (1969).

HOST. — Anguilliformes: Ophichthidae: *Pisodontophis semicinctus* (Richardson, 1848) (as *Ophichthus semicinctus*).

LOCALITY. — Off Ghana.

REMARK

Proctotrematoides ophichthi differs in size, sucker width ratio and length of caeca.

Proctotrematoides yamaguti Dutta & Manna, 1998

RECORD. — Dutta & Manna (1998).

HOST. — Anguilliformes: Ophichthidae: *Pisodontophis boro* (Hamilton, 1822).

LOCALITY. — Matla River estuary, Sundarbans, West Bengal, India.

REMARK

Proctotrematoides yamaguti (apparently) lacks an atrial sac and has eggs with a "unipolar" spine.

Suborder XIPHIDIATA Olson, Cribb, Tkach, Bray & Littlewood, 2003
Superfamily ALLOCREADIOIDEA Looss, 1902
Family OPECOELIDAE Ozaki, 1925
Subfamily PLAGIOPORINAE Manter, 1947
Genus *Macvicaria* Gibson & Bray, 1982

Macvicaria pardachiri n. sp. (Fig. 3)

TYPE MATERIAL. — Holotype MNHN 3303-5. Paratypes: MNHN JNC3302, JNC3303-6-7; NHMUK 2012.2.15.4-5.

TYPE HOST AND LOCALITY. — *Pardachirus pavoninus*, Soleidae, peacock sole, fish market, Nouméa, New Caledonia (03/02/2011).

SITE. — Digestive tract.

PREVALENCE. — 2/2.

ETYMOLOGY. — This species is named after the host-genus.

DESCRIPTION

Based on six worms, measurements in Table 3. Body elongate, fusiform, widest in region of ventral sucker (Fig. 3). Tegument unarmed. Pre-oral lobe short or absent. Oral sucker oval, subterminal. Ventral sucker transversely oval, just pre-equatorial, bigger than oral sucker. Prepharynx short, often entirely dorsal to oral sucker. Pharynx oval. Oesophagus distinct. Intestinal bifurcation in mid-forebody. Caeca terminate blindly fairly close to posterior extremity.

Testes two, oval or irregularly oval, oblique, but close to tandem, usually contiguous, in mid-hindbody. Post-testicular region short. Cirrus-sac long, relatively narrow, reaching to mid-ventral sucker. Internal seminal vesicle elongate saccular filling about half of cirrus-sac. Pars prostatica and ejaculatory duct not clearly differentiated, jointly long. Genital atrium small. Genital pore sinistral, mid-way between median line and body margin at level of mid-oesophagus.

Ovary oval, entire, pretesticular. Seminal receptacle canalicular, dorsal to ovary. Mehlis' gland dorsal to ovary. Laurer's canal opens dorsally to ovary or anterior testis. Uterus pre-testicular, intercaecal, egg(s) often found between ovary and anterior testis. Metraterm of similar length to cirrus-sac. Eggs relatively few, tanned, operculate. Vitellarium follicular, fields reaching from close to posterior extremity to mid-level of oesophagus, dorsal, ventral and lateral to caeca, small gaps present or absent at level of ventral sucker (50% of each), confluent in forebody and in post-testicular region.

Excretory pore terminal. Vesicle I-shaped reaching dorsally to middle or anterior part of anterior testis.

TABLE 2. — Tabular key to *Proctotrematoides* spp. Major differentiating characters emboldened.

***Proctotrematoides* spp.**	**Length**	**Width %**	**Accessory sac**	**Forebody %**	**Pre-genital pore %**	**Pre-vitelline %**	**Pre-ovarian %**	**Pretesticular %**	**Sucker width ratio**	**Post-vitelline %**	**Post-ovarian %**	**Post-testicular %**	**Post-uterine %**	**Post-caecal %**	**Eggs**	**References**
P. synapturae Machida, 2005	1165-1793	21-27	Yes	26-29	25-29	37-45	39-45	46-51	77-100	37-45	48-54	35-43	1-6	14-22	23-27 × 13-18	Present study
P. synapturae Machida, 2005	1780-2800	31-33	Yes	25-37	23	34	37	40	84-103	46	57	46	1	26	21-26 × 15-18	Machida (2005)
P. anguillae Qiu & Tong *in* Shen & Qiu, 1995	833-1003	31-41	**No**	30	**40**	51	**56**	61	86-123	33	38	29	10	9	21-24 × 10-12	Shen & Qiu (1995)
P. diacanthi Zaidi & Khan, 1977	1160-1276	20-21	Yes	39	34	30	46	50	81-87	48	43	38	3	8	18-29 × 12-18	Zaidi & Khan (1977)
P. gymnothoracis Shen, 1990	1137-2221	30-40	**No**	32	39	42	47	53	80-139	43	46	38	2	10	18-21 × 9-12	Shen (1990)
P. indicum Ahmad & Gupta, 1985	1440-1870	15-19	Yes	39-40	38	41	**69**	**73**	107-130	36	**23**	**12-15**	11	**1**	13-15 × 8-12	Ahmad & Gupta (1985)
P. kuwaiti Sey & Nahhas, 1997	1350-2100	25-31	**No**	35	28	**17**	47	51	80-100	53	46	34	1	5	25-30 × 16-20	Sey & Nahhas (1997)
P. pisodontophidis Yamaguti, 1938	1300-2600	25-31	Yes	**40**	37	39	49	52	100-104	41	45	34	0	**3**	21-27 × 15-20	Yamaguti (1938)
P. pisodontophidis Yamaguti, 1938	700-1600	37-44	Yes	**39**	34	41	46	51	82-87	31	48	35	31	12	metacercaria	Hoshina (1951)
P. pisodontophidis Yamaguti, 1938	1370-2440	29-43	Yes	**38**	35	41	48	54	77-78	39	47	33	10	14	24-30 × 13-16	Hoshina (1951)
P. ophichthi Fischthal & Thomas, 1969	**3910-4040**	19-21	Yes	27	26	45	50	55	**113-123**	25-31	43	38-42	2	**3**	24-32 × 15-19	Fischthal & Thomas (1969)
P. yamaguti Dutta & Manna, 1998	1550-2380	25-30	**No**	34	33	44	49	53	81-122	31	43	33	3	18	16-20 × 12-16	Dutta & Manna (1998)

TABLE 3. — Measurements of *Macvicaria pardachiri* n. sp. from *Pardachirus pavoninus* (Lacépède, 1802). N = 6. Abbreviation: *, % of body length.

	min.	max.	mean
Length	724	974	875
Width	195	268	239
Forebody length	279	369	331
Pre-oral lobe	0	6	2
Oral sucker length	77	95	85
Oral sucker width	91	103	94
Prepharynx length	0	5	2
Pharynx length	43	55	48
Pharynx width	58	71	62
Oesophagus length	55	84	65
Intestinal bifurcation to ventral sucker	105	164	137
Ventral sucker to anterior vitellarine extent	133	211	184
Ventral sucker length	132	151	141
Ventral sucker width	148	181	166
Cirrus-sac length	160	291	239
Cirrus-sac width	24	46	37
Ventral sucker to ovary	19	100	49
Ovary length	52	71	62
Ovary width	49	67	56
Ovary to anterior testis	0	17	4
Anterior testis length	65	105	78
Anterior testis width	60	104	76
Distance between testes	0	7	1
Posterior testis length	75	145	104
Posterior testis width	62	115	80
Post-testicular distance	98	186	139
Post-caecal distance	89	116	100
Egg length	67	80	76
Egg width	36	45	42
Width %*	23.3	29.2	27.4

	min.	max.	mean
Forebody %*	33.8	41.8	38.0
Sucker length ratio	1.43	1.83	1.66
Sucker width ratio	1.62	1.91	1.77
Pharynx: oral sucker width ratio	1.46	1.57	1.53
Ventral sucker to ovary %*	2.64	11.4	5.50
Post-testicular distance %*	11.6	21.2	15.7
Oesophagus length %*	5.60	9.17	7.50
Intestinal bifurcation to ventral sucker %*	12.1	18.6	15.6
Ventral sucker to anterior vitelline extent %*	16.8	26.4	21.0
Ovary to anterior testis %*	0	1.77	0.42
Distance between testes %*	0	0.69	0.12
Cirrus-sac length %*	22.1	34.5	27.8
Anterior testis length %*	6.74	11.5	9.04
Posterior testis length %*	8.58	15.9	12.0
Pre-pharynx distance	82	101	87
Pre-intestinal bifurcation distance	181	224	199
Pre-genital pore distance	132	160	148
Pre-vitelline distance	124	180	155
Cirrus-sac reach	276	432	376
Pre-ovarian distance	436	579	526
Post-uterine distance	255	356	307
Pre-pharynx distance %*	8.49	11.3	10.1
Pre-intestinal bifurcation distance %*	19.9	25.0	22.9
Pre-genital pore distance %*	15.0	18.3	17.0
Pre-vitelline distance %*	15.5	21.9	17.8
Cirrus-sac reach %*	38.1	49.9	42.9
Pre-ovarian distance %*	58.0	61.8	60.1
Post-uterine distance %*	31.9	40.1	35.2

DISCUSSION

Bray & Justine (2009) produced a dichotomous key to the 46 species they recognised in the problematic genus *Macvicaria*. If the uterus is interpreted as partly between the ovary and anterior testis then our specimens key to *M. synagris* (Yamaguti, 1952). This species is based on a single specimen and has not been reported since its original report in *Nemipterus* sp. (as *Synagris* sp.) from Makassar, Sulawesi (Yamaguti 1952). It differs from *Macvicaria pardachiri* n. sp. in sucker-ratio (1:2.45 vs 1:1.62-1.91) and the cirrus-sac reaches into the hindbody just to the level of the ovary. The eggs are smaller (57-66 vs 67-80) and the vitellarium is confluent at the level of the ventral sucker.

If the uterus is interpreted as the usual condition, then our specimens key to *M. georgiana* (Kovaleva & Gaevskaya, 1974), an Antarctic species frequently reported from Nototheniidae (mainly), Harpagiferidae, Bathydraconidae and Channichthyidae (Kovaleva & Gaevskaya 1974; Zdzitowiecki 1997). The forebody tends to be shorter (26-39% of body-length vs 34-42%), the eggs smaller (51-70 vs 67-80) and the vitellarium reaches to the pharynx.

Three species of *Macvicaria* have been reported from soleid fishes:

– *Macvicaria soleae* (Dujardin, 1845) was reported in the common sole *Solea solea* (Linnaeus, 1758) from the northeastern Atlantic off Brittany (Dujardin 1845), the Crouch estuary, SE England (Gibson &

Bray 1982), off western Spain (Alvarez *et al.* 2002) and the Portuguese coast (Durieux *et al.* 2007; Marques *et al.* 2006), and the Senegalese sole *Solea senegalensis* Kaup, 1858, the sand sole *Pegusa lascaris* (Risso, 1810) and the sole-perdrix brune *Microchirus azevia* (Brito Capello, 1867) off the Portuguese coast (Marques *et al.* 2006). It is also reported in other pleuronectids and the perciform families Callionymidae and Labridae in the eastern and western North Atlantic. It differs from *Macvicaria pardachiri* n. sp. in having a distinctly coiled internal seminal vesicle and a short forebody (Gibson & Bray 1982).

– *Macvicaria cynoglossi* (Madhavi, 1975) has been reported from the unicorn sole *Aesopia cornuta* Kaup, 1858, the zebra sole *Zebrias altipinnis* (Alcock, 1890) and the Indian zebra sole *Zebrias synapturoides* (Jenkins, 1910) off the Arabian Sea coast of Kerala, India (Bijukumar 1997). It was originally reported in the roughscale tonguesole *Cynoglossus lida* (Bleeker, 1851) (Cynoglossidae) from the Bay of Bengal (Madhavi 1975). It differs from *Macvicaria pardachiri* n. sp. in growing to 4 mm long, in the vitellarium reaching to the pharynx (in the original description), the lobed testes and in the numerous eggs in the long ventral sucker to ovary gap (Bijukumar 1997; Madhavi 1975).

– *Macvicaria longicaudus* (Hafeezullah, 1971) was reported from Commerson's sole *Synaptura commersoniana* (Lacépède, 1802) off the Arabian Sea coast of Kerala, India (Bijukumar 1997). It was originally reported in *Cynoglossus lida* from the Gulf of Mannar (Hafeezullah 1971) and differs from *Macvicaria pardachiri* n. sp. in growing to over 3.5 mm long, in its coiled internal seminal vesicle and possibly the configuration of the uterus, with some eggs seen in the forebody (Bijukumar 1997, Hafeezullah 1971).

Two other species of *Macvicaria* from flatfishes have a saccular internal seminal vesicle:

– *Macvicaria dampieri* Bray, 1990 was reported from the small-toothed flounder *Pseudorhombus jenynsii* (Bleeker, 1855) (Paralichthyidae) from Shark Bay, Western Australia (Bray 1990). It differs from *Macvicaria pardachiri* n. sp. in its more robust appearance, its shorter forebody, greater sucker width ratio and no indication of eggs encroaching between the ovary and anterior testis.

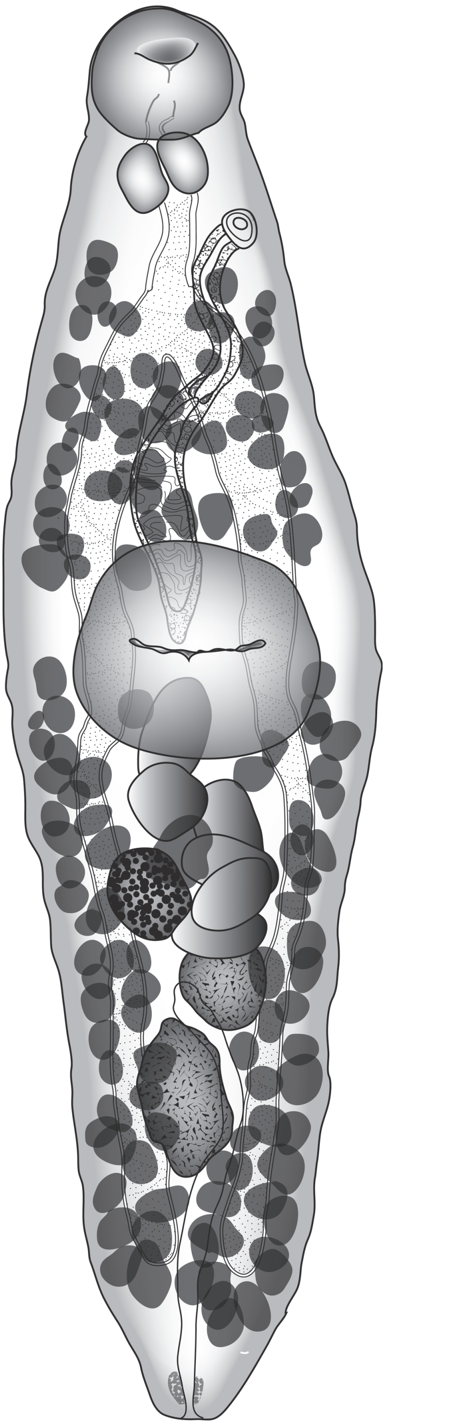

FIG. 3. — *Macvicaria pardachiri* n. sp., ventral view of holotype. Scale bar: 200 µm.

– *Macvicaria jagannathi* (Gupta & Singh, 1985), originally reported in the chiseltooth wrasse *Pseudodax moluccanus* (Valenciennes, 1840) (Labridae) in the Bay of Bengal, was later reported in four bothid species by Bijukumar (1997), but Bray & Justine (2009), who redescribed the species from a nemipterid from New Caledonia, thought that these specimens probably belonged to the similar related species *M. yamagutii* (Gupta & Ahmad, 1977). Both *M. jagannathi* and *M. yamagutii* belong to a "small group of species previously reported from the waters off India, with a relatively narrow outline, probably a protuberant ventral sucker, separated gonads, [...] and vitelline fields reaching just into the forebody, where they are distinctly separated" (Bray & Justine 2009). These features serve to differentiate these forms from *M. pardachiri* n. sp.

There are now six species of *Macvicaria* reported from flatfishes, but based on morphology, they do not appear to represent a homogeneous group.

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