

# ***Peracreadium akenovae* sp. nov. (Trematoda: Opecoelidae) parasitising the highfin moray eel *Gymnothorax pseudothyrsoides* (Anguilliformes: Muraenidae) from Moreton Bay, Australia**

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## **Abstract**

A new opecoelid trematode, *Peracreadium akenovae* sp. nov., is described from the highfin moray eel *Gymnothorax pseudothyrsoides* (Bleeker) (Anguilliformes; Muraenidae), collected from Moreton Bay off southeast Queensland, Australia. The new species is distinctive in its body shape, transversely elongate irregular testes, vitelline follicles interrupted at the level of the ventral sucker, and diverticulate excretory vesicle. The Muraenidae is a new host family for *Peracreadium* Nicoll, 1909. *Peracreadium* is the seventh opecoelid genus reported from temperate eastern Australian marine fishes and this is its first report from Australian waters.

## **Keywords**

Trematoda, Digenea, Opecoelidae, Muraenidae, *Peracreadium*, Australia

## **Introduction**

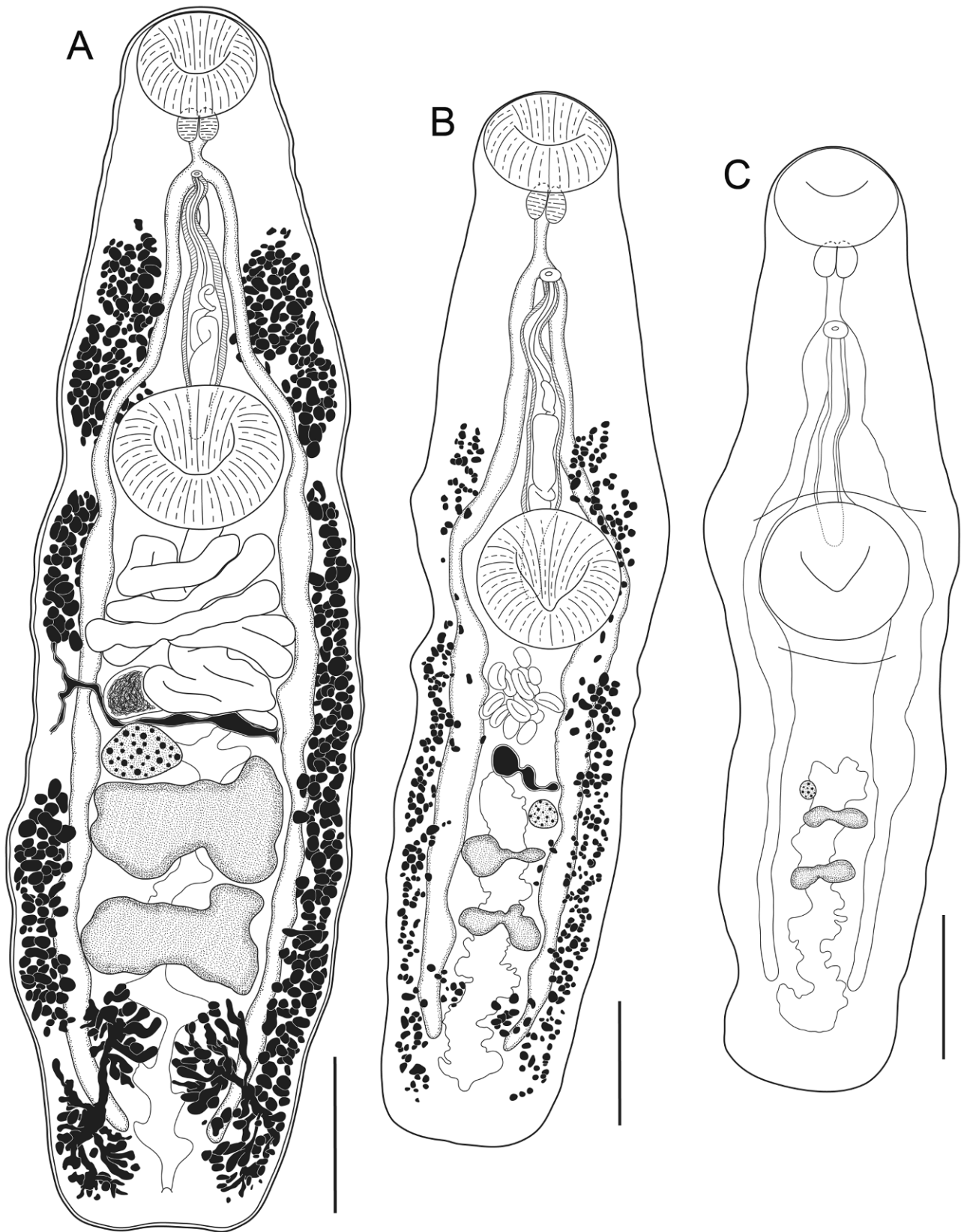
Knowledge of the Opecoelidae Ozaki, 1925 of marine fishes of temperate eastern Australian waters comprises six genera, *Coitocaecum* Nicoll, 1915, *Hamacreadium* Linton, 1910, *Hellicometra* Odhner, 1902, *Neolebouria* Gibson, 1976, *Opecoelus* Ozaki, 1925 and *Orthodena* Durio et Manter, 1968, which together comprise 13 species (Durio and Manter 1968, Aken'Ova and Cribb 1996, 2001, Aken'Ova *et al.* 2006, Aken'Ova 2007). Given the size of the Opecoelidae [85 genera as recognised by Cribb (2005)] and the richness of the fish fauna of this region (Kuitert 1993), it is certain that many species remain to be reported for the area. Here we report an additional opecoelid genus, *Peracreadium* Nicoll, 1909, for this fauna, from a muraenid eel in Moreton Bay off southeast Queensland. This genus does not appear to have been reported previously from Australian waters. Among the 53 genera of the Plagioporidae Manter, 1947 within the Opecoelidae recognised by Cribb (2005), species of *Peracreadium* are relatively distinctive in the combination of a comparatively elongate

body, unfilamented, typical-sized eggs, blind caeca, extensive vitelline follicles, tandem testes and, especially, a median genital pore and an entire ovary.

## **Materials and Methods**

Two fish were caught, one by line and the other by hand net, from Moreton Bay, Queensland, Australia. The fish were killed by neural pithing and examined for worms. Worms were collected, fixed and preserved as described by Cribb and Bray (2010) except that one specimen was strongly flattened as it was fixed. Specimens were stained with Mayer's haematoxylin, destained in HCl, neutralized in ammonia solution, dehydrated through a graded series of alcohols (including straightening of the body under light coverslip pressure once 70% alcohol was reached), cleared in methyl salicylate and mounted on slides in Canada balsam. Drawings were completed using an Olympus BH-2 compound microscope and a drawing tube. Measurements were recorded on an Olympus

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**Fig. 1.** *Peracreadium akenovae* sp. nov. ex intestine of *Gymnothorax pseudothyrsoides* (Muraenidae) from Moreton Bay, Australia. **A.** Adult, holotype. **B.** Adult, a paratype, showing small gonads. **C.** Immature specimen, showing medially constricted testes and diverticulate excretory vesicle. Scale bars: A 500  $\mu$ m; B, C 200  $\mu$ m

BH-2 microscope using a Nikon Digital Sight DS-LI digital camera (Nikon Corporation, Japan) and are in micrometres as range with the mean in parentheses. Where length is followed by breadth, the two measurements are separated by '×'. The specimens have been deposited in the Queensland Museum (QM), South Brisbane, Queensland 4101, Australia.

## Results

Family Opecoelidae Ozaki, 1925

Plagioporinae Manter, 1947

*Peracreadium* Nicoll, 1909

*Peracreadium akenovae* sp. nov. (Figs 1A–C)

**Description.** (Based on 11 measured gravid adults). Body elongate, with almost parallel sides, distinctly squared posterior extremity, and pronounced bend at level of ventral sucker in heat-killed specimens, 1,691–3,865 (2,006) × 377–1,096 (493). Forebody 628–1,192 (733) long, occupying 30.8–42.1 (37.0)% of body length. Tegument unarmed. Oral sucker opens subterminally, slightly to distinctly wider than long, 153–345 (187) × 193–388 (231). Prepharynx short, typically entirely dorsal to posterior margin of oral sucker. Pharynx unspecialised, typically partly dorsal to posterior margin of oral sucker, 53–114 (65) × 58–141 (76). Oesophagus short. Intestinal bifurcation in anterior forebody. Intestinal caeca smooth, parallel lateral margins in hindbody, blind, extend to 123–280 (176) from posterior end of body. Ventral sucker round, unspecialised, 222–456 (265) × 240–550 (293). Sucker width ratio 1:1.15–1.42 (1.26). Testes two, tandem, slightly separated in mid-hindbody, transversely elongate and irregular in outline, typically constricted medially; anterior testis, 43–395 (95) × 127–623 (191); posterior testis 58–353 (101) × 130–573 (197). Cirrus-sac a highly muscular, rectilinear tube, running from dorsal to ventral sucker to genital pore, containing prominent, convoluted (not bipartite despite appearance in Fig. 1b) internal seminal vesicle filling posterior half and pronounced ejaculatory duct in anterior half, neither pars prostatica nor prostatic cells clearly observed, 444–826 (527) × 42–150 (64). Genital pore median, ventral to intestinal bifurcation, 270–540 (322) from anterior extremity. Ovary entire, anterosinistral or anterodextral to and either slightly separated from or contiguous with anterior testis, 202–571 (276) from posterior margin of ventral sucker, 40–187 (65) × 39–261 (71). Vitelline follicles relatively small, extend 64–127 (86) from posterior extremity to well into forebody, 407–702 (490) from anterior extremity, interrupted at level of ventral sucker on either side of body; lateral fields medial to caeca only posterior to testes. Ovarian complex details not distinguishable. Canalicular seminal receptacle immediately anterior to ovary. Uterus restricted to area between ovary and genital pore, with coils containing eggs mainly between ovary and posterior margin of ventral sucker. Eggs numerous, without filaments, 43–55 (49) × 19–28 (23). Excretory vesicle I-shaped, dis-

tinctly diverticulate, runs from excretory pore medial to and just anterior to ovary. Excretory pore dorsal, distinctly anterior to posterior end of body, 85–129 (99) from posterior extremity. Even in immature worms, testes constricted medially and excretory vesicle diverticulate (Fig. 1C).

Type-host: *Gymnothorax pseudothyrsoides* (Bleeker, 1853) (Anguilliformes: Muraenidae).

Prevalence: 2 of 2.

Type-locality: Moreton Bay off Amity Point 27°24'S, 153°26'E, Stradbroke Island, south-east Queensland Australia.

Other localities: Moreton Bay off Dunwich 27°30'S 153°24'E, Stradbroke Island, south-east Queensland Australia.

Site in host: Intestine.

Specimens deposited: Holotype QM G234109; 14 Paratypes QM G234110–23.

Etymology: The species is named for Dr Thelma Aken'Ova in recognition of her major contribution to the taxonomy of the Opecoelidae of temperate Australian fishes.

## Remarks

Two worms were recovered from the first eel. One of them was flattened at fixation. The other, the holotype (Fig. 1A), was far larger (3,865 µm long) than any of the many specimens found in the second eel; they were no greater than 2,068 µm long (Figs 1B, C). A noticeable difference between the holotype and all the specimens from the second eel was in the size of the gonads. Despite the fact that all the measured specimens referred to above were gravid and contained what appeared to be well-formed eggs, the gonads, especially the ovary, were notably small. In the holotype the gonads were much larger and generally proportionate to the size of the worm. No other structural differences were detected in specimens from the two eels, and so we are confident that they belong to the same species. Conceivably a seasonal effect may be involved in the difference between the two samples given that the first eel was collected in March and the second in November.

## Discussion

As presently constituted (Cribb 2005), *Peracreadium* contains 10 species. *Peracreadium akenovae* sp. nov. is readily distinguishable from all of these. Three species, (*P. longicirrus* (Salman et Srivastava, 1990) Cribb, 2005, *P. megaformis* (Salman et Srivastava, 1990) Cribb, 2005 and *P. mycteropercae* (Sogandares-Bernal, 1959) Pritchard, 1966), have the vitelline follicles restricted to the hindbody. All the seven others, *P. characis* (Stossich, 1886) Bartoli, Gibson et Bray, 1989, *P. commune* (Olsson, 1868) Nicoll, 1909, *P. genu* (Rudolphi, 1819) Nicoll, 1909, *P. guptai* (Kakaji, 1969) Yamaguti, 1971, *P. idoneum* (Nicoll, 1909) Gibson et Bray, 1982, *P. gibsoni* Korniychuk et Gaevskaya, 2001 and *P. kareii* (Qiu et Lin in Shen et Qiu, 1995) Cribb, 2005, have the vitelline follicles extend-



ing into the forebody. However, *P. akenovae* differs from them by having a distinctively squared posterior extremity, in having irregular and transversely and medially constricted elongated testes and in having a distinctly diverticulate excretory vesicle. It differs further from all the previously known species, except *P. genu*, in that the vitelline follicles are interrupted at the level of the ventral sucker on either side of the body.

As far as we can detect, a diverticulate excretory vesicle has previously been reported in the Opacoelidae only in the type-species of the monotypic genus *Pacificreadium* Durio et Manter, 1968. However, in *P. serrani* (Nagaty et Abdel Aal, 1962) Durio et Manter, 1968, the excretory vesicle extends to the oral sucker (Nagaty and Abdel Aal 1962, Durio and Manter 1968, Bray and Cribb 1989). *Pacificreadium serrani* differs further from *Peracreadium akenovae* in its possession of a deeply lobed ovary.

Species of *Peracreadium* have been reported from a wide range of marine (and one freshwater) fishes. The present new species is the first species of this genus to be reported from a muraenid eel. There is just one previous record from anguilliforms, by Olsson (1868), who reported *P. commune* from *Anguilla anguilla* (as '*Muraena anguilla*') presumably from Scandinavian waters. The absence of *P. akenovae* from the many other fishes that we have examined from Moreton Bay suggests that this species is specific to muraenids and that this is a further basis for its distinction from its congeners. As far as we can ascertain, this is the first parasite to be reported from *Gymnothorax pseudothyrsoides*.

The Muraenidae is a rich family, comprising 200 species according to Fishbase (Froese and Pauly 2013) and 11 confirmed species in Moreton Bay (Johnson 1999). Despite the richness, the family remains poorly studied for trematodes, perhaps because many of its species are cryptic and some are dangerous to collect and handle. The known trematode fauna is dominated by hemiurids and bucephalids. The Opacoelidae is represented by *Peracreadium* (this report) and small numbers of species of *Coitocaecum*, *Helicometra*, *Helicometrina* Linton, 1910 and *Pseudoopacoelus* von Wicklen, 1946 (Manter 1940, Sogandares-Bernal 1959, Manter and Pritchard 1960, Nahhas and Cable 1964, Pritchard 1966, Yamaguti 1970, Ahmad 1983, Dyer *et al.* 1988).

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