

## NEW SPECIES OF *OPECHONA* LOOSS, 1907 AND *CEPHALOLEPIDAPEDON* YAMAGUTI, 1970 (DIGENEA: LEPOCREADIIDAE) FROM FISHES OFF NORTHERN TASMANIA

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(with one text-figure)

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Two new species of lepo-creadiid trematodes are described from teleost fishes from off the coast of northern Tasmania. *Opechona kahawai* sp. nov. from *Arripis* sp. (Arripidae) differs from congeners by a combination of a longer prepharynx, longer excretory vesicle and the genital pore antero-sinistral to the ventral sucker. *Cephalolepidapedon warehou* sp. nov. from *Serirolella punctata* (Centrolophidae) differs from its only congener in the vitellarium reaching into the posterior forebody, a heavy concentration of eye-spot pigment in the forebody, a relatively narrower and more elongate body, a longer prepharynx and a more distinct oesophagus.

**Key Words:** *Opechona*, *Cephalolepidapedon*, *Arripis*, *Serirolella*, Digenea, Lepo-creadiidae, Tasmania.

### INTRODUCTION

We have recovered two lepo-creadiine species from the perciform fishes *Arripis* sp. (non *georgiana*) and *Serirolella punctata* (Forster, 1801) from the waters off northern Tasmania. According to records in the Host-Parasite database at the Parasitic Worms Division at the Natural History Museum, London, and a database produced at the Department of Microbiology and Parasitology, University of Queensland, neither species, indeed neither genus, has been reported as hosts of lepo-creadiids before. Examination of these two forms has shown that they are undescribed and are, therefore, described as new.

### MATERIALS AND METHODS

Digeneans collected from freshly-killed fish were fixed by being pipetted into nearly-boiling saline and immediately preserved in formalin. Whole-mounts were stained with Mayer's haematoxylin, cleared in methyl salicylate 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 as ranges and means in parentheses. Sucker-width ratio is given with the oral sucker width as one. The following abbreviations are used: BMNH, the British Museum (Natural History) collection at the Natural History Museum, London, UK; QM, Queensland Museum collection, Brisbane, Australia.

### RESULTS

Family Lepo-creadiidae Odhner, 1905  
Subfamily Lepo-creadiinae Odhner, 1905  
Genus *Opechona* Looss, 1907  
*Opechona kahawai* sp. nov.  
Fig. 1A, B

#### Type material

Holotype: QM G221984, ex *Arripis* sp. (either *trutta* or *truttacea*) (Perciformes: Arripidae). Intestine. Off Stanley, Tasmania (40°46'S, 145°20'E, Dec. 1999).

Paratypes: QM G221985–221988, BMNH 2003.7.23.34–35, same data as holotype.

#### Description

Based on seven whole-mounts, four of which are mature. Body elongate, more or less parallel-sided, widest at oral sucker, bluntly rounded posteriorly, 3718–5307 × 315 × 473 (4205 × 359); width 7.8–9.0 (8.5)% of length (fig. 1A). Tegument spinose; spines in regular rows, reach to close to posterior extremity; rows less regular close to posterior extremity. Eye-spot pigments scattered around posterior part of oral sucker and prepharynx. Oral sucker large, widely-flared funnel-shaped, terminal, 403–545 × 370–489 (451 × 411). Ventral sucker small, oval, pre-equatorial, on slight protuberance 125–147 × 124–157 (132 × 136). Forebody 1599–2230 (1786) long, 40–44 (42)% of length. Sucker-width ratio 1:0.32–0.36 (1:0.33). Prepharynx distinct, 97–177 (134) long. Pharynx small, subglobular, 97–137 × 103–133 (111 × 119). Pharynx to oral sucker width ratio 1:3.08–3.68 (1:3.46). Oesophagus lined with tegument, short, 11–42 (31) long. Pseudoesophagus (gastrodermis-lined) wider than oesophagus, 777–1068 (877) long, 19–79 (37) times as long as oesophagus. Intestinal bifurcation just anterior to ventral sucker; anterior point of bifurcation 127–217 (162) from ventral sucker. Caeca narrow anteriorly, wider in post-testicular region, form uroproct at posterior extremity by opening into wide chamber at base of excretory vesicle.

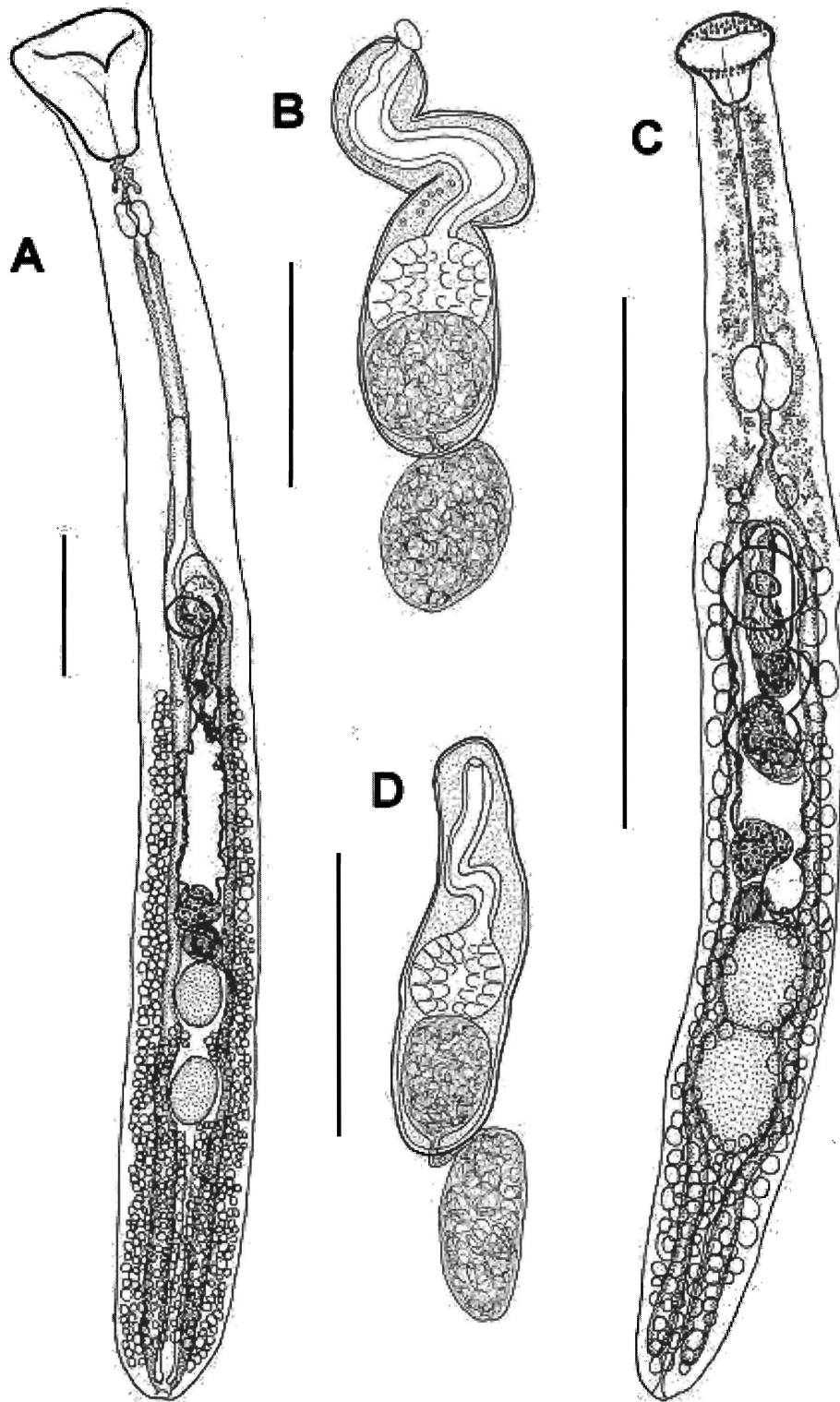


FIG. 1 — (A, B) *Opechona kahawai* sp. nov. (A) Ventral view of holotype, uterus in bold outline, tiny tegumental spines not shown; (B) Cirrus-sac. (C, D) *Cephalolepidapedon warehou* sp. nov. (C) Ventral view of holotype, uterus in bold outline, tiny tegumental spines not shown; (D) Cirrus-sac. Scale-bars: A, C, 500  $\mu$ m; B, 200  $\mu$ m; D, 100  $\mu$ m.

Testes two, tandem, oval, entire, slightly to distinctly separated by 4–100 (43), in mid-hindbody; anterior 215–269 × 167–200 (241 × 181), posterior 216–288 × 172–203 (252 × 188). Post-testicular region 686–1022 (799) long, 18–20 (19)% of body-length. External seminal vesicle coiled, tubular, reaches 305–400 (340) into hindbody, 43–53 (51)% of ventral sucker to ovary distance. Cirrus-sac of typical *Opechona*-type, claviform, convoluted, reaches well into hindbody, 365–500 × 108–127 (433 × 121) (fig. 1B). Internal seminal vesicle subglobular to oval. Pars prostatica vesicular, subglobular, lined with anuclear cell-like bodies, towards proximal end of cirrus-sac. Ejaculatory duct long, convoluted, muscular. Genital atrium distinct. Genital pore close to antero-sinistral margin of ventral sucker.

Ovary subglobular, virtually entire, but with evidence of three lobes separated by 69–111 (85) from anterior testis, median, 105–168 × 114–170 (137 × 136); 573–924 (683) from ventral sucker. Seminal receptacle canalicular, saccular, mainly dorsal to ovary. Mehlis' gland dorsal to ovary. Laurer's canal opens dorsally to left caecum at about level of anterior margin of anterior testis. Uterus preovarian, intercaecal. Eggs not highly numerous, tanned, operculate, 75–87 × 38–46 (83 × 41). Metratem about half length of cirrus-sac; musculature develops gradually along length. Vitellarium follicular; fields reach into anterior hindbody, 75–191 (143) from ventral sucker; mainly lateral to caeca, encroach between testes, confluent dorsally and ventrally in post-testicular region.

Excretory pore terminal. Excretory vesicle I-shaped, initially a wide chamber at point where caeca join, then passes forward dorso-dextrally to testes, ovary and uterus, and reaches to mid-level of pseudoesophagus or slightly anterior; distal part lies ventrally to pseudoesophagus.

#### Discussion

Bray & Gibson (1990) reviewed *Opechona* Looss, 1907 and related genera. *Opechona* was characterised within the Lepocreadiinae by the presence of a uroproct, a pseudoesophagus and a typical 'Opechona-type' cirrus-sac. They gave a key to those species that they considered definite members of the genus and also a key to those species which were possibly members of the genus, but which lacked some detail in the descriptions. In the first key our material from *Arripis* sp. comes closest to *O. occidentalis* Montgomery, 1957, an elongate form from scorpaenid fishes in the northeast Pacific Ocean. *Opechona occidentalis* differs in that the genital pore is at the posterior margin of the ventral sucker, the sucker ratio is much greater, the pseudoesophagus is only eight or nine times as long as the oesophagus and the excretory vesicle reaches only to the bifurcal level (Montgomery 1957). In addition, the eggs are larger in *O. kahawai* sp. nov. In the key to possible *Opechona* species, *O. kahawai* is closest to *O. formiae* Oshmarin, 1965 from formionids, stromateids and leiognathids in the northwest Pacific Ocean. In the latter species the caeca are figured as ending blindly, the sucker-ratio is distinctly greater, the prepharynx is longer and the genital pore is sinistro-lateral to the ventral sucker (Oshmarin 1965). Bray & Cribb (1998) erected a further species of *Opechona*, *O. austrobalearis* Bray & Cribb, 1998 from *Pomatomus saltatrix* off both the eastern and western coasts of Australia. This is similar to *O. kahawai*, but differs in sucker-ratio (1:0.50–0.72) and in the pseudoesophagus being only 7–20 times the length of the oesophagus. Other species of *Opechona* erected since the review of Bray & Gibson (1990) are *O. dongshanensis* Wang & Wang, 1993

from *Upeneus sulphureus* off China, *O. gaeuskayae* Ahmad, 1991 from *Fistularia villosa* in the Arabian Sea and *O. glossooides* Wang, 1989 from *Megalaspis cordyla* off China. A uroproct is not described in any of these species (Wang 1989, Ahmad 1991, Wang & Wang 1993). *Opechonis dongshanensis* and *O. glossooides* also differ from *O. kahawai* in the anterior extent of the vitelline fields, which reach into the forebody in the former and reach to the ventral sucker in the latter. In *O. gaeuskayae* the vitellarium is restricted to the hindbody, but the oral sucker is 'spherical' and the sucker ratio 1:1, the pseudoesophagus is only about three times longer than the pharynx and the excretory vesicle reaches only to the bifurcal level. Thus *O. kahawai* possesses a unique suite of characters which we believe justifies the erection of a new species.

#### Etymology

'Kahawai' is a common name of the host used in Australia and New Zealand (Froese & Pauly 2003).

### Genus *Cephalolepidapedon* Yamaguti, 1970 *Cephalolepidapedon warehou* sp. nov.

Fig. 1C, D

#### Type material

Holotype: QM G221968, ex *Serirolella punctata* (Forster) (Perciformes: Centrolophidae). Intestine. Off Stanley, Tasmania (40°46'S, 145°20'E, Dec. 1999). Paratypes: QM G221969–221983, BMNH 2003.7.23.27–33, same data as holotype.

#### Description

Based on 23 whole-mounts. Body elongate, slightly wider in hindbody, rounded posteriorly, 994–1503 × 115–163 (1294 × 143); width 9.5–14 (11)% of length (fig. 1C). Tegument spinose; spines in regular rows in forebody, sparse or absent in hindbody; anterior 2–3 rows slightly, but distinctly, enlarged, appearing as rows of circum-oral spines. Eye-spot pigment copious, scattered throughout parenchyma of forebody and to about posterior margin of ventral sucker. Oral sucker funnel-shaped, with narrow posterior protuberance, terminal, 73–93 × 79–98 (83 × 88). Ventral sucker small, rounded, pre-equatorial, on slight protuberance; 65–92 × 66–99 (76 × 78). Forebody 393–576 (481) long, 31–40 (37)% of length. Sucker-width ratio 1:0.83–0.96 (1:0.89). Prepharynx long, 133–285 (196) long. Pharynx large, oval, 52–67 × 50–62 (60 × 55). Pharynx to oral sucker width ratio 1:1.4–2.0 (1:1.6). Oesophagus lined with tegument, short, 18–119 (66) long. Intestinal bifurcation just anterior to ventral sucker; anterior point of bifurcation 47–104 (75) from ventral sucker. Caeca terminate blindly, 12–53 (35) from posterior extremity.

Testes two, tandem, oval, entire, contiguous or very slightly separated by 0–1.15 (0.08), in mid-hindbody; anterior 64–136 × 58–100 (100 × 83); posterior 75–167 × 60–106 (119 × 88). Post-testicular region 200–269 (234) long, 16–21 (18)% of body-length. External seminal vesicle saccular, reaches 107–258 (154) into hindbody, 60–95 (82)% of ventral sucker to ovary distance; distal narrow, recurved duct reaches to cirrus-sac. Cirrus-sac of typical *Opechona*-type, claviform, convoluted, reaches into hindbody, 130–218 × 34–54 (181 × 43) (fig. 1D). Internal seminal vesicle subglobular to oval. Pars prostatica vesicular, subglobular, lined with anuclear cell-like bodies, in proximal half of cirrus-sac. Ejaculatory duct long, convoluted, muscular. Genital atrium small. Genital pore antero-sinistral

to ventral sucker.

Ovary subtriangular, contiguous or slightly separated by 0–45 (23) from anterior testis, slightly dextral, 46–78 × 40–72 (62 × 58); 125–299 (189) from ventral sucker. Ventral sucker to ovary distance 11–21 (15)% of body-length. Seminal receptacle canalicular, saccular, in dorsal plane between ovary and anterior testis or dorsal between junction of them. Mehlis' gland dorsal to ovary. Laurer's canal opens dorsally to left caecum or sinistral edge of anterior testis, at about level of anterior third of anterior testis. Uterus pre-ovarian, mainly intercaecal. Eggs relatively few (c. 3–19), tanned, operculate, 52–63 × 27–37 (58 × 32). Metraterm distinct, muscular, reaches from about posterior edge of ventral sucker. Vitellarium follicular; fields reach into posterior forebody, 29–124 (74) from ventral sucker; mainly lateral to caeca; in ventral plane scattered follicles may overlie uterus, encroach over testes slightly and be confluent ventrally in post-testicular region; in dorsal plane follicles encroach caeca only slightly at level of gonads and fields are separated by excretory vesicle in post-testicular region.

Excretory pore terminal. Excretory vesicle I-shaped, narrow, reaches to anterior part of post-testicular region or just overlaps posterior testis.

#### Discussion

The general morphology of the type, and only, species of *Cephalolepidapedon*, *C. saba* Yamaguti, 1970, is similar to other lepopocreadiines, but differs from most by the rows of slightly-enlarged spines around the aperture of the oral sucker. These are not greatly enlarged, as is found, for example, in the acanthocolpid genera *Stephanostomum* Looss, 1899 or *Stephanostomoides* Mamaev & Oshmarin, 1966, or other lepopocreadiids, such as *Acanthogalea* Gibson, 1976, but are similar to those of *Clavogalea* Bray, 1985. *Cephalolepidapedon* is distinguished from *Clavogalea* by its blind-ending caeca and lack of a pseudoesophagus, although the pseudoesophagus in *Clavogalea* may be insignificant, as in the type-species *C. gaeuskayae* Bray, 1985 (Bray & Gibson 1990) or much longer than the oesophagus, as in *C. trachinoti* (Fischthal & Thomas, 1968) (see Bray & Cribb 1998). Yamaguti (1970) described *C. saba* as having a long excretory vesicle reaching to the pharynx, but examination of the 'type-series' and new material by Shimazu (1989) has shown it to be short, 'barely reaching to posterior testis'. The specimens described here are considered members of *Cephalolepidapedon* because they have the following suite of characters: slightly-enlarged oral spines, blind caeca, lack of a pseudoesophagus, short excretory vesicle and funnel-shaped oral sucker.

*Cephalolepidapedon saba* (syns *Stephanostomum trisephanum* of Zhukov (1960); *S. scombri* Korotaeva, 1974; *Opechona acanthoris* Gaevskaya & Aleshkina, 1985; *Lepocreadium misakiensis* Shimazu, 1986) has been found in two species of *Scomber*, but from a geographically wide area, that is, *S.* [= *Pneumatophorus*] *japonicus* off Hawaii (Yamaguti 1970), in the Sea of Japan (Shimazu 1986; Shimazu 1989; Zhukov 1960), in the East China Sea (Shen 1986), in the Yellow and Bo Hai seas (Shen & Qiu 1995) and in the southeastern Atlantic (Gaevskaya & Aleshkina 1985), and in *S. australasicus* from the Great Australian Bight (Korotaeva 1974). The species has also been reported from off Hainan Island in the South China Sea, but the host is not given (Shen & Li 2000). The species has been described several times (Zhukov 1960; Yamaguti 1970; Korotaeva 1974; Gaevskaya & Aleshkina 1985; Shimazu 1986; Shimazu 1989; Shen & Qiu 1995). *Cephalolepidapedon warehou*

sp. nov. is morphologically similar to *C. saba*, but can be distinguished by the vitellarium reaching into the posterior forebody, the heavy concentration of eye-spot pigment in the forebody, a relatively narrower and more elongate body, a longer prepharynx and a more distinct oesophagus. In *C. saba* the vitellarium is restricted to the hindbody, reaching anteriorly only as far as the middle of the ventral sucker to ovary distance. The illustrations in Zhukov (1960), Yamaguti (1970) and Shimazu (1986) show scattered eye-spot pigment, but it is much less widely distributed than in *C. warehou*, being confined to the area between the oral sucker and the pharynx.

#### Etymology

Silver or Spotted 'Warehou' are common names of the host used in Australia and New Zealand (Froese & Pauly 2003).

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