

**Description:** Male: Body filiform, whitish, 5.39–5.92 mm long, maximum width at posterior part 66–78; anterior part of body somewhat narrowed just posterior to cephalic end; body width at this narrowed part 33–39. Maximum width/body length ratio 1:72–89. Cuticle smooth. Cephalic end rounded, 48–54 wide. Oral aperture small, triangular, surrounded by 14 minute cephalic papillae arranged in 2 circles: external circle formed by 4 submedian pairs of papillae (each pair consisting of 1 circular and 1 narrower, more elongate papilla); internal circle by 4 submedian and 2 lateral papillae. Small lateral amphids just posterior to lateral papillae of internal circle. Oesophagus well visible, 555–720 long, forming 10–12% of body length, with distinct inflation at anterior end measuring 60–69 × 33–42; posterior part of muscular oesophagus overlapped by well-developed oesophageal gland with large cell nucleus in middle; maximum width of gland 27–42. Small ventriculus 6–9 long, 6–12 wide. Oesophagus opening into intestine through distinct valve. Oesophageal nucleus and nerve ring 405–531 and 207–240, respectively, from anterior extremity. Excretory pore 240–279 from anterior end. Testis extending anteriorly to short distance anterior to anterior end of intestine, overlapping thus posterior end of oesophagus. Posterior end of body blunt, 39–51 wide, provided with broad U-shaped mound situated laterally and dorsally to cloacal opening; 3 adanal pairs of very flat, hardly visible caudal papillae present. Phasmids not located. Spicules slender, needle-like, equally long, with somewhat expanded proximal and sharply pointed distal tips; length of spicules 279–312, representing 5.0–5.3% of body length. Gubernaculum narrow, 151–168 long, with anterior portion somewhat dorsally bent; length of anterior bent part 27–42, representing 17–27% of entire gubernaculum length. Distal part of gubernaculum with distinct transverse lamella-like structures arranged on both sides of dorsal surface, demarcating broad smooth field between them; ventral surface of gubernaculum distal portion with two conspicuous longitudinal grooves. Length ratio of gubernaculum and spicules 1:1.79–1.93. Spicules and gubernaculum well sclerotized; spicules and gubernaculum yellowish, anterior part of gubernaculum colourless.

Subgravid female: Body of fixed specimen brownish, with dark brown intestine visible through cuticle. Body filiform, 25.70 mm long, maximum width 381. Maximum width/body length ratio 1:67. Cuticle smooth. Cephalic end rounded; cephalic papillae indistinct in lateral view. Oral aperture oval, surrounded by small cephalic papillae arranged in 2 circles and slightly outlined lateral amphids; internal circle of papillae consisting of 4 submedian and 2 lateral single papillae, whereas external circle formed by 4 submedian pairs of papillae, each composed of 1 short and 1 elongate papilla. Oesophagus including anterior bulbous inflation 1.09 mm long, representing 4% of body length; bulb well developed, 84 long and 87 wide; maximum width of oesophagus including oesophageal gland 95. Oesophageal gland well developed, with large cell nucleus at middle. Nerve ring and nucleus of oesophageal gland 258 and 639, respectively, from anterior extremity. Ventriculus 33 long and 75 wide. Oesophagus opening into intestine through distinct valve. Intestine ending blindly, its posterior end attached by long ligament ventrally to body wall near caudal end; ligament 272 long. Vulva and anus absent. Ovaries long, narrow, reflected, situated near

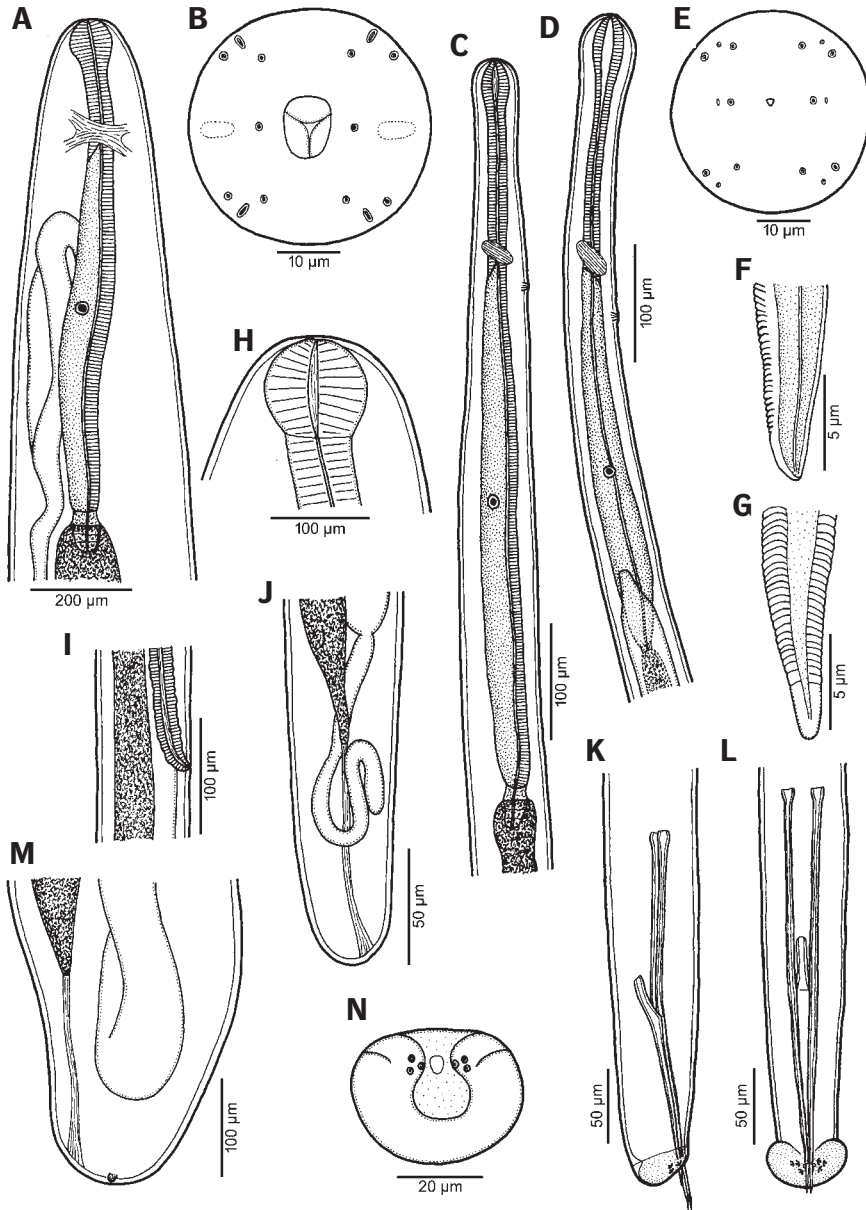


Fig. 60. *Philometra brevicollis* Moravec et Justine, 2011. A – anterior end of subgravid female, lateral view; B – cephalic end of subgravid female, apical view; C – anterior end of mature female, lateral view; D – anterior end of male, lateral view; E – cephalic end of male, apical view; F, G – distal end of gubernaculum, ventral and dorsal views; H – cephalic end of subgravid female, lateral view; I – vulva of mature female, lateral view; J – posterior end of mature female, lateral view; K, L – posterior end of male, lateral and ventral views; M – caudal end of subgravid female, lateral view; N – tail of male, apical view. (After Moravec and Justine 2011.)

body ends. Uterus containing spherical eggs. Caudal end rounded, with two small, lateral papilla-like projections.

**Male:** Body filiform, whitish, 5.45–6.57 mm long, maximum width 63–72; anterior part of body somewhat narrowed just posterior to cephalic end; body width at this narrowed part 36–39. Maximum width/body length ratio 1:76–100. Cuticle smooth. Cephalic end rounded, 39–42 wide. Oral aperture circular, with somewhat elevated rim, surrounded by 14 minute cephalic papillae arranged in 2 circles: external circle formed by 4 submedian pairs of papillae (each pair consisting of 1 circular and 1 narrower, more elongate papilla); internal circle by 4 submedian and 2 lateral papillae. Small lateral amphids just posterior to lateral papillae of internal circle. Oesophagus well visible, 684–774 long, forming 11–14% of body length, with distinct inflation at anterior end measuring 42–51 × 27–33; posterior part of muscular oesophagus overlapped by well-developed oesophageal gland with large cell nucleus in middle; maximum width of gland 33–39. Small ventriculus 9–12 long, 15–24 wide. Oesophagus opening into intestine through distinct valve. Oesophageal nucleus and nerve ring 396–480 and 156–195, respectively, from anterior extremity. Excretory pore 192–228 from anterior end. Anus absent. Vulva postequatorial, situated 3.56–4.58 mm from anterior extremity, at 65–70% of body length; short vagina directed anteriorly from vulva. Uterus amphidelphic, empty, extending posteriorly to short distance from posterior end of body. Ovaries short, situated near both ends of uterus. Caudal end rounded, 33–39 wide, without any projections.

**Host:** *Lutjanus vitta* (Lutjanidae, Eupercaria/misc).

**Site of infection:** Ovary.

**Distribution:** South Pacific Ocean, off New Caledonia (Moravec and Justine 2011).

**Biology:** Specimens of *P. brevicollis* were collected in 3 of 4 *L. vitta* examined off Nouméa, New Caledonia in April and October, with the intensity 20–22 nematodes per fish (Moravec and Justine 2011).

***Philometra brevispicula* Moravec et Bakenhaster, 2010**

Fig. 61

**Description:** Male: Body filiform, whitish, 1.35 mm long, maximum width 24; width of cephalic end 16, of caudal end 16. Cuticle smooth. Cephalic end rounded. Mouth small, surrounded by indistinct cephalic papillae. Oesophagus 264 long (20% of body length), with slightly outlined inflation at anterior end; posterior portion of oesophagus with well-developed, long oesophageal gland with large cell nucleus in middle. Oesophageal nucleus and nerve ring 225 and 108, respectively, from anterior extremity. Excretory pore 129 from anterior end of body. Small ventriculus measuring 3 in length and 7 in width. Testis reaching anteriorly to 258 from anterior extremity, slightly anterior to end of oesophagus. Posterior end of body blunt, with broad, U-shaped, lobular mound and with 1 pair of preanal, 1 pair of adanal and 1 pair of postanal very flat and hardly visible caudal papillae. Cloacal opening subterminal, tail 6 long. Spicules well sclerotized, slender, needle-like, equally long, with blunt proximal and sharply pointed distal tips; length of spicules 45, representing 3% of body length. Gubernaculum narrow, 39 long, without distinct dorsally bent proximal portion;

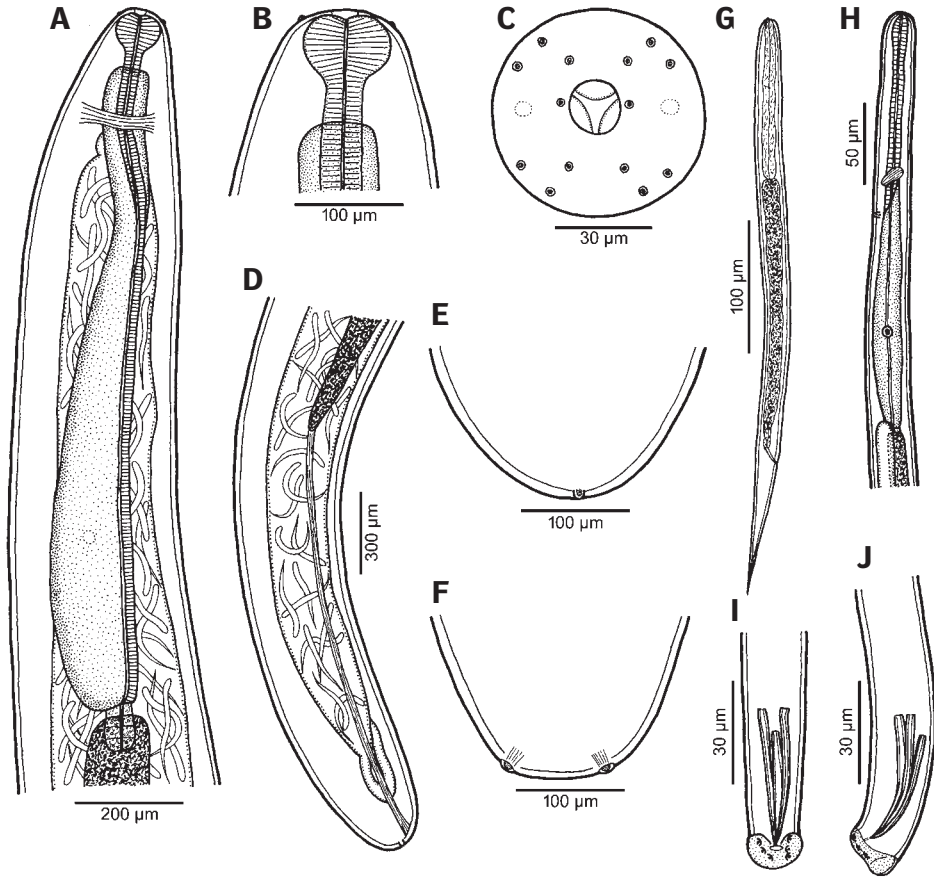


Fig. 61. *Philometra brevispicula* Moravec et Bakenhaster, 2010. A–F – gravid female (A – anterior end, lateral view; B, C – cephalic end, lateral and apical views; D – posterior end, lateral view; E, F – caudal end, lateral and dorsoventral views); G – larva from uterus; H–J – male (H – anterior end, lateral view; I, J – posterior end, ventral and lateral views). (After Moravec and Bakenhaster 2010.)

distal tip of gubernaculum pointed, without distinct reflected dorsal barb. Length ratio of gubernaculum and spicules 1:1.15.

Gravid female: Body of fixed larvigerous specimens filiform, yellowish to brown-coloured, somewhat tapering at both ends; anterior end blunt, 995–163 wide, with indistinct cephalic papillae in lateral view; posterior end rounded, 122–218 wide. Cuticle smooth. Body length 28.41–43.96 mm, maximum width 558–816; maximum width/body length ratio 1:46–54. Oral aperture large, oval, surrounded by 4 pairs of small submedian cephalic papillae of external circle and 6 single papillae (2 lateral and 4 submedian) of internal circle; lateral amphids slightly outlined. Bottom of mouth formed by flat surfaces of anterior ends of 3 oesophageal sectors. Oesophagus narrow, swollen near mouth to form bulb 66–87 long and 78–105 wide, not separated from posterior cylindrical part of oesophagus; oesophageal gland well developed, extending anteriorly far anterior to nerve ring, with poorly visible

cell nucleus situated at its posterior part. Overall length of oesophagus 1.20–1.73 mm, representing 4% of body length; width of muscular oesophagus just posterior to oesophageal bulb 41–68, maximum width of oesophagus at its posterior portion, including gland, 95–177. Small ventriculus 27–32 long and 41–68 wide, opening into intestine through valve. Nerve ring 204–258 from anterior extremity. Intestine relatively narrow, brown-coloured, its posterior end atrophied, forming long translucent ligament attached ventrally to body wall near posterior extremity; ligament 1.01–1.73 mm long. Posterior end of body rounded, with pair of small subterminal caudal projections 3–6 high. Ovaries long, narrow, reflected. Uterus occupying major part of body, usually extending anteriorly nearly to level of nerve ring, posteriorly far posterior to end of intestine. Uterus filled with numerous elongate larvae 444–465 long and 18–19 wide; oesophagus 114–123 long (26–28% of body length), tail 99–105 long (22–24% of body length), sharply pointed.

**Sub gravid female:** Body of fixed specimens yellowish to brown-coloured, 4.75–22.43 mm long, maximum width 163–462; maximum width/length ratio 1:29–49. Length of entire oesophagus 0.48–1.09 mm (5–10% of body length), maximum width 30–95; anterior bulb 30–66 long, 33–84 wide. Nerve ring 102–177 from anterior extremity. Intestinal ligament 114–748 long. Uterus filled with numerous developing eggs.

**Host:** *Lutjanus griseus* (Lutjanidae, Eupercaria/misc).

**Site of infection:** Mouth (buccal epithelium).

**Distribution:** Off Florida (Florida Bay, Everglades National Park), USA (Moravec and Bakenhaster 2010).

**Biology:** In the type locality (Florida Bay), *P. brevispicula* occurred in 25% of *L. griseus* examined, with the intensity 1–10 nematodes per fish (Moravec and Bakenhaster 2010).

### *Philometra carangis* Moravec et Diggles, 2014

Fig. 62

**Description:** Male: Body whitish, filiform, tapering to both ends, 3.22–4.15 mm long, maximum width at middle 54–75; anterior part of body slightly narrower just posterior to cephalic end; body width at this narrowed part 36–45. Maximum width/body length ratio 1:50–60; width of cephalic end 39–48, that of posterior end 30–36. Cuticle smooth. Cephalic end rounded. Oral aperture small, oval, surrounded by 14 cephalic papillae arranged in 2 circles: external circle formed by 4 submedian pairs of papillae; internal circle formed by 4 submedian and 2 lateral papillae. Small lateral amphids just posterior to lateral papillae of internal circle; each amphid located on inner border of large oval lateral cuticular elevation. Oesophagus 321–549 long, maximum width 21–30, comprising 8–15% of body length, slightly inflated at anterior end; posterior part of muscular oesophagus overlapped by well-developed oesophageal gland with large cell nucleus in middle; anterior oesophageal inflation 48–57 long and 21–33 wide. Nerve ring, excretory pore and oesophageal nucleus 117–147, 177–210 and 207–402, respectively, from anterior extremity. Testis reaching anteriorly nearly to nerve ring. Posterior end of body blunt, with broad, V-shaped mound extending dorsally and laterally. Four pairs of very flat, hardly visible caudal papillae close to each other situated on sides of cloacal aperture on mound; 1 additional pair of larger

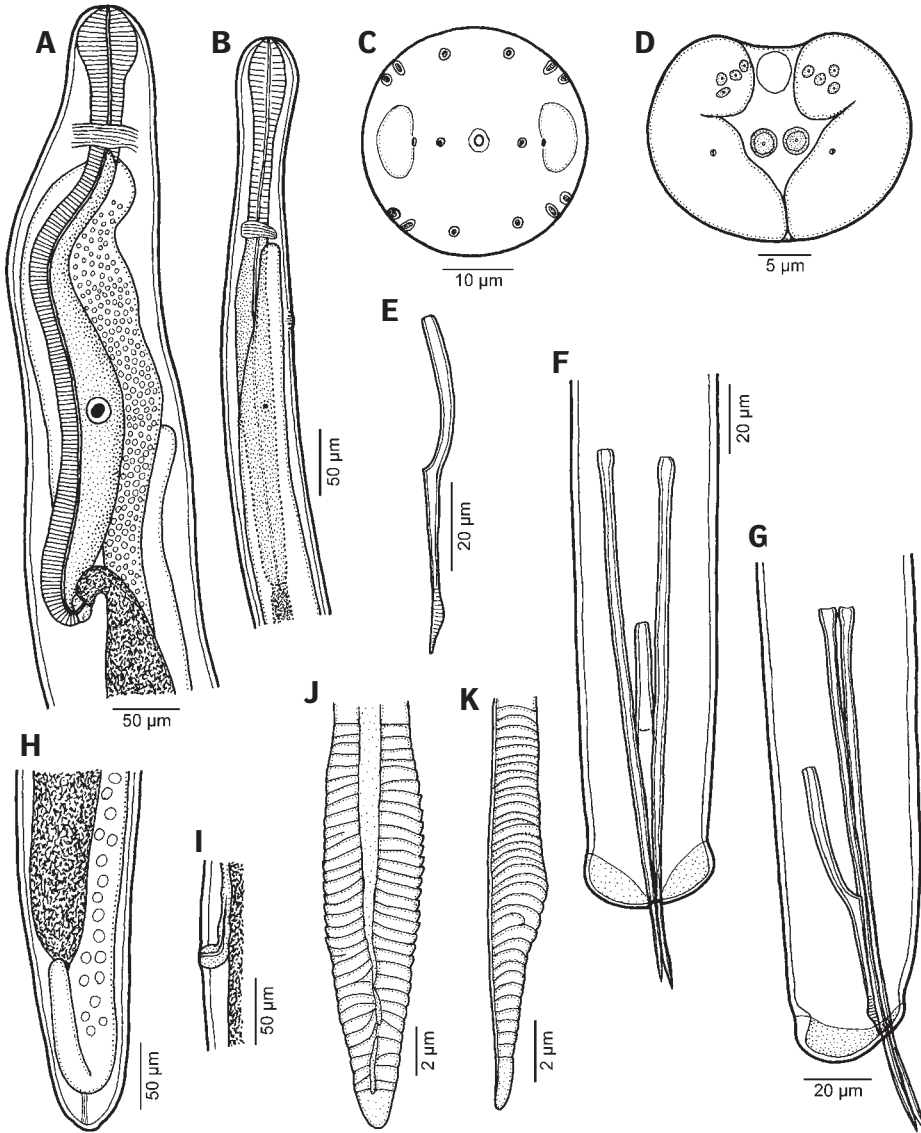


Fig. 62. *Philometra carangis* Moravec et Diggles, 2014. A – anterior end of very small subgravid female with immature eggs, lateral view; B – anterior end of male, lateral view; C – cephalic end of male, apical view; D – caudal end of male, apical view; E – gubernaculum, lateral view; F, G – posterior end of male, ventral and lateral views; H – posterior end of small subgravid female, lateral view; I – region of vulva of small subgravid female; J, K – distal end of gubernaculum, dorsal and lateral views. (Redrawn after Moravec and Diggles 2014.)



papillae located posterior to cloacal aperture between both lateral arms of mound. Pair of small phasmids present at about middle of each mound arm. Spicules slender, needle-like, equal or slightly subequal, with somewhat expanded proximal and sharply pointed distal tips; length of spicules 159–189 and 153–183, comprising 4–5% of body length. Length ratio of spicules 1:1.00–1.04. Gubernaculum narrow, 69–93 long, with anterior portion somewhat dorsally bent; length of anterior bent part 30–51, representing 40–55% of entire gubernaculum length; posterior end of gubernaculum with dorsal protuberance composed of 2 longitudinal parts bearing numerous transverse lamella-like structures and demarcating depressed smooth field between them. Length ratio of gubernaculum and longer spicule 1:1.81–2.39. Spicules and gubernaculum well sclerotized; spicules and gubernaculum yellowish, anterior part of gubernaculum colourless.

**Subgravid female:** Body of fixed specimen brownish, filiform, with rounded ends; posterior part of body narrower than anterior part. Body length 10.61 mm, maximum width 138. Cuticle smooth. Maximum width/body length ratio 1:77. Width of cephalic end 69. Cephalic papillae small, indistinct when viewed laterally. Oesophagus including anterior bulbous inflation 2.11 mm long, comprising 20% of body length; anterior inflation 51 long and 51 wide; maximum width of posterior part of oesophagus including gland 51. Oesophageal gland well developed, opening into oesophagus just posterior to nerve ring, with large cell nucleus. Nerve ring and oesophageal nucleus 105 and 318, respectively, from anterior extremity. Small ventriculus present. Intestine brownish, its posterior end attached by ligament ventrally to body wall near caudal end; ligament 135 long. Vulva still visible, postequatorial, situated 6.83 mm from anterior extremity (at 64% of body length). Ovaries reflexed, situated near body ends. Uterus filled with numerous immature eggs. Posterior end rounded, 45 wide, without any caudal projections.

**Host:** *Caranx bucculentus* (Carangidae, Carangiformes).

**Site of infection:** Ovary.

**Distribution:** Off northern Australia (Darwin Harbour) (Moravec and Diggles 2014a).

**Biology:** The life cycle of this parasite is not known. Eighteen specimens of this nematode was found in one of two fish examined in the type locality (Moravec and Diggles 2014a).

***Philometra carolinensis* Moravec, de Buron et Roumillat, 2006**

Fig. 63

**Description:** Male: Body filiform, whitish, 1.59–1.71 mm long, maximum width at middle 48–57, slightly tapering towards both ends. Cuticle smooth. Oral aperture small, surrounded by indistinct cephalic papillae. Oesophagus 315–516 long (19–24% of body length), without distinct anterior inflation; posterior part of muscular oesophagus provided with well-developed dorsal oesophageal gland with large cell nucleus in middle. Nerve ring, excretory pore and oesophageal cell nucleus 108–168, 138–156 and 219–420, respectively, from anterior extremity. Posterior end of body blunt, with broad, U-shaped, lobular mound and with 1 pair of preanal and 2 pairs of postanal very flat, hardly visible caudal papillae. Spicules well sclerotized, equally long, with distinctly expanded proximal and sharply pointed distal tips; length of spicules 78–87, representing 3–5% of body length; anterior parts of

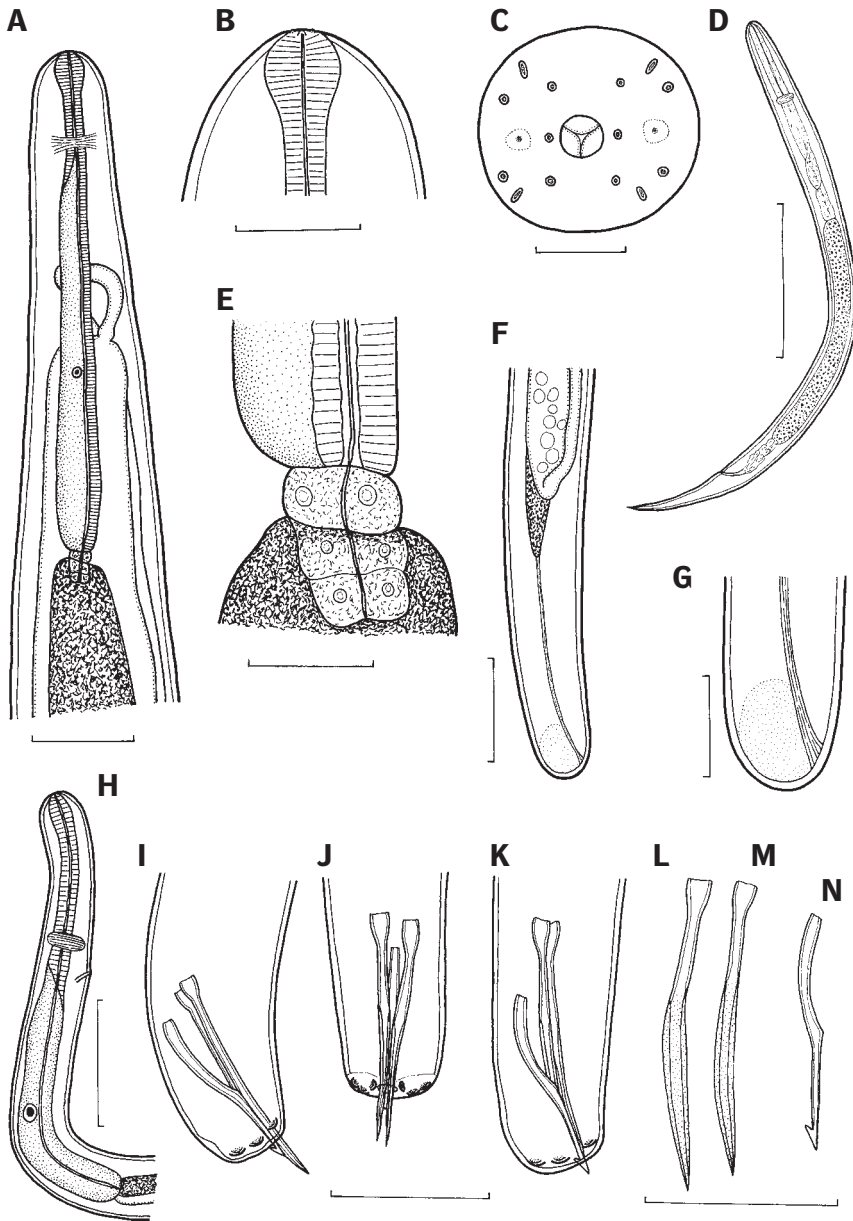


Fig. 63. *Philometra carolinensis* Moravec, de Buron et Roumillat, 2006. A–G – gravid female (A – anterior end of body, lateral view; B, C – cephalic end, lateral and apical views; D – larva from uterus; E – region of oesophago-intestinal junction; F – posterior part of body, lateral view; G – caudal end, lateral view); H–N – male (H – anterior end of body, lateral view; I, J – caudal end, lateral and ventral views; K – caudal end of another specimen, lateral view; L, M – spicule in two different specimens, lateral views; N – gubernaculum, lateral view). Scale bars: A, F – 200  $\mu$ m; B, D, G, H – 100  $\mu$ m; C – 20  $\mu$ m; E, I–N – 50  $\mu$ m. (After Moravec, de Buron and Roumillat 2006.)



spicules light-coloured, posterior more heavily sclerotized parts brownish. Gubernaculum narrow, 57–75 long, with approximately its proximal half somewhat dorsally bent; distal tip of gubernaculum pointed, with distinct reflect dorsal barb. Length ratio of gubernaculum and spicules 1:1.08–1.42.

Gravid female (measurements of 1 subgravid specimen in parentheses): Body of fixed specimens conspicuously narrow, whitish to yellowish, with distinct dark-brown coloured intestine visible through cuticle, with rounded ends. Posterior part of body narrower than anterior part; maximum width in region posterior to oesophagus. Body length 100.00–156.74 (108.80) mm, maximum width 558–680 (530); maximum width/body length ratio 1:147–263 (1:205). Cuticle smooth. Width of cephalic end 150–204 (177). Cephalic papillae very small, indistinct when viewed laterally. Oral aperture large, oval, surrounded by 4 pairs of small submedian cephalic papillae of outer circle and 6 single papillae (2 lateral and 4 submedian) of inner circle. Pair of small lateral amphids present. Anterior ends of 3 oesophageal sectors protruding out of mouth as small oesophageal teeth. Oesophagus narrow, swollen near mouth to form bulb 63–75 (66) long and 57–75 (60) wide, not separated from posterior cylindrical part of oesophagus. Overall length of oesophagus 1.10–1.29 (1.14) mm, representing 0.8–1.3 (1.0)% of body length; maximum width of its cylindrical part 95 (95). Dorsal oesophageal gland well developed, extending anteriorly to level of nerve ring and posteriorly to small ventriculus; gland provided with large cell nucleus located in about its middle, 762–979 (680) from anterior extremity. Ventriculus 21–30 long, 54–72 wide. Nerve ring 204–367 from anterior end of body. Posterior end of intestine atrophied, forming ligament attached ventrally to body wall, not far anterior to posterior extremity. Posterior end of body rounded, 109–141 (112) wide, without caudal projections; small round darker tissue appears to be present in caudal end. Vulva and vagina absent. Ovaries of medium length, reflected, situated near anterior and posterior ends of body. Uterus occupies most of body, being filled with eggs, developing embryos and first-stage larvae with rounded anterior end and sharply pointed tail. Larvae from uterus 399–528 long, maximum width 15–21; length of their oesophagus 129–168 (31–34% of body length), that of tail 63–87 (14–19% of body length).

Nongravid female: Body length 90–95 mm.

**Hosts:** *Cynoscion nebulosus* (type host) and *Menticirrhus americanus* (both Sciaenidae, Eupercaria/misc).

**Site of infection:** Gonads (ovary).

**Distribution:** West Atlantic Ocean, off South Carolina (Charleston), USA (Moravec, de Buron and Roumillat 2006; Moravec and de Buron 2009).

**Biology:** The life cycle of this species has not yet been studied. Moravec, de Buron and Roumillat (2006) found *P. carolinensis* in 39% of *C. nebulosus* examined from the estuaries in South Carolina, USA, with the mean intensity 14 nematodes per fish.