Meteterakis ishikawanae sp. n. (Nematoda: Heterakidae) from the Frog, Rana ishikawae, on Okinawa Island, Japan

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ABSTRACT: Meteterakis ishikawanae sp. n. from the rectum of the frog, Rana ishikawae, collected in the mountainous forest of Okinawa Island, Japan, is described. Meteterakis ishikawanae is readily distinguished from related species of the genus in having spicules with slightly widened proximal ends and well-developed heavily tessellated alae. This is the first species of the genus Meteterakis that utilizes a ranid frog as the primary definitive host.

KEY WORDS: Amphibia, taxonomy, morphology, host specificity.

The nematodes of the genus Meteterakis Karve, 1930 (Heterakoidea: Meteterakidae: Meteterakinae), are parasites of amphibians and reptiles of the Oriental region, and 17 species have been described. The hosts are mainly toads and lizards, rarely gymnophionian amphibians, frogs other than bufonids, and snakes and turtles (Inglis, 1958; Biswas and Chakravarty, 1963; Oshmarin and Demshin, 1972; Crusz and Ching, 1975; Crusz and Santiapillai, 1982). Bufonerakis Baker, 1980, parasitic in toads and snakes of South America (Baker, 1980), and Gireterakis Lane, 1917, parasitic in porcupines of India (Chabaud, 1978), are the only other genera in the subfamily Meteterakinae. During a study on the helminth fauna of the Ryukyu Archipelago, Japan, an undescribed species of Meteterakis was recovered from the frog, Rana ishikawae, of Okinawa Island, and is described herein.

Materials and Methods

From July 1981 to January 1985, a total of 66 frogs belonging to 5 species were collected by hand in the mountainous forest of Kunigami-son, Okinawa Island, Japan. They were autopsied after being killed with chloroform or ether inhalation. Recovered nematodes were fixed in hot 70% ethanol, cleared in a glycerin–alcohol solution, and mounted on slides with pure glycerin for microscopical study. Figures were made with the aid of a drawing apparatus, Olympus BH-DA-LB. Measurements are in micrometers unless stated otherwise, with the range being followed by the mean. Specimens of Meteterakis japonica (Wilkie, 1930) from Bufo gargarizans miyakonis of Miyako Island, Japan, were also examined.

Results

A species of Meteterakis was detected in all of the 4 Rana ishikawae examined: 34, 15, 39, and 74 worms, respectively, were recovered. On the other hand, Meteterakis was not found in the other frogs examined, namely 40 Rana narina, 2 Rana holsti, 8 Rana namiyei, and 12 Rhabdophorus viridis viridis.

Meteterakis ishikawanae sp. n.
(Figs. 1–11)

GENERAL: Ascaridida, Heterakoidea, Heterakidae, Meteterakinae, Meteterakis Karve, 1930. Small worms with tapered extremities (Fig. 1). Cuticle finely striated transversely, with narrow lateral alae commencing from level of nerve ring and ending at precloacal region in male and at posterior end in female (Figs. 2, 7, 10). Minute somatic papillae present on cuticle of both sexes, especially prominent in female (Figs. 5, 6, 9, 10). Cephalic end with 3 lips separated from each other by deep grooves (Figs. 2–4) of which posterior margin extends to about midlevel of pharynx; dorsal lip with 2 lateral double papillae and 2 minute apical papillae; subventral lips each with a subventral double papillae, a sublateral single papilla, 2 minute apical papillae, and an amphid (Fig. 3). Anterior extremity of pharynx with 3 pharyngeal teeth projecting anteriorly (Figs. 3, 4). Esophagus consisting of long narrow cylindrical portion and bulbous portion (Fig. 1). Nerve ring at junction between anterior and middle third of esophagus (Fig. 1). Excretory pore at midlevel of esophagus (Figs. 1, 5); excretory vesicle large and lobulated (Figs. 5, 6).

MALE (holotype and 12 paratypes): Length 4.13–6.27 (5.08) mm. Maximum width 150–230 (180). Caudal end bent ventrally (Figs. 1, 7, 8). Pharynx 53–63 (58) long; cylindrical portion of esophagus 590–700 (650) long by 40–48 (45)
wide; esophageal bulb 143–180 (160) long by 118–150 (153) wide. Cephalic apex to nerve ring 240–290 (260), to excretory pore 410–510 (450). Spicules almost equal, stout, alate, heavily tessellated including alae but except distal tip, bent ventrally, 520–650 (590) long (Figs. 7, 8). Gubernaculum absent. Precoecal sucker 33–43 (38) in diameter, 26–40 (33) from cloacal aperture (Figs. 7, 8). Narrow caudal alae supported by 3 pairs of large papillae present (Figs. 7, 8); in addition, a pair of large papillae present posteroventrally to cloacal aperture; a pair of small papillae present just in front of cloacal aperture; about 10 pairs of small sessile papillae also present in caudal region (Figs. 7, 8). Tail conical, 168–230 (192) long, with pointed tip (Figs. 7, 8). Ventral surface of posterior half of tail with distinct striae (Fig. 8).

**FEMALE** (allotype and 20 paratypes): Length 4.53–6.43 (5.57) mm. Maximum width 180–240 (210). Pharynx 53–70 (60) long; cylindrical portion of esophagus 640–800 (720) long by 40–55 (49) wide; esophageal bulb 175–213 (185) long by 133–175 (158) wide. Cephalic apex to nerve ring 260–320 (290), to excretory pore 410–490 (460), to vulva 1.93–2.59 (2.24) mm. Vulva slitlike; cuticle anterior and posterior to vulva striated distinctly and with deep grooves (Fig. 9). S-shaped cuticular channel present between vulva and muscular portion of vagina (Fig. 9); vagina, 0.90–1.55 (1.25) mm long, running posteriorly and splitting into 2 parallel uteri; uteri elongate and joining oviducts near anus; oviducts directed anteriorly; ovaries long, directed anteriorly, then flexed posterior to esophageal bulb and terminating posterior to vulva. Tail conical 260–420 (350) long, with pointed tip (Fig. 10). Eggs elliptical, relatively thick-shelled, 61–78 (72) by 40–48 (44), containing morula-stage embryo at deposition (Fig. 11).

**HOST:** *Rana ishikawae* (Stejneger, 1901).

**LOCATION:** Rectum.

**LOCALITY:** Kunigami-son, Okinawa Island, Japan.

**SPECIMENS:** National Science Museum, Tokyo, NSMT—As 1806 (holotype and allotype); Meguro Parasitological Museum, Tokyo, MPM—Coll. No. 19424 (paratypes).

**Discussion**

The present species has every morphological feature of the genus *Meteterakis* except the vulval flap, which has been considered to be a key characteristic of the genus (Inglis, 1958). However, the S-shaped cuticular channel between the vulva and the muscular portion of the vagina suggests that the vulval flap may be retracted into the body. It is therefore reasonable to put the present species into the genus *Meteterakis*.

*Meteterakis ishikawanae* sp. n. resembles *M. govindi* Karve, 1930, *M. baylisi* Inglis, 1958, *M. longispiculata* (Baylis, 1929), *M. louisi* Inglis, 1958, and *M. sinharajensis* Crusz and Ching, 1975, in having alae on the spicules. However, *M. ishikawanae* is readily distinguished from *M. govindi* and *M. louisi* in that these alae are much more prominent, and from *M. baylisi* by the absence of the caplike formation at the distal tip of the spicules (Inglis, 1958). *Meteterakis ishikawanae* sp. n. has a slightly widened proximal portion of the spicule in contrast to the strongly expanded and funnel-shaped appearance in *M. longispiculata* and *M. sinharajensis* (Inglis, 1958; Crusz and Sanmugasunderam, 1973; Crusz and Ching, 1975). Other distinguishing characteristics are as follows: *M. govindi* has shorter spicules (180–270) in males 4.0–5.4 mm long (Inglis, 1958); *M. baylisi* has tessellated spicules, but the alae are nontessellated (Inglis, 1958); *M. longispiculata* has a somewhat longer tail (270–310) in males 7.0–7.5 mm long (Inglis, 1958); 210–290 in males 3.5–5.7 mm long (Crusz and Sanmugasunderam, 1973); *M. louisi* has longer spicules (0.97–1.10 mm) in males 5.0–7.4 mm long (Inglis, 1958); *M. sinharajensis* has 2 pairs of large fleshy papillae lateral to the cloaca in males (Crusz and Ching, 1975). The presence or absence of alae on the spicules has not been sufficiently described in *M. singaporensis* (Sandosham, 1954) and *M. varani* (Maplestone, 1931). The latter species was considered to be a synonym of *M. govindi* by Inglis (1958) but Skrjabin
et al. (1961) retained its validity. However, *M. singaporensis* has very long spicules (740–960) in males 5.2–5.7 mm long (Sandosham, 1954) and *M. varani* has spicules with a whiplike distal half (Maplestone, 1931) that are clearly different from those of *M. ishikawanae*.

*Meteterakis ishikawanae* sp. n. was recovered only from *Rana ishikawae* in the locality surveyed, and thus it may be suggested that it has a strict host-specificity to this frog. *Rana ishikawae* is a relict species, being distributed only on Okinawa and Amami-oshima islands in the Ryukyu Archipelago (Frost, 1985). It is believed that most frog species of the Ryukyu Archipelago have their origins in continental China (Kuramoto, 1979). *Rana ishikawae* (or its ancestor) might have extended its distribution to this island chain in the late Miocene or Pleistocene periods, when there was a land connection of the Ryukyus to the continent.

There have been only a few reports of *Meteterakis* from anurans other than bufonids. Wilkie (1930) described *Meteterakis japonica* from the “bull frog,” which he suggested may be *Rana japonica*. However, this nematode is a common parasite of bufonids in Japan (Yamaguti, 1935, 1941), and Ichikawa (1951) considered that the “bull frog” of Wilkie (1930) might be *Bufo bufo japonicus*. On the other hand, *M. govindi* was recovered from a “tree frog” in China (Inglis, 1958) and Biswas and Chakravarty (1963) recorded *Meteterakis varani* from *Rana hexadactyla* in India. However, the former nematode is commonly a parasite of bufonids (Karve, 1930; Inglis, 1958), and the latter was first described from a lizard (Maplestone, 1931) and its prevalence and intensity in *R. hexadactyla* were relatively low (Biswas and Chakravarty, 1963). It is possible that these frogs were only accidental hosts for the parasites. Therefore, *M. ishikawanae* sp. n. is considered to be the first described species of the genus that utilizes a ranid frog as the primary definitive host.

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**Literature Cited**


Sandosham, A. A. 1954. Malaysian parasites XV. Seven new worms from miscellaneous hosts. Studies from the Institute for Medical Research of Malaysia 26:212–226.


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Report on the Brayton H. Ransom Memorial Trust Fund

The Brayton H. Ransom Memorial Trust Fund was established in 1936 to “encourage and promote the study and advance of the Science of Parasitology and related sciences.” Income from the Trust currently provides token support of the Proceedings of the Helminthological Society of Washington and limited support for publication of meritorious manuscripts by authors lacking institutional or other backing.

Financial Report for 1986

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