**Pharyngodon lepidodactylus** sp. n. (Nematoda: Pharyngodonidae) from the Mourning Gecko, *Lepidodactylus lugubris* (Lacertilia: Gekkonidae), from Hawaii

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**ABSTRACT:** Sixty-three *Pharyngodon lepidodactylus* sp. n. were recovered from the large intestines of 26 of 283 adult *Lepidodactylus lugubris* collected from Hawaii. Prevalence of infection was 9% (mean intensity 2.4, range 1–8). *Pharyngodon lepidodactylus* sp. n. represents the thirtieth species of the genus and can be distinguished from all other species of *Pharyngodon* by the presence of a unique “bottle-shaped” egg. This is the first report of the genus *Pharyngodon* from Hawaii.

**KEY WORDS:** *Pharyngodon lepidodactylus* sp. n., Pharyngodonidae, *Lepidodactylus lugubris*, Gekkonidae, Hawaii.

In a recent helminthological survey of lizards of Hawaii, 26 of 283 *Lepidodactylus lugubris* (Duméril and Bibron, 1836) were found to harbor 4 male and 59 female nematodes of a previously undescribed species of *Pharyngodon*. *Lepidodactylus lugubris*, the mourning gecko, has a wide distribution and is known from Oceania, India, Sri Lanka, Southeast Asia, Philippine Islands, Indonesia, Papua New Guinea, Australia, and the United States (Welch et al., 1990). It was probably introduced into Hawaii by early settlers approximately 1,000 years ago (Hunsaker and Breese, 1967). In Hawaii, *Lepidodactylus lugubris* is sympatric with the geckos *Geothyris multilata*, *Hemidactylus frenatus*, and *Hemidactylus garnotii* and the skinks *Cryptoblepharus boutoni*, *Emoia cyanura*, *Lampropholis delicata*, and *Lipinia noctua* (McKeown, 1978).

The genus *Pharyngodon* was established by Diesing (1861) with *P. spinicauda* (Dujardin, 1845) from the intestine of a lizard, *Lacerta muralis*, taken at St. Malo, France, as type species. Skrjabin et al. (1960) revised the genus to retain only those species in which males have well-developed caudal alae forming a genital bursa enveloping all the anal pedunculate papillae and females have the vulva in the anterior half of the body. There are currently 29 species (an additional 4 species, *P. boulengerula* Ubelaker, 1965, *P. elongata* Markov and Bogdanov, 1961, *P. sphaerodactylus* Barus and Coy Otero, 1974, and *P. polyedritus* Yamaguti, 1941, are known only from female specimens and are designated as *species inquirenda*). Species of *Pharyngodon* occur primarily in lizards of the families Gekkonidae, Phrynosomatidae, Scincidae, and Teiidae; however, 2 species, *Pharyngodon bursatus* Rao, 1980, in *Euphytyis cyanophlyctis* (=*Rana cynanophlyctis*) and *P. schistopapillatus* Rao, 1980, in *Bufo viridis*, are known only from amphibians (see Baker, 1987). Of the species infecting lizards, 9 are found in the Palearctic Zoogeographical Realm, 5 each in the Nearctic and Australian realms, 4 in the Neotropical Realm, 3 in the Oriental Realm, and 1 in the Ethiopian Realm.

**Material and Methods**

Of the 283 *Lepidodactylus lugubris* captured by hand and fixed in neutral buffered 10% formalin, 35 were from Hawaii, Hawaii (1991, southeast corner of the island, 19°43′N, 155°05′W, from sea level to approximately 450 m elevation), and 248 were from Oahu, Hawaii (18 in 1991, eastern shore, 21°20′N, 157°52′W, from sea level to approximately 375 m elevation; 44 in 1992 at various sites along the northern, eastern, western, and southeastern shores from sea level to 100 m; 186 in 1993 at various sites on the northern, eastern, and western shores from 5 to 100 m). The body cavity was opened by a longitudinal incision from vent to throat and the gastrointestinal tract was removed and opened longitudinally. Nematodes were placed in glycerol, allowed to clear, and examined under a light microscope.

**Results**

Four (11%) of the 35 *Lepidodactylus lugubris* collected from Hawaii, Hawaii, and 22 (9%) of the 248 from Oahu, Hawaii, were found to be infected. There was no significance difference in infection rates between the 2 islands ($\chi^2 = 0.19; 1$ df, $P > 0.05$); thus, the combined prevalence...
of infection was 9% (mean intensity 2.4, range 1–8). A description of the new species follows.

**Pharyngodon lepidodactylus** sp. n.  
(Figs. 1–8)

**DESCRIPTION:** Males having caudal alae which envelop posterior postcloacal pair of pedunculate papillae; females having vulva in anterior half of body. Nematodes of small size with a cylindrical body tapering both anteriorly and posteriorly. Cuticle with distinct transverse striations extending from behind lips to level of anus. Lateral alae present in males only. Mouth bounded by three lips; there is no buccal cavity. Esophagus ends in a valvulate, subspherical bulb which is separated from the esophageal body by a small constriction. In both sexes, there is an elongated tail.

**MALE** (based on 4 specimens; mean measurement and range in mm): Small, white, fusiform nematodes tapering both anteriorly and poste-
riorly; length 1.20 (1.10–1.50); maximum width 0.20 (0.15–0.25). Lateral alae 0.030 (0.029–0.034) wide extending posteriorly from the level of nerve ring to the middle of the genital bursa. Cuticle with fine cross striations at 1 µm intervals, extending the entire length of the body. Mouth opening surrounded by 3 lips, V-shaped notch in each. One small, pedunculated amphid on each ventrolateral lip. Esophagus (including bulb) 0.186 (0.151–0.198); bulb length 0.055 (0.051–0.058); bulb width 0.059 (0.057–0.060). Nerve ring 0.036 (0.028–0.040), excretory pore 0.250 (0.228–0.274) from anterior end, respectively. Well-developed caudal alae present, 0.015 wide by 0.050 long. Three pairs of caudal papillae present; precloacal pair situated on slightly inflated anterior portion of caudal end, adcloacal pair posterolaterally directed and postcloacal pair enclosed by caudal alae, 0.030 behind adcloacal pair. Filiform tail extending 0.218 (0.211–0.234) beyond postcloacal papillae. Spicule absent; prominent genital cone with the posterior lip supported by a sclerotized V-shaped structure. Single vas deferens and testis; at level of excretory pore testis reflected posteriorly.

**FEMALE** (based on 10 gravid specimens): Small, white, cylindrical nematodes tapering anteriorly and posteriorly; posterior drawn out into subulate tail filament. Length (excluding tail filament) 3.40 (3.05–4.75); maximum width 0.285 (0.228–0.325). Lateral alae absent. Cuticle with fine cross striations at 1.2-µm intervals. Esophagus (including bulb) 0.273 (0.245–0.297); bulb length 0.080 (0.074–0.086); bulb width 0.096 (0.086–0.103). Nerve ring 0.044 (0.034–0.063); excretory pore 0.330 (0.281–0.357) and vulva 0.345 (0.289–0.383) from anterior end. Vagina directed posteriorly, anterior thick, muscular and posterior glandular. Uterus didelphic, 1 uterine branch directed posteriorly, the other anteriorly. Ovaries with flattened oocytes arranged in single file. One ovary running anteriorly to join posteriorly directed oviduct and second ovary running posteriorly joining anteriorly directed oviduct. Ovarian and uterine coils postbulbar. Fertilamentous portion of tail 0.760 (0.650–0.845) and without spines. Thick-shelled, nonperculated eggs flattened on 1 side, fusiform with 1 end extended, i.e., "bottle-shaped," cuticular knob present at poles, 144 × 36 µm (131–151 × 31–40 µm). Pronucleus stage of development at deposition.

**TYPE SPECIMENS:** Holotype male, U.S. National Parasite Collection, Beltsville, Maryland, Accession No. 84164. Allotype female, 84165. Paratypes: 3 males, 9 females, 84166.

**TYPE HOST:** *Lepidodactylus lugubris* (Dumont and Bibron, 1836) "mourning gecko."

**TYPE LOCALITY:** Hawaii, Hawaii; prevalence 11% (4/35); mean intensity 1.5, range 1–2.

**OTHER LOCALITY:** Oahu, Hawaii; prevalence 9% (22/248) mean intensity 2.4, range 1–8.

**ETYMOLOGY:** The specific epithet is derived from the name of the host genus.

**Discussion**

The general morphology of *Pharyngodon lepidodactylus* sp. n. allows its assignment to the superfAMILY OXYUROIDEA Railliet, 1916, family Pharyngodonidae Travassos, 1919, which currently contains 21 genera (see Petter and Quentin, 1976). Of these, 3 genera characteristic of reptiles exhibit a vulvar opening in the anterior part of the body just behind the postbulbar excretory pore: *Pharyngodon* Diesing, 1861, *Spauligodon*, Skrabin, Schikhobalova, and Lagodovsky, 1960, and *Skrabinodon*, Inglis, 1968. These genera are distinguished by the relationship of the caudal alae to the genital papillae: males of *Pharyngodon* have well-developed caudal alae that form a genital bursa enveloping all genital papillae; in males of *Spauligodon*, the posterior pair of papillae are excluded from the genital bursa; and males of *Skrabinodon* lack caudal alae. The inclusion of the described specimens in the genus *Pharyngodon* is based on the position of the vulva and the configuration of the caudal alae.

Species of *Pharyngodon* are separated on the presence or absence of a spicule, the morphology of the caudal alae, the shape of the egg, the presence or absence of spines on the tail filament of adults, and geographical distribution (Table 1). Chabaud and Brygoo (1962) suggested that geographical distribution is the most important factor in the speciation of reptilian oxyurids. No other species of *Pharyngodon* has been reported to have "bottle-shaped" eggs; thus, *P. leptodactylus* sp. n. is easily distinguished from all other species of *Pharyngodon*. Geographically, the nearest species are found in Australia: *P. asteroconstoma* Adamson, 1984, *P. australis* Johnston and Mawson, 1942, *P. hindlei* Thapar, 1925, *P. kartana* Johnston and Mawson, 1941, and *P. tiliquae* Baylis, 1930; all have eggs with truncated ends. *Pharyngodon lepidodactylus* sp. n. is most like *P. inermicauda* Baylis, 1923, from the gecko *Tarentola annularis* of Egypt in that males of
<table>
<thead>
<tr>
<th>Biogeographic realm</th>
<th>Pharyngodon sp.</th>
<th>Male characters</th>
<th>Female characters</th>
<th>Reference</th>
</tr>
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<tbody>
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<td></td>
<td></td>
<td>Spicule</td>
<td>Tail filament/bursa length</td>
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<td>Australian</td>
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<td>P. mamillatus</td>
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<td>Subulate, smooth</td>
<td>Bottle-shaped, ends knobbed</td>
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<td>Oceania</td>
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<td>Subulate, smooth</td>
</tr>
</tbody>
</table>

**Table 1. Geographic distribution and selected characters of species of Pharyngodon infecting lizards.**
both species lack spicules and the tail filament is longer than the bursa, whereas females have smooth, subulate tails and the eggs are knobbled at each end; however, egg shape and geography separate the 2 species. This description of the thirtieth species of Pharyngodon, _P. lepidodactylus_ sp. n., extends the range of the genus to Hawaii.

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**Literature Cited**


