J. Helminthol. Soc. Wash.
66(2), 1999 pp. 175–179

Skrjabinodon piankai sp. n. (Nematoda: Pharyngodonidae) and Other Helminths of Geckos (Sauria: Gekkonidae: *Nephrurus* spp.) from Australia

CHARLES R. BURSEY[1,3] AND STEPHEN R. GOLDBERG[2]

[1] Department of Biology, Pennsylvania State University, Shenango Campus, Sharon, Pennsylvania 16146, U.S.A. (e-mail: cxb13@psu.edu), and

[2] Department of Biology, Whittier College, Whittier, California 90608, U.S.A. (e-mail: sgoldberg@whittier.edu)

ABSTRACT: *Skrjabinodon piankai* sp. n. from the large intestine of the Australian gecko *Nephrurus laevissimus* is described and illustrated. It is also reported from *Nephrurus levis* and *Nephrurus vertebralis*. *Skrjabinodon piankai* differs from 6 other Australian realm species in the number of tail filament spines and egg shape. Other helminths found include *Oochoristica piankai, Maxvachonia brygooi, Pharyngodon tiliquae, Physalopteroides filicauda, Wanaristrongylus ctenoti,* third-stage larvae of *Abbreviata* sp., third-stage larvae of *Physaloptera* sp., and *Raillietiella scincoides*. New host records are established for *O. piankai* and *R. scincoides* in *N. laevissimus*; *M. brygooi* and *P. filicauda* in *N. levis*; and *P. tiliquae* in *N. vertebralis*.

KEY WORDS: *Skrjabinodon piankai* sp. n., Pharyngodonidae, helminths, *Nephrurus laevissimus, Nephrurus levis, Nephrurus vertebralis,* Gekkonidae, Sauria, Australia.

Four species of *Skrjabinodon* Inglis, 1968 have been reported previously from reptiles of Australia. *Parathelandros oedurae* Johnston and Mawson, 1947, was originally described from specimens taken from the robust velvet gecko, *Oedura robusta* Boulenger, 1885, collected in southeast Queensland. Inglis (1968) revised *Parathelandros* Diesing, 1861, retaining the genus for parasites of Australian amphibians and erecting *Skrjabinodon* as a new genus for parasites of reptiles; 7 species, including *P. oedurae,* were placed in the new genus. *Skrjabinodon smythi* Angel and Mawson, 1968 was described from the marbled gecko, *Christinus* (=*Phyllodactylus*) *marmoratus* (Gray, 1845) collected in South Australia. *Skrjabinodon parasmythi* Mawson, 1971, from the thick-tailed gecko, *Underwoodisaurus milii* (Bory de Saint-Vincent, 1825), and *Skrjabinodon leristae* Mawson, 1971, from a skink, *Lerista* sp., were described from specimens collected on Flinders Island, South Australia. In addition, 2 species, *Skrjabinodon trimorphi* Ainsworth, 1990, from the common skink, *Leiolopisma nigriplantara* Patterson and Daugherty, 1990, and *Skrjabinodon poicilandri* Ainsworth, 1990 from the common gecko, *Hoplodactylus maculatus* Boulenger, 1885, have been described from specimens collected in New Zealand (Ainsworth, 1990).

Nephrurus Günther, 1876, is an endemic Australian gecko genus containing arid-adapted species characterized by large heads and short, fat tails that terminate in a small knob (Cogger, 1992). The spinifex knobtail gecko, *Nephrurus laevissimus* Mertens, 1958, occurs in southeastern Western Australia, northwestern South Australia, and southern parts of the Northern Territory; the smooth knobtail gecko, *Nephrurus levis* De Vis, 1886, occurs from the central coast of Western Australia to the arid parts of all states except Victoria; Storr's knobtail gecko, *Nephrurus vertebralis* Storr, 1963, occurs from the lower central interior of Western Australia to South Australia (Cogger, 1992). The ranges of these 3 nocturnal species overlap in Western Australia (Cogger, 1992). However, they are reported to favor different habitats (Pianka, 1972): *N. laevissimus* is associated with sandridges; *N. levis* occurs on sandplains vegetated with dense clumps of perennial grasses of *Triodia* Brown, 1810; and *N. vertebralis* is associated with shrubs of *Acacia* Miller, 1754.

There are 4 previous reports of nematodes from *N. laevissimus* (Jones, 1985, 1987, 1995a, b), 1 report from *N. levis* (Jones, 1995b), but, to our knowledge, no reports from *N. vertebralis*. We describe here a new species of *Skrjabinodon* that was found in the large intestines of *N. laevissimus, N. levis,* and *N. vertebralis* from Western Australia and the Northern Territory and list other helminth parasites found in these hosts.

[3] Corresponding author.

Table 1. Prevalence (%) and mean abundance of helminths of *Nephrurus laevissimus, N. levis,* and *N. vertebralis* from Australia.

Helminth	*Nephrurus laevissimus* (*N* = 36)		*Nephrurus levis* (*N* = 13)		*Nephrurus vertebralis* (*N* = 3)	
	P* (%)	Ā ± SD†	P (%)	Ā ± SD	P (%)	Ā ± SD
Cestoda						
Oochoristica piankai	3‡	0.14 ± 0.83	—	—	—	—
Nematoda						
Maxvachonia brygooi	—	—	15‡	1.00 ± 2.45	—	—
Pharyngodon tiliquae	—	—	—	—	33‡	4.00 ± 6.93
Physalopteroides filicauda	17	0.83 ± 2.45	31‡	16.08 ± 56.47	—	—
Skrjabinodon piankai	22‡	12.75 ± 29.77	62‡	53.69 ± 78.69	66‡	55.33 ± 94.98
Wanaristrongylus ctenoti	—	—	8	0.15 ± 0.56	—	—
Abbreviata sp. (larvae)	5	0.08 ± 0.37	31	0.85 ± 1.95	—	—
Physaloptera sp. (larvae)	3	0.03 ± 0.17	—	—	—	—
Pentastomatida						
Raillietiella scincoides	5‡	0.06 ± 0.23	—	—	—	—

* P = Prevalence (number of hosts infected with a parasite species divided by the number of hosts examined × 100).

† Ā ± SD = mean abundance (summation of number of individuals of a parasite species per host divided by the number of hosts examined) ± standard deviation.

‡ New host record.

Materials and Methods

Thirty-six *N. laevissimus,* 13 *N. levis,* and 3 *N. vertebralis* from the collections of the Natural History Museum of Los Angeles County (LACM) were examined: *N. laevissimus,* mean snout–vent length (SVL) = 64.6 ± 8.5 mm SD, range 51–80 mm, LACM 57145, 57146, 57156, 57159, 57160, 57162, 57163, 57165, 57170, 57173–57175, 57177, 57180–57182, 57189, 57192, 57193, 57196–57198, 57201, 57204, 57209, 57210, 57213, 57215–57217, 57219, 57220, 57225–57228, collected 34 km west of Lorna Glen homestead, Western Australia (26°14′S, 121°13′E); *N. levis,* SVL = 77.2 ± 10.2 mm SD, range 64–98 mm, LACM 57008, 57009, collected 29 km south of Neale Junction, Western Australia (28°30′S, 125°50′E), LACM 57011–57014, 38 km east of Laverton, Western Australia (28°28′S, 122°50′E), LACM 57018, 57020, 16 km southeast of Renhan's Well, Northern Territory (21°24′S, 130°53′E), LACM 57026, 57029, 11 km south of The Granite, Northern Territory (20°38′S, 130°25′E), LACM 57032, 57037, 57039, 13 km west of Neale Junction, Western Australia (28°17′S, 125°40′E); *N. vertebralis,* SVL = 81.3 ± 7.6 mm SD, range 73–88 mm, LACM 57047, 6 km east of Stony Point, Western Australia (28°05′S, 124°15′E), LACM 57049, 57051, 14 km northeast of Millrose homestead, Western Australia (26°17′S, 121°00′E). These specimens had been collected between October 1966 and January 1968 for use in an ecological study (Pianka and Pianka, 1976). Because the ecological study included stomach analysis, only small and large intestines remained with the carcasses. Each intestine was searched for helminths using a dissecting microscope. Cestodes were stained with hematoxylin and mounted in balsam for identification; other helminths were identified from the glycerol mounts. Measurements are in mm unless otherwise indicated.

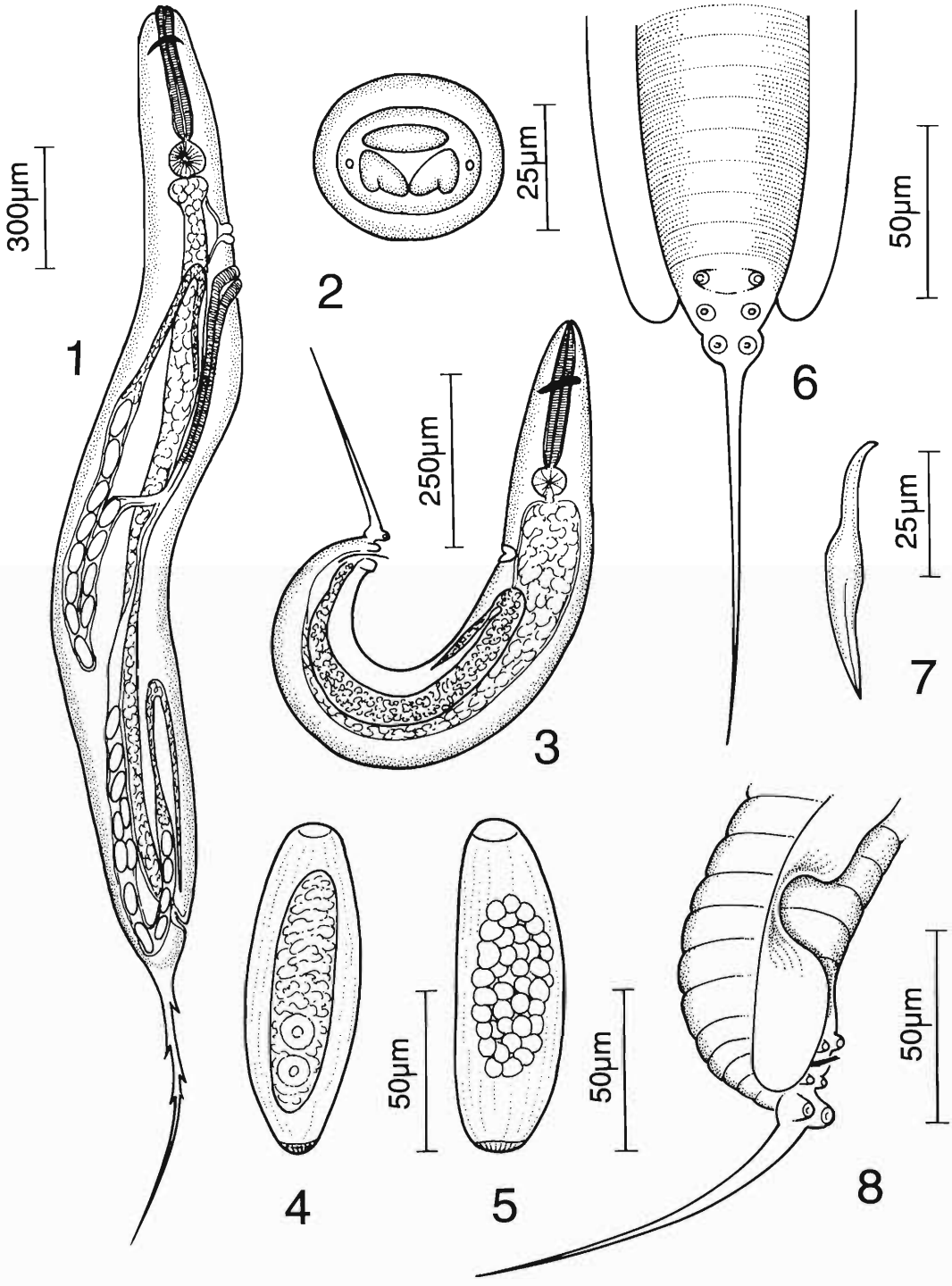
Results

Helminths representing 9 species were found: the cestode *Oochoristica piankai* Bursey, Goldberg, and Woolery, 1996; the nematodes *Maxvachonia brygooi* Mawson, 1972, *Pharyngodon tiliquae* Baylis, 1930, *Physalopteroides filicauda* Jones, 1985, *Skrjabinodon piankai* sp. n. (this paper), *Wanaristrongylus ctenoti* Jones, 1987, *Abbreviata* sp. (third-stage larvae only), *Physaloptera* sp. (third-stage larvae only); and the pentastomid *Raillietiella scincoides* Ali, Riley, and Self, 1984. Prevalence and mean abundance are given in Table 1. Selected specimens were placed in vials of alcohol and deposited in the U.S. National Parasite Collection (USNPC). These are parasites from *N. laevissimus*: *O. piankai,* USNPC 88189; *P. filicauda,* USNPC 88190; *S. piankai,* USNPC 88191; *Abbreviata* sp. (larva), USNPC 88192; *Physaloptera* sp. (larva), USNPC 88193; *R. scincoides,* USNPC 88194. *N. levis*: *M. brygooi,* USNPC 88195; *P. filicauda,* USNPC 88196; *S. piankai,* USNPC 88197; *W. ctenoti,* USNPC 88198; *Abbreviata* sp. (larva), USNPC 88199. *Nephrurus vertebralis*: *Pharyngodon tiliquae,* USNPC 88200; *S. piankai,* USNPC 88201.

Skrjabinodon piankai sp. n. (Figs. 1–8)

Description

GENERAL: Oxyurida: Pharyngodonidae Travassos, 1919, *Skrjabinodon* Inglis, 1968. Small,



Figures 1–8. ***Skrjabinodon piankai*** **sp. n. 1. Female, entire, lateral view. 2. Female, en face view. 3. Male, entire, lateral view. 4, Egg, pronuclear stage. 5. Egg, morula stage. 6. Male, posterior end, ventral view. 7. Spicule. 8. Male, posterior end, lateral view.**

cylindrical nematodes, extremities tapered in both sexes; moderate sexual dimorphism, males approximately one-third length of females. Cuticle with fine transverse striations along entire body. Mouth surrounded by 3 small lips; prominent lateral amphids just behind lips. Lateral alae present in both sexes. Tail narrowing abruptly behind anus to form filamentous appendage.

MALE (based on 10 specimens): Small, white, fusiform nematodes tapering both anteriorly and posteriorly, body usually bent to give comma-shaped appearance. Length 1.27 (1.19–1.40), body length 1.00 (0.97–1.12), tail filament 0.25 (0.22–0.29). Width at level of excretory pore 0.12 (0.10–0.14). Cuticle with striations approximately 3 μm apart. Esophagus excluding bulb 0.216 (0.204–0.242), bulb length 0.049 (0.040–0.054), bulb width 0.052 (0.046–0.057). Nerve ring 0.118 (0.103–0.125) and excretory pore 0.342 (0.306–0.383) from anterior end, respectively. Lateral alae 0.012 (0.010–0.015) wide, beginning midway between lips and nerve ring and ending just anterior to third pair of caudal papillae. Spicules 0.055 (0.051–0.057). Tail filament with 1 (0–2) small spine. Cloaca and associated papillae slightly raised from body surface but not on distinct cone. Caudal alae absent, 3 pairs of sessile papillae, 1 pair precloacal, 1 pair postcloacal, third pair occurring on base of tail filament. Single tubular testis reflexed just posterior to excretory pore.

FEMALE (based on 10 gravid specimens): Small, white nematodes tapering anteriorly and posteriorly. Length 3.21 (2.80–3.58), body length 2.55 (2.21–2.86), tail filament 0.66 (0.58–0.71). Width at level of vulva 0.22 (0.18–0.25). Lateral alae 2 μm (2–3 μm) wide, doubled, approximately 50 μm apart at midbody, beginning in a single point at level of nerve ring, ending in a single point just anterior to beginning of tail filament. Cuticle with transverse striations approximately 2 μm wide. Mouth with 3 lips, each lateral lip with 1 small papilla. Esophagus excluding bulb 0.295 (0.285–0.310), bulb length 0.073 (0.068–0.080), bulb width 0.087 (0.080–0.094). Nerve ring 0.125 (0.115–0.145), excretory pore 0.477 (0.410–0.535), and vulva 0.535 (0.485–0.610) from anterior end, respectively. Thick-walled muscular ovijector extending posteriorly 0.40 mm, then continuing as thin-walled vagina 0.18 mm in length before joining 2 uteri, 1 directed anteriorly and the other posteriorly. Ovarian and uterine coils not extending to vulva. In fully gravid females, uterus extending from slightly behind vulva to end of body. Egg barrel shaped, slightly flattened on 1 side, operculum at each end, length 105 μm (100–108 μm), width 34 μm (31–37 μm). Egg surface finely pitted, having a ground-glass appearance. Development to morula stage at deposition. Tail spines 5 (4–7).

Taxonomic summary

TYPE HOST: *Nephrurus laevissimus* Mertens, 1958.

ADDITIONAL HOSTS: *Nephrurus levis* De Vis, 1886; *N. vertebralis* Storr, 1963.

TYPE LOCALITY: 34 km west of Lorna Glen homestead, Western Australia (26°14′S, 121°13′E).

SITE OF INFECTION: Large intestine.

TYPE SPECIMENS: Holotype, male, U.S. National Parasite Collection no. 88186; allotype, female, no. 88187; paratypes (9 males, 9 females), no. 88188.

ETYMOLOGY: The specific epithet honors Eric R. Pianka, Denton A. Cooley Centennial Professor of Zoology, University of Texas at Austin, for his pioneering studies on the ecology of Australian lizards.

Remarks

Skrjabinodon piankai is the seventh species of *Skrjabinodon* to be reported from the Australian biogeographical realm; 5 from Australia and 2 from New Zealand. These species are separated on the basis of tail spines and egg shape. *Skrjabinodon oedurae* and *S. poicilandri* possess 3 caudal body spines that the other 5 species lack. Females of *S. oedurae* have 19 tail filament spines; females of *S. poicilandri* have 36–44. *Skrjabinodon leristae, S. parasmythi, S. smythi,* and *S. trimorphi* have spindle-shaped eggs; the eggs of *S. piankai* are barrel-shaped. Eggs of *S. parasmythi* and *S. smythi* have plugs at each end, those of *S. leristae* and *S. trimorphi* do not. Tail filament spines of female *S. parasmythi* are slender and pointed, those of female *S. smythi* are digitiform. Males of *S. parasmythi* have a well-developed spicule, males of *S. smythi* lack a spicule. Females of *S. leristae* have doubled lateral alae; females of *S. trimorphi* have single lateral alae.

Discussion

Other species of helminths found in this study are listed in Table 1. Previously reported hel-

minths of *N. laevissimus* include *P. filicauda, Wanaristrongylus papangawurpae* Jones, 1987, and cysts containing larvae of physalopterids; from *N. levis, W. ctenoti* and physalopterid larvae (Jones, 1985, 1987, 1995a, b).

Oochoristica piankai was first described from specimens taken from the small intestine of the thorny devil, *Moloch horridus* Gray, 1841, collected by E. R. Pianka in Western Australia (Bursey et al., 1996). *Nephrurus laevissimus* is the second host for this parasite to be reported. *Maxvachonia brygooi* was first described from the agamid genus *Amphibolurus* Wagler, 1830, by Mawson (1972); *N. levis* is a new host record for *M. brygooi* and represents the 10th lizard species to harbor this helminth. *Pharyngodon tiliquae* was first described from the skink *Tiliqua scincoides* (White, ex Shaw, 1790) by Baylis (1930); *N. vertebralis* is a new host record for *P. tiliquae* and represents the 10th lizard species to harbor this helminth. *Physalopteroides filicauda* was described from specimens taken from the stomach of a *N. laevissimus* collected by E. R. Pianka in Western Australia (Jones, 1985). It has been found in at least 38 species of Australian lizards. *Wanaristrongylus papangawurpae* and *W. ctenoti* were also described from specimens taken from the stomachs of *N. laevissimus* and *N. levis,* respectively, collected by E. R. Pianka in Western Australia (Jones, 1987). *Wanaristrongylus papangawurpae* has been found in 8 species of Australian lizards and *W. ctenoti* in 12 species (Jones, 1988, 1995a). *Raillietiella scincoides* was originally described from *T. scincoides* by Ali et al. (1984); *N. laevissimus* is the second reported host. Larvae of *Abbreviata* sp. and *Physaloptera* sp. are commonly reported in Australian reptiles (Jones, 1995a). Larvae of *Abbreviata* sp. have submedian teeth on each pseudolabium; such teeth are absent in larvae of *Physaloptera* sp.

It should be noted that the material examined by Jones (1995a, b) and our material were from the same collection of lizards by E. R. Pianka; the stomachs had been deposited in the Western Australia Museum and the carcasses in LACM. Further examination of Australian lizards will be necessary before the number of hosts for *S. piankai* can be known.

Acknowledgments

We thank Robert L. Bezy (Natural History Museum of Los Angeles County) for permission to examine the geckos; Peggy Firth for the illustrations constituting Figs. 1–8; and Cynthia Walser and Cheryl Wong for dissection assistance.

Literature Cited

Ainsworth, R. 1990. Male dimorphism in two new species of nematode (Pharyngodonidae: Oxyurida) from New Zealand lizards. Journal of Parasitology 76:812–822.

Ali, J. H., J. Riley, and J. T. Self. 1984. Further observations of blunt-hooked raillietiellids (Pentastomaida: Cephalobaenida) from lizards with descriptions of three new species. Systematic Parasitology 6:147–160.

Baylis, H. A. 1930. Some Heterakidae and Oxyuridae (Nematoda) from Queensland. Annals and Magazine of Natural History, Series 10, 5:354–366.

Bursey, C. R., S. R. Goldberg, and D. N. Woolery. 1996. *Oochoristica piankai* sp. n. (Cestoda: Linstowiidae) and other helminths of *Moloch horridus* (Sauria: Agamidae) from Australia. Journal of the Helminthological Society of Washington 63: 215–221.

Cogger, H. G. 1992. Reptiles and Amphibians of Australia, 5th ed. Reed Books, Chatswood, New South Wales, Australia. 775 pp.

Inglis, W. G. 1968. Nematodes parasitic in western Australian frogs. British Museum (Natural History) Bulletin, Zoology 16:161–183.

Jones, H. I. 1985. Two new species of nematode (Spirurida: Physalopteridae) from Australian lizards (Reptilia: Scincidae: Gekkonidae). Journal of Natural History 19:1231–1237.

———. 1987. *Wanaristrongylus* gen. n. (Nematoda: Trichostrongyloidea) from Australian lizards, with descriptions of three new species. Proceedings of the Helminthological Society of Washington 54: 40–47.

———. 1988. Nematodes from nine species of *Varanus* (Reptilia) from tropical Northern Australia, with particular reference to the genus *Abbreviata* (Physalopteridae). Australian Journal of Zoology 36:691–708.

———. 1995a. Gastric nematode communities in lizards from the Great Victoria Desert, and an hypothesis for their evolution. Australian Journal of Zoology 43:141–164.

———. 1995b. Pathology asssociated with physalopterid larvae (Nematoda: Spirurida) in the gastric tissues of Australian reptiles. Journal of Wildlife Diseases 31:299–306.

Mawson, P. M. 1972. The nematode genus *Maxvachonia* (Oxyurata: Cosmocercidae) in Australian reptiles and frogs. Transactions of the Royal Society of South Australia 96:101–108.

Pianka, E. R. 1972. Zoogeography and speciation of Australian desert lizards: an ecological perspective. Copeia 1972:127–145.

———, **and H. D. Pianka.** 1976. Comparative ecology of twelve species of nocturnal lizards (Gekkonidae) in the Western Australian desert. Copeia 1976:125–142.