

A new species of *Cosmocerca* (Nematoda, Cosmocercidae) and other helminths from *Barygenys atra* (Anura, Microhylidae) from Papua New Guinea

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Abstract

Cosmocerca oroensis sp. nov. (Ascaridida, Cosmocercidae) from the large intestine of *Barygenys atra* (Anura, Microhylidae) is described and illustrated. *Cosmocerca oroensis* represents the 26th species assigned to the genus and the 7th from the Australo-Papuan biogeographical region. *Cosmocerca oroensis* sp. nov. differs from the previously described Australo-Papuan species in number of plectanes: *C. oroensis* with 2 pairs; *C. australis*, 3–4 pairs; *C. archeyi*, *C. tyleri* and *C. zugii*, 4 pairs; *C. limnodynastes* and *C. novaeguineae*, 5 pairs. In addition to the new nematode species, *Meteterakis crombiei* (Nematoda, Heterakidae) was also found.

Keywords

Helminths, *Cosmocerca oroensis* sp. nov., *Barygenys atra*, Anura, Papua New Guinea

Introduction

Gunther's Papua frogs, *Barygenys atra* (Günther, 1896), a fossorial microhylid, is endemic to eastern Papua New Guinea, occurring on the north side of the south-eastern peninsula from the Mambare River to Cape Nelson from sea level to 700 m (Menzies 2006). To our knowledge, there are no helminthological reports for this species. The purpose of this paper is to describe a new species of nematode harbored by *B. atra* and to provide an initial helminth list for this host.

Materials and Methods

Twenty-two *Barygenys atra* were collected by hand by FK on the south slope of Mt. Victory (9.24245°S, 149.13559°E), Oro (= Northern) Province, Papua New Guinea (1–4 October 2010). Specimens were fixed in neutral buffered 10% formalin. The body cavity was opened by a longitudinal incision and the gastrointestinal tract was removed by cutting across the oesophagus and rectum. The oesophagus, stomach, small intestine and large intestine were examined separately for endoparasites. Only nematodes were found which were placed in lactophenol, allowed to clear and examined under a light mi-

croscope. Illustrations were made with the aid of a microprojector. Measurements are in μm with mean $\pm$ SD and range in parentheses unless otherwise stated. Frogs were deposited in the Bernice P. Bishop Museum (BPBM), Honolulu, Hawaii as BPBM 37100-37121.

Results

Two species of Nematoda, *Meteterakis crombiei* Bursey, Goldberg et Kraus, 2005 and a new species of *Cosmocerca* (22 males, 276 females) were found. Fourteen *B. atra* (63.6%, 14 of 22) were infected with *Cosmocerca oroensis* sp. nov.; of these 2 had a dual infection of *C. oroensis* and *M. crombiei*. Site of infection, number, prevalence, mean intensity, and range by helminth species are given in Table I. Selected helminths were deposited in the United States National Parasite Collection (USNPC), Beltsville, Maryland (Table I). Description of the new species follows.

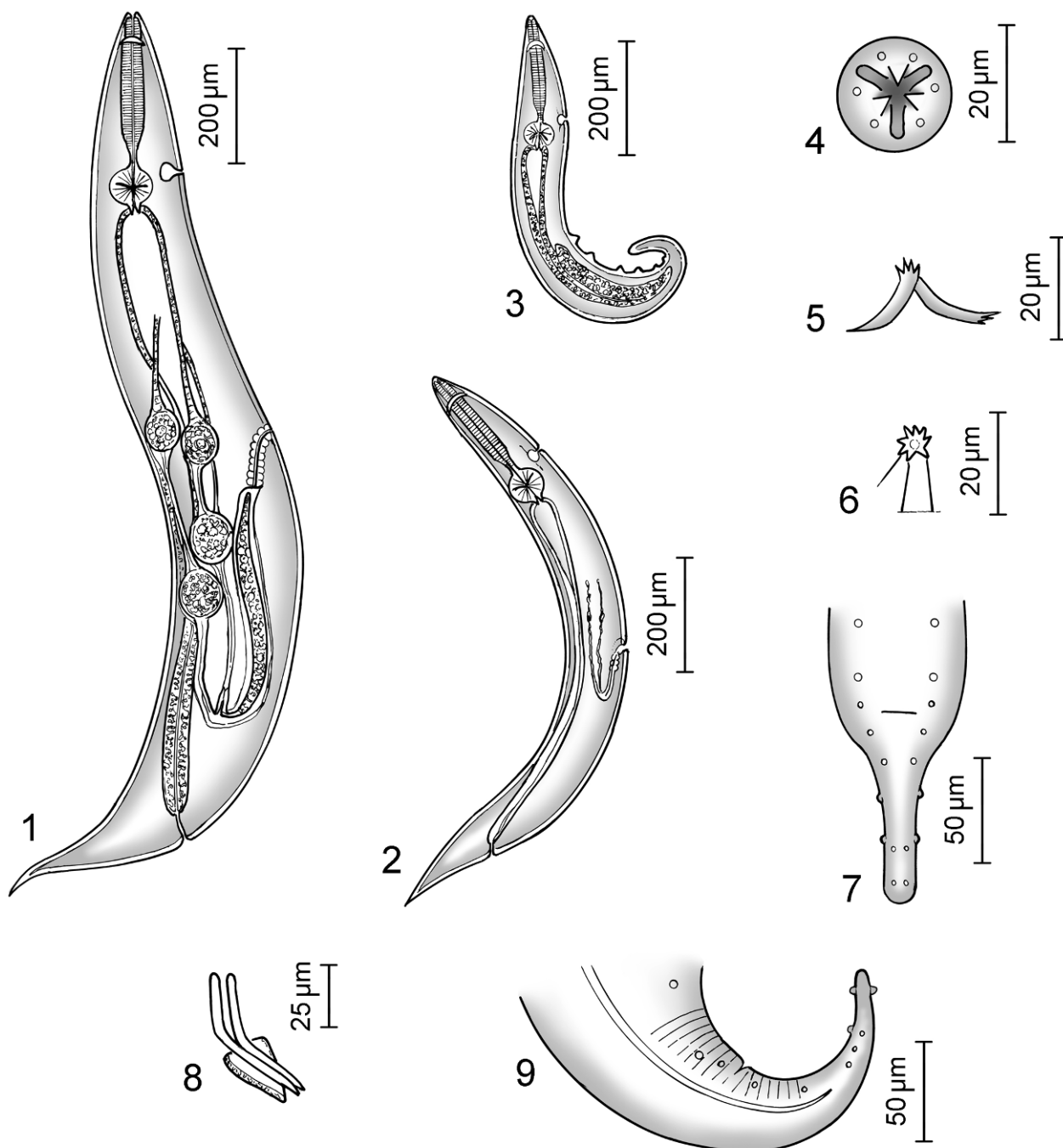
Cosmocerca oroensis sp. nov. (Figs 1–9)

Description: Small fusiform nematodes, prominent sexual dimorphism, males approximately one-half length of females.

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Table 1. Site of infection, number of helminths, prevalence, mean intensity, range of infection and USNPC accession numbers for 2 helminth species in *Barygenys atra* from Papua New Guinea

Helminth species	Site of infection	Number	Prevalence	Mean intensity $\pm$ 1SD	Range	Accession #
<i>Cosmocerca oroensis</i> sp. nov.	large intestine	298	14/22 (64%)	21.3 $\pm$ 19.9	1–62	USNPC105961
<i>Meteterakis crombiei</i>	large intestine	7	3/22 (14%)	2.3 $\pm$ 0.6	2–3	USNPC105962

**Figs 1–9.** *Cosmocerca oroensis* sp. nov. 1. Female, entire, lateral view. 2. Female, fourth stage, entire, lateral view. 3. Male, entire, lateral view. 4. Female, en face view. 5. Plectane, lateral view. 6. Plectane, anteriodorsal view. 7. Male, posterior end, semidigammic ventral view. 8. Gubernaculum and spicule. 9. Male, posterior end, lateral view

Lateral alae beginning at posterior end of pharynx and terminating at mid-point of tail in both males and females. Cuticle with longitudinal striations. Mouth with 3 prominent lips, each lip with an anteriorly directed V-shaped cuticular flange; dorsal lip with 2 sessile papillae, each ventrolateral lip with 1 sessile papilla and 1 lateral amphid. Oesophagus with short pharynx, cylindrical corpus, isthmus and posterior bulb containing valves. Excretory pore anterior to oesophageal bulb. Vulva near midbody; female reproductive system prodelphic. Males with 2 small spicules, a somewhat triangular gubernaculum, and 4 plectanes in 2 rows of 2 on ventral surface near midbody.

Male: Based on holotype and 9 paratypes. Length 0.85 ± 0.06 mm ($0.77\text{--}0.99$ mm), width at level of oesophago-intestinal junction 101 ± 9 ($92\text{--}110$). Oesophagus 274 ± 20 ($256\text{--}311$) in total length; pharynx 25 ± 2 ($23\text{--}30$) long, corpus 169 ± 12 ($153\text{--}186$), isthmus 29 ± 4 ($24\text{--}37$) long, oesophageal bulb 53 ± 5 ($47\text{--}61$) long, 50 ± 4 ($43\text{--}55$) wide. Nerve ring 65 ± 6 ($55\text{--}73$) and excretory pore 211 ± 17 ($183\text{--}238$) from anterior end respectively. Gubernaculum V-shaped, 27 ± 2 ($24\text{--}29$) in length, heavily sclerotized margins, distal end pointed. Spicules equal 46 ± 4 ($37\text{--}52$) in length, lightly sclerotized and bent at midpoint. Four precloacal plectanes, 2 rows of 2 each; anterior plectane 503 ± 38 ($434\text{--}587$) and posterior plectane 552 ± 39 ($485\text{--}638$) from anterior end, respectively. Each plectane with heavily sclerotized body producing a “shark’s tooth” appearance, distal tip with rosette of small denticles. Four pairs of precloacal papillae, ventral in position, 4th pair immediately anterior to cloaca much smaller in diameter than more anterior pairs. Tail flexed ventrally, 91 ± 9 ($73\text{--}104$) in length terminating in blunt point. Seven pairs of sessile postcloacal papillae: 4 ventral pairs, 2 pairs on wide portion of tail, 2 pairs on narrow portion of tail; 2 pairs lateral in position on narrow portion of tail; 1 pair dorsal in position near tip of tail. Phasmids on lateral surface between lateral pairs of papillae. Somatic papillae absent.

Female: Based on allotype and 9 paratypes. Length 1.98 ± 0.14 mm ($1.73\text{--}2.30$ mm), width at level of vulva 267 ± 21 ($230\text{--}306$). Oesophagus 369 ± 18 ($336\text{--}390$) in total length; pharynx 34 ± 4 ($31\text{--}43$) long, corpus 216 ± 12 ($192\text{--}238$) long, isthmus 34 ± 4 ($31\text{--}40$) long, oesophageal bulb 78 ± 7 ($70\text{--}92$) long, 89 ± 8 ($79\text{--}98$) wide. Nerve ring 119 ± 6 ($110\text{--}128$), excretory pore 277 ± 13 ($262\text{--}305$), and vulva 940 ± 55 ($842\text{--}995$) from anterior end, respectively. Reproductive system prodelphic, ovijector approximately 180 in length, directed posteriorly, joining 2 uteri. Eggs large, less than 10 present, thin shelled, 162 ± 15 ($153\text{--}191$) $\times$ 150 ± 11 ($140\text{--}166$), several containing larvae, occasional hatched larvae approximately 638 long by 51 wide present in uterus. Tail an elongate cone 320 ± 22 ($281\text{--}357$) in length. Phasmids not seen.

Type host: Gunther’s Papua frogs, *Barygenys atra* (Günther, 1896); symbiotype BPBM 37113; 2 October 2010.

Type locality: Papua New Guinea, Oro Province, vicinity Mt. Victory, 320 m elevation, 9.242425°S , 149.13500°E .

Site of infection: Large intestine.

Type specimens: Holotype male, USNPC 105958; allotype female, USNPC 105959; paratypes, USNPC 105960; voucher specimens, USNPC 105961.

Etymology: The new species is named for the Province of collection.

Remarks: A list of 25 species of *Cosmocerca* by biogeographical region was published Rizvi et al. (2011). *Cosmocerca oroensis* sp. nov. represents the 26th species assigned to the genus and the 7th from the Australo-Papuan region. Of the 6 Australian species previously described, 5 have been described from anuran hosts: *C. archeyi* Baker et Green, 1988 from *Leiopelma archeyi* collected in New Zealand; *C. australis* Baker et Green, 1988 from *Leiopelma hochstetteri* also collected in New Zealand; *C. limnodynastes* Johnston et Simpson, 1942 from *Limnodynastes dorsalis* collected in Australia; *C. novaeguineae* Moravec et Sey, 1990 from *Platymantis papuensis* collected in Papua New Guinea; and *C. tyleri* Bursey, Goldberg et Kraus, 2006 from *Genyophryne thomsoni* also collected in Papua New Guinea (Johnston and Simpson 1942, Baker and Green 1988, Moravec and Sey 1990, Bursey et al. 2006). The sixth species, *C. zugii* Bursey, Goldberg et Kraus, 2005, was described from the lizard *Cyrtodactylus louisadensis* collected in Papua New Guinea (Bursey et al. 2005). *Cosmocerca oroensis* sp. nov. differs from the above 6 species in number of plectanes possessed: *C. oroensis* with 2 pairs; *C. australis*, 3–4 pairs; *C. archeyi*, *C. tyleri* and *C. zugii*, 4 pairs; *C. limnodynastes* and *C. novaeguineae*, 5 pairs.

Discussion

Barygenys atra represents a new host record for *Meteterakis crombiei*, a common parasite of Papua New Guinean anurans and reptiles. *Meteterakis crombiei* was originally described from the lizard *Sphenomorphus jobienis* and is known from the anurans, *Barygenys exsul*, *Callulops robustus*, *Cophixalus sisyphus*, *Copiula fistulans*, *Hylophorbus* cf. *rufescens*, *Manthophryne lateralis*, *Nyctimystes cheesmani*, *N. pulcher*, *Platymantis adiasolus*, *P. boulengeri*, *P. schmidtii* and *Hylarina daemeli* (reported as *Rana daemeli*) as well as the lizards, *Carlia luctuosa*, *Cyrtodactylus klugei*, *C. sermowaiensis*, *Emoia battersbyi*, *E. longicauda*, *E. obscura*, *E. pallidiceps*, *E. physicae*, *E. popei*, *Eugongylus rufescens*, *Hypsilurus modestus*, *Sphenomorphus aignanus*, *S. louisadensis*, *S. meyeri*, *S. nigrolineatus*, *S. simus* and *Trilobolobolus novaeguineae* (Bursey et al. 2005, 2007, 2009; Goldberg et al., 2008, 2009a, 2010a,b).

The parasite list for *B. atra* currently contains 2 nematode species, *Cosmocerca oroensis* sp. nov. and *Meteterakis crombiei*. This represents a small complement of helminth species compared to many other Papuan frogs. The only congener previously studied (*Barygenys exsul*) hosts at least five species, including the closely related *Cosmocerca tyleri* (see Goldberg et al. 2009b). Similarly, other fossorial microhylids (e.g., *Callulops personata*, *C. robusta*, *Oxydactyla crassa*) host at least

three species, but non-fossorial frogs may host up to ten (Goldberg *et al.* 2009b). We expect the helminth community of *B. atra* to also increase with further research.

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