12-1-1988

Coccidia (Apicomplexa: Eimeriidae) from the Subterranean Rodent *Ctenomys opimus* Wagner (Ctenomyidae) from Bolivia, South America

Christine R. Lambert  
*University of New Mexico*

Scott Lyell Gardner  
*University of Nebraska - Lincoln*, slg@unl.edu

Donald Duszynski  
*University of New Mexico*, eimeria@unm.edu

Follow this and additional works at: http://digitalcommons.unl.edu/parasitologyfacpubs

Part of the Parasitology Commons

Lambert, Christine R.; Gardner, Scott Lyell; and Duszynski, Donald, "Coccidia (Apicomplexa: Eimeriidae) from the Subterranean Rodent *Ctenomys opimus* Wagner (Ctenomyidae) from Bolivia, South America" (1988). Faculty Publications from the Harold W. Manter Laboratory of Parasitology. Paper 15.  
http://digitalcommons.unl.edu/parasitologyfacpubs/15

This Article is brought to you for free and open access by the Parasitology, Harold W. Manter Laboratory of at DigitalCommons@University of Nebraska - Lincoln. It has been accepted for inclusion in Faculty Publications from the Harold W. Manter Laboratory of Parasitology by an authorized administrator of DigitalCommons@University of Nebraska - Lincoln.
COCCIDIA (APICOMPLEXA: EIMERIDAE) FROM THE SUBTERRANEAN RODENT CTENOMYS OPIMUS WAGNER (CTENOMYIDAE) FROM BOLIVIA, SOUTH AMERICA

Christine R. Lambert, Scott L. Gardner, and Donald W. Duszynski
Department of Biology, The University of New Mexico, Albuquerque, New Mexico 87131

ABSTRACT: Of 35 tuco-tucos (Ctenomys opimus) collected in Bolivia, South America, 31 (88%) had eimerian oocysts in their feces at the time they were examined. Eighteen (58%) of the 31 infected animals were concurrently infected with 2 or 3 eimerian species. Four species of Eimeria were recovered and are described as new species based on the characteristics of sporulated oocysts. Oocysts of Eimeria granifera n. sp. were ellipsoidal, 21.1 \times 17.2 (15-26 \times 11-20) \mu m with sporocysts ovoidal, 11.3 \times 7.1 (8-14 \times 5-9) \mu m. Oocysts of Eimeria montuosi n. sp. were spheroidal, 24.2 \times 22.0 (21-28 \times 18-25) \mu m with sporocysts ovoidal, 10.5 \times 7.3 (8-14 \times 6-9) \mu m. Oocysts of Eimeria opimi n. sp. were spheroidal to subspherical, 24.3 \times 21.8 (18-29 \times 15-26) \mu m with sporocysts ovoidal, 11.6 \times 7.6 (10-13 \times 6-9) \mu m. Oocysts of Eimeria oruroensis n. sp. were spheroidal to subspherical, 27.3 \times 23.6 (23-32 \times 20-28) \mu m with sporocysts ovoidal, 13.2 \times 8.6 (10-16 \times 8-11) \mu m.

RESULTS

The coccidians with which hosts were infected and collection localities are presented in Table I. Eimeria granifera n. sp.

(Figs. 2, 3, 11)

Description: Oocyst subspheroidal/ellipsoidal, wall of uneven thickness (Fig. 2) ~ 2.0, composed of 2 layers: outer wall smooth, ~3% of total thickness, pale blue to transparent; inner layer yellow; polar body present in about 44% of the oocysts; oocyst residuum absent; sporulated oocysts (n = 75) 21.1 \times 17.2 (15-26 \times 11-20) with L:W ratio 1.2 (1.1 \times 1.9); sporocysts (n = 75) ovoidal, 11.3 \times 7.1 (8-14 \times 5-9) with L:W ratio 1.6 (1.2 \times 2.0); button-like Stieda body present (Figs. 2, 3), but sub- and parastieda bodies absent; sporocyst residuum of 10-12 large globules in a compact mass of varying shape, wedged between sporozoites (Figs. 2, 3); each sporozoite large, folded, highly granular with a large posterior refractile body (Figs. 3, 11). Oocysts were 274-275 days old when measured.

Taxonomic summary

Diagnosis: Oocysts of this eimerian do not resemble those from any eimerian previously described from New World hystricognath rodents.

Type host: Ctenomys opimus Wagner, Museum of Southwestern Biology, Division of Mammalogy, MSB 57200, NK 14776 (female), N. Olds #980, 3 Oct 1986.

Type locality: 3 km W of Huancaroma, Rio Desaguadero, 3,720 m, Department of Oruro, Bolivia, South America (17°40'S, 61°31'W).

Prevalence: Found in 23 of 35 (66%) C. opimus.

Site of infection: Unknown, oocysts recovered from feces.

Material deposited: Syntypes (=phototypes, see Bandoni and Duszynski, 1988) of sporulated oocysts, USNM Helm. Coll. No. 80445.

Etymology: The nomen triviale is derived from the word granifer (L., grain-carrying); this is descriptive of the highly granular sporozoites.

Received 30 May 1988; revised 10 July 1988; accepted 21 July 1988.
**Eimeria montuosi n. sp.**

*Description:* Oocysts spheroidal or nearly so with thick wall ~3.0, consisting of 2 or 3 layers: outer layer having large protruding bumps on the surface, yellow to gold, ~¼ of the total thickness (Fig. 4, insert); oocyst residuum a compact mass of large granules, ~6; polar body absent; sporulated oocysts (n = 42) 24.2 x 22.0 (21-28 x 18-25) with L:W ratio 1.1 (1.0 x 1.2); sporocysts (n = 42) ovoidal, 10.5 x 7.3 (8-14 x 6-9) with L:W ratio 1.4 (1.2 x 1.9); sporocysts with small Stieda body, but sub- and parastieda bodies absent; sporocyst residuum consisting of 6 or more small globules separating the sporozoites. Oocysts were 298-330 days old when measured.

**Taxonomic summary**

*Diagnosis:* Oocysts of this eimerian do not resemble those from any eimerian previously described from New World hystricognath rodents.

*Type host:* *Ctenomys opimus* Wagner, Museum of Southwestern Biology, Division of Mammalogy, MSB 57202, NK 14559 (female), N. Olds #861, 12 Sep 1986.

*Type locality:* 5 km W, 1 km N Pomata Ayte, Rio Barros, Department of Oruro, Bolivia, South America (18°40'S, 67°59'W).

*Prevalence:* Found in 1 of 35 (3%) *C. opimus.*

*Site of infection:* Unknown, oocysts recovered from feces.

*Material deposited:* Syntypes (phototypes) of sporulated oocysts, USNM Helm. Coll. No. 80446.

**Eimeria oruroensis n. sp.**

*Description:* Oocyst spheroidal to subspheroidal, wall ~1.5, composed of at least 2 layers: outer layer finely sculptured (Fig. 7, insert), ~¼ of total thickness, colorless to pale blue; inner layer smooth, transparent to pale blue; dumbbell-shaped polar body present (Fig. 5); oocyst residuum (~5.3) composed of 8-10 uniform granules in a compact mass (Fig. 6); sporulated oocysts (n = 55) 24.3 x 21.8 (18-29 x 15-26) with L:W ratio 1.1 (1.0 x 1.7); sporocysts (n = 55) ovoidal, 11.6 x 7.6 (10-13 x 6-9) with L:W ratio 1.5 (1.3 x 1.9); nipple-like Stieda body present (Figs. 5-7), but sub- and parastieda bodies absent; sporocyst residuum of 2-3 granules (Fig. 7) separating the sporozoites; each sporozoite transparent with large posterior refractile body (Fig. 7). Oocysts were 1,024-1,025 days old when measured.

**Taxonomic summary**

*Diagnosis:* Oocysts of this eimerian do not resemble those from any species previously described from New World hystricognath rodents.

*Type host:* *Ctenomys opimus* Wagner, Museum of Southwestern Biology, Division of Mammalogy, MSB 55372, NK 11564 (male), J. A. Cook #1264, 6 Aug 1984.

*Type locality:* 2.5 km NE of Huancaroma, Department of Oruro, Bolivia, South America (17°40'S, 67°27'W).

*Prevalence:* Found in 28 of 35 (80%) *C. opimus.*

*Site of infection:* Unknown, oocysts recovered from feces.

*Material deposited:* Syntypes (phototypes) of sporulated oocysts, USNM Helm. Coll. No. 80447.

*Etymology:* The *nomen triviale* is derived from the specific name of the host.
FIGURES 2-10. Photomicrographs of sporulated oocysts of coccidia recovered from the feces of *Ctenomys opimus.* ×1,860. 2, 3. *Eimeria granifera* n. sp. Note button-like Stieda body (3, arrow), sporocysts residuum (2), and large, folded, highly granular sporozoites with large posterior refractile body. 4. *Eimeria montuosi* n. sp. Note large, protruding bumps on surface of oocyst. 5-7. *Eimeria opimi* n. sp. 5. Note dumbbell-shaped polar body (arrow). 6. Sporulated oocyst showing compact oocyst residuum. 7. Sporocysts with nipple-like Stieda body (arrow), large posterior refractile body (*), and finely sculptured nature of oocyst wall (insert). 8-10. *Eimeria oruroensis* n. sp. 8. Sporulated oocyst showing oocyst residuum in a loosely packed mass. 9. Sporocyst residuum forming a line along sporocyst wall (arrow), and separating the 2 sporozoites. 10. Sculptured nature of oocyst wall.
(Fig. 10), ~3⁄4 of total thickness, yellow to gold, always with adherent debris; middle layer pale yellow in color; innermost layer dark brown; polar body present; oocyst residuum (~9) composed of 10–15 globules of varying size in a loosely packed mass (Fig. 8); sporulated oocysts (n = 50) 27.3 x 23.6 (23–32 x 20–28) with L:W ratio 1.2 (1.0 x 1.7); sporocysts (n = 50) ovoidal, 13.2 x 8.6 (10–16 x 8–11) with L:W ratio 1.5 (1.2 x 1.8); Stieda body present, but sub- and parasieda bodies absent; sporocyst residuum consists of large globules of varying shape and size separating the 2 sporozoites or forming a line along the sides of the sporocyst wall (Figs. 8, 9); each sporozoite with a posterior refractile body. Oocysts were 1,023–1,035 days old when measured.

**Taxonomic summary**

*Diagnosis:* Oocysts of this eimerian do not resemble those from any species previously described from New World hystricognath rodents.

*Type host:* *Ctenomys opimus* Wagner, American Museum of Natural History, Division of Mammalogy, AMNH 260840, NK 11514 (male), S. Anderson #7890, 4 Aug 1984.

*Type locality:* 3.5 km E of Huancaroma, Department of Oruro, Bolivia, South America (17°40' S, 67°27' W).

*Prevalence:* Found in 1 of 35 (3%) *C. opimus*.

*Site of infection:* Unknown, oocysts found in feces.

*Material deposited:* Syntypes (phototypes) of sporulated oocysts, USNM Helm. Coll. No. 80444.
**Etymology:** The *nomen triviale* combines the name of the department in Bolivia in which the infected host was caught and -*ensis* (L., belonging to).

**DISCUSSION**

The genus *Ctenomys* Blainville includes approximately 33 currently recognized species (Honacki et al., 1982). These rodents occur in suitable habitats from about 10°S latitude southward to the Strait of Magellan. *Ctenomys opimus* has one of the most extensive geographic distributions compared to other members of the genus (Fig. 1). Colonies occur at altitudes up to >4,000 m in the altiplano region of Bolivia and in habitats characterized as Puna and high altitude desert of Peru, Bolivia, Chile, and Argentina (Gallardo, 1979; Mares and Ojeda, 1982). *Ctenomys opimus* is a strictly subterranean species with populations occurring in small isolated areas throughout their range in Bolivia (Gardner, pers. obs.). These rodents display some of the same ecological and morphological attributes as other subterranean rodents (Nevo, 1979). For example, members of the genus *Thomomys* Weidmann in the Nearctic exhibit low vagility, relatively low density, and patchy distributions (Patton, 1972).

Up to the present, the coccidia of *Ctenomys* have not been studied, and the number of species that exist of both host and parasite and their phylogenetic and coevolutionary relationships are unknown. Pellérdy (1974) listed 23 described species of *Eimeria* from hystricognath rodents; however, none of those listed are from the host *Ctenomys*, nor do they resemble the eimerian described in the present paper.

At present we are analyzing the coccidians from 9 other species of *Ctenomys*. In subsequent papers, we hope to discuss the patterns and processes of speciation, diversification, and coevolution among members of the genus *Ctenomys* and their parasites.

**ACKNOWLEDGMENTS**

We are indebted to the following colleagues in the Department of Biology, The University of New Mexico, and elsewhere for their help in the collection and/or processing of tuco-tucos: J. A. Cook, C. Schuster, N. Olds, J. S. Salazar, J. M. Goytia, Dr. T. L. Yates, Dr. S. Anderson, and, especially, Dr. O. C. J. Camacho. We also thank J. A. Cook for reviewing the manuscript. This work was supported by NSF grant BSR-8408923 to Dr. T. L. Yates.

**LITERATURE CITED**


