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Two New Species of *Andrya* (Cestoda: Anoplocephalidae) from Sigmodontine Rodents in the Neotropics

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ABSTRACT: We redescribe *Andrya octodonensis* based on new material from *Phyllotis xanthopygus* from Argentina. *Andrya vesicula* n. sp. from *Phyllotis xanthopygus* and *Andrya boliviensis* n. sp. from *Phyllotis osliae* are also described and illustrated. The occurrence of these species in South America suggests that cestodes of the genus *Andrya* were introduced on that continent by sigmodontine rodents from the Nearctic, probably after the formation of the Isthmus of Panama.

KEY WORDS: Anoplocephalidae, Sigmodontinae, Hystricognathi, *Andrya*, *Phyllotis*, *Octodon*, Bolivia, Chile.

The evolutionary and biogeographic history of species of cestodes in the genus *Andrya* Railliet, 1893, in the New World is complex. Relative to the report of *Andrya neotomae* Voge, 1946 (see Haukisalmi and Rausch, 2006), it is difficult to explain how one species of cestode can parasitize hosts representing two different rodent suborders (Sciurognathi and Hystricognathi) found in both North and South America. The presence of these cestodes in sigmodontine rodents in both North and South America indicates that an ancestral species of *Andrya* accompanied the early dispersing sigmodontine rodents that expanded their range south from North America into South America when the continents were joined by the Panamanian land bridge (or earlier via island hopping) (Marshall, 1985).

Prior to the present work, there have been no reports of *Andrya* in sigmodontine rodents in Central or South America; herein, we report two new species of *Andrya* from South American sigmodontine rodents and provide new specimens that support the validity of *Andrya octodonensis* (Babero and Cattan, 1975) Haukisalmi and Wickström, 2005, as a species separate from *Andrya neotomae*.

The characters that define the species in the genus *Andrya* have recently been clarified by Haukisalmi and Wickström (2005). They amended the diagnosis for species included in that genus after it was found that the structure of the early uterus (reticulate) was not a sufficiently robust and reliable character to enable adequate separation of species allocated to either *Andrya* or *Paranoplocephala* Lühe, 1910. The specimens we examine in the present study conform to the generic diagnosis of *Andrya* given by Haukisalmi and Wickström (2005); specifically, that the early uterus is ventral to the testes but dorsal when crossing the osmoregulatory canals.

Several specimens used in the present study were obtained from faunal surveys conducted in Bolivia in the summer of 1993 as part of a joint effort among the American Museum of Natural History (AMNH) in New York City, New York, U.S.A., the Museum of Southwestern Biology at the University of New Mexico in Albuquerque, New Mexico, U.S.A., the University of California at Davis, California, U.S.A., and the Harold W. Manter Laboratory of Parasitology at the University of Nebraska State Museum, Lincoln, Nebraska, U.S.A. Those expeditions focused on collecting and subsequently describing the diversity of mammals and their parasites throughout Bolivia. Current efforts continue to examine the material that was collected and deposited in museum collections to describe new species of parasites (Hugot and Gardner, 2000; Gardner and Pérez-Ponce de León, 2002; Notarnicola et al., 2007; Haverkost and Gardner, 2008).

MATERIALS AND METHODS

Mammals were collected and processed according to standard protocols (Gardner, 1996). Cestodes recovered at necropsy were relaxed in distilled water or river water and killed and fixed in either 10% cold formalin or 70% (v/v) ethanol (some specimens were preserved in one vial of 70% or 10% formalin, never exposing those specimens in alcohol to formalin and the reciprocal). Specimens stored in the collection were washed in alcohol, stained in Semichon's acetic carmine, dehydrated in an ethanol series, cleared in cedarwood oil and xylene, and mounted on slides in Damar Gum. While in cedarwood oil, the tegument and dorsal longitudinal muscles were removed to allow an unobstructed view of the reproductive and excretory organs.

Measurements from individual proglottids (1–3 per strobila) were made by first drawing the proglottid with the aid of a drawing tube, digitizing the image, and measuring the digitized image using SigmaScan Pro 5.0

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(SPSS, Chicago, Illinois, U.S.A.). Measurements of the full strobila were made with an ocular micrometer on a Jenaval microscope. Measurements of eggs were taken from digital images of eggs removed from gravid proglottids and mounted on a slide under a coverslip in lactophenol. Scolex length was measured from the anterior of the scolex to the posterior margin of the suckers. Neck length was measured from the posterior margin of the suckers to the beginning of visible segmentation. Genital alternation was quantified by counting the sinistral/dextral alternation of the genital atrium per 100 proglottids. The alternation of genital pores was also quantified by the mean number of proglottids in each unilateral set. The index of asymmetry (Sato et al., 1993) was calculated from the following ratio: distance between the midpoint of the vitelline gland and the poral extreme/total width of the proglottid. Testicular distribution (Haukisalmi and Henttonen, 2003) in each proglottid was recorded as the transverse distance between the two most distal testes. Measurements are presented in μm, unless otherwise stated, and as range values followed by the mean, and, in some instances, the sample size is given in parentheses. Selected measurements are presented in Table 1. For the redescription of *Andrya octodonensis*, we acquired 3 specimens of *Andrya* found in *Phyllotis xangthopygus* from collections made by Dr. Agustín Jiménez in Argentina in 2006. Hosts of parasites were deposited at the Museum of Southwestern Biology (NK) in Albuquerque, New Mexico, U.S.A., the Sam Noble Oklahoma Museum of Natural History (SNOMNH) (tissue cataloged at the Oklahoma Collection of Genomic Resources [OCGR]) in Norman, Oklahoma, U.S.A., the American Museum of Natural History (AMNH) in New York City, New York, U.S.A., and the Coleccion Boliviana de Fauna in La Paz, Bolivia. Parasites were deposited at the Harold W. Manter Laboratory of Parasitology (HWML) in Lincoln, Nebraska, U.S.A.

RESULTS

Andrya vesicula n. sp. (Figs. 1–3)

Description

Based on 4 specimens and 12 segments. Cestodes 78–92 (84) mm long, maximal width 1.9–2.9 (2.3) mm. Scolex 220–252 (240, $n = 3$) long, 360–456 (404, $n = 3$) wide. Suckers directed laterad, 150–176 (164) in diameter. Neck 576–1120 (845, $n = 3$) long, minimal width 208–288 (259, $n = 3$). Adult cestodes have 188–198 (192) proglottids. Proglottids craspedote. Immature proglottids 128–343 (252) long, 424–936 (698) wide. Length:width ratio of immature proglottids 0.30–0.39 (0.36). Mature proglottids 409–664 (539) long, 1,344–1,870 (1,702) wide. Length:width ratio of mature proglottids 0.23–0.41 (0.32). Gravid proglottids 936–1,092 (1,014) long, 1,373–2,340 (1,981) wide. Length:width ratio of gravid proglottids 0.41–0.77 (0.54). Dorsal canal 5–12 (8) wide. Dorsal osmoregulatory canal follows sinuous path, overlaps ventral canal. Ventral canal 26–53 (36) wide with one transverse canal per proglottid. Transverse canal 12–70 (46) in diameter. Testes number 56–68 (61) per proglottid. Testes spherical or ovoid, 41–79 (68, $n = 60$) in diameter. Testes continuous across proglottid in anterior field; slightly more testes antiporal than poral. Testes rarely cross osmoregulatory canals. Testicular distribution 779–1,162 (1,053). Internal seminal vesicle present, not measured due to everted cirrus. External seminal vesicle large, winding. External seminal vesicle first seen as densely staining cells, becoming a prominent tube with no thick cellular coating. Cirrus spined. Cirrus sac 342–465 (414) long, 107–141 (121) wide. Cirrus sac extends proximad beyond osmoregulatory canals. Genital ducts pass osmoregulatory canals dorsally. Genital pores alternate irregularly, switching lateral margins 52–74 (62) times per 100 proglottids. Mean number of proglottids in each unilateral set 1.5. Vagina enters genital atrium posterior to cirrus sac. Vagina 306–675 (396, $n = 11$) long. Seminal receptacle 358–616 (540) long, 60–226 (175) wide in mature proglottids. Seminal receptacle overlaps external seminal vesicle dorsally or ventrally. Ovary small, slightly antiporal, 199–366 (326) long, 376–676 (591) wide. Vitelline gland 91–147 (128) long, 120–201 (177) wide; resembles shallow horseshoe posterior to ovary. Index of asymmetry 0.53–0.58 (0.56). Numerous uterine fenestrations, no prominent anterior/posterior branches in developing uterus. Uterus ventral to external seminal vesicle, testes, and seminal receptacle, dorsal to ovary and osmoregulatory canals. Uterus only crosses osmoregulatory canals at posterior of proglottid. Developing uterus a fine reticulum, eventually forming lateral diverticula and with internal trabeculae.

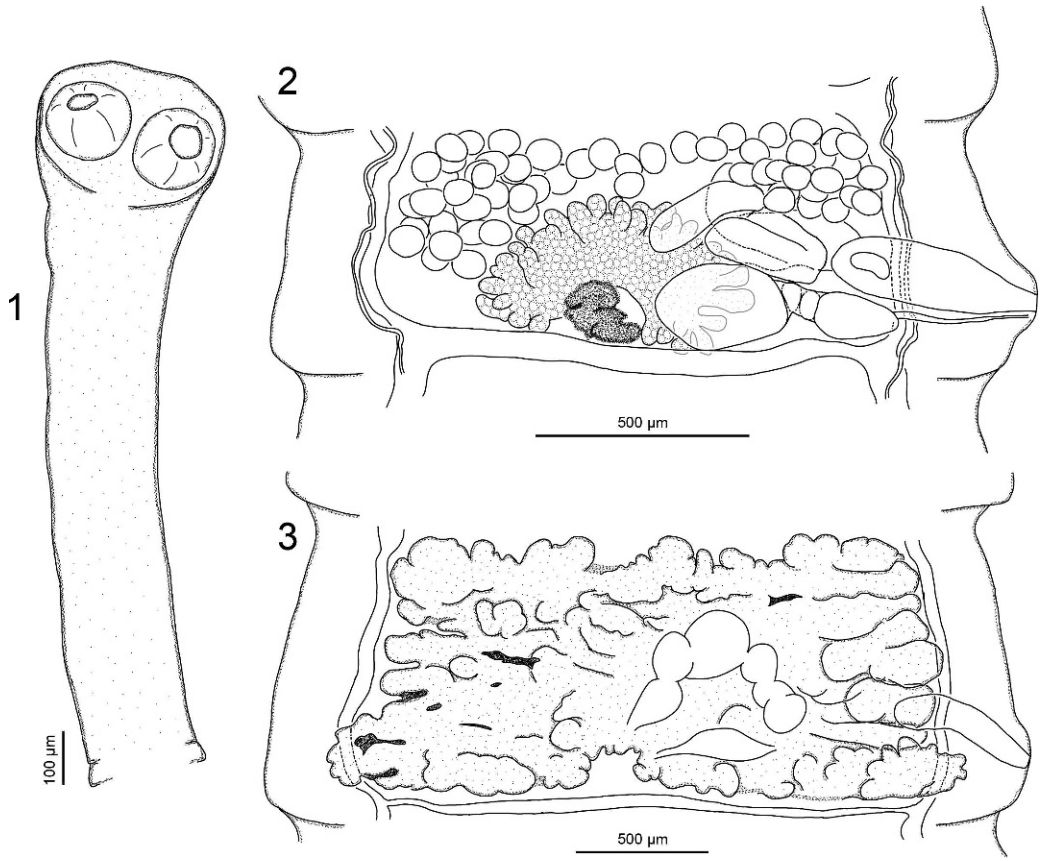
Remarks

In comparison with *Andrya rhopalocephala* (Riehm, 1881) Stiles, 1895, *A. vesicula* n. sp. has a shorter total length, lesser minimal width, lesser scolex width, smaller sucker diameter, and fewer testes. In comparison with *A. neotomae*, *A. vesicula* n. sp. can be distinguished principally by a large and winding external seminal vesicle in mature proglottids; *A. vesicula* n. sp. also has lesser total length, lesser maximal width, lesser scolex width, greater neck length, and more antiporal genitalia. Fully mature eggs were not observed, but egg shells were seen around embryophore primordia in some gravid proglottids. From this, we expect the eggs to be between 47 and 55 ($n = 5$) μm in diameter.

Table 1. Selected measurements (presented in μm, unless otherwise stated, and as range values followed by the mean in parentheses). For current study, the *n* value is shown in brackets.

Cestode species	*A. boliviensis* n. sp.	*A. octodonensis* (type material)	*A. octodonensis*	*A. neotomae*	*A. rhopalocephala*	*A. vesicula* n. sp.
Host	*Phyllotis osliae*	*Octodon degus*	*Phyllotis xanthopygus*	*Neotoma cinerea*	*Lepus europaeus*	*Phyllotis xanthopygus*
Source	Current study	Haukisalmi and Rausch (2006)	Current study	Haukisalmi and Rausch (2006)	Tenora and Murai (1978)	Current study
Total length	199 mm [1]	—	108–131 (120) mm [3]	144–174 mm	600–800 mm	78–92 (84) mm [4]
Width at widest	5.9 mm [1]	2.5–2.6 mm	3.1–3.7 (3.4) mm [3]	4.1–5.3 mm	4.5–5.5 mm	1.9–2.9 (2.3) mm [4]
Scolex width	540 [1]	0.31–0.35	288–372 (329) [2]	0.45–0.70	1,100–1,300	360–456 (404) [3]
Sucker diameter	180–192 (185) [4]	0.12–0.14	108–124 (116) [12]	0.19–0.30	450–550	150–176 (164) [12]
Neck length	680 [1]	0.35–0.40	40–1,064 (520) [3]	0.25–0.50	—	576–1,120 (845) [3]
Neck width (min)	512 [1]	0.22–0.33	260–420 (347) [3]	0.30–0.46	—	208–288 (259) [3]
Genital alternation	70 [1]	—	36–52 (44) [3]	—	—	52–74 (62) [4]
Testes number	42–68 (55) [3]	92–126	50–65 (63) [9]	57–115	80–90	56–68 (61) [12]
Cirrus length	364–373 (368) [3]	0.33–0.40	202–408 (287) [9]	0.32–0.57	350–400	342–465 (414) [12]
Ovary width	616–685 (646) [3]	0.40–0.65	677–1,020 (809) [9]	0.44–1.00	—	376–676 (591) [12]
Vitellarium width	174–180 (177) [3]	0.15–0.25	243–402 (320) [9]	0.19–0.38	—	120–201 (177) [12]
Index of asymmetry	0.49–0.50 (0.50) [3]	0.39–0.70	0.45–0.53 (0.49) [9]	0.41–0.48	—	0.53–0.58 (0.55) [12]
Testes distribution	1,610–1,740 (1,655) [3]	—	1,300–1,961 (1,586) [9]	—	—	779–1,162 (1,053) [12]
Testes diameter	42–76 (60) [15]	—	57–102 (77) [45]	0.05–0.10	60–80	41–79 (68) [60]
VLOC*	38–52 (44) [3]	—	29–61 (40) [9]	—	—	26–53 (36) [12]
Egg diameter	35–50 (41) [5]	—	63–84 (72) [10]	0.059–0.070	56–62	—
Pyriform length	13–15 (15) [5]	—	18–34 (26) [10]	—	—	—
Oncosphere diameter	8–8 (8) [5]	—	9–12 (10) [10]	—	—	—

* VLOC, ventral longitudinal osmoregulatory canal.



Figures 1–3. *Andrya vesicula* n. sp. **1.** Scolex. **2.** Mature proglottid. **3.** Gravid proglottid.

Taxonomic summary

Type host: Phyllotis xanthopygus (Waterhouse, 1837) (Myomorpha: Cricetidae).

Type locality/collection date: Bolivia, Department of Cochabamba, 16.5 km NW Colomi, 3,500 m elevation, 17°13′38″S; 65°57′26″W. July 1993.

Symbiotype designation: Phyllotis xanthopygus (NK30538).

Site of Infection: Small intestine.

Prevalence, intensity, and abundance of infection: 1 of 7 hosts infected with 5 cestodes.

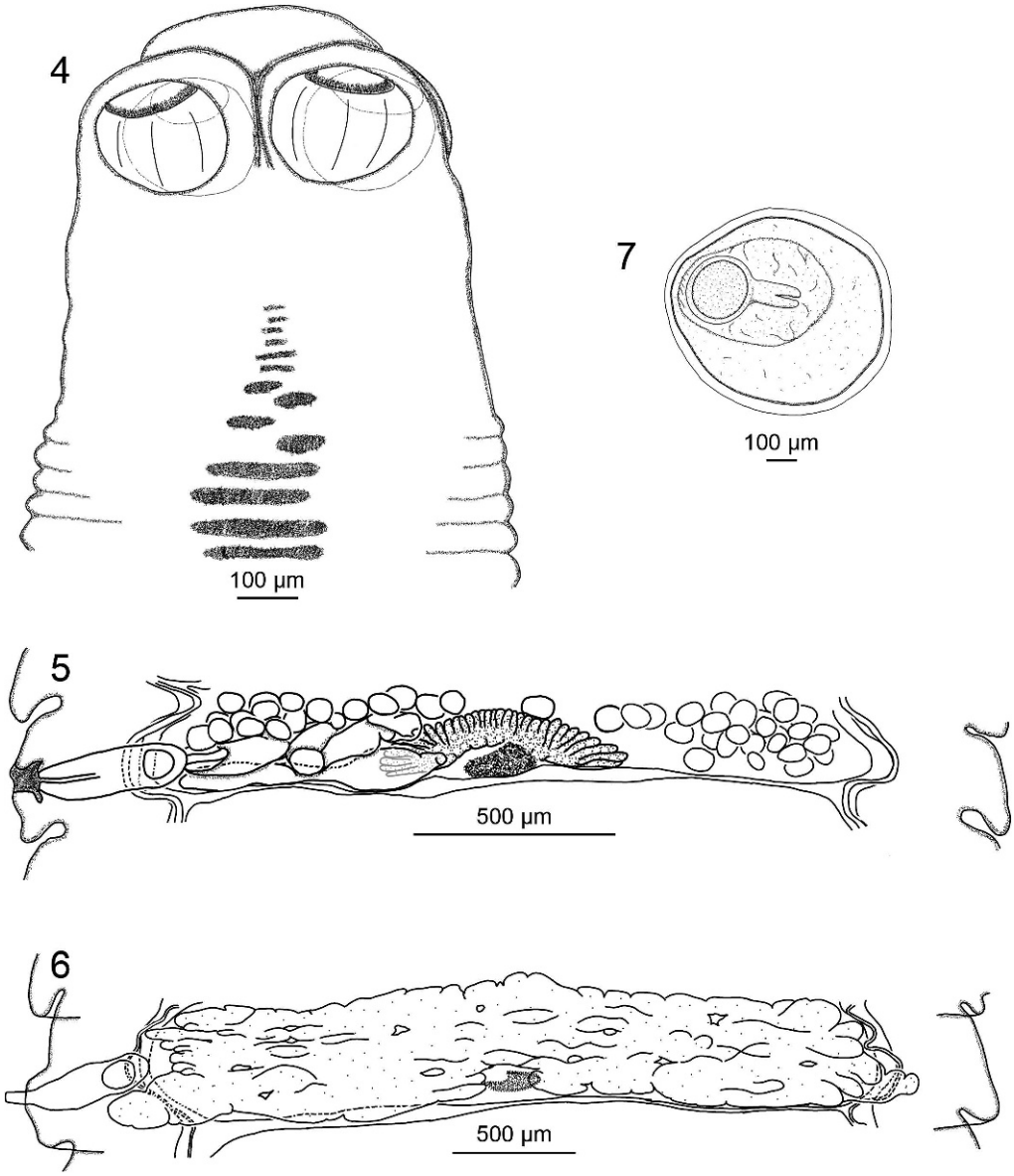
Specimens deposited: Holotype and paratypes, HWML62731 (4 specimens) (holotype = HWML 62731B).

Etymology: A. vesicula n. sp. is named for the distinctive external seminal vesicle.

Andrya boliviensis n. sp. (Figs. 4–7)

Description

Based on 1 specimen and 3 segments. Cestode 199 mm long, maximal width 5.9 mm. Scolex 240 long, 540 wide. Scolex not prominently developed apart from neck, suckers directed laterad or anteriolaterad, 180–192 (185) in diameter. Neck 680 long, minimal width 512. Adult cestode has 470 proglottids. Proglottids craspedote. Immature proglottids 94 long, 1,591 wide. Length:width ratio of immature proglottids 0.06. Mature proglottids 304–346 (320) long, 2,428–2,525 (2,469) wide. Length:width ratio of mature proglottids 0.13–0.14 (0.13). Gravid proglottids 679 long, 5,626 wide. Length:width ratio of gravid proglottids 0.12. Dorsal canal 13–16 (15) wide, overlapping ventral canal. Ventral canal 38–52 (44) wide with one transverse canal per proglottid. Transverse canal 9–40 (26) wide. Testes spherical or



Figures 4–7. *Andrya boliviensis* n. sp. **4.** Scolex. **5.** Mature proglottid. **6.** Gravid proglottid. **7.** Egg.

ovoid, 42–76 (60, n = 65) in diameter. Testes number 42–68 (55) per proglottid. Testicular distribution 1,610–1,740 (1,655). Internal seminal vesicle present. External seminal vesicle first seen as densely staining cells, becoming a prominent tube with no thick cellular coating. Cirrus sac 364–373 (368) long, 106–119 (112) wide in mature proglottids. Cirrus spined. Genital pores alternate irregularly, switching lateral margins 70 times per 100 proglottids. Number of proglottids in each unilateral set 1.4. Genital ducts pass osmoregulatory canals dorsally. Vagina enters genital atrium posterior to cirrus sac. Vagina 389–419 (405) long, no thick cellular lining. Seminal receptacle overlaps external seminal vesicle dorsally or ventrally. Seminal receptacle composed of many vesicles, maximum 639–689 (659) long and 90–107 (101) wide in mature proglottids. Ovary central, 142–162 (150) long, 616–685 (646) wide. Vitelline gland transversely elongated, 81–107 (92) long, 174–180 (177) wide; posterior to ovary. Index of asymmetry

0.48–0.50 (0.50). Egg diameter 35–50 (41, $n = 5$). Embryophore in form of pyriform apparatus, 13–15 (15, $n = 5$) long. Oncosphere 8 ($n = 5$) in diameter. Uterus dorsal to ovary and osmoregulatory canals, ventral to seminal receptacle and external seminal vesicle. Developing uterus a fine reticulum, eventually forming lateral diverticula with internal trabeculae.

Remarks

In comparison with *A. rhopalocephala*, *A. boliviensis* n. sp. has a shorter total length, lesser scolex width, smaller sucker diameter, smaller egg diameter, and fewer testes. In comparison with *A. neotomae*, *A. boliviensis* n. sp. can be distinguished by having a larger and winding external seminal vesicle. *Andrya boliviensis* n. sp. also has a smaller vitelline gland (in both dimensions), twice as many proglottids, and smaller eggs than *A. neotomae*. In comparison to *A. vesicula*, *A. boliviensis* n. sp. can be distinguished by having more than twice the number of proglottids, twice the total length, greater scolex and sucker width, smaller length:width ratio in mature and gravid proglottids, greater testicular distribution, more central genitalia, and longer seminal receptacle.

Taxonomic summary

Type host: Phyllotis osliae Allen, 1901 (Myomorpha: Cricetidae).

Type locality/collection date: Bolivia, Department of Cochabamba, 13km N of Colomi, 3,152 m elevation, 17°13′29″S; 65°53′30″W. June 1993.

Symbiotype designation: Phyllotis osliae: AMNH 268887 (NK29707)

Site of infection: Small intestine.

Prevalence, intensity, and abundance of infection: 1 of 1 host infected with 1 worm.

Specimens deposited: Holotype, HWML62273 (1 specimen).

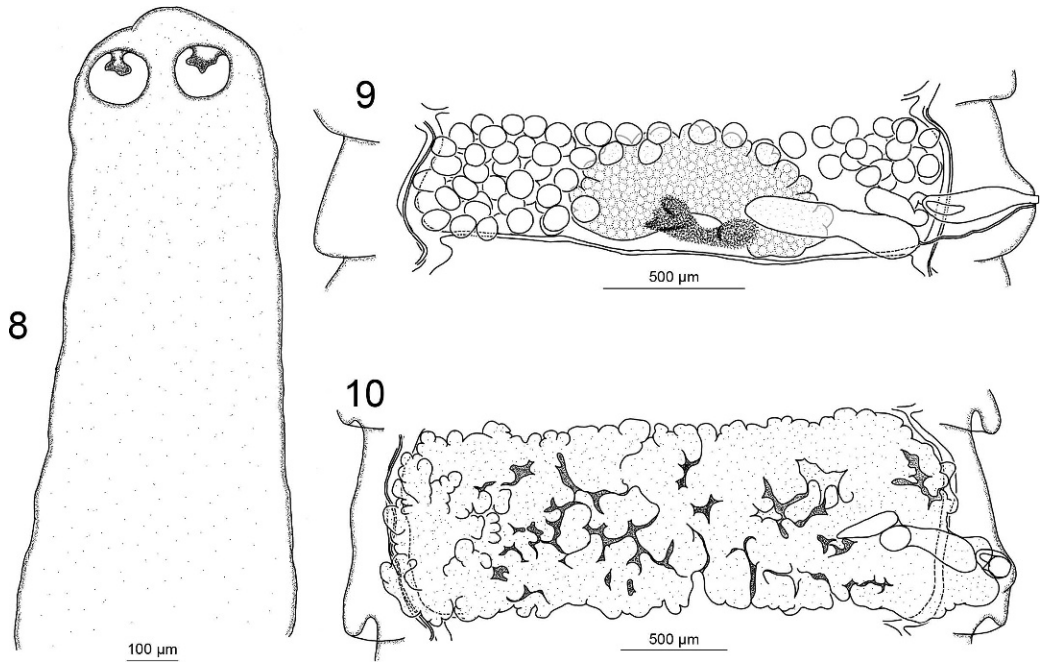
Etymology: A. boliviensis n. sp. is named after the country of Bolivia, from which these specimens were collected.

Andrya octodonensis (Babero et Cattan, 1975) Haukisalmi and Wickström, 2005 Syn: *Aprostatandrya octodonensis* Babero et Cattan, 1975

Paranoplocephala octodonensis (Babero et Cattan, 1975) Tenora et al., 1986 *Andrya neotomae* Voge, 1946 sensu Haukisalmi and Rausch, 2006 (in part) (Figs. 8–10)

Redescription

Based on 3 specimens and 9 segments. Cestodes 108–131 (120) mm long, maximal width 3.1–3.7 (3.4). Scolex 172–200 (186) long, 288–372 (329) wide. Suckers directed laterad, 108–124 (116) in diameter. Scolex not clearly separated from neck. Neck 40–1,064 (520) long, minimum width 260–420 (347). Adult cestodes have 224–244 (232) proglottids. Proglottids craspedote. Immature proglottids 104–312 (222) long, 1048–1,466 (1,264) wide. Length:width ratio of immature proglottids 0.10–0.24 (0.17). Mature proglottids 237–567 (405) long, 1,867–2,770 (2,210) wide. Length:width ratio of mature proglottids 0.11–0.22 (0.18). Gravid proglottids 1,248–1,622 (1,414) long, 2,246–3,307 (2,703) wide. Length:width ratio of gravid proglottids 0.41–0.72 (0.54). Dorsal canal 5–11 (7) wide. Dorsal osmoregulatory canal follows sinuous path, overlaps ventral canal. Ventral canal 29–61 (40) wide with one transverse canal per proglottid. Transverse canal 7–20 (13) wide. Testes spherical or ovoid, 57–102 (77, $n = 45$) in diameter, number 50–76 (63) per proglottid. Testicular distribution 1,300–1,961 (1,585). Testes continuous across anterior of proglottid, two thirds of testes antiporal. Internal seminal vesicle present, oblong or variable in shape due to everted cirrus. External seminal vesicle present with no deep-staining cells. Cirrus spined. Cirrus sac extends proximal to ventral osmoregulatory canal, 202–408 (287) long, 84–119 (101) wide. Genital pores alternate irregularly, switching lateral margins 36–52 (44) times per 100 proglottids. Number of proglottids in each unilateral set 2.1. Genital ducts pass osmoregulatory canals dorsally. Vagina 342–574 (454) long. Vagina enters genital atrium posterior to cirrus sac. Seminal receptacle rarely vesiculated, often appears as one large tube, maximum 492–707 (592) long and 77–160 (114) wide in mature proglottids. Ovary 266–471 (358) long, 677–1020 (809) wide. Vitelline gland resembles shallow horseshoe, 95–190 (139) long, 243–402 (320) wide; posterior to ovary. Index of asymmetry 0.45–0.53 (0.49). Egg diameter 63–84 (72, $n = 10$). Embryophore in the form of pyriform apparatus, 18–34 (26, $n = 10$) long. Oncosphere 9–12 (10, $n = 10$) in diameter. Uterus crosses osmoregulatory canals in posterior of segment; uterus crosses canals dorsally.



Figures 8–10. *Andrya octodonensis*. **8.** Scolex. **9.** Mature proglottid. **10.** Gravid proglottid. All scale bars = 0.1 mm.

Developing uterus a fine reticulum, eventually forming lateral diverticula and with internal trabeculae.

Remarks

Haukisalmi and Rausch (2006) recently reviewed the available material for *Andrya neotomae* Voge, 1946. In that work, they named *Andrya octodonensis* a junior synonym of *A. neotomae*. The measurements of our specimens are closely aligned with those given for *A. neotomae* sensu Haukisalmi and Rausch (2006) with the following exceptions: Our specimens have a shorter overall length 108–131 mm (120 mm), smaller maximum body width of 3.1–3.7 mm (3.4), smaller scolex width of 288–372 (329), and smaller sucker diameter of 108–124 (116). Those characters more closely align these specimens with the description of *A. octodonensis* than *A. neotomae*. Although Haukisalmi and Rausch (2006) did not consider these characters to be significant enough to validate *A. octodonensis* as separate from *A. neotomae*, we consider our specimens to belong to the former species and consider *Andrya octodonensis* to be a valid species. We are confident that our specimens are more representative of *A. octodonensis* since our specimens were collected and processed consistently and according to standard protocols (Gardner, 1996), i.e., the specimens were properly relaxed before fixation. *Andrya octodonensis* can be distinguished from *A. boliviensis* and *A. vesicula* by the lack of a large and winding external seminal vesicle in *A. octodonensis*. *Andrya octodonensis* can further be distinguished from *A. boliviensis* by having a lesser total length, lesser maximal width, lesser scolex width, smaller suckers, less frequent genital alternation, and larger eggs. *Andrya octodonensis* can be further distinguished from *A. vesicula* by having a greater total length, greater maximum width, fewer genital alternations, greater ovary width, more poral genitalia, greater testes distribution, and greater width of the vitelline gland and ovary. *Andrya octodonensis* can be distinguished from *A. rhopalocephala* by having a lesser total length, lesser maximal width, lesser scolex width, smaller sucker diameter, fewer testes, and larger eggs.

Taxonomic summary

Type host: Octodon degus (Molina, 1782) (Hystricomorpha: Octodontidae).

Type locality/collection date: Chile, Santiago, Quebrada de la Plata, 1974.

Site of infection: Small intestine.

Additional host: SNOMNH 34999 (OCGR7398): *Phyllotis xanthopygus* from Argentina, Jujuy, 8.2 km S of Sey, 24°00′48.8″S 66°30′52.8″W, 4,167 m, April 2006.

Prevalence, intensity, and abundance of infection: 2 of 17 *Phyllotis xanthopygus* infected with 2 cestodes per host.

Specimens deposited: HWML70042, HWML 70043, HWML70044, HWML70045.

DISCUSSION

Haukisalmi and Rausch (2006) discussed plausible explanations for the presence of an *Andrya* species in two mammalian hosts representing two different suborders of rodents (*Neotoma* of the Sciurognathi in North America and *Octodon* of the Hystricognathi in South America). One of their more plausible explanations for this pattern of parasitism is the presence of *Andrya* species within the sigmodontine rodents colonizing South America. With *A. vesicula* and *A. boliviensis* both parasitizing *Phyllotis* species (sigmodontine rodents), we provide evidence that sigmodontine rodents colonizing South America were likely infected with a precursor of *A. neotomae* that has since diversified. With other anoplocephaline cestodes being recently described from South American rodents (Denegri et al., 2003; Haverkost and Gardner, 2008), it is likely that more species of *Andrya* will be found in hystricognath or sciurognath rodents in Central and South America when field expeditions are undertaken in those countries targeting those taxa. The discovery of *A. vesicula* and *A. boliviensis*, along with the additional material collected by Dr. Jiménez and its similarity to *A. octodonensis*, may lessen the likelihood of the *A. octodonensis* type material being the result of a "technical error" (Haukisalmi and Rausch, 2006). Anoplocephaline cestodes are not commonly known from Central and South America (except species of *Monoecocestus*), but it is evident that the lack of specimens is correlated to a lack of adequate sampling in these areas.

The description of *A. boliviensis* is based on one specimen collected in Bolivia in 1993. We recognize that descriptions based on a single specimen cannot reflect intraspecific variation of that species. This may cause taxonomic problems in the future if it is found that the *A. boliviensis* is, in fact, not a valid species. However, no cestode has been described from *Phyllotis osliae* (to our knowledge) since the collection of our specimen in 1993. We feel that the lack of any taxonomic studies from this region and from this host in the past 16 yr is a larger problem of both biodiversity description and documentation and dwarfs the small taxonomic problem that may arise from this work. We describe *A. boliviensis* in the hopes of encouraging further studies of Neotropical mammalian parasitology that will address such taxonomic problems.

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