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Rabbium paradoxus sp. n. (Seuratidae: Skrjabinelaziinae) Maturing in *Camponotus castaneus* (Hymenoptera: Formicidae)

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ABSTRACT: *Rabbium paradoxus* sp. n. (Seuratidae: Skrjabinelaziinae) is described from workers of the ant *Camponotus castaneus* (Hymenoptera: Formicidae) from Florida. This is the first report of males of the genus *Rabbium* and the first report of a member of the Seuratidae that develops to the adult stage inside an invertebrate host. All other members of this family occur in the alimentary tract of reptiles, especially lizards. Males and females of *R. paradoxus* occurred together in the abdominal body cavity of worker ants. Female parasites contained completely embryonated eggs.

KEY WORDS: *Rabbium,* Nematoda, *Camponotus,* ant.

Specimens of *Camponotus castaneus* parasitized by nematodes were collected in Florida by James C. Trager. These nematodes, which were submitted to the senior author for identification, showed strong affinities with the Spirurida and represent a new species of *Rabbium* M. B. Chitwood. The genus *Rabbium* contains a single species, *R. caballeroi* M. B. Chitwood (1960), which is a parasite in the stomach of the lizard *Leiocephalus carinatus* in the Bahama Islands. The genus *Rabbium* was originally described in the family Thelazeidae of the superfamily Spiruroidea, but is now placed in the subfamily Skrjabinelaziinae of the family Seuratidae. This new species of *Rabbium* is unique because it is the first representative of the Seuratoidea known to mature and apparently complete its life cycle in invertebrates, in this case, ants of the genus *Camponotus.*

Materials and Methods

Preserved workers of the ant species *Camponotus castaneus* infected with *Rabbium* nematodes were submitted in a solution of 1% propionic acid, 10% formalin, and 89% water by volume. The specimens were either processed and mounted in glycerin or placed in lactophenol for 3 wk at 32°C, then mounted in lactophenol on standard microscope slides. The latter method of mounting proved helpful in relaxing and partially clearing the specimens, permitting easier viewing of the stoma, excretory pore, rectal area, and genital system.

The infected worker ants were collected on 22 July 1987 by J. C. Trager in the San Felasco Hammock State Preserve, Alachua Co., Florida. The parasites occurred in the body cavity of the host, and 1 ant contained 5 oviparous females and 3 males in its abdominal cavity (Fig. 1).

Results

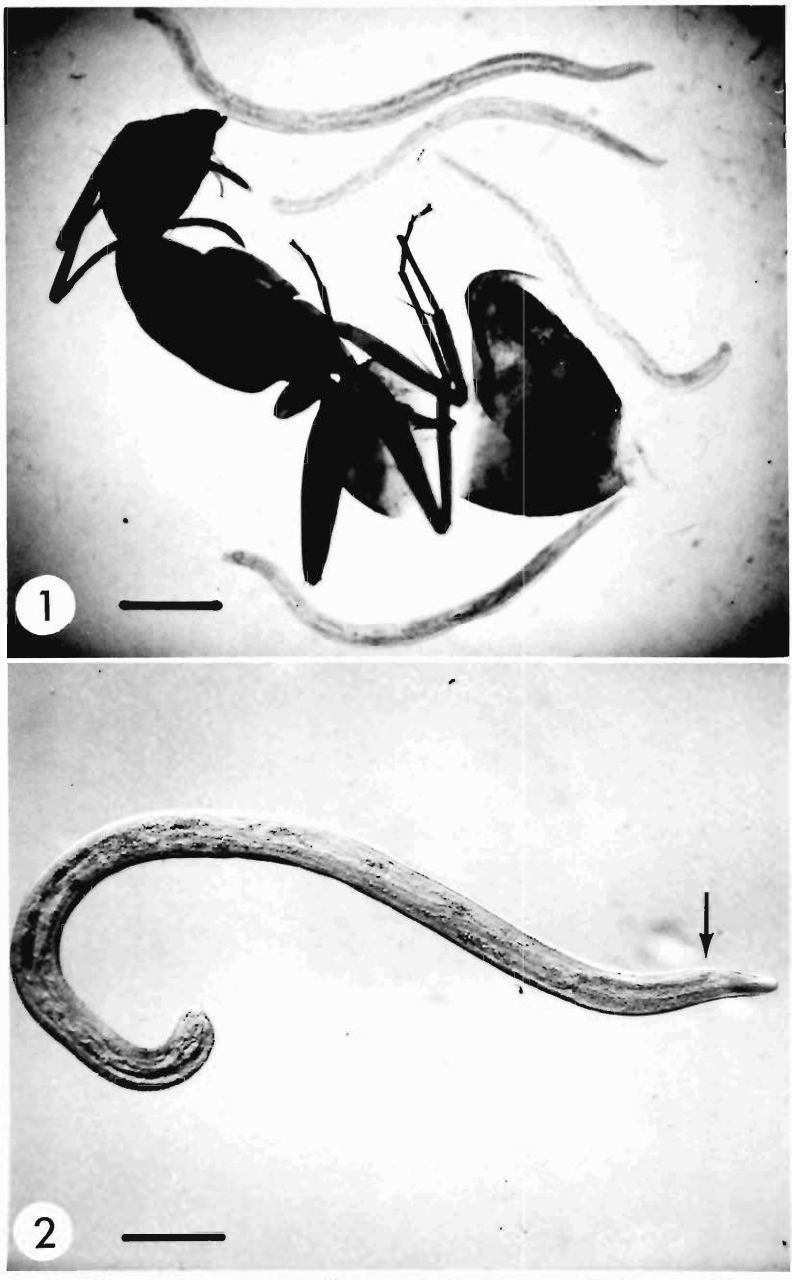
Male and gravid female nematodes were collected from the abdominal cavities of parasitized ants (Figs. 1, 2). A comparison of the females with the description of *Rabbium caballeroi* M. B. Chitwood (1960) showed that both nematodes were congeneric but belonged to different species. Dimensions are given as means followed by range in parentheses.

Rabbium paradoxus sp. n. (Figs. 1–10)

Description

GENERAL: *Rabbium* M. B. Chitwood, 1960; Skrjabinelaziinae Chabaud, Campona-Routeg, and Brygoo; Seuratidae (Hall); Seuratoidea (Hall); Ascaridida.

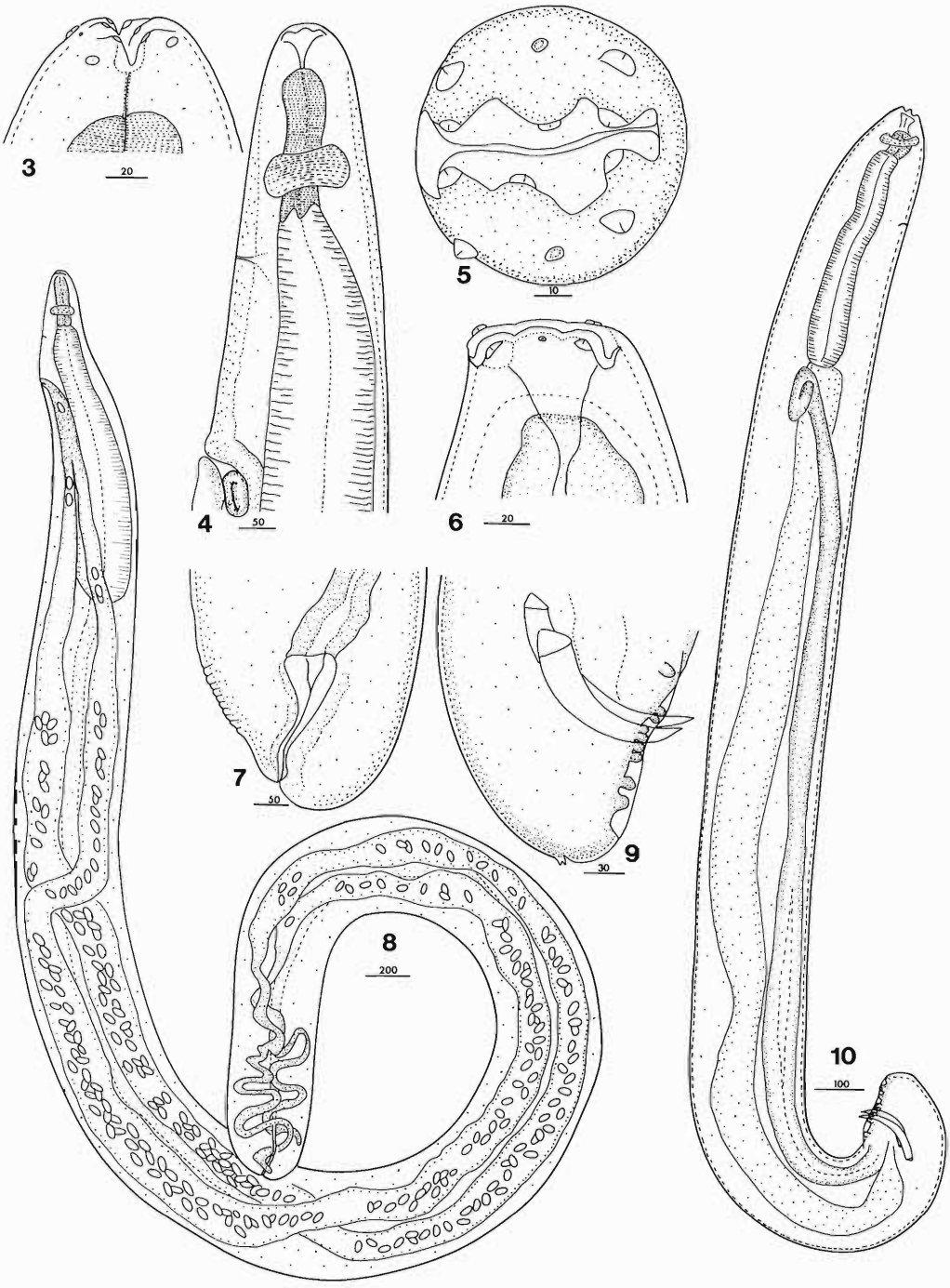
ADULTS (Figs. 1–10): Medium-sized, rather stout nematodes with blunt anterior end and bluntly rounded posterior end; cuticle with distinct transverse striations ranging from 12 to 19 μm in thickness, pseudolabia bearing 6 labial papillae, 4 cephalic papillae, and paired amphids located further posteriorly; mouth and stoma dorsoventrally elongated; pharynx divided into a short muscular anterior and a long glandular posterior portion; intestine reduced, seemingly degenerate; rectum distinct, anus terminal or subterminal. Females didelphic and opisthodelphic with the vulva located posterior to the excretory pore in the cervical region; ovaries extend tortuously to the posterior end, filled with relatively thin walled, smooth shelled eggs containing fully developed juveniles that possess a small apical thorn; males smaller than females, similar in gen-



Figures 1, 2. ***Rabbium paradoxus*** **sp. n. 1. Four gravid females removed from the abdominal cavity of the figured worker ant,** ***Camponotus castaneus*** **(bar = 1.7 mm). 2. Gravid female removed from the abdominal cavity of a** ***Camponotus castaneus*** **worker (arrow denotes position of vulva) (bar = 0.9 mm).**

eral structure; testis single, may or may not be once or double reflexed at tip; spicules paired, separate, subequal, slightly curved, triangular in cross section, pointed at tip, with the left one slightly longer than the right; narrow bursa supported by 8–9 small knoblike genital papillae, gubernaculum absent. Parasites of ants.

FEMALES (Figs. 1–8) (*N* = 10): All measurements are in micrometers unless otherwise stated. Length 8.0 (5.1–9.3) mm; greatest width 440



Figures 3–10. ***Rabbium paradoxus*** **sp. n. (all measurements in micrometers). 3. Dorsal view of female head. 4. Lateral view of female pharyngeal region. 5. En face view of female. 6. Lateral view of female head. 7. Lateral view of female tail. 8. Lateral view of female. 9. Lateral view of male tail. 10. Lateral view of male.**

(350–610); length of stoma 35 (25–54); greatest width of stoma (dorsoventrally) 54 (41–63); length from head to excretory pore 259 (176–409); from head to nerve ring 170 (151–202); from head to vulva 440 (315–599); from head to base of muscular pharynx 193 (157–252); from head to base of glandular portion of pharynx 1,385 (1,070–1,575); length of tail 32 (0–88); width at anus 124 (75–220); length of vagina 372 (252–454); length of eggs 61 (54–63); width of eggs 32 (25–38).

MALES (Figs. 9, 10) ($N = 3$): Length 2.6 (2.4–2.7) mm; greatest width 214 (201–233); length of stoma 12 (12–13); greatest width of stoma (dorsoventrally) 29 (25–32); distance from head to excretory pore 174; from head to nerve ring 85 (79–95); from head to base of muscular portion of pharynx 86 (70–95); from head to base of glandular portion of pharynx 517 (473–542); length of tail 96 (94–101); width at cloaca 145 (132–158); length of right spicule 115 (79–139); length of left spicule 147 (104–178); greatest width of right spicule 18 (6–25); greatest width of left spicule 25 (19–32).

TYPE SPECIMENS: Holotype female and allotype male deposited in the Nematology Collection at the University of California, Davis, California. Paratype females at the Laboratoire de Zoologie (Vers), Paris.

TYPE HOST: *Camponotus castaneus* (Latreille) (Hymenoptera: Formicidae).

TYPE LOCALITY: San Felasco Hammock State Preserve, Alachua County, Florida, U.S.A.

Diagnosis

The new species *R. paradoxus* can be distinguished from the only other species in the genus, *R. caballeroi,* by the larger egg size (30 μm wide by 40 μm long in *R. caballeroi* and 30 μm wide by 60 μm long in *R. paradoxus*), the egg shell texture (rugose in *R. caballeroi* and smooth in *R. paradoxus*), and overall length (11–12 mm in *R. caballeroi* and 5–9 mm in *R. paradoxus*). Males of *R. caballeroi* are unknown.

Redescription of subfamily

With the addition of *Skrjabinelazia galliardi* Chabaud, 1973, and *Rabbium paradoxus,* the subfamily Skrjabinelaziinae is hereby redefined as follows: Seuratidae; Seuratoidea; Ascaridida; mouth triangular without lips or modified lips on the inner faces of paired pseudolabia; buccal capsule varies from cylindrical to triangle-shaped, sometimes with a crown of small teeth; normally 10 anterior papillae and paired amphids present; pharynx may be simple or divided into a muscular anterior and glandular posterior portion; cuticle varies from smooth to bearing transverse striations; tail variable, may be absent in some females; bursa present or absent, genital papillae present, mostly post anal; spicules mostly present, usually unequal; gubernaculum present or absent; female with vulva placed anteriorly at the level of the pharynx, eggs become completely embryonated in female; oviparous or ovoviviparous; adults occur in the alimentary tract of reptiles and rarely in the body cavity of insects.

Discussion

Rabbium paradoxus is the first member of the Seuratoidea with adults which mature and develop in invertebrates. The females of *R. paradoxus* are closely related to those of *R. caballeroi,* which occur in the stomach of the lizard *Leiocephalus carinatus* from the Bahamas. Although the life cycle of *R. caballeroi* is not known, the immature stages could be in ants. *Rabbium paradoxus* may have a vertebrate host (possibly a lizard) in some portion of its range, but in Florida the nematode is able to complete its development in the intermediate host. The selection pressure to achieve this could have been the decline or possible extinction of the original vertebrate host.

In the present case, the ant *Camponotus castaneus* has taken over the role of the vertebrate host. This ant species is native to the eastern portion of the United States and southeastern portion of Canada. Parasitized workers were easily recognized in the field by their swollen gasters and unusual behavior of daytime movement. Normally, *C. castaneus* will forage only at night. It is a generalist feeder with a likeness for sweets (fruits), but does also feed at vertebrate feces (Trager, pers. comm.).

A study on the life history of another member of this subfamily, *Skrjabinelazia galliardi,* recently has been undertaken (Chabaud et al., 1988). This nematode is a parasite of a sphaerodactyline lizard (*Gonatodes humeralis* Guichenot) in Brazil. The females produce eggs that contain third-stage juveniles. These eggs are voided with the feces, and when ingested by insects, hatch, and the nematodes enter the insect's body cavity. They

remain as third-stage juveniles without further development, and the cycle is completed when the insect is eaten by a lizard.

In the case of *R. paradoxus,* it appears that at least with this population, the cycle could continue in the invertebrate line if worker ants ingest the eggs by consuming the bodies of their parasitized nestmates. Eggs of *R. paradoxus* containing juveniles were found throughout the abdominal cavity of parasitized ants. Since the parasites are located in the body cavity of the insect, the eggs would be unable to pass out of the ant naturally, as they would with *R. caballeroi* in the lizard. Therefore, if the parasite is restricted to ants, transmission must occur after the host's death. It is not known if the nematodes bring about the ant's death from a depletion of nutrients or possible rupture of the abdominal cavity, but considering the parasite burden in some instances, the latter is a definite possibility.

Literature Cited

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MEETING SCHEDULE
HELMINTHOLOGICAL SOCIETY OF WASHINGTON
1989–1990

(Wed) 11 Oct 1989	"Selected Epidemiology Topics," Uniformed Services University of the Health Sciences, Bethesda, MD
(Wed) 15 Nov 1989	"*Haemonchus* and Haemonchiasis—Old Questions and New Answers," Animal Parasitology Unit, U.S. Department of Agriculture, Beltsville, MD
(Wed) 6 Dec 1989	"To Be Announced," Plant Protection Institute, U.S. Department of Agriculture, Beltsville, MD
(Wed) 10 Jan 1990	"To Be Announced," Laboratory of Parasitic Diseases, National Institutes of Health, Bethesda, MD
(Wed) 14 Feb 1990	"Recent Advances in Pre-erythrocytic Stage Malaria Vaccine Development," Department of Immunoparasitology, U.S. Naval Medical Research Institute, Bethesda, MD
(Wed) 14 Mar 1990	"Antiparastic Diseases Drug Development," Division of Experimental Therapeutics, Walter Reed Army Institute of Research, Washington, DC
(Wed) 11 Apr 1990	"To Be Announced," School of Hygiene and Public Health, The Johns Hopkins University; and Medical College, University of Maryland, Baltimore, MD
(Sat) 5 May 1990	"To Be Announced," Department of Pathobiology, Veterinary School, University of Pennsylvania, New Bolton, PA; Royal Society of Tropical Medicine and Hygiene; and New Jersey Society for Parasitology
(Sat) August 1990	"To Be Announced," Crabfest, Easton, MD

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