

Octomyomermis arecoensis n. sp. (Nematoda : Mermithidae), parasitizing midges (Diptera : Chironomidae) in Argentina, with some observations on its bionomics ⁽¹⁾

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SUMMARY

Octomyomermis arecoensis sp. n. is described from *Eukefferiella* sp. (Diptera : Chironomidae) larvae obtained from Areco river, Argentina. Diagnostic characters of this species include a mouth terminal and central, six cephalic papillae, eight hypodermal chords, amphids medium sized, rounded and oval, vagina barrel-shaped, two medium spicules (77.5-84.5 µm) slightly curved, genital papillae in three rows, the ventral one with nine pre-anal and seven to nine post-anal papillae, elliptical eggs, post-parasitic juveniles without tail. Parasitic development lasts from 7 days at 20 °C. Natural infections occur in August, September, October, November and December, and reach 70 % in October. Artificial infections are successful under laboratory conditions. Investigations are being continued to evaluate the effectiveness and potential of this parasite as a biological control agent.

RÉSUMÉ

Octomyomermis arecoensis n. sp. (Nematoda : Mermithidae) parasite de chironomes (Diptera : Chironomidae) en Argentine et observations sur sa biologie

Description est donnée d'*Octomyomermis arecoensis* n. sp., parasitant des larves d'*Eukefferiella* sp. (Diptera : Chironomidae) récoltées dans la rivière Areco, en Argentine. Les caractères diagnostiques de cette espèce sont : ouverture buccale terminale et centrale, six papilles céphaliques, huit cordes hypodermiques, amphides rondes ou ovales de taille moyenne, vagin en forme de tonneau, deux spicules légèrement courbes de longueur moyenne (77,5-84,5 µm), papilles génitales disposées sur trois rangées, la rangée ventrale comprenant neuf papilles préanales, les post-anales au nombre de sept à neuf, des œufs ovales, des juvéniles pré-infestants dépourvus de queue. Le développement parasitaire dure sept jours à 20 °C. Les infestations naturelles ont lieu en août, septembre, octobre, novembre et décembre et atteignent 70 % en octobre. Les infestations artificielles sont positives dans les conditions du laboratoire. Les recherches se poursuivent pour évaluer les potentialités de ce parasite en tant qu'agent de lutte biologique.

The parasitizing of midges (Diptera : Chironomidae) by mermithids is known at present in nearly twenty species described in Europe, North America and South America. Specially in Argentina two mermithids *Octomyomermis albicans* Camino, 1985 and *Isomermis ventania* Camino, 1987, are reported both parasitizing the midge *Cricotopus* sp.

These species cited all over the world belong to eleven genus in which *Hydromermis* Corti, 1902, is the most frequent parasite of chironomids (Corti, 1902; Johnson, 1965, 1971; Poinar, 1968; Hominick & Welch, 1971; Poinar & Tourenq, 1972).

Another contribution to this is a parasite called *Octomyomermis arecoensis* n. sp. found in larvae of *Eukefferiella* sp. (Diptera : Chironomidae) described in Buenos

Aires, Argentina. Pre-parasitic and parasitic juveniles are included in the description, and some observations are made on its life cycle.

Material and methods

Larvae of *Eukefferiella* sp. were found with mermithids in the river Areco, Buenos Aires Province, Argentina, taking samples during 1986. They were maintained in containers with dechlorinated tap water and an air-pump, at 20 °C, until the nematodes emerged.

The post-parasitic juveniles were placed in Petri dishes with distilled water with a layer sand in the bottom at 20 °C.

Adults and post-parasitic juveniles were observed alive and then killed in 60 °C distilled water for 3 se-

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conds, fixed in TAF and processed to glycerol by Seinhorst's method for taxonomic studies (Curran & Hominick, 1980). Viable material was maintained in the laboratory at 20 °C for life cycle studies.

Histological sections for longitudinal chords determination were made by fixing the nematodes in Bouin's fluid, passing them through an alcohol series to paraplast, sectioning at 10 µm and staining with the hematoxylin-eosin technique. Apical view of the head was prepared in glycerine jelly (Hooper, 1970).

Morphological studies on the pre-parasitic and parasitic juveniles were made on living material stained with a 1 % aqueous solution of New blue R (Poinar, 1975).

Drawings and measurements were made from living and fixed specimens with a camera lucida and a micrometer in a Zeiss light microscope.

Octomyomermis arecoensis n. sp.

(Fig. 1)

DIMENSIONS

Males (paratypes; n = 16) : L = 7-10 mm (8 ± 1.04); width of head at level of cephalic papillae : 30.5-40 µm (35 ± 3.48); width of body at level of nerve ring = 66-77.5 µm (71 ± 4.35); maximum width of the body = 103.5-117.5 µm (110.5 ± 5.39); width of body at level of anus = 80-92 µm (85 ± 4.31); cuticle thickness at head papillae = 2.5-3 µm (3 ± 0.17), at nerve ring = 3-4 µm (3.5 ± 0.33), at base of trophosome = 2.35-2.82 µm (2.54 ± 0.21); oesophagus width = 2.5-3.5 µm (2.8 ± 0.52); oesophagus length = 2.11-3.64 mm (2.47 ± 0.49); distance from head to nerve ring = 164.5-178.5 µm (170.5 ± 4.32); distance from anus to tail = 108.5-124.5 µm (118 ± 4.90); spicules = 77.5-84.5 µm (81.4 ± 2.56); width of spicules in the middle = 9.5-12 µm (10 ± 0.98); basal width of spicules = 10.5-13 µm (12 ± 0.65); testes = 1.41-1.88 mm (1.65 ± 0.16).

Females (paratypes; n = 10) : L = 9-12 mm (10.1 ± 1.10); width of head at level of cephalic papillae = 37.5-47 µm (41.2 ± 3.43); width of body at level of nerve ring = 75-82 µm (77.2 ± 2.82); maximum width of body = 103.5-124.5 µm (115.9 ± 7.96); width of body at level posterior end of trophosome = 75-87 µm (80.4 ± 2.88); width of body at level of vulva = 117.5-127 µm (124 ± 3.53); cuticle thickness at head papillae = 3.5-4 µm (3.8 ± 0.17), at nerve ring = 4-5 µm (4.6 ± 0.24), at base of trophosome = 3-4 µm (3.5 ± 0.17); oesophagus width = 3.8-4.2 µm (4.05 ± 0.16); oesophagus length = 2.58-3.76 mm (3.06 ± 0.38); distance from head to nerve ring = 146-216 µm (161.9 ± 23.65); V = 46.9-49.9 (49.2 ± 1.16); length of vagina = 73-77.5 µm (74.96 ± 1.33); width vagina = 47-54 µm (49.8 ± 1.85); ovary = 1.79-2.02 mm (1.93 ± 0.06).

Holotype (male) : L = 8 mm; width of head at level of cephalic papillae = 35 µm; width of body at level of nerve ring = 75 µm; maximum width of the body = 110.5 µm; width of body at level of anus = 87 µm; cuticle thickness at head papillae = 3 µm, at nerve ring = 3.5 µm, at base of trophosome = 2.5 µm; oesophagus width = 2.5 µm; oesophagus length = 2.4 mm; distance from head to nerve ring = 171.5 µm; distance from anus to tail = 117.5 µm; spicules = 82 µm; width of spicules in the middle = 9.5 µm; basal width of spicules = 12 µm; testes = 1.64 mm; length and width of amphids = 14 µm × 9.5 µm; amphid pore = 5 µm × 7 µm.

Allotype (female). L = 10 mm; width of head at level of cephalic papillae = 40 µm; width of body at level of nerve ring = 75 µm; maximum width of body = 115 µm; width of body at level posterior end of trophosome = 80 µm; width of body at level of vulva = 125 µm; cuticle thickness at head papillae = 4 µm, at nerve ring = 4.5 µm, at base of trophosome = 3.5 µm; oesophagus width = 4 µm; oesophagus length = 2.89 mm; distance from head to nerve ring = 183 µm; V = 49.9; vagina length = 75 µm; vagina width = 49 µm; ovary = 1.95 mm; length and width of amphids = 11.5 µm × 7 µm; amphid pore = 6 µm × 6.5 µm.

DESCRIPTION

Female : No protruding vulva, no developed vulval lips. Cuticle thickened at vulva. Vagina barrel-shaped, with the base in the ventral chord, with a straight vaginal canal perpendicular to the axis of the body. The uterus muscular, of constant diameter with wider lumen. At the end of the vagina the uteri diverge, one is directed anteriorly and the other posteriorly, each go straight, have a simple arch. The oviducts have one region which shows many folds, the same diameter as the uterus. There is a constriction between oviduct and ovary. In gravid females the uterus and oviduct are filled with eggs.

Eggs : Ellipsoidal, oval in shape, 51.7-64 µm (54.52 ± 6.44) × 35.25-48 µm (41.02 ± 6.38) *in situ*, unembryonated and unornamented. Smooth shell, without any cover.

Male : Two medium, parallel spicules, slightly curved, walls thin; length slightly exceeds the body width at anus. Spicule tip rounded, plain, without any sculpture. Genital papillae arranged in three rows, the medium row with 9 pre-anal and 7 to 9 post-anal papillae, the lateral rows with 21 papillae each one.

Pre-parasitic larva (n = 10) : Length 545-713 µm (620 ± 84.16); width of body 15-20.7 µm (18 ± 2.85). Cuticle smooth. Stylet widens at end, 5 µm long. Long oesophagus which extends more than the middle of the body length, near 4/7 long. The penetration glands

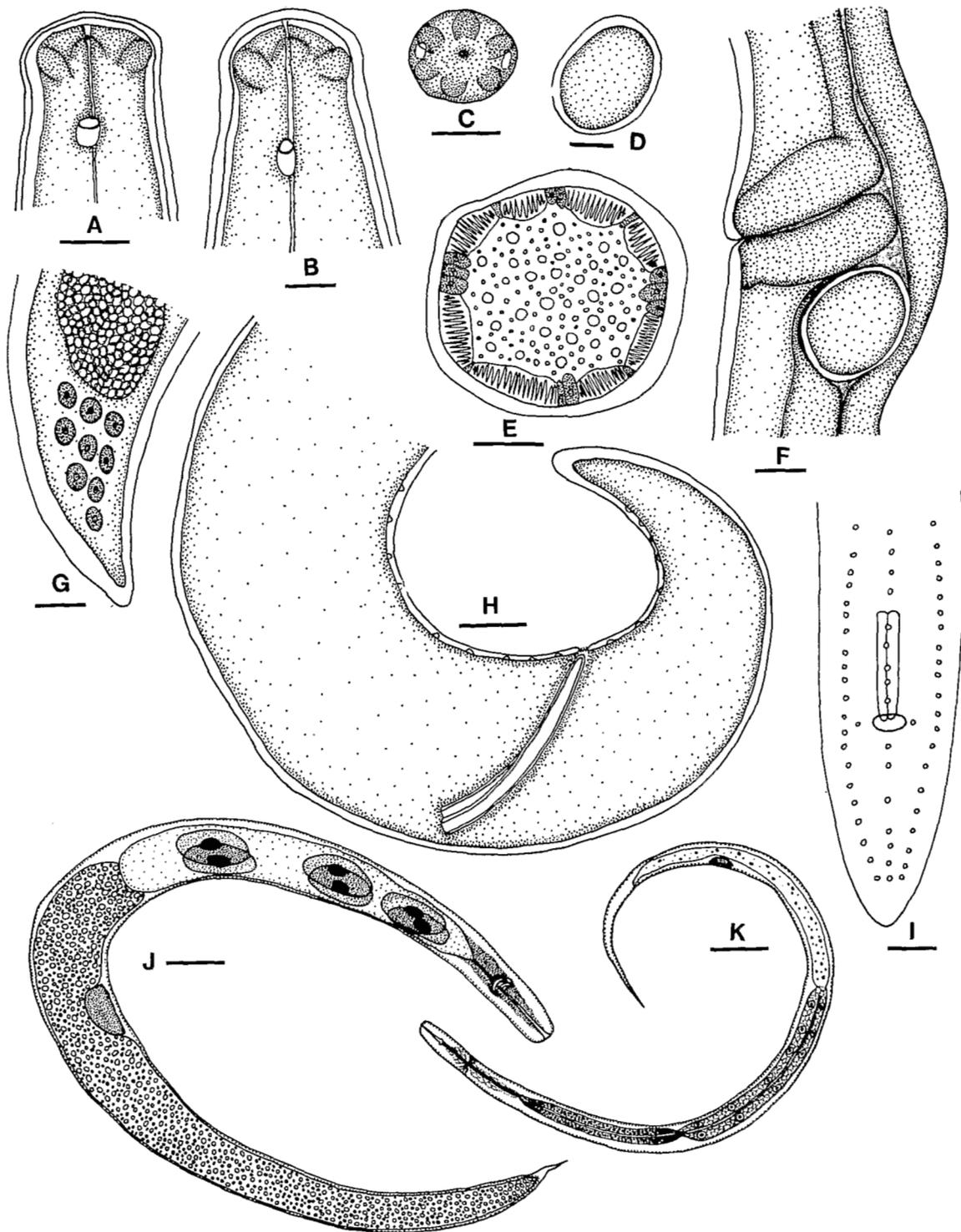


Fig. 1. *Octomyomermis arecoensis* n. sp. A : Lateral view of male head; B : Lateral view of female head; C : *En face* view of the male head; D : Egg; E : Cross section at midbody; F : Vagina; G : Lateral view of post-parasitic juvenile tail; H : Lateral view of male tail; I : Ventral view of male tail; J : Parasitic juvenile; K : Pre-parasitic juvenile. (Bars = 50 μ m).

are present. Stichosome with twelve stichocytes. Intestine has few granules, anus is present. Gonad primordium is situated ventral in the posterior portion, about 1/3 of the intestine. Short and thin tail.

Parasitic larva (n = 10) : This stage changes during the parasitic life. The stylet is rudimentary and disappears just at the end of the parasite life. The oesophagus is shorter than in the L 2 and occupies 1/2 long. The pharyngeal glands are atrophied. Stichosome increases greatly in size. Intestine is enlarged and full of globules; the anus is lacking. Gonad primordium localized at midbody in the ventral position. Very short and thin tail.

TYPE HOST AND LOCALITY

Larvae of *Eukefferiella* sp. (Diptera : Chironomidae), Areco river, Buenos Aires, Argentina (coll. N.B. Camino, 1986).

TYPE MATERIAL

Holotype, allotype and paratypes deposited in the CEPAVE, Entomonematodes Division, Argentina. Paratypes deposited at the Zoology Division of Invertebrata, Museum of Natural Sciences, La Plata, Argentina.

DIAGNOSIS

(Mermithidae Braun, 1883; *Octomyomermis* Johnson, 1963). Adult cuticle without visible cross fibres. In living specimens the trophosome is white. Eight hypodermal chords : subdorsal and subventral chords with one row of cells, lateral chord with two rows of cells in front of nerve ring and three behind it, dorsal and ventral chords with two rows of cells. Head homocephalic. Mouth terminal and central. Six cephalic papillae arranged in a circle around the mouth. Amphids medium size, round and oval, without commissure, with globular pore. Oesophagus of uniform width and extending for more than one-third of the body length. Vagina barrel-shaped. Spicule paired. Elliptical eggs. Post-parasitic juvenile without tail appendage.

RELATIONSHIPS

Octomyomermis arecoensis n. sp. is close to *O. itascensis* Johnson, 1963 (USA) and *O. albicans* Camino, 1985 (Argentina) — both parasite of midges — and to *O. muspratti* (Obiamiwe & MacDonald, 1973), a parasite of mosquitoes in Africa. These species are similar to our new species in having the same vagina shape and the same terminal and central mouth.

O. itascensis differs from *O. arecoensis* n. sp. by having short spicules (24-28 µm), the number of the genital papillae is variable, 21 to 49 in one or two rows pre-anal and 18 to 33 in double rows post-anal, the eggs are spherical, the diameter is 69 µm.

O. albicans can be separated from our new species in its long spicules (200-204 µm), and the genital papillae of the middle row has 11 pre-anal and 7 post-anal papillae.

O. muspratti is distinguished in its typical head constriction, long spicules (115 ± 2.3 µm), post-anal papillae are indistinct and scattered, the egg measures 80 µm × 70 µm.

O. troglodytis Poinar & Sanders, 1974, a parasite of mosquitoes in USA can be shared with *O. arecoensis* n. sp. in the length of the spicules but it differs having the mouth slightly displaced ventrally, the pre-anal papillae arranged in number of 19 to 23 and post-anal 10 to 15 papillae and the eggs diameter are 78 µm × 93 µm.

In 1968 Rubzov described *Capitomermis crassiderma* and Mulvey and Nickle (1978) *C. micropeos*, both species possessed the basic characters of the genus *Octomyomermis* (Poinar & Sanders, 1974). These species are separated from *O. arecoensis* n. sp. by having the spherical head shape with strongly thickened cuticle, amphids situated posterior to level of cephalic papillae, few genital papillae, tail in both sexes terminating in a pointed tail.

LIFE CYCLE

Post-parasitic juveniles of *O. arecoensis* n. sp., molt (double molt) to the adult stage 11 days after leaving their host. They began mating within the next day and it is usually completed in 10 hours. Then the male and female separate, the oviposition starts 12 hours after the mating. One female deposits 200 eggs without any covered. The eggs hatch in 10 days. The pre-parasitic juveniles survive 1 to 2 days at 20 °C without finding the host. Laboratorial infection is achieved by placing larvae of *Eukefferiella* sp. 24 hours in Petri dishes containing infective juveniles of the nematode. Only the second stage of *Eukefferiella* sp. larva is infected, first and later stages are not infected.

The pre-parasitic juveniles enter the host by direct penetration through the cuticle of the abdomen and into the hemocoel of the host. Parasitic juveniles development takes 7 days.

Parasitized larvae of *Eukefferiella* sp. are recovered from August to December 1986, although the highest rates of infection are found in spring reaching a 70 % infection in October.

A single infection of *Eukefferiella* sp. larvae is common, the maximum number of nematodes found in one host is six.

No pupae and adults of *Eukefferiella* sp. are found parasitized.

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