

***Agamermis decaudata* Cobb, Steiner & Christie, 1923 (Nematoda: Mermithidae) parasitizing *Castnia dedalus* isopods in Córdoba, Argentina**

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Summary. A population of *Agamermis decaudata* from Córdoba, Argentina, is described on the basis of its morphology and morphometrics and is compared with other populations of the species. Variability occurring in morphological and morphometric characters is analyzed and provides new data on the nematodes' biology. The morphological characters correspond to those known for the species, but for some characters the mean values are smaller and the morphometric limits greater than those previously published. Variability of these characters was larger in males than in females. The nematodes were found parasitizing *Castnia dedalus*, which is the first record of isopods being attacked by members of the genus *Agamermis*. The nematode had not previously been recorded from Córdoba and this occurrence extends the known distribution of the genus.

Key words: *Agamermis decaudata*, distribution, isopods, morphology, morphometry, parasitism, variability.

Agamermis decaudata Cobb, Steiner & Christie, 1923 was described from specimens collected in the United States of North America and subsequently there have been several other reports of its occurrence in North America (Christie, 1936; Poinar, 1979; Kaiser, 1991). It has also been reported to occur in India (Varma & Yadav, 1974) and was first identified in Latin America, from Buenos Aires province, Argentina, by Gutierrez (1945), and subsequently from Entre Ríos, Buenos Aires and Chaco provinces, Argentina, by Camino *et al.* (1986). The species apparently has a limited host range, having been reported only from Orthoptera (Tettigoniidae and Acrididae) and Coleoptera (Coccinellidae) (Poinar, 1979; Kaiser, 1991).

In the original description of the species Cobb *et al.* (1923) did not provide morphometric data and the first report providing morphometrics, and then only for the juvenile pre-parasitic stage, was that of Christie (1936). Subsequently, in a redescription of the species, Nickle (1972) provided morphometric data for 5 lectotype females and Camino *et al.* (1986) provided morphometric data for a mixture of specimens from several populations of *A. mermis*. Consequently, little is known about the morphological or morphometric variability of this species.

Examination of soil samples collected in the

Province of Córdoba, Argentina, revealed the presence of an abundant population of *A. decaudata* and the nematode was found to be naturally parasitizing isopods. A description of the nematodes is provided. Also, results from the morphological examination of the nematodes are compared with those from other populations of the species. Analysis of the variability observed in the morphological and morphometric characters provides new data on the nematodes biology.

MATERIALS AND METHODS

From 1990 to 1994, free living stages of the mermithid species *A. decaudata*, and those from the parasitized hosts, were extracted from soil collected in the Capital Department, province of Córdoba, Argentina. The mermithids were collected during 1994, from soil samples taken at 20 to 30 cm depth and parasitic juveniles were recovered from *Castnia dedalus* isopods. For taxonomic studies all the specimens were observed alive and then heat-killed in water at 80 °C, fixed and processed to anhydrous glycerin by Seinhorst's method (Curran & Homnick, 1980).

Morphometric variability was determined according to the coefficient of variation values (CV), and following the criteria of Stanuszek (1974), *viz.*, $CV <$

10% = small; CV between 10-20% = medium; and CV > 20% = large variability.

DESCRIPTION

Agamermis decaudata Cobb, Steiner & Christie, 1923 (Fig. 1)

Medium to large nematodes. Rounded head. Mouth opening terminal, surrounded by six head papillae arranged in a circle, amphids small. Cuticle with criss-cross fibres. Six hypodermal chords at midbody. Prominent sexual dimorphism.

Females: S-shaped vagina and well developed vulval cone.

Males: two short spicules, genital papillae in ventral-ventrolateral position and irregular in arrangement.

Pre-parasitic juveniles: thin, elongate body. Long tail appendage, 80% of the body length.

Post-parasitic juveniles: opaque body, length similar to adults. Double cuticle; the outer cuticle, corresponding to the third larval stage, characterized by having criss-cross fibres, to give a thick and resistant appearance. Tail ending in a characteristic terminal bulge.

Morphometrics of the population from Córdoba and comparison with other populations are presented in Tables 1 & 2. The variability of the characters was medium or large, being greater in males than in females (Table 1). For males the characters with large variation were body length, greatest body diameter and spicule width, and in females were body length and ratio V%.

Biological observations. Adults and post-parasitic juveniles were most numerous, and were collected during the spring of 1994. However, they were present in soil samples collected throughout the year. The nematodes were always found in discrete groups; each group being composed of males and females. When exposed to daylight the nematodes tended to burrow into the soil, through small interstices between soil particle and aggregates.

The females laid their eggs freely in the soil after which the body became transparent revealing the reproductive structures, the hypodermal chords intercalated in the muscle layer and the criss-cross fibers of the cuticle. Males were more transparent than young females and more opaque than females which had newly completed egg-laying, which enabled them to be readily distinguished in the groups occurring in the soil.

Approximately 10% of *C. dedalus* present at the sampling site were parasitized with one to four

nematodes present in each host. Also, a single parasitized acridid was found in one sample.

DISCUSSION

The *A. decaudata* population studied here showed differences in its morphometric characters in relation to other populations recovered from the USA (Cobb *et al.*, 1923; Nickle, 1972), India (Varma & Yadav, 1974) and a mixed population from Argentina (Camino *et al.*, 1986). In general, the mean values for the various characters measured were smaller for the specimens from Córdoba than in the populations reported previously (Tables 1 & 2). Except for the head width at the level of the cephalic papillae and ratio V%, the morphometric ranges for characters measured in females from the population from Córdoba were within the ranges known for the species but, with the exception of the body length, for male specimens were different (Table 1).

Variability in the males was found to be greater than that in females, which is the converse of what has been reported for other entomoparasitic nematodes in which the females exhibit greatest variability (Doucet *et al.*, 1991, 1996). Identification of this phenomenon, described here for the first time in mermithids, is of practical importance when preparing identification keys for the species, especially as such keys frequently are based on males (Mulvey & Nickle, 1978). As with other species of entomoparasitic nematodes, the variability of these mermithids confirms the requirement to fully characterize each population found. Also, the different stages and several specimens for each stage should be examined (Curran & Hominick, 1981).

The behaviour of the free living stages, in particular the post-parasitic and adults, was similar to that which has been described for other populations (Christie, 1936; Gutierrez, 1945). As these nematodes have only been found parasitizing representatives of three families belonging to two orders of terrestrial insects, i.e., Coccinellidae (Coleoptera), Acrididae and Tettigoniidae (Orthoptera), the host specificity of *A. decaudata* is considered to be relatively narrow and related to physiological factors. Development of the nematode on specimens of Coccinellidae is considered equivocal (Poinar, 1979), but in our study *C. dedalus* possibly represents an alternative host for *A. decaudata*. This may result from their relative abundance, in comparison to a paucity of insects, in the soil samples collected at the sampling site. Therefore, the host specificity of *A. decaudata* may be related to ecological factors.

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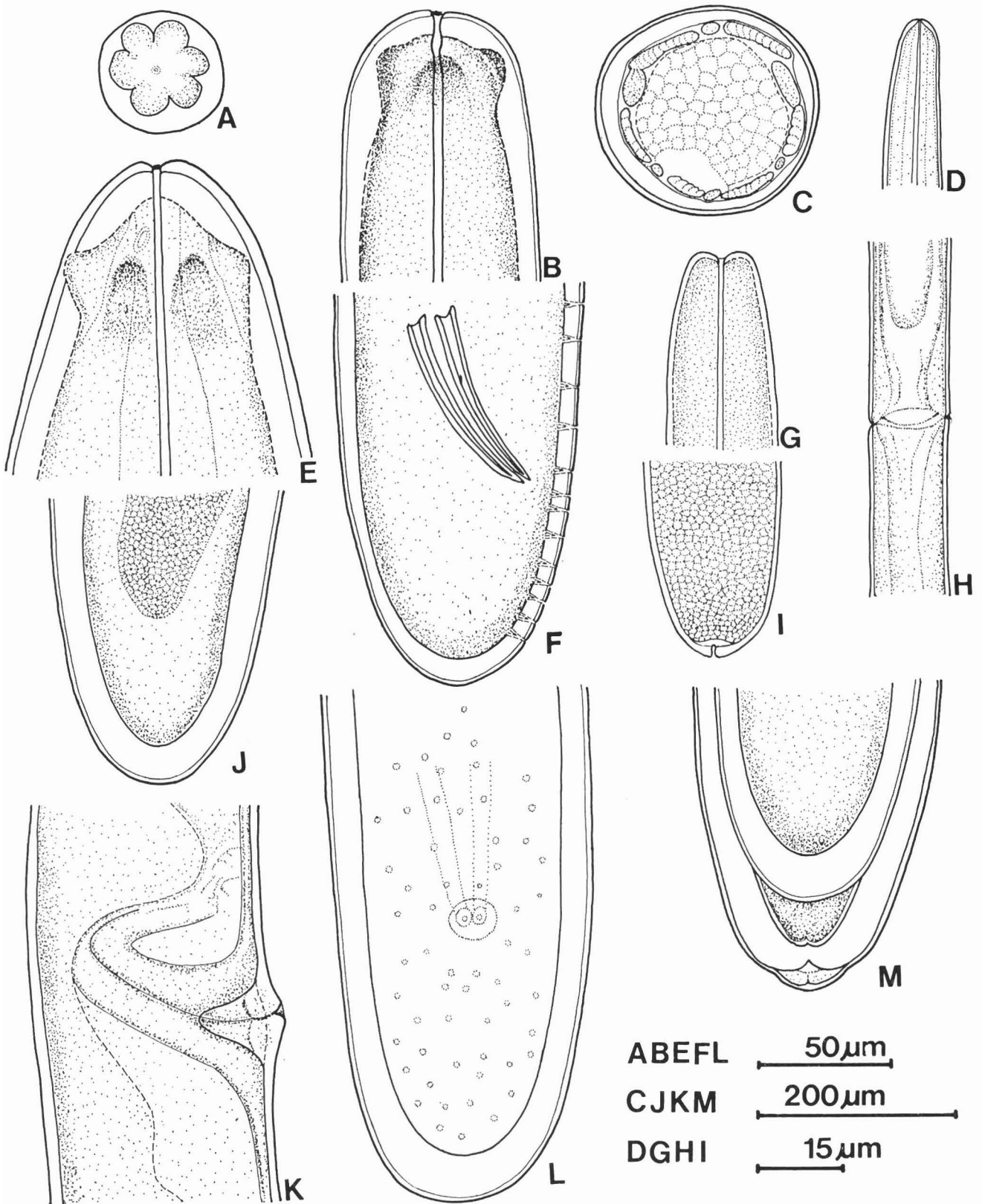


Fig. 1. *Agameremis decaudata* Cobb, Steiner & Christie, 1923. Female. A: Lip region (*en face* view); C: Cross-section at mid-body; E: Head, lateral view; J: Tail, lateral view; K: Vulval region, lateral view. Male. B: Head, lateral view; F: Tail lateral view; L: Tail ventral view. Pre-parasitic stage. D: Head, lateral view; H: Node. Parasitic stage. G: Head, lateral view; I: Tail, lateral view. Post-parasitic stage. M: Tail, lateral view.

Table 1. Morphometrics (in μm ; mean \pm standard deviation, range in parenthesis and coefficient of variation in %) of *Agamermis decaudata* males and females from the type and two Argentine populations.

| | Type population | | Argentinian populations | | | |
|--|-----------------|------------------|-------------------------|------------------|-----------------------------------|-----------------------------------|
| | Nickle (1972) | | Mixed specimens * | | Córdoba | |
| | Females (n=5) | Male (n=5) | Females (n=7+2+8) | Male (n=3+4+10) | Females (n=21) | Male (n=17) |
| Body length (mm) | 280 (50-465) | 70 (10-120) | 72 (30-465) | 36 (10-120) | 54.3 \pm 9.8 (40-71), 18.0 | 28.1 \pm 9.4 (12-47), 33.5 |
| Greatest diameter | 500 | 200 (150-250) | 300 (200-500) | 196 (150-250) | 289 \pm 35.1 (216-385), 12.1 | 153 \pm 33.0 (95-210), 21.6 |
| Distance from head to cephalic papillae | | | | – | 35 \pm 4.6 (28-43), 13.0 | 22 \pm 3.6 (15-28), 16.6 |
| Head width at level of cephalic papillae | | | 112 (90-200) | 84 (60-100) | 71 \pm 4.6 (60-79), 6.6 | 66 \pm 9.8 (51-78), 15.0 |
| Distance from head to nerve ring | | – | – | – | 349 \pm 36.5 (299-462), 10.5 | 287 \pm 28.8 (232-334), 10.0 |
| Body width at nerve ring | | – | 168 (100-250) | 120 (90-160) | 146 \pm 12.6 (122-173), 8.6 | 107 \pm 14.1 (79-126), 13.1 |
| V% | 58 (50-60) | – | 56 (50-60) | – | 54 \pm 9.7 (30-68), 17.7 | – |
| Tail length | – | – | – | 220 | – | 146 \pm 22.8 (104-189), 15.6 |
| Body width at anus | – | – | – | – | – | 142 \pm 20.7 (98-177), 14.6 |
| Spicule length | – | 175 (150-180) | – | 172 (150-180) | – | 139 \pm 20.3 (98-173), 14.7 |
| Spicule width | – | – | – | – | – | 11 \pm 2.5 (8-16), 22 |

* - Specimens from Entre Rios, Chaco and Buenos Aires Provinces, Argentina.

Table 2. Morphometrics (in μm ; range in parenthesis) of infective juveniles of *Agamermis decaudata*.

| | Type population | India | Córdoba, Argentina |
|---------------------|--------------------|---------------------------|--------------------|
| | Poinar (1979), n=? | Varma & Yadav (1974), n=1 | n=1 |
| Body length | 5100 (3000-5600) | 1350 | 1600 |
| a | – | 193 | 100 |
| Mid-body width | 23-25 | – | 16 |
| Anterior to nodum | – | 370 | 310 |
| Body width at nodum | – | – | 15 |
| Stylet length | 33-37 | 30 | 24 |

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Doucet M.M.A. de., Cagnolo S.R. *Agameremis decaudata* Cobb, Steiner & Christie, 1923 (Nematoda: Mermithidae), поражающий изопод *Castnia dedalus* в провинции Кордоба, Аргентина.

Резюме. Описываются морфологические и морфометрические особенности популяции *Agameremis decaudata* из провинции Кордоба в Аргентине. Представлен анализ изменчивости основных морфометрических признаков этих мермитид, а также приводятся данные по их биологии. Хотя морфологические особенности аргентинских популяций соответствуют ранее отмеченным для этого вида, средние значения некоторых морфометрических признаков несколько меньше, а пределы изменчивости этих признаков несколько шире ранее отмеченных. Изменчивость морфометрических особенностей самцов была большей, чем у самок. Мермитиды были выделены от мокриц *Castnia dedalus*, что представляет собой первое сообщение о выделении представителей рода *Agameremis* из ракообразных хозяев. Нематод ранее не обнаруживали в провинции Кордоба, и данное сообщение существенно расширяет границы ареала этого вида.
