

## Redescription of *Aorolaimus capsici* Jiménez Millán, Arias & Fijo, 1964 (Nematoda : Tylenchida)

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**Summary** – A redescription of *Aorolaimus capsici* Jiménez Millán, Arias & Fijo, 1964 and a comparative study of type material of this species with three populations of *A. perscitus* (Doucet, 1980) Fortuner, 1987 has been carried out. It has been found that the small morphometric differences existing among the studied populations do not justify the existence of two species; therefore, *A. perscitus* is proposed as a junior synonym of *A. capsici*.

**Résumé** – *Redescription d'Aorolaimus capsici Jiménez Millán, Arias & Fijo, 1964 (Nematoda : Tylenchida)* – La redescription d'*Aorolaimus capsici* Jiménez Millán, Arias & Fijo, 1964 et une étude comparative du matériel type de cette espèce et de trois populations d'*A. perscitus* (Doucet, 1980) Fortuner, 1987 ont été réalisées. Les faibles différences morphométriques montrées par les populations étudiées ne justifient pas l'existence de deux espèces, il est proposé de considérer *A. perscitus* comme un synonyme mineur d'*A. capsici*.

**Key-words** : *Aorolaimus perscitus*, morphology, taxonomy, synonymy, nematodes.

Sher (1963, 1964) described the genera *Aorolaimus* and *Peltamigratus*, respectively, under the subfamily Hoplolaiminae Filipjev, 1934. Fortuner (1987) carried out the revision of the family Hoplolaimidae and considered *Peltamigratus* Sher, 1964 to be synonymous with *Aorolaimus* Sher, 1963 on the basis of the intraspecific variability of the main diagnostic characters (lip region annulation and shape of male caudal alae) and because a single identifying character (the scutella position) is not a sound basis for the definition of a genus.

Jiménez Millán *et al.* (1964) described *Aorolaimus capsici* in a population, from Cortijo del Cuarto (Sevilla), in soil around *Capsicum annuum* L. roots, which presents some differences with the species described up to that time, mainly in vulva and scutella position, number of lip region annuli, areolation in lateral fields and stylet length.

Doucet (1980) described *Peltamigratus perscitus* from *Paspalum* sp. in Pampa de Achala, Córdoba (Argentina), now *Aorolaimus perscitus* (Doucet, 1980) Fortuner, 1987. Peña Santiago and Geraert (1990) found *A. perscitus* associated with olive trees in Bailén, Martos and Torredonjimeno (Jaén) and Gómez Barcina *et al.* (1991) reported *P. perscitus* associated with *Quercus* sp. in Sierra de Cazorla (southern Spain).

Moreover, Baujard *et al.* (1991), in a study of the variability of the genus, reinforce the synonymy of *Aorolaimus* and *Peltamigratus* proposed by Fortuner (1987) and found that shape and striations of lip region and presence of vulvar epitygma cannot be used for species characterization as they show a high intraspecific vari-

ability. They established three groups, for the 33 described species into the genus, according to the scutella situation along the body and lateral fields areolation at phasmid level. They only included 32 species, omitting *A. capsici*, even though the record appears in the bibliography.

The incomplete description of *A. capsici* led the authors to redescribe it and to carry out a comparative study of type material of *A. capsici* and specimens of *A. perscitus* from Spain and Argentina, because of the similarity found between the two species.

### Material and methods

The studied specimens belong to the following collections :

– Type material of *A. capsici* deposited in the collection of the Centro de Ciencias Medioambientales, Madrid (Spain). The specimens, fixed in formalin and mounted on cotton blue-lactophenol, consist of holotype plus five female and four male paratypes that are in slides nos. 2063 (one female), 2064 (one male) and 2065 (the holotype female, four females and three males) and the anterior part of one female paratype in a slide without number; all belonged to sample 639, from *Capsicum annuum* L. The specimens have been removed and processed in glycerine for reexamination. Therefore, type material are in the new slides as follows : in number 2063 a female, in 2064 a male, in 2065-1 there are the holotype and one female more, and in each of 2065-2, 2065-3 and 2064-4, one female and one male.

– Paratypes of *A. perscitus* deposited in the nematode collection of Muséum National d'Histoire Naturelle, Paris (France), kindly lend by M. Luc : a female, slide 15577, and a male, slide 15578, processed in glycerine.

– Two females of *A. perscitus* from Sierra de Cazorla (Spain), slide 1988, kindly sent us by Dr. Castillo, processed in glycerine.

– Five females and three juveniles from Jaén (Spain), belonged to Dr. Peña collection, processed in glycerine, slides 584, 585, 586 and 587.

***Aorolaimus capsici* Jimenez Millan,  
Arias & Fijo, 1964  
(Fig. 1)**

MEASUREMENTS

See Table 1.

DESCRIPTION

*Female* : Body ventrally curved, tapering slightly towards anterior end. Cuticle with two layers, outer dis-

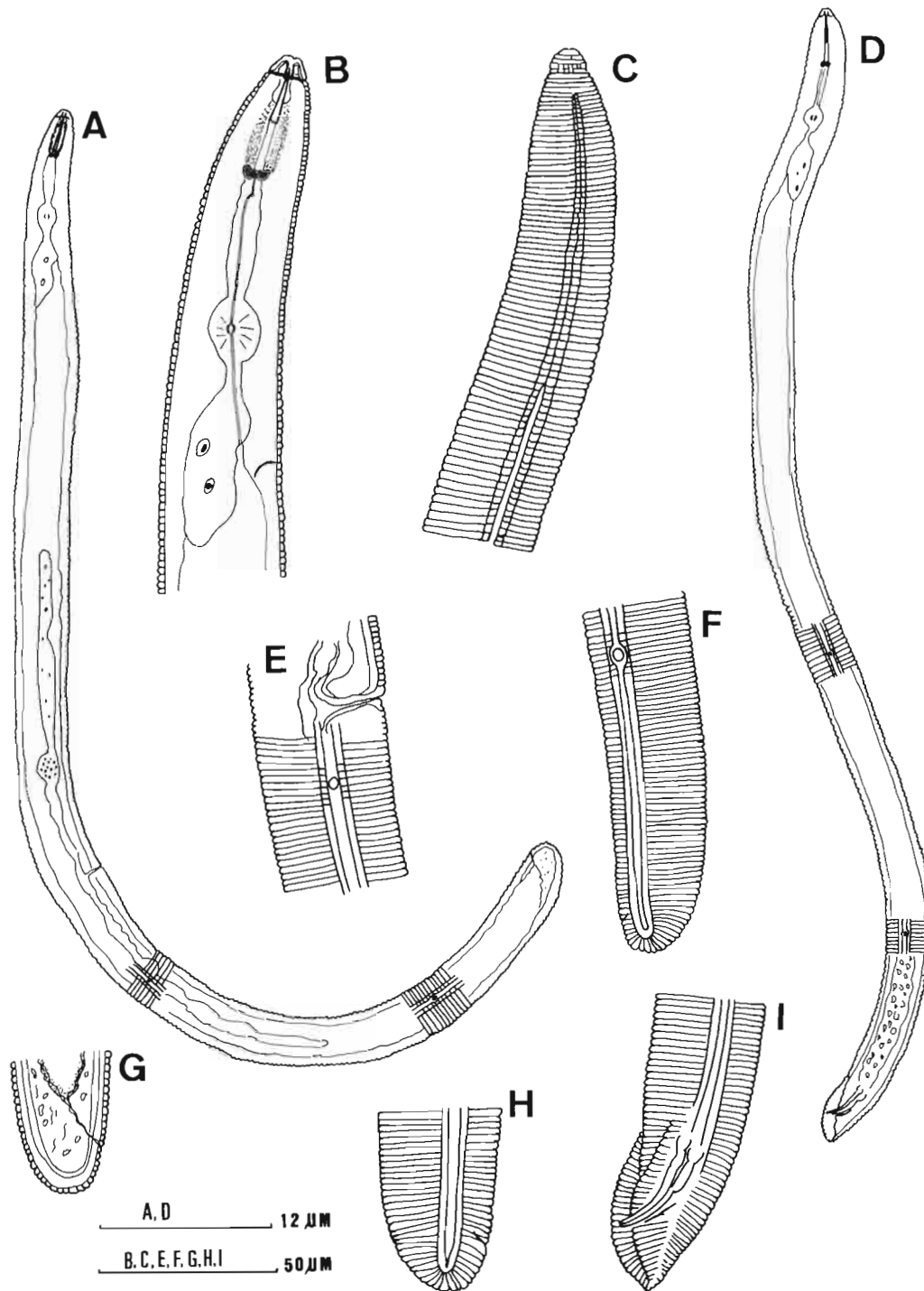
tinctly annulated and inner finely striated, annuli almost the same width along the body. Lip region conical with truncate or somewhat rounded terminus slightly offset, about twice as wide as high; four to five annules and some longitudinal striations can hardly be distinguished when observed at high magnification in phases contrast. Cephalic framework well developed. Stylet about three times as long as head width, conus and shaft almost of the same length. Median bulb rounded to oval, muscular, with well sclerotized valve plates, typical of the genus. Pharyngeal gland varying in length, overlapping the intestine dorsally and laterally. Excretory pore only seen in one specimen situated at 113 µm from anterior end, about 11 % of total body length. Lateral field with four incisures occupying 18-21 % of body width at midbody, beginning at level of stylet conus base. Areolations present along the neck region and around scutella. Scutella, always preanal, variable in position, one posterior to the vulva level and another near the caudal region. Ovaries paired, outstretched. Spermatheca rounded to oval, filled with sperm. Vulva as a transverse slit. Epiptygma

**Table 1.** Measurements of *Aorolaimus capsici* Jimenez Millan, Arias et Fijo, 1964 and *A. perscitus* (Doucet, 1980) Fortuner, 1987 (measurements in µm except L, in mm).

	<i>A. capsici</i>						<i>A. perscitus</i>			
	Jimenez Millán et al. (1964)			Our measurements			Doucet (1980)		Peña & Geraert (1990)	
	Holotype	Female	Male	Holotype	Female	Male	Female	Male	Female**	Male
n		6	4		5	4	10	5	8	1
L	0.89	0.78-0.98	0.52-0.82	0.88	0.82-0.97	0.78-0.80	0.95-1.06	0.92-0.94	0.74-1.03	0.86
a	24.8	18.00-29	19.0-28.0	31.3	23.4-29.1	25.0-27.0	27.6-32.0	32.0-34.7	20.5-30.5	23.3
b	11.0			6.4	6.8-9.3	5.1-6.6	7.8-8.5	7.7-7.8	5.6-7.2	6.4
b'	6.4	6.0-11.7	4.7-6.6	10.5	10.5-11.5	8.8 (n = 1)	6.4-8.8	6.3-6.6	-	-
c	74.4	41.0-74.4	25.0-48.5	79.2	52.9-76.4	38.6-40.3	48.7-79.5	41.6-43.7	49.3-73.6	36.0
c'	-	-	-	0.8	0.5-0.66	0.7-0.85	0.6*	1.06*	0.6-0.9	1.6
V	55.8	41.0-64.0	-	54.3	55.0-60.0	-	52.6-58.6	-	54.6-58.0	-
Stylet	33.0	30.0-34.8	25.0-28.6	31.8	31.3-32.3	30.4-32.3	31.0-33.5	29.5-30.0	32.0-35.0	31.0
Body diam. at mid body	-	-	-	28.1	32.3-38.0	28.4-32.0	40.3*	35.4*	29.0-44.0	37.0
Body diam. at anus	-	-	-	19.2	18.0-25.6	14.8-16.2	29.5*	18.2*	18.0-25.0	15.0
Lateral field	-	-	-		6.6-7.0	7.0 (n = 1)	9.2*	8.6*	6.0-8.5	7.5
Ant. scut.-ant. end	-	-	-	612.0	528.0-612.0	467.0-520.0	572.0*	562.0*	370.0-630.0	498.0
Ant. scut.-ant. end (%)	63.0	34.0-72.0	38.0-51.0	69.5	63.0-83.0	59.0-66.0	64.0-72.0	66.0-70.0	49.0-85.0	58.0
Post. scut.-ant. end	-	-	-		760.0-819.0	585.0-698.0		697.0*	601.0-854.0	752.0
Post. scut.-ant. end (%)	80.4	80.0-89.0	80.9-90.0		84.0-90.0	74.0-88.0	85.0-88.0	68.0-85.0	79.0-91.0	87.0
Tail	-	-	-	15.5	12.3-15.5	19.0-20.9	13.0-20.0	21.5-22.4	12.0-15.0	24.0
Bursa	-	-	-	-	-	42.0-57.0	-	41.6*	-	50.0
Spicule	-	-	22.0-38.0	-	-	31.5-35.1	-	33.5-35.0	-	37.0
Gubernaculum	-	-	10.0-15.0	-	-	14.0-15.5	-	16.4-18.6	-	15.0

\* Not included in the original description, measurements taken by us on paratypes.

\*\* Range of three populations.



**Fig. 1.** *Aorolaimus capsici*. A : Female; B : Anterior end; C : anterior end (surface view); D : Male; E : Detail of scutellum at postvulval region; F : Posterior scutellum in female; G-H : Female tail; I : Tail of male (surface view).

double, not projecting out of the body surface. Tail convexo-conoid to hemispherical, nine or ten annuli on ventral side.

*Male* : Body similar in appearance to female. Lip region as in female, hemispherical or somewhat conical with truncated terminus. Testis single, outstretched. Spicules, ventrally arcuate. Gubernaculum slightly smaller as body width at anus. Tail conical with finely rounded terminus.

#### TYPE SPECIMENS

One female and one male specimens have been deposited in the nematology collections of both, Muséum National d'Histoire Naturelle, Paris, France (slide 2065-4), and Nematology Laboratory, University of Wageningen, the Netherlands (slide 2065-3).

#### DISCUSSION

Table 1 shows that body length in *A. capsici* females have higher minimum values than reported in original description by Jiménez Millán *et al.* (0.82 mm *vs* 0.78 mm); minimum value in body length of males are 0.78 mm *vs* 0.52 mm; minimum value in males "a" index are 25 *vs* 19; minimum value of male stylet length is 30.4 µm instead of 25 µm; anterior scutella to anterior end (% body length) are 63-83 in females and 59-66 in males *vs* 34-72 and 38-51 respectively; finally, minimum value of spicule 31.5 µm against 22 µm.

On the other hand, in original description of *A. capsici*, it seems that holotype and allotype measurements are as well included in the paratypes, as specified in "b" index in the table of measurements. Another mistake in this table appears in male "b" index, where it says "holotype" it means "allotype". However, stylet length of the male allotype is not included in such a table, for the measurements given for this index range between 25 µm and 28.6 µm, whereas allotype stylet is 30 µm.

Therefore, *A. capsici* must be included in group 2 of Baujard *et al.* (1991) characterized by the anterior scutella of 64-78 % and the posterior ones of 73-93 % of body length, while the other three species existing in 1964, *A. israeli* Sher, 1963 (= *A. leiomerus* de Guiran, 1963), *A. helicus* Sher, 1963 and *A. leipogrammus* Sher, 1963, belong to group 1, with scutella situated between 30 % and 70-80 % respectively, as was properly discussed by Jiménez Millán *et al.* (1964) in the original description. *A. capsici* can be distinguished, from *i*) *A. brevicaudatus* (Doucet, 1984) Fortuner, 1987; *A. conicori* (Doucet, 1984) Fortuner, 1987; *A. longistylus* (Doucet, 1980) Fortuner, 1987 and *A. triticeus* (Doucet, 1984) Fortuner, 1987 by the presence of males; *ii*) *A. annulatus* (Mulk & Siddiqi, 1982) Fortuner, 1987 and *A. areolatus* (Bittencourt & Huang, 1986) Baujard *et al.*, 1991 by a longer stylet (25-27 and 25-26 µm, respectively, *vs* 31-35 µm in *A. capsici*). However, with *A. vigiae* (Rashid *et al.*, 1987) Baujard *et al.*, 1991 and *A. perscitus* only very small differences could be found;

from the former it only differs in length of stylet (33-37 *vs* 31-35 µm), which, on the other hand, overlap; therefore, a thorough study of type material of both species seems to be necessary in order to investigate the possible synonymy of the two species.

In regard to the second species, we found that *A. capsici* population and the three different populations of *A. perscitus* have a very similar morphometry, only small differences can be shown in body and tail length with higher maximum values in Argentinian populations, reflected in "c" and "c'" indexes (Table 1). No significant differences have been found in the measurements of the population studied by Peña Santiago and Geraert (1990) and, furthermore, paratypes sent by Castillo, reported by Gómez Barcina *et al.* (1991), fit properly *A. capsici* type population.

On the other hand, some variability has been observed in the lip region shape and number of annuli, discussed by Peña and Geraert (1990). Argentinian populations have a hemispherical lip region, slightly offset with five longitudinal striations; the population from Jaén shows a conical labial region with truncate end, slightly offset with longitudinal and transverse striations. In the same way, some variations in lip region of *A. capsici* population have been observed. It could be conical with truncated lip region or somewhat rounded (Fig. 1) and in phase-contrast they seem to have both longitudinal and transverse striations of variable size. The population from Sierra de Cazorla, Jaén (Gómez Barcina *et al.*, 1991) showed a hemispherical rounded lip region with five annuli, features that according to Baujard *et al.* (1991) have no taxonomic value.

Therefore, the two species seem to be similar and *A. perscitus* (Doucet, 1980) Fortuner, 1987 must be considered a junior synonym of *A. capsici* Jiménez Millán, Arias & Fijo, 1964.

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