

Mononchid nematodes from Spain. A description of *Anatonchus acutus* Altherr, 1974

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Summary. Females and juveniles of *Anatonchus acutus* Altherr, 1974 are described and illustrated for the first time from specimens collected in Spain. Male specimens are also described from the same populations. The species is redefined and characterized by its medium size, lip region offset by a strong depression, buccal cavity 23-32 x 28-42 μm , teeth located in the anterior half of the stoma with the apex of the dorsal tooth at 46-63% of the buccal cavity length measured from the base, $V=67-73\%$, female genital system pseudomonodelphic or didelphic with the posterior branch reduced, ejaculatory glands in tandem, spicules 52-68 μm , lateral guiding pieces bifurcate with straight arms, 9-13 ventromedian supplements, tail conical, elongate with acute terminus and caudal glands or spinneret absent. It is similar to *A. amiciae* Coomans & Lima, 1965 and *A. monohystera* Altherr, 1977 in the characteristics of the female genital system but it differs in tail shape and absence of caudal glands and spinneret.

Key words: *Anatonchus acutus*, Mononchida, Spain, taxonomy.

Anatonchus amiciae Coomans & Lima, 1965 was recently reported by Escuer (1995) from several populations found in Catalonia (Spain). Examination of this material by one of us (D.J.G.) revealed it to be similar to *A. acutus* Altherr, 1974. The original description of *A. acutus* was based on a single male specimen; description and illustration of the Spanish populations thus allows a more comprehensive definition of the species.

Andrássy (1994) accommodates the species of Anatonchinae Jairajpuri, 1969, characterized by having three retrorse or backward directed teeth in the buccal cavity, within the following genera: *Anatonchus* Cobb, 1916, *Truxonchus* Siddiqi, 1984 and *Tigronchoides* Ivanova & Dzhuraeva, 1971. The separation of these genera was by a single character, the teeth location in the stoma. The remaining features of the species are not sufficient to be used for generic identification. We reassessed the diagnosis of these genera and used the definition of *Anatonchus* as defined by Mulvey (1961) or Jairajpuri & Khan (1982).

MATERIAL AND METHODS

Specimens were extracted by a centrifugal flotation technique, fixed in hot F.G. 4:1, processed in lactophenol and mounted in anhydrous glycerin according to Siddiqi (1964).

DESCRIPTION

Anatonchus acutus Altherr, 1974 (Figs. 1 & 2)

Measurements. See Table 1.

Female. Nematodes of medium size, around 55 μm wide at midbody and 1.5 mm long. Body cylindrical, truncate anteriorly and gradually tapering towards posterior extremity. Habitus more or less ventrally curved when fixed, frequently G to J-shaped. Cuticle with fine and faint transverse striations, sometimes obscure but generally visible in caudal region. Lateral chord occupying 32 ± 7 (25-58)% of midbody width. Lip region clearly separated from the adjacent body by a strong depression, 3 ± 0.53 (2-4) times as wide as high. Lips separated and rounded. Labial and cephalic papillae slightly prominent, extruding from the head contour. Amphid cup-shaped, located at level of the cephalic depression; its aperture oval, extending 15 ± 2 (11-18)% of lip region width. Buccal cavity subrectangular, flattened at base, with relatively thick walls and 1.32 ± 0.13 (0.98-1.54) times as long as wide. Dorsal and ventrosublateral teeth similar in morphology and location, situated slightly anterior of the mid-region, retrorse or backward directed, with one cylindroid basal and other with an arrow-like pointed distal part.

Dorsal tooth apex located at 54.3 ± 3.9 (46-62.6)% of the buccal cavity length from the base. Ventrosublateral foramina are visible in the basal plates. Pharynx cylindrical, muscular, surrounding the basal part of the stoma. Nerve ring located at 31.8 ± 2.3 (23.1-35.4)% of the total neck region measured from the anterior body end. Excretory pore small but easily visible, situated behind the nerve ring. Pharynx-intestine junction tuberculate with tubercles relatively prominent; conical organ more or less rounded. Intestinal cells polygonal, granular, six to eight in transverse section. Bacillary layer well developed, especially visible at the anterior and posterior regions. Genital system pseudomonodelphic or didelphic with the posterior branch reduced. Anterior genital branch with ovary short, not reaching the oviduct-uterus junction. Oocytes few in number. Oviduct consisting of a slender distal part and a well developed proximal *pars dilatata*. A strong sphincter present at the oviduct-uterus junction with an inner sclerotized part surrounded by a muscle. Anterior uterus relatively well developed, not especially elongated and without differentiations. Vagina cylindrical, extending 38 ± 6 (30-48)% of the corresponding body width. Two small to medium sized sclerotized pieces in the vagina-vulva junction. Vulva a short transverse slit. Posterior genital branch degenerate, generally reduced to a long uterine sac filled with sperm. In some individuals the sphincter in the oviduct-uterus junction and the oviduct are well developed but always the posterior ovary is absent. Vulval papillae irregularly spaced, 0-2 prevulval and 0-3 postvulval, sometimes absent from both locations. A single intra-uterine egg observed 2.4 times as long as wide. Tail conical-elongate, ventrally curved and gradually tapering to an acuminate terminus. Caudal glands indistinct and spinneret and its opening absent. Caudal pores weakly visible, apparently four at each side of the tail.

Male. General morphology similar to female. Body around 50 μm wide at middle and 1.5 mm long, the posterior region more ventrally curved. Lateral chord extending 37 ± 2 (35-41)% of the midbody width. Lip region 2.9 ± 0.5 (2.3-3.6) times as wide as high. Amphid occupying 18 ± 1 (16-20)% of the lip region width. Buccal cavity 1.36 ± 0.11 (1.18-1.5) times as long as wide. Nerve ring located at 31.9 ± 0.84 (30.6-33.1)% of the total neck region measured from the anterior body end. Genital system diorchid. Testes opposed with elongate, spindle-shaped sperm. *Vas deferens* and *ductus ejaculatorius* separated by a constriction with a surrounding muscular band. The ventral body contour is slightly contracted in this body region just at level of the anterior supplement.

Ejaculatory glands in tandem, sometimes indistinct; rectal glands poorly visible. Nine to thirteen ventromedian supplements present more or less regularly spaced. Spicules moderately slender, ventrally curved, 1.5 ± 0.1 (1.3-1.6) times as long as anal body width, measured along axis. Gubernaculum well developed and lateral guiding pieces bifurcated in the tip with both arms straight. Tail similar to female but relatively shorter. Four small caudal pores at each side of the tail.

Juveniles. Only a few juvenile specimens were available for study. The characteristics of the teeth of the buccal cavity are very important in the identification of the different juvenile stages. Apparently the position, number and direction of the teeth is similar to *A. amiciae* described by Coomans & Lima (1965) although the first stage could not be examined. The second stage has only a basal, forward directed, well developed tooth in the dorsal plate and a replacement one, lying basal, in each of the dorsal and sublateral plates. The third stage has three, backward directed, functional and three replacement teeth in the posterior region of the buccal cavity, each in the corresponding vertical plate. The fourth stage is similar to the third but the teeth are more anteriorly located.

Amended diagnosis. *A. acutus* Altheir, 1974 is characterized by medium size (body length 1.23-2.16 mm), lip region offset by a strong depression, buccal cavity 23-32 x 28-42 μm or 0.98-1.54 times as long as wide, teeth in the anterior half of the stoma and apex of the dorsal tooth at 46-63% of the total buccal cavity length from base, $V=67-73\%$, the reduced posterior female genital branch which generally consists of a relatively long uterine sac, usually filled with sperm and extending 5.5-11.5% (16% in one specimen due to expanded sphincter and oviduct) of the body length, muscles between *vas deferens* and *ductus ejaculatorius* forming an outstretched circular band, ventral body contour slightly contracted at beginning of supplement series, ejaculatory glands in tandem, spicules 52-68 μm , bifurcate with straight arms in lateral guiding pieces, 9-13 ventromedian supplements, conical elongate and ventrally curved tail with acute terminus and caudal glands and spinneret absent.

Distribution. The species was collected from several localities: i) Brull, soil around roots of *Fagus sylvatica*, *Pteridium aquilinum*, *Quercus ilex* and under pasture; ii) Fogars de Montclús, associated with *Abies alba*, *Alnus glutinosa*, *Castanea sativa*, *Platanus orientalis*, *Quercus ilex* and *Robinia pseudoacacia*; iii) Montseny, associated with *Quercus ilex*; iv) Mos-

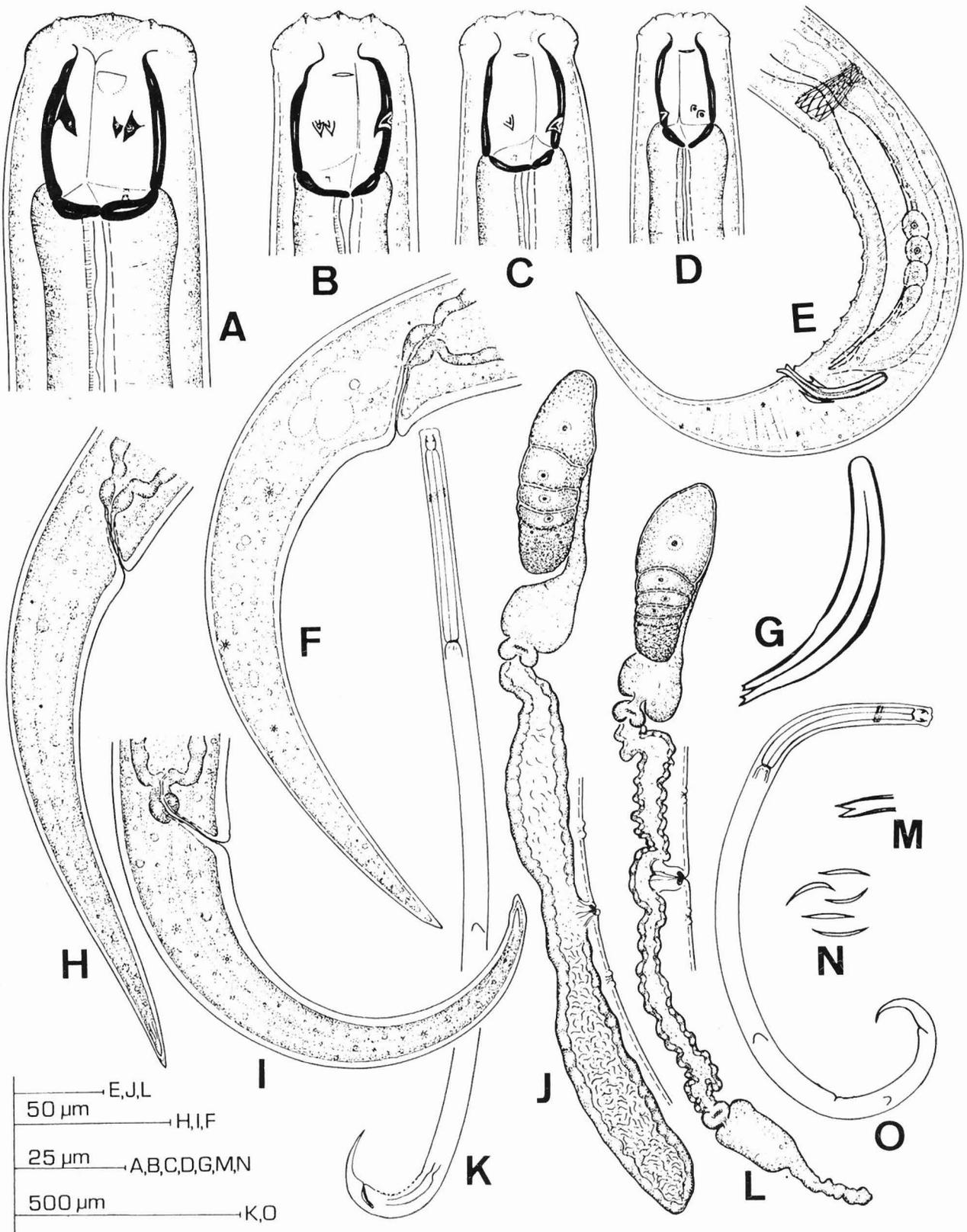


Fig. 1. *Anatonchus acutus* Alther, 1974. A: Head region of the adult; B, C, D: Head region of the fourth, third and second juvenile stages respectively; E: Male posterior region; F, H, I: Female caudal region; G: Spicules; J, L: Female genital system; K: Male entire; M: Lateral guiding piece; N: Sperm; O: Female entire.

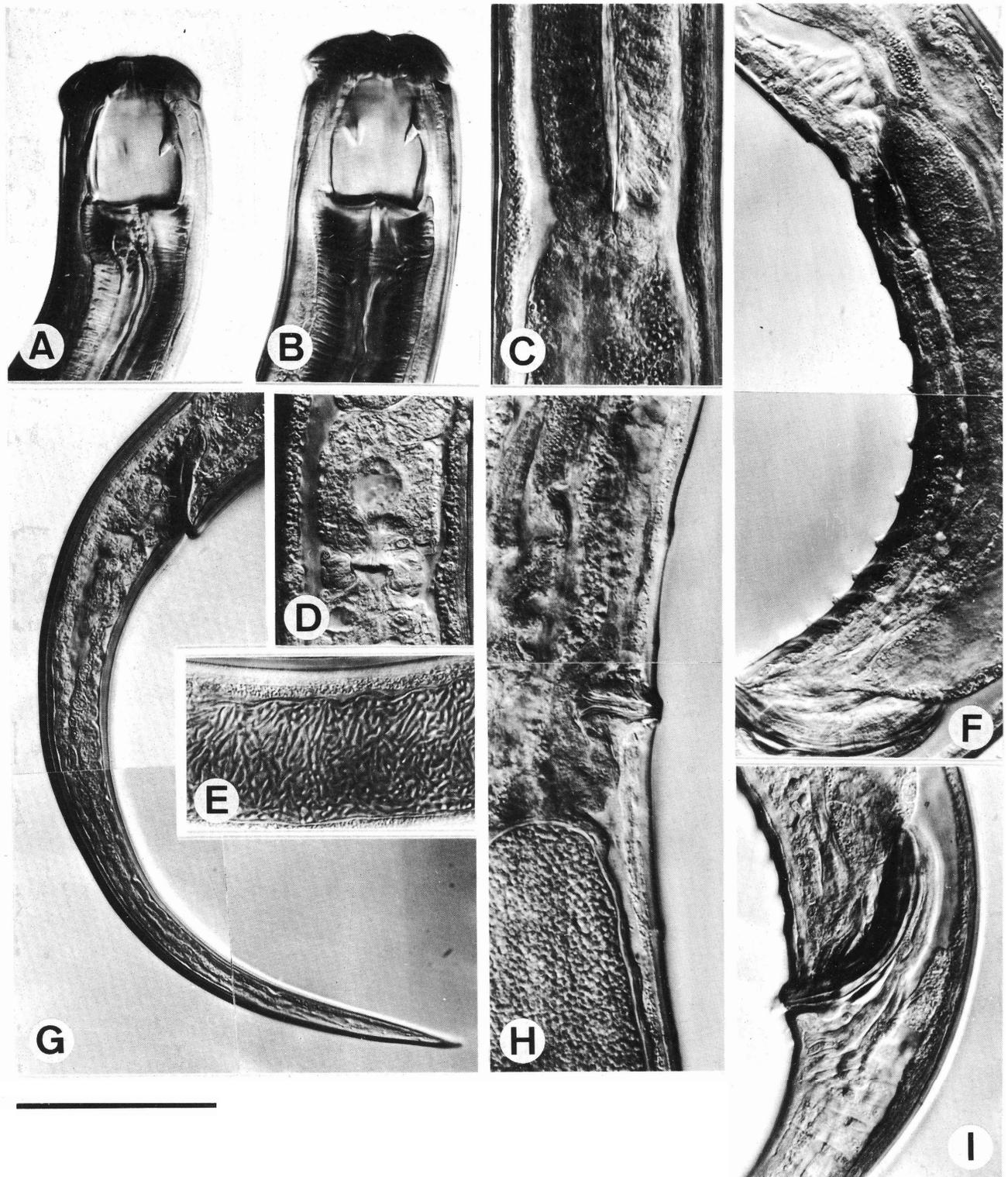


Fig. 2. *Anatonchus acutus* Altherr, 1974. A, B: Head; C: Pharynx-intestine junction; D: Oviduct-uterus sphincter; E: Sperm; F: Supplement region; G: Female tail; H: Vulval region; I: Spicules. Scale bar - 50 μ m.

Table 1. Morphometric data of *Anatonchus acutus* Altherr, 1974 from several Spanish populations (mean \pm standard deviation and range; all measurements in μm except L in mm).

	Females	Males	J ₄	J ₃	J ₂
n	25	6	7	3	1
L	1.64 \pm 2.1 (1.23-2.16)	1.64 \pm 2.37 (1.30-2.02)	1.48 \pm 1.0 (1.26-1.62)	1.06 (1.02-1.12)	0.86
a	30.3 \pm 3.7 (23.5-37.5)	34.5 \pm 3.5 (31.5-41.5)	38.2 \pm 3.1 (31.7-41.5)	31.3 (28.8-36.1)	31.7
b	4.3 \pm 0.2 (3.9-4.6)	4.2 \pm 0.2 (4-4.5)	4.1 \pm 0.2 (3.9-4.5)	3.5 (3.4-3.6)	3.3
c	9.7 \pm 0.9 (8.3-11.7)	12.3 \pm 1.3 (9.5-13.5)	9.4 \pm 0.5 (8.7-9.9)	8.5 (8.2-8.8)	9.1
c'	5.0 \pm 0.7 (3.2-6.7)	3.4 \pm 0.4 (3-4)	5.9 \pm 0.5 (4.9-6.6)	5.2 (4.7-6.1)	5.9
V/T	69.9 \pm 1.4 (67.8-72.7)	37.3 \pm 2.8 (33.5-42.5)	–	–	–
G ₁	15.7 \pm 2.0 (11-19.2)	–	–	–	–
G ₂	9.0 \pm 2.0 (5.6-15.9)	–	–	–	–
Max. body width	54.5 \pm 5.3 (43-67)	47.5 \pm 5.9 (41-56.5)	38.9 \pm 4.4 (33-46)	34.1 (31-36)	27.0
Cuticle: head	3.0 \pm 0.7 (2-4.5)	3.0 \pm 0.8 (1.5-3.5)	2.3 \pm 0.4 (2-3)	1.9 (1.5-2)	1.0
mid-body	3.5 \pm 0.9 (2-5)	2.7 \pm 0.8 (2-4)	2.8 \pm 0.4 (2-3.5)	2.3 (2-3)	2.0
tail	3.2 \pm 1.1 (2.5-5.5)	2.6 \pm 0.8 (1.5-4)	3.3 \pm 0.8 (2-4.5)	3.2 (2.5-4)	1.5
Lateral chord	17.5 \pm 4.6 (11-35.5)	17.6 \pm 2.9 (14.5-23)	12.2 \pm 3.5 (6.5-17.5)	11.2 (10-13)	7.5
Head: width	38.6 \pm 2.5 (35-43.5)	35.4 \pm 2.3 (32.5-39.5)	30.6 \pm 1.6 (28.5-33.5)	26.1 (25-26.5)	20.5
height	13.0 \pm 2.2 (10-17)	12.5 \pm 1.5 (10-14.5)	11.8 \pm 0.4 (11.5-12.5)	10.7 (10.5-11.5)	7.0
Amphid	5.7 \pm 0.6 (4.5-7)	6.5 \pm 0.2 (6-7)	4.6 \pm 0.3 (4-5)	4.3 (4-4.5)	3.5
Buccal cavity: length	35.4 \pm 3.5 (28-42)	33.0 \pm 2.6 (29.5-37.5)	32.3 \pm 0.6 (31.5-33)	29.7 (29.5-30)	23.0
width	27.0 \pm 2.4 (23-31.5)	24.3 \pm 1.0 (23-26)	22.1 \pm 0.7 (21-23.5)	20.2 (18.5-22.5)	14.0
Apex dorsal tooth	54.3 \pm 3.9 (46-62.5)	52.4 \pm 3.6 (48-58.5)	44.2 \pm 3.3 (38.5-50)	32.3 (28.5-35.5)	31.4
Ner. ring-ant. end	122.1 \pm 18.7 (82.5-155)	122.3 \pm 13.5 (105-146)	116 \pm 12.5 (103-133.5)	105 (89-129)	82.5
Excr. pore-ant. end	150.6 \pm 21.2 (117-194)	155 \pm 21.9 (132.5-200)	130 \pm 12.5 (112-151)	116.5 (103-137.5)	–
Pharynx length	344 \pm 49.8 (247.5-473)	346.4 \pm 46.8 (285-432)	322 \pm 20.3 (288.5-347.5)	271.8 (262-278.5)	232.5
Vagina length	20.3 \pm 2.5 (15.5-25.5)	–	–	–	–
Tail	169.5 \pm 23.8 (115-204)	134.1 \pm 21.5 (100-167)	158.4 \pm 16.1 (129-180)	124.4 (121-127)	94.5
Spicules	–	58.1 \pm 5.8 (52-68)	–	–	–
Gubernaculum	–	12.0 \pm 2.4 (8-15)	–	–	–
Lat. guiding pieces	–	13.6 \pm 1.0 (12.5-15.5)	–	–	–
Supplements	–	11.0 \pm 1.3 (9-13)	–	–	–
Sperm	–	5.0 \pm 1.5 (4-8.5)	–	–	–
Egg: length	(n=1) 105.5	–	–	–	–
width	(n=1) 43.5	–	–	–	–

queroles, in association with *Platanus orientalis*, all in the province of Barcelona and v) Pla de l'Espinal, and associated with *Fagus sylvatica*, in the province of Girona.

Relationships. The Spanish populations examined and the formerly known single male specimen of *A. acutus* were similar. Only the spicules were longer in the description by Altherr (1974). The species was compared with *A. tridentatus* (de Man, 1876) de Coninck, 1939, *A. subacutus* Mulvey, 1961 and *A. mammillatus* Altherr, 1968 and was clearly differentiated from them by the male characters. It is distinguished from all known species of the genus except for *A. amiciae* Coomans & Lima, 1965 and *A. monohystera* Altherr, 1977 by the reduced structure of the female posterior genital branch. It differs from *A. amiciae* by the teeth lying more posterior in the

buccal cavity (*vs* more anterior), more anterior vulva (*vs* V=73-77%), shorter spicules (*vs* 69-78 μm), longer tail (*vs* 122-166 μm , c=12-14 in females; 112-140 μm , c=14-16 in males), acute tail terminus (*vs* subtruncate) and by the absence of caudal glands and spinneret (*vs* presence). It can be distinguished from *A. monohystera* by having a smaller body length (*vs* 3.1 mm), more anterior vulva (*vs* V=75%), relatively longer tail (*vs* c=22), acute tail terminus (*vs* not acute) and by the absence of the spinneret and its opening (*vs* presence). In tail terminus shape and lacking caudal glands and spinneret *A. acutus* appears most closely related to *A. subacutus* but it can be differentiated by smaller body length (*vs* 2.5-2.9 mm), buccal cavity size (*vs* 36-40 x 48-52 μm in females; 31-38 x 42-50 μm in males), more anterior teeth in the stoma (*vs* more posterior), more posterior

vulva (vs $V=60-66\%$), female genital system pseudomonodelphic (vs didelphic), shorter spicules (vs 80-90 μm) and shorter tail (vs 280-340 μm in females; 230-290 μm in males).

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Jiménez Guirado D., Escuer M. Мононхиды Испании. Описание *Anatonchus acutus* Altherr, 1974. **Резюме.** Впервые описываются и приводятся рисунки самок и личинок вида *Anatonchus acutus* Altherr, 1974 по материалам, собранным в Испании. Из нескольких популяций также описываются самцы. Уточнен диагноз этого вида. Вид характеризуется средними размерами тела, обособленной от остального тела сильным сужением областью губ, буккальной полостью 23-32x28-42 мкм, онхами, расположенными в передней половине стомы с оконечностью дорсального онха в пределах 46-63% длины буккальной полости, $V=67-73\%$, псевдомонодельфной или дидельфной половой системой самки с редуцированной задней трубкой, спикулами длиной 52-68 мкм, наличием 9-13 вентромедианных супплементов, удлинненным коническим хвостом с заостренным терминусом, а также отсутствием хвостовых желез и спиннереты. Вид сходен с *A. amiciae* Coomans & Lima, 1965 и *A. monchystera* Altherr, 1977 по особенностям строения половой системы самок, но отличается от них по форме хвостового конца и отсутствию хвостовых желез и спиннереты.
