

THE MONONCHIDAE: A FAMILY OF PREDACEOUS NEMATODES

II. GENUS ANATONCHUS (ENOPLIDA: MONONCHIDAE)¹

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Abstract

Anatonchus ginglymodontus n. sp., *A. subacutus* n. sp., *A. alleni* n. sp., and *Anatonchus* sp., near *alleni*, are described and figured. The female of *Anatonchus gracilicaudatus* (Cobb, 1917) is described and figured for the first time. The development of the head and tail structures in juvenile stages of *Anatonchus tridentatus* (de Man, 1876) and *A. dolichurus* (Ditlevsen, 1911) is described and figured. A key to the species of the genus *Anatonchus* is provided.

Introduction

This paper is the second in a series dealing with the taxonomy of the Mononchidae, a family of free-living predatory nematodes inhabiting soil and fresh water. The genus *Anatonchus* (Cobb, 1916) de Coninck, 1939 was first established by Cobb as a subgenus. Cobb (2) included three species in his monograph, viz., *Mononchus* (*Anatonchus*) *tridentatus* de Man, 1876, *M. (A.) dolichurus* Ditlevsen, 1911, and *M. (A.) gracilicaudatus*, a new species. de Coninck (3) in describing and illustrating a male and several juveniles of *A. tridentatus* was the first to regard *Anatonchus* at the generic level. Andr assy (1) proposed the new combinations of *A. tridentatus*, *A. dolichurus*, and *A. gracilicaudatus*. However, he apparently did not consider de Coninck's paper of 1939 although he included it in his list of references. The validity of *A. gracilicaudatus* has been questioned by several workers including Micoletzky (12) and Ditlevsen (5). Hofm anner and Menzel (7) and Micoletzky (12) differed in their opinions as to the number of teeth in the buccal cavity of *A. dolichurus*. The present paper attempts to deal with these differences and also with establishing some new species in this genus.

Materials and Methods

Collection, preparation of slide mounts, measurement, and illustration of nematodes were done as previously described by Mulvey (13).

Anatomical Studies

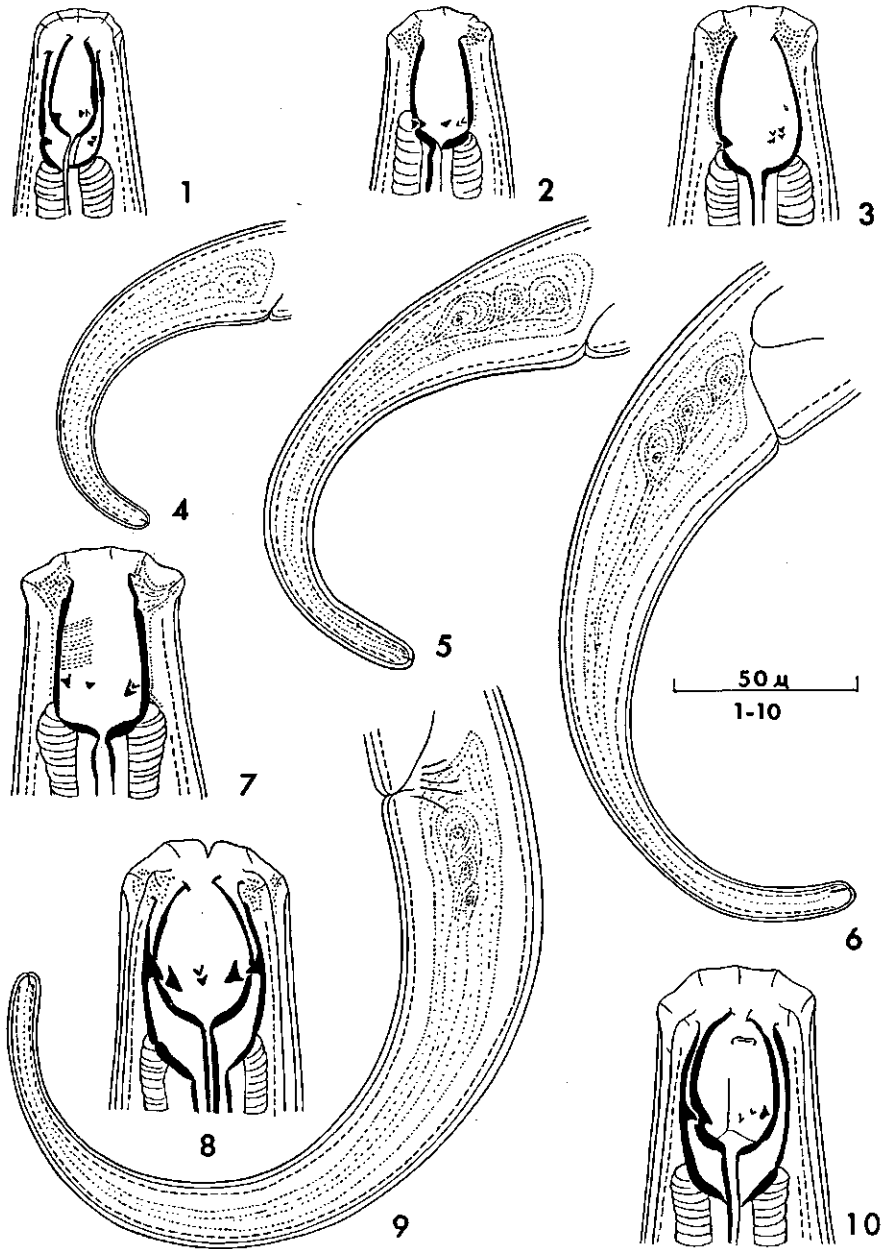
Position and Direction of the Teeth in A. tridentatus and A. dolichurus

(a) *A. tridentatus*

de Man (9) first described and figured males and females of this species. His original illustrations show three equal, fairly strong retrorse teeth located in the anterior third of the buccal cavity. In 1921 de Man (10) described and illustrated the head only of a female of this species. He also figured the head of a juvenile (probably the third stage) in which the three retrorse teeth were situated in the posterior third of the buccal cavity. His 1921 illustration of the female shows a large amphid located just anterior to the three teeth. Cobb (2)

¹Manuscript received June 12, 1961.

Contribution from the Nematology Section, Entomology Research Institute, Research Branch, Canada Department of Agriculture, Ottawa.



FIGS. 1-10. *Anatonchus tridentatus*, juvenile stages (Figs. 1-7, 9, specimens from Holland). 1, 4. First stage, molting. 2, 5. Second stage. 3, 6. Third stage. 7, 9. Fourth stage. 8. Fourth stage, molting (female from France). 10. Fourth stage, molting (male from England).

TABLE I
 Measurements of juveniles and adults of *Anatonchus dolichurus* from Canada and *A. tridentatus* from Holland

Juvenile stage	Species	No. of specimens	Body length (mm)	Tail length (mm)	c-value	Buccal cavity	
						Length (μ)	Width (μ)
1	<i>dolichurus</i>	3	1.2-1.8	0.29-0.36	4.3-5.0	35-40	18-28
	<i>tridentatus</i>	1	0.83	0.12	6.9	27	11
	<i>dolichurus</i>	4	2.1-2.6	0.46-0.58	4.2-5.2	53-55	29-38
	<i>tridentatus</i>	1	1.4	0.16	8.7	32	17
3	<i>dolichurus</i>	2	3.7-3.8	0.70-0.75	5.0-5.4	68-70	42-43
	<i>tridentatus</i>	1	1.6	0.19	7.4	39	23
4	<i>dolichurus</i>	1	4.5	0.98	4.6	83	50
	<i>tridentatus</i>	2	2.0	0.18-0.19	10.5-11.0	40	20-22
Adult (females)	<i>dolichurus</i>	1	6.3	1.4	4.5	100	60
	<i>tridentatus</i>	5	1.8-2.7	0.18-0.29	8.0-10.8	42-60	32-34

used de Man's illustration of 1876 of the female in his description of this species but apparently Cobb had not found *A. tridentatus* in soil in the United States. Goodey (6) illustrated and described in detail males and females of this species found in England. He emphasized the presence of three sharp retrorse teeth situated in the anterior third of the buccal cavity. Kreis (8) described and illustrated a female which deviated considerably in the details of the buccal cavity from that of de Man (9) and therefore this specimen of Kreis is best regarded as *incertae sedis*. Hofmänner and Menzel (7) and Stefanski (14) noted that the three retrorse teeth in the adult were situated somewhat anterior to the center of the buccal cavity.

I examined 18 males and 35 females from various European countries and observed that the three retrorse teeth in the males were about midway in the buccal cavity and in the females they were in the anterior third of the buccal cavity.

Preserved specimens from Holland were used in the study of the development of the buccal cavity and tail (Figs. 1-7, 9) from juvenile to adult. Specimens from France, England, and Germany were studied for comparison. The studies showed that the teeth of *A. tridentatus* are directed anteriorly in the first-stage juvenile but become retrorse during the first molt. In the remaining stages the teeth are retrorse. However, the three teeth do not assume their normal position until the last molt (Figs. 8, 10). Tail growth during the juvenile stages (Table I) is much less in proportion to that of *A. dolichurus*.

(b) *A. dolichurus*

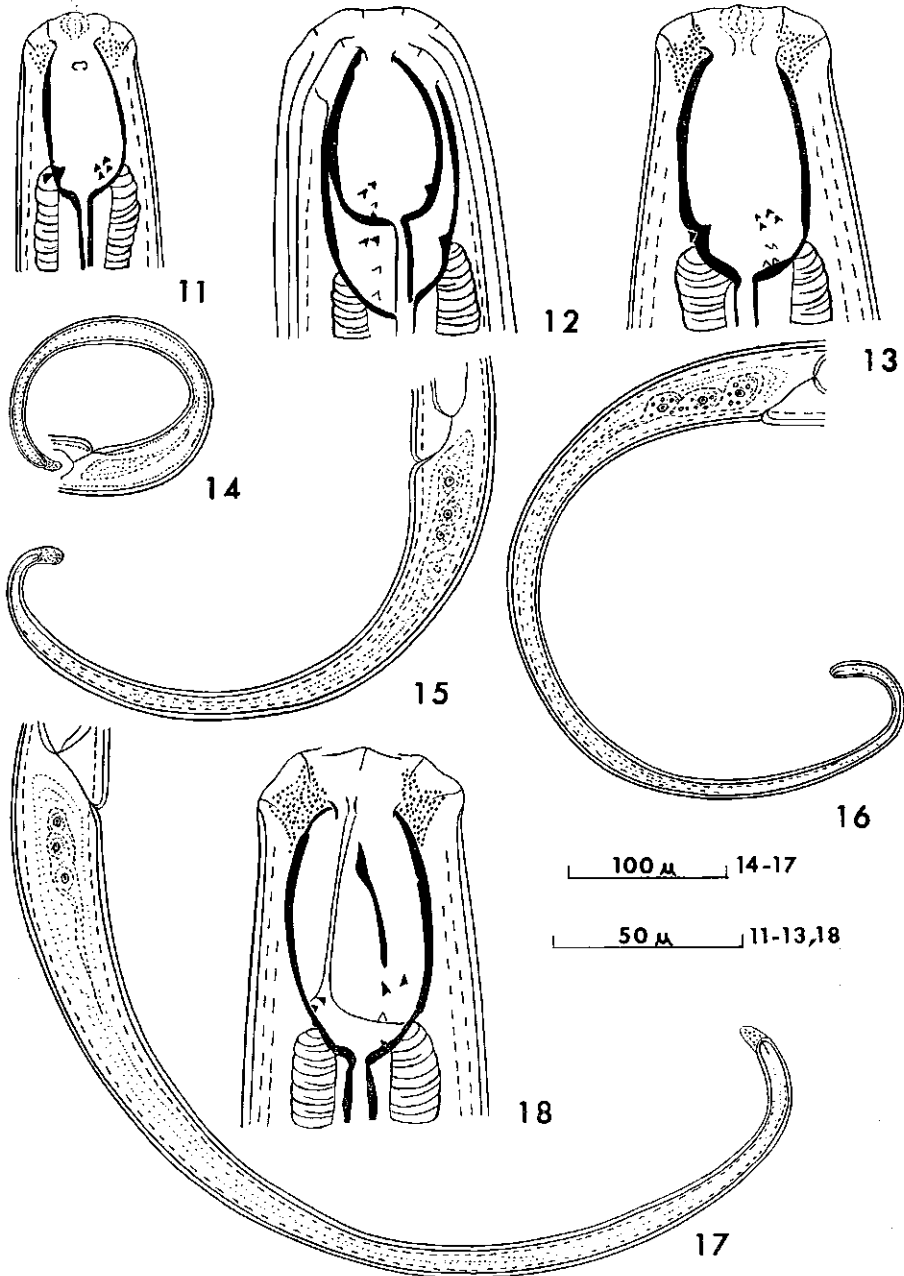
Ditlevsen (4) first described and illustrated this species. His illustration showed a fourth-stage molting juvenile. The two sets of posterior-pointed structures are probably angular foramina similar to that described by Goodey (6) in the buccal cavity of the adult *A. tridentatus*. Hofmänner and Menzel (7) surmised that the specimen examined by Ditlevsen (4) had been molting. Their sexually mature female specimens of *A. dolichurus* had only three teeth. Menzel (11) was the first to illustrate and describe adult females of this species. His Swiss specimens had three equally large retrorse teeth situated in the posterior third section of the buccal cavity. Micoletzky (12) disagreed with Hofmänner and Menzel's (7) presumption that Ditlevsen's specimen of 1911 represented a molting stage. Juveniles for the study of the development of the head and tail (Figs. 11-18, 19-22) of *A. dolichurus* were obtained from a population taken from bog soil near Ottawa, Canada. These were subsequently killed, fixed, and mounted on slides in glycerin. In *A. dolichurus* the three teeth of the juvenile stages point forward until the final molt. The tail of this species undergoes considerable growth in length during the development of the juvenile to the adult stage (Table I). The results of this study confirm Hofmänner and Menzel's (7) statements.

Taxonomy

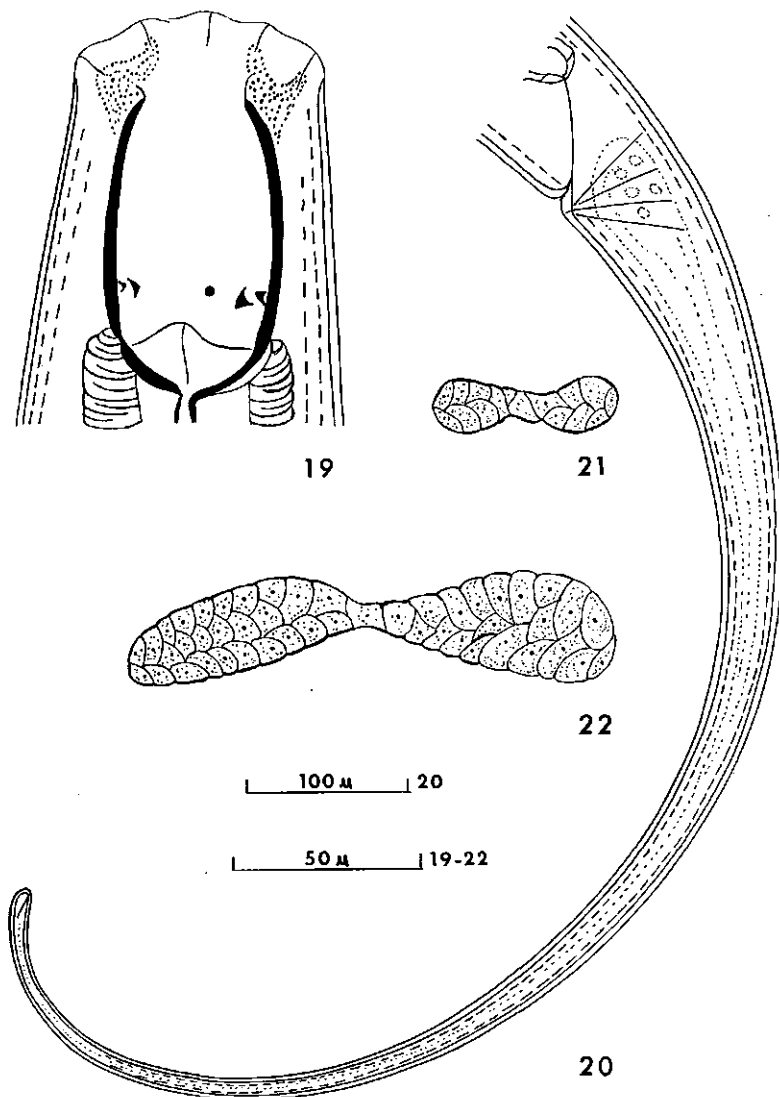
Genus *Anatonchus* (Cobb, 1916) de Coninck, 1939

Diagnosis.—Teeth retrorse, situated anteriorly to nearly basal in the buccal cavity, generally large species with roomy buccal cavity, tail long and usually becoming cylindroid, female organs paired, males of most species known.

Type species.—*Anatonchus tridentatus* (de Man, 1876) de Coninck, 1939.



FIGS. 11-18. *Anatonchus dolichurus*, juvenile stages (all specimens from Ontario, Canada). 11, 14. First stage. 12, 15. First stage, molting. 13, 16. Second stage. 17, 18. Third stage.



FIGS. 19-22. *Anatonchus dolichurus*, fourth-stage juvenile (specimen from Ontario, Canada). 19. Head. 20. Tail. 21. Developing ovaries of second-stage juvenile. 22. Developing ovaries of fourth-stage juvenile.

KEY TO SPECIES OF GENUS *Anatonchus*

FEMALES

1. Teeth midway to anterior in buccal cavity..... 2
Teeth nearly basal in buccal cavity..... 4
2. Species very long and thin ($L = 5.3$ mm; $a = 71.0$), buccal cavity large ($75 \times 65 \mu$).....
..... *gracilicaudatus* (Cobb)
Species shorter and wider (body length generally less than 3 mm), buccal cavity medium-sized..... 3
3. Teeth nearly anterior, appear hinged to walls of buccal cavity, buccal cavity nearly as wide as long..... *ginglymodontus* n. sp.
Teeth situated in anterior third of buccal cavity, not hinged, buccal cavity considerably longer than wide..... *tridentatus* (de Man)
4. Tail very long ($c = 4.5-5.5$)..... *dolichurus* (Ditlevsen)
Tail relatively short ($c = 6.7-11.3$)..... 5
5. Tail terminus acutely rounded, spinneret absent..... *subacutus* n. sp.
Tail terminus rounded, terminal spinneret present..... 4
6. Body length 2.5-3.5 mm, buccal cavity $50-58 \mu$ long \times $35-50 \mu$ wide, with thin walls..... *alleni* n. sp.
Body length 4.0-4.8 mm, buccal cavity $75-80 \mu$ long \times $52-58 \mu$ wide, walls thick..... *Anatonchus* sp. near *alleni*

MALES

1. Teeth midway in buccal cavity..... 2
Teeth nearly basal in buccal cavity..... 3
2. Species long, thin ($L = 6.1$ mm; $a = 56.0$), buccal cavity $93 \times 72 \mu$, spicule length about 140μ *gracilicaudatus* (Cobb)
Species shorter and wider ($L = 1.7-2.6$ mm, $a = 33$ or less), buccal cavity $40-55 \mu$ long \times $22-35 \mu$ wide, spicule length $83-110 \mu$ *tridentatus* (de Man)
3. Tail very long ($c = 5.5$), spicule length about 160μ *dolichurus* (Ditlevsen)
Tail shorter ($c = 8.1-10.4$), spicule length $84-125 \mu$ 4
4. Tail terminus acute, spinneret absent..... *subacutus* n. sp.
Tail terminus rounded, terminal spinneret present..... 5
5. Length 2.7-3.0 mm, buccal cavity $49-52 \mu$ long \times $37-40 \mu$ wide, spicule length $90-105 \mu$ *alleni* n. sp.
Length 3.8-4.6 mm, buccal cavity $70-75 \mu$ long \times 50μ wide, spicule length $125-130 \mu$ *Anatonchus* sp., near *alleni*

Anatonchus tridentatus (de Man, 1876) de Coninck, 1939 (Figs. 23-25)

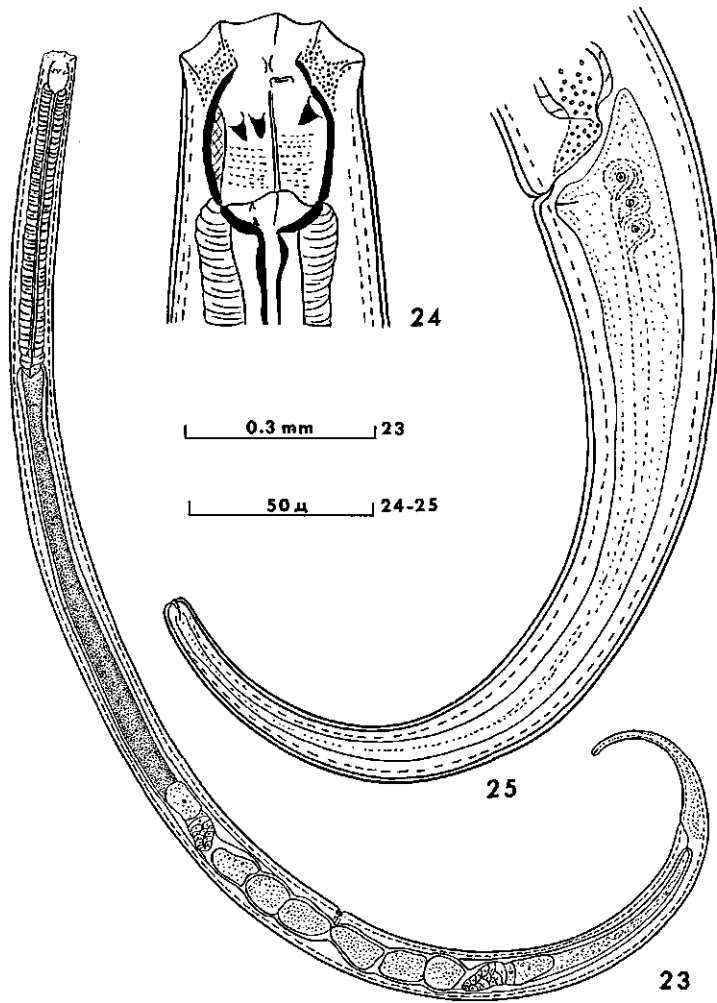
California specimens (2 females).— $L = 2.3-2.6$ mm; $a = 31-32.5$; $b = 4.8-5.2$; $c = 7.7-8.6$; $V = 61\%$; buccal cavity = $48-49 \times 34-36 \mu$; tail length = 0.30 mm.

These specimens from California generally conform to de Man's description (9). Only two females and two juveniles were available for study. Sperm was not observed in the female reproductive tracts. Caudal glands are obscure in the adults but distinct in the juveniles. The teeth of the juveniles are basal and retrorse.

Males and females of *A. tridentatus* from Holland, Switzerland, Germany, France, and England were studied in detail. Measurements of these specimens are contained in Table II.

A. tridentatus has a rather wide range in body length and buccal cavity size (Table II). de Man (9) records females slightly greater than 3 mm in body length. Hofmänner and Menzel (7) stated that the females they examined from Switzerland ranged from 1.55 to 2.33 mm. I examined a male and a female from Switzerland and found that the female body length was over 3 mm.

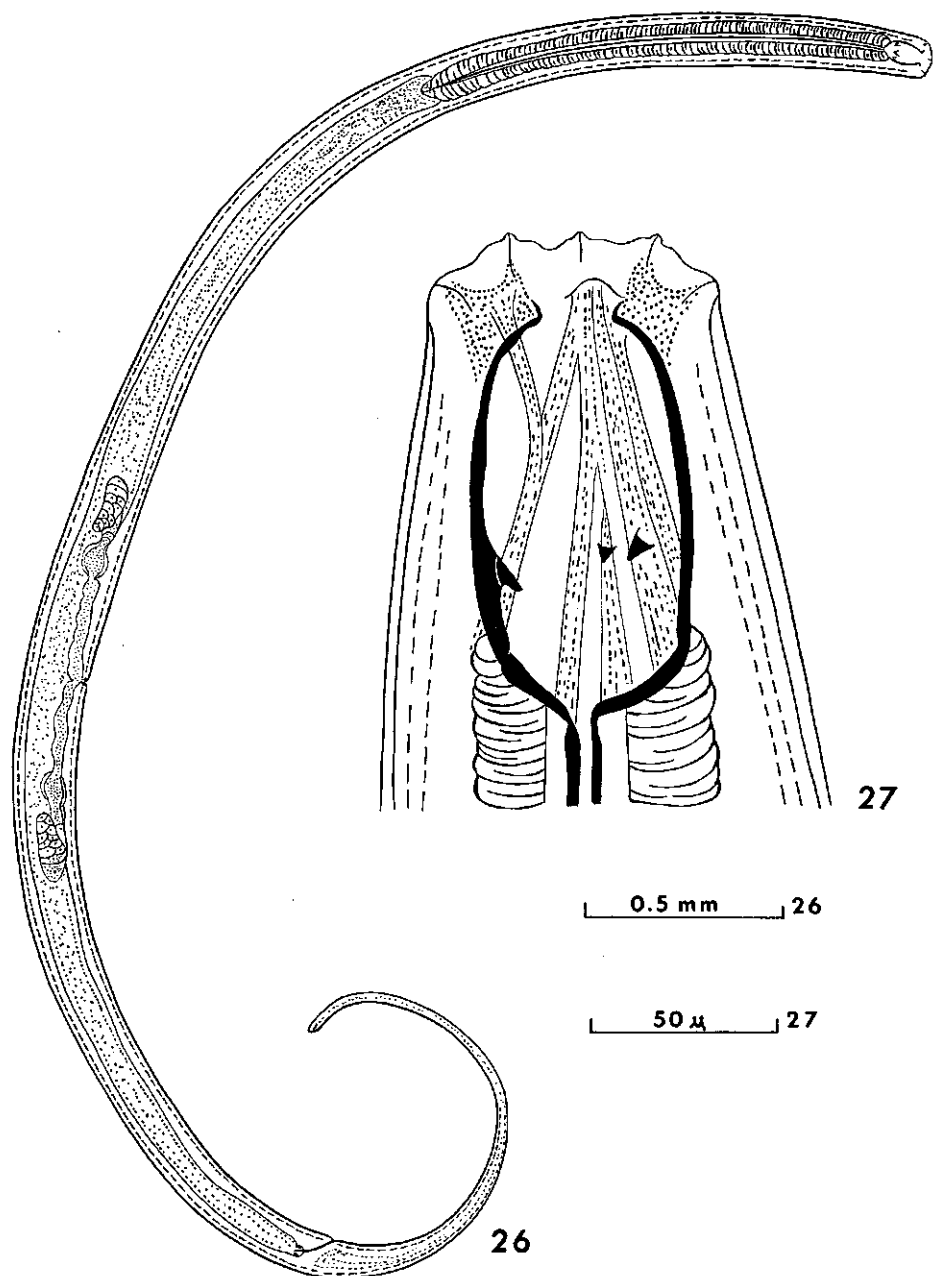
Habitat.—Turf, forest and orchard soil, flower garden soil.



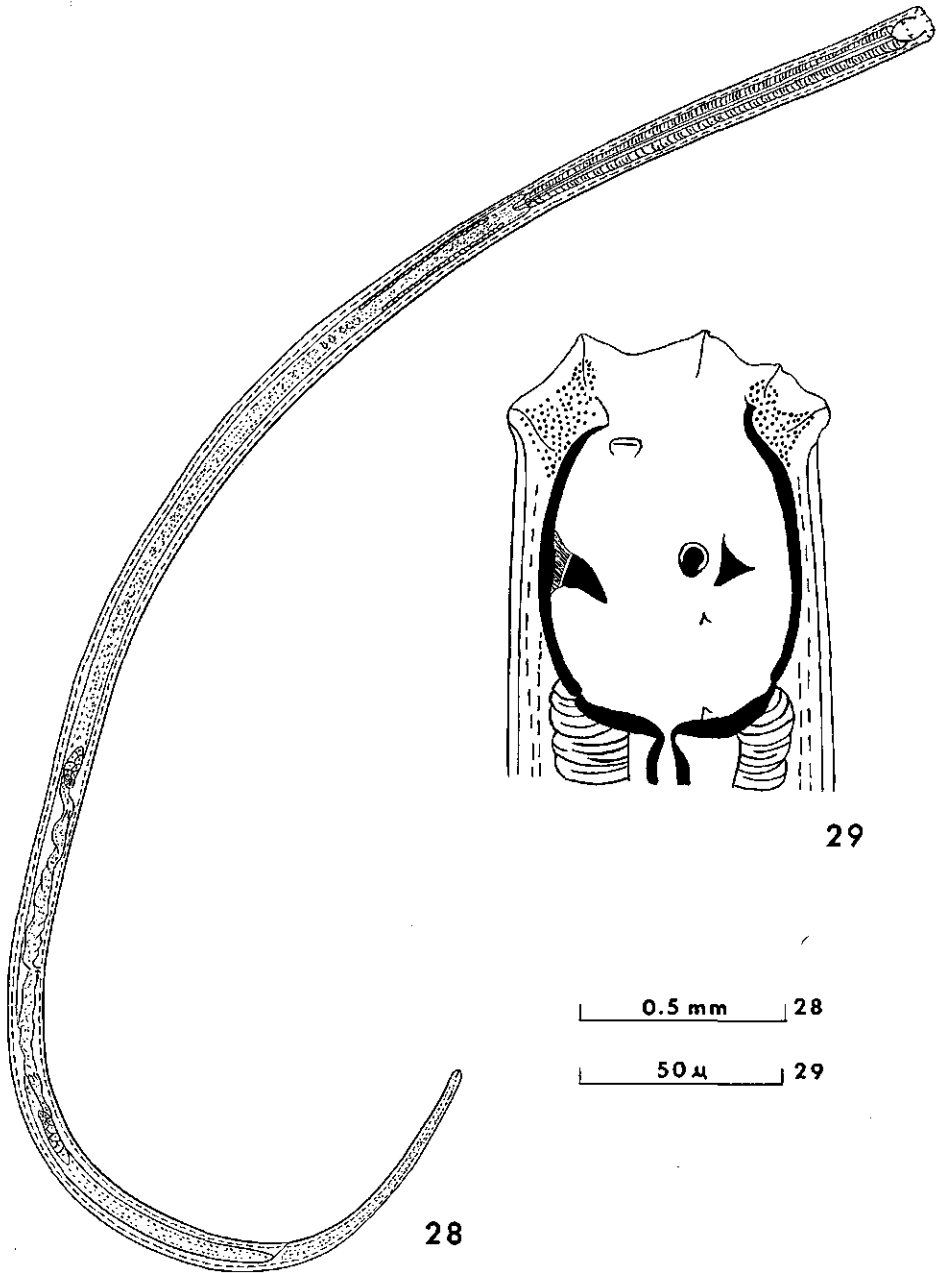
FIGS. 23-25. *Anatonchus tridentatus* (specimen from California, U.S.A.). 23. Female. 24, 25. Female head and tail enlarged.

TABLE II
 Measurements of *A. tridentatus* from various European countries

Country	No. of specimens	Body length (mm)	Buccal cavity		Tail length (mm)	c-value	Spicule length (μ)	V (%)
			Length (μ)	Width (μ)				
Holland	5 females	2.3 (1.8-2.7)	42-60	32-34	0.24 (0.18-0.29)	9.6 (8.0-10.8)	—	61 (60-62)
	7 males	2.1 (1.7-2.4)	40-50	22-35	0.19 (0.13-0.25)	11.6 (9.7-13.8)	85-100	—
England	5 females	2.3 (2.2-2.5)	44-52	31-42	0.25 (0.19-0.27)	9.5 (7.0-11.8)	—	61 (59-62)
	3 males	2.2 (2.2-2.3)	40-44	25-30	0.18 (0.15-0.20)	12.5 (11.2-14.3)	80-100	—
Germany	1 female	2.5	48	38	0.27	9.3	—	61
	1 male	2.3	45	31	0.19	11.5	83	—
France	7 females	2.4 (2.1-2.5)	42-50	30-33	0.24 (0.20-0.27)	9.7 (9.3-10.5)	—	63 (60-64)
	1 male	2.4	40	28	0.19	12.6	95	—
Switzerland	1 female	3.4	60	42	0.43	7.9	—	64
	1 male	2.6	55	35	0.32	8.1	110	—



FIGS. 26 and 27. *Anatonchus dolichurus* (specimen from Ontario, Canada). 26. Female. 27. Female head enlarged.



FIGS. 28 and 29. *Anatonchus gracilicaudatus* (specimen from California, U.S.A.). 28. Female. 29. Female head enlarged.

Geographical distribution.—Switzerland, Germany, Austria, Holland, France, Belgium, England, Scotland, Mexico, and California, U.S.A.

Anatonchus dolichurus (Ditlevsen, 1911) Andrassy, 1958 (Figs. 26 and 27)

Canadian specimen (1 female).— $L = 6.3$ mm; $a = 42.0$; $b = 4.7$; $c = 4.5$; $V = 51.6\%$; buccal cavity = $100 \times 60 \mu$; tail length = 1.4 mm.

The Canadian specimen fits Ditlevsen's 1928 description (5) of adult females of this species. Ditlevsen's original description (4) was based on immature females.

Ditlevsen (5) was the first to record the male of *A. dolichurus*. He found one male in a population of 25 females. He adequately described and figured (tail and spicules) the male, which was 6.3 mm long and had a c value of 5.5. There were about 20 supplements and the spicule was about 160μ in length.

Habitat.—Green turf, boggy soil.

Geographical distribution.—Jutland, Switzerland, Norway, Faroes Island, and Ottawa, Canada.

Anatonchus gracilicaudatus (Cobb, 1917) Andrassy, 1958 (Figs. 28 and 29)

California specimen (1 female).— $L = 5.30$ mm; $a = 70.6$; $b = 4.8$; $c = 7.9$; $V = 65\%$; buccal cavity = $75 \times 65 \mu$; tail length = 0.67 mm.

Cobb (2) erected this species on a single male. The following description is of a female that I have identified as belonging to this species: Labia conspicuous; body long and thin. Three strong, equal-sized teeth about midway in the buccal cavity. Buccal cavity spacious, with walls of moderate thickness. Longitudinal muscle structure prominent as described by Cobb (2). Lining of esophagus thick. Ovaries two, reflexed about one quarter, prominent valve between uterus and oviduct. Tail arcuate, tapering to rounded terminus. Caudal glands three, small, in tandem. Spinneret opening terminal but obscure.

There has been considerable discussion as to the validity of this species. Micoletzky (12) considered it a variety of *A. dolichurus*. Ditlevsen (5) stated that *A. gracilicaudatus* was probably identical with *A. dolichurus*. After careful examination of the illustrations of both species in the literature and the specimens available for study, I have concluded that *A. gracilicaudatus* is a valid species. It differs from *A. dolichurus* in having a larger buccal cavity, and larger teeth. The three teeth of *A. gracilicaudatus* are robust and situated nearly midway in the buccal cavity, while those of *A. dolichurus* are smaller and situated in the posterior third of the buccal cavity.

Habitat.—Marshy ground.

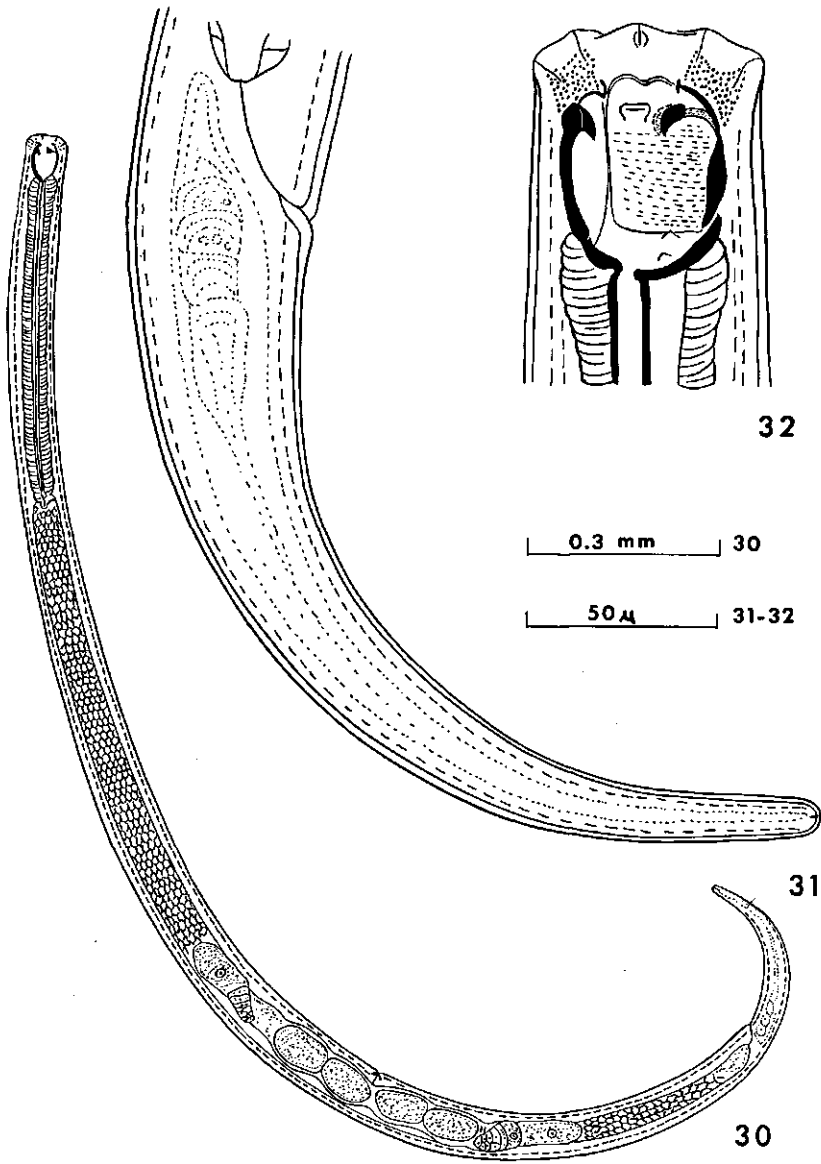
Geographical distribution.—Arlington Farm, Virginia, U.S.A. (male); Placerville, California (female).

Anatonchus ginglymodontus n. sp. (Figs. 30–32)

(4 females).— $L = 2.4$ mm (2.2–2.6); $a = 30.7$ (29.6–31.1); $b = 4.4$ (4.2–4.7); $c = 10.3$ (9.3–11.0); $V = 63\%$ (61–66); buccal cavity = $42\text{--}48 \times 40\text{--}42 \mu$; tail length = 0.24 mm (0.22–0.26).

Holotype (female).— $L = 2.6$ mm; $a = 30.6$; $b = 4.7$; $c = 10.4$; $V = 61\%$; buccal cavity = $48 \times 42 \mu$; tail length = 0.25 mm.

Diagnosis.—Labia distinct, buccal cavity barrel-shaped, nearly as wide as long. Three medium-sized retrorse teeth, pointed, and appear to be hinged to



FIGS. 30-32. *Anatonchus ginglymodontus* n. sp. 30. Female. 31. Female tail enlarged. 32. Female head enlarged.

anterior wall of the buccal cavity. Wall of buccal cavity anterior to base of teeth weakly developed. Walls of buccal cavity distinctly striated, of medium thickness, and cavity leads into a thickly lined lumen of the esophagus. Ovaries two, reflexed, and having a distinct valve between the uterus and the oviduct. One specimen contained a thick-shelled egg ($100 \times 60 \mu$). No sperm observed in reproductive tract. Intestine tessellated. Tail uniformly conoid, curved ventrally. Caudal glands leading into terminal spinneret. Tail terminus rounded.

Differential diagnosis.—This species differs from *A. tridentatus* in the position and attachment of teeth to the walls of the buccal cavity. The teeth in *A. ginglymodontus* are close to the anterior portion of the buccal cavity walls, while those of *A. tridentatus* are situated farther back. The teeth of *A. ginglymodontus* appear to be hinged to the buccal wall, while those of *A. tridentatus* appear to be part of the wall. The buccal cavity of *A. tridentatus* is rather longer than wide ($48 \times 38 \mu$) while that of *A. ginglymodontus* is about as wide as long ($44 \times 42 \mu$).

Habitat.—Grass sod.

Geographical distribution.—Berkeley Campus, University of California, California, U.S.A.

Holotype (female).—Collection 307. Deposited with University of California. Nematode collection at Davis, California.

Paratypes (females).—Collection 257, slide No. 20. Same data as holotype.

***Anatonchus subacutus* n. sp. (Figs. 33–37)**

(10 females).— $L = 2.6$ mm (2.5–2.9); $a = 40.9$ (35.7–46.0); $b = 4.7$ (4.4–5.0); $c = 8.7$ (7.6–9.3); $V = 64\%$ (60–66); buccal cavity = $48\text{--}52 \times 36\text{--}40 \mu$; tail length = 0.30 mm (0.28–0.34).

(10 males).— $L = 2.5$ mm (2.1–3.0); $a = 41.9$ (33.3–50.0); $b = 5.0$ (4.2–5.6); $c = 9.8$ (8.1–10.8); spicule length = 84μ (80–90); buccal cavity = $42\text{--}50 \times 31\text{--}38 \mu$; tail length = 0.25 mm (0.23–0.29); supplements = 12–13.

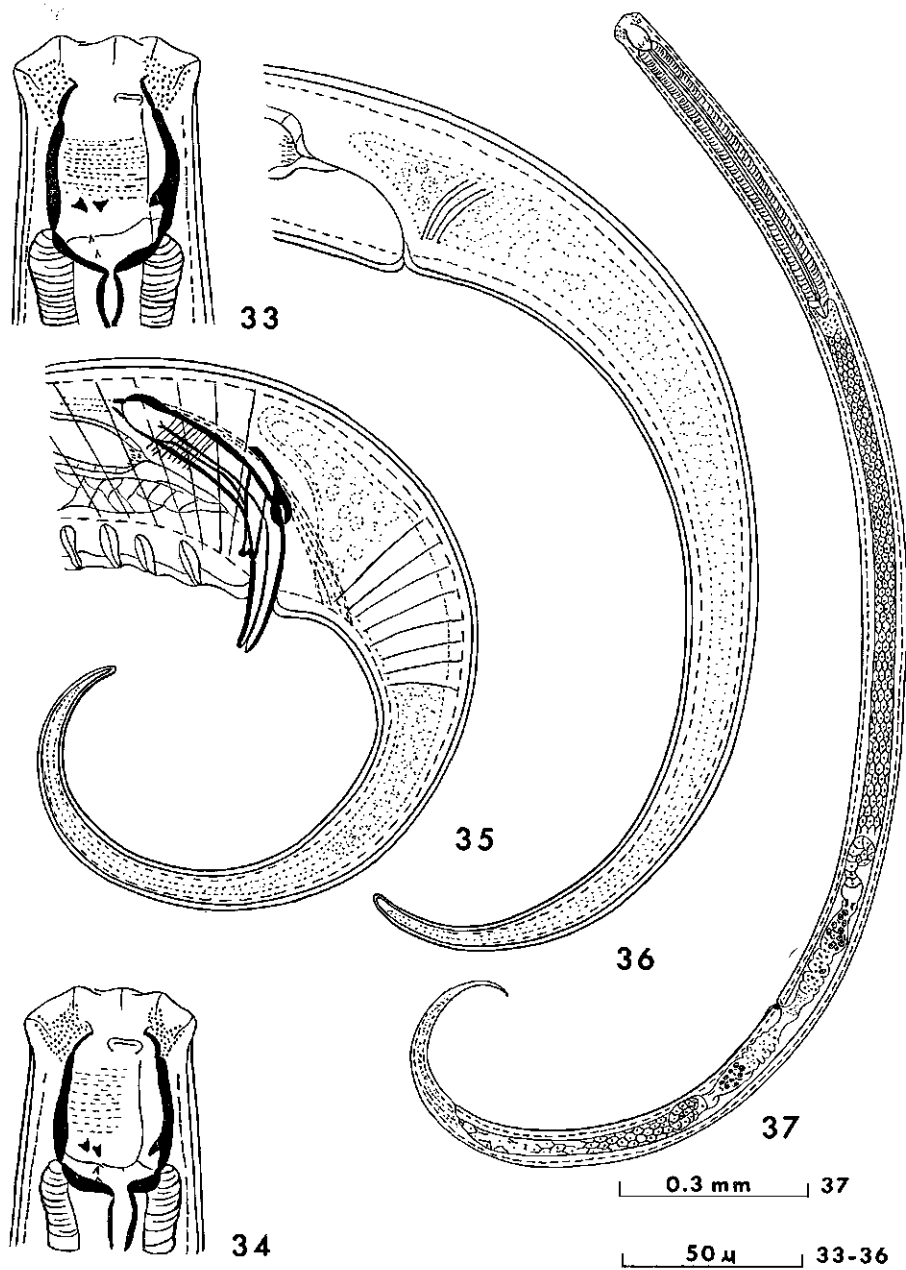
Holotype (female).— $L = 2.5$ mm; $a = 35.7$; $b = 4.6$; $c = 8.3$; $V = 66\%$; buccal cavity = $50 \times 38 \mu$; tail length = 0.30 mm.

Allotype (male).— $L = 2.4$ mm; $a = 42.1$; $b = 5.0$; $c = 10.4$; spicule length = 87μ ; buccal cavity = $42 \times 32 \mu$; tail length = 0.23 mm; supplements = 13.

Diagnosis, female.—Labia set off by slight depression, teeth three, equal-sized, small, and located in posterior third of buccal cavity. Walls of buccal cavity moderately thick, distinctly striated. Amphids distinct, aperture slit-like. Lining of esophageal lumen thick, flared outward immediately posterior to junction of esophagus and buccal cavity. Intestine tessellated. Ovaries double, reflexed, spermathecae of all the females amply supplied with sperm. Uterus and spermatheca connected by a valve. Tail conoid, arcuate, terminus minutely rounded. Caudal glands and spinneret absent.

Diagnosis, male.—Buccal cavity usually smaller than that of the female. Testes two, outstretched, spicules bulky, accessory pieces bifurcated, gubernaculum bifid. Supplements elevated above level of cuticle. Tail sharply arcuate conoid ending in minutely rounded terminus. Caudal glands and spinneret absent.

Differential diagnosis.—*A. subacutus* differs from *A. tridentatus* in the position of teeth and details of tail structure and shape. The minutely rounded



FIGS. 33-37. *Anatonchus subacutus* n. sp. 33. Female head enlarged. 34. Male head enlarged. 35. Male tail enlarged. 36. Female tail enlarged. 37. Female.

tail terminus and absence of spinneret and caudal glands separates this species from all other species in the genus.

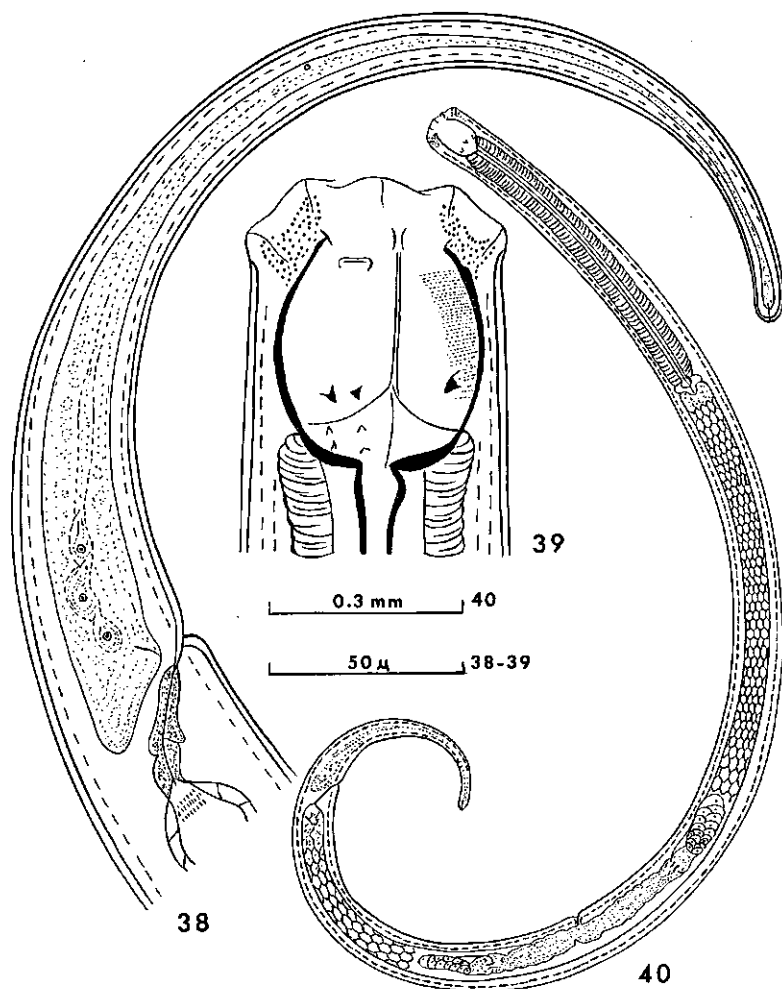
Habitat.—Soil beneath oak tree.

Geographical distribution.—Cordelia Junction, California, U.S.A.

Holotype (female).—Collection 162. Deposited with University of California Nematode collection, Davis, California.

Allotype (male).—Collection 162. Same data as holotype.

Paratypes (males and females).—Collection 162, slide Nos. 10a, 10b, and 10c. Same data as holotype.

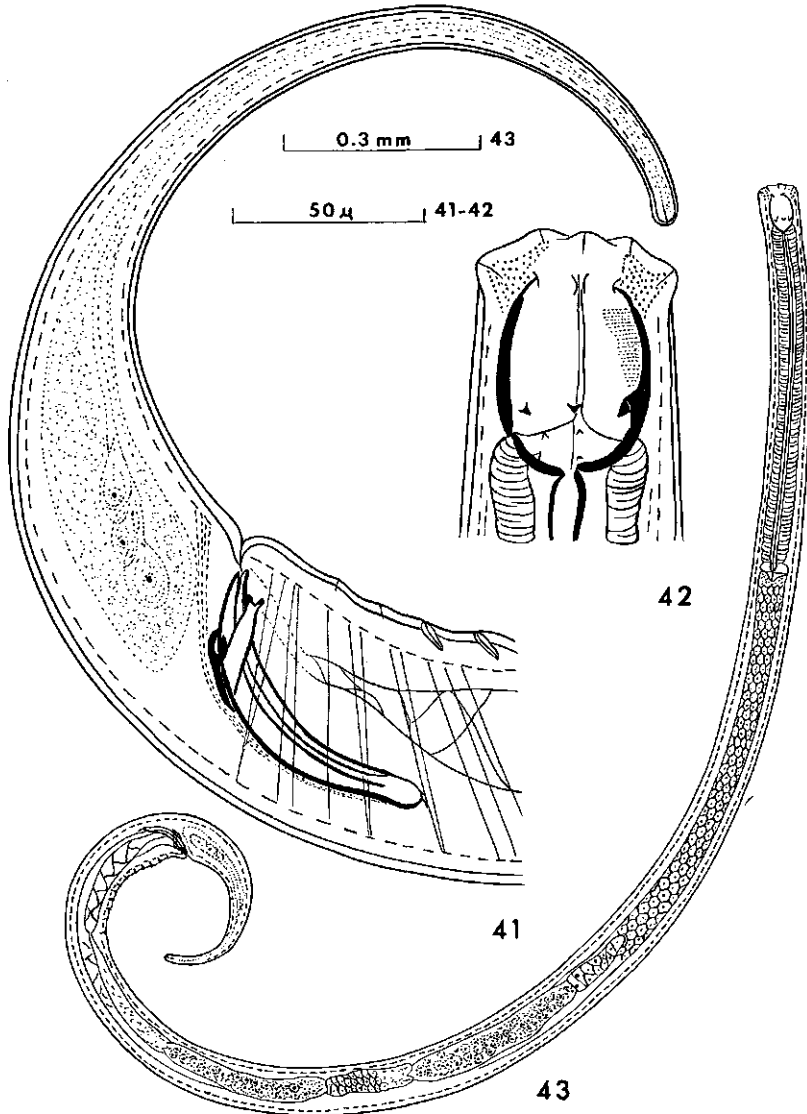


FIGS. 38-40. *Anatonchus allenii* n. sp. 38. Female tail enlarged. 39. Female head enlarged. 40. Female.

*Anatonchus alleni*² n. sp. (Figs. 38-40, 41-43)

(7 females).— $L = 3.0$ mm (2.5-3.5); $a = 38.6$ (33.3-50.0); $b = 4.9$ (4.4-5.5); $c = 8.6$ (6.7-11.3); $V = 63\%$ (60-66); buccal cavity = $50-58 \times 35-50\mu$; tail length = 0.35 mm (0.31-0.39).

(3 males).— $L = 2.8$ mm (2.7-3); $a = 41.2$ (37.5-47.6); $b = 4.9$ (4.7-5.5);



FIGS. 41-43. *Anatonchus alleni* n. sp. 41. Male tail enlarged. 42. Male head enlarged. 43. Male.

²In honor of Dr. M. W. Allen, University of California.

$c = 9.4$ (8.5–10.0); spicule length = 97μ (90–105); buccal cavity = $49\text{--}52 \times 37\text{--}40 \mu$; supplements = 12–17.

Holotype (female).— $L = 2.5$ mm; $a = 34.0$; $b = 4.5$; $c = 7.1$; $V = 62\%$; buccal cavity = $58 \times 50 \mu$; tail length = 0.35 mm.

Allotype (male).— $L = 2.8$ mm; $a = 38.4$; $b = 4.7$; $c = 8.5$; spicule length = 105μ ; buccal cavity = $50 \times 40 \mu$; supplements = 13.

Diagnosis, female.—Labia distinct, buccal cavity roomy, longer than wide. Teeth three, retrorse, equal-sized, relatively small, and situated in the posterior third of buccal cavity. Walls of buccal cavity thin, obscurely striated. Junction of buccal cavity and esophagus flared outward, lining of esophageal lumen thick. Ovaries two, reflexed and with distinct valve between oviduct and uterus. Spermatheca in fertilized females large and filled with sperm. A thin-shelled egg in one female measured $120 \times 70 \mu$. Tail uniformly conoid, ventrally arcuate, and ending in a rounded terminus. Caudal glands three, saccate, and leading to a terminal unarmed spinneret. Glands obscure in older females.

Diagnosis, male.—Details of head area same as those of female. Testes two, containing many small sperm. Three to four pairs of ejaculatory glands just anterior to the spicules. Spicules arcuate, relatively slender. Supplements slightly elevated above level of cuticle. Accessory pieces bifurcated, gubernaculum bifid. Caudal glands three, saccate, leading to terminal unarmed spinneret. Tail conoid arcuate with rounded terminus.

Differential diagnosis.—*A. alleni* differs from *A. tridentatus* in the position of teeth and relative proportions of buccal cavity. It may be separated from *A. subacutus* by tail shape and terminus.

Habitat.—Orchard and lawn soil.

Geographical distribution.—Berkeley, California, and Santa Clara County, California, U.S.A.

Holotype (female).—Coll. 303A. Deposited with University of California Nematode collection, Davis, California.

Allotype (male).—Coll. 303A, same data as holotype.

Paratypes (males and females).—Coll. 304, 188, 99, 257, and 165, same data as holotype.

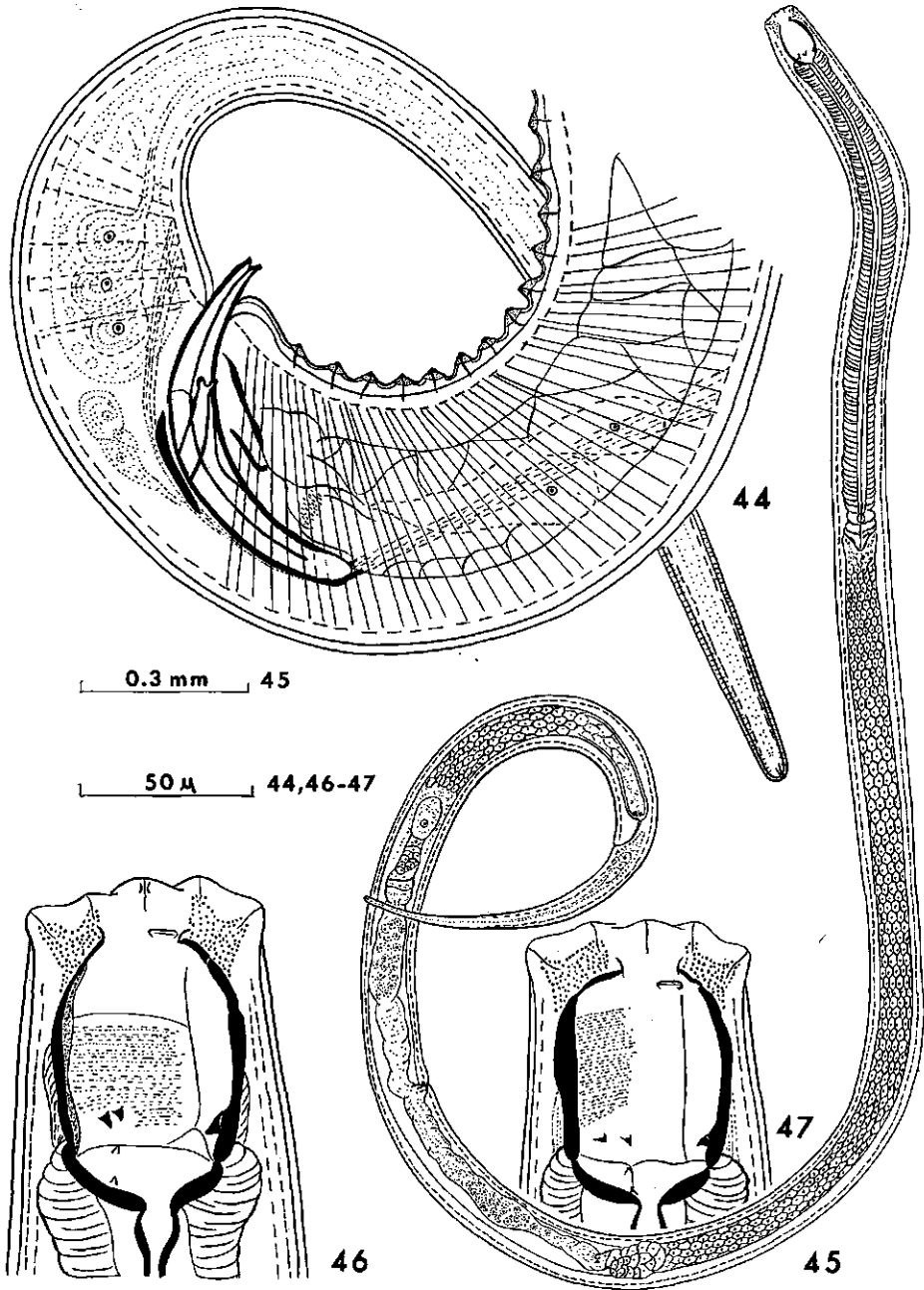
Anatonchus sp., near *alleni* (Figs. 44–47)

In addition to the specimens of *A. alleni* described there were three females and two males found in the same area which differed considerably from the new species in body length and buccal cavity size. At the present time I do not feel that these differences are sufficient for the erection of a new species. Measurements and descriptions of these specimens are as follows.

(3 females).— $L = 4.4$ mm (4.0–4.8); $a = 46.8$ (44.0–48.4); $b = 5.0$ (4.8–5.2); $c = 9.1$ (7.5–10.7); $V = 65\%$ (63–67); buccal cavity = $75\text{--}80 \times 52\text{--}58 \mu$; tail length = 0.49 mm (0.45–0.53).

(2 males).— $L = 3.8\text{--}4.6$ mm; $a = 42.0\text{--}51.1$; $b = 4.7\text{--}5.2$; $c = 8.3\text{--}10.3$; spicule length = $125\text{--}130 \mu$; buccal cavity = $70\text{--}75 \times 50 \mu$; tail length = 0.45–0.46 mm; supplements = 15–16.

Diagnosis, female.—Differs from type form of species in body length and buccal cavity size. The buccal cavity walls are thicker and the teeth relatively



FIGS. 44-47. *Anatonchus* sp., near *alleni*. 44. Male tail enlarged. 45. Female. 46. Female head enlarged. 47. Male head enlarged.

larger in this variety. The caudal glands differ in shape and are more distinct than those of the type form of this species.

Diagnosis, male.—Differs from type form of the species in body length, in buccal cavity size, in length of spicule, and in size and shape of caudal glands. The spicules in this variety appear to be uneven in length. The gubernaculum may be bifid.

Habitat.—Orchard soil (walnuts).

Geographical distribution.—Santa Clara County, California, U.S.A.

Acknowledgments

The author is indebted to Dr. M. W. Allen, Professor of Nematology, University of California, California, for the use of the Californian collection upon which most of the present paper is based. Grateful thanks also go to Dr. A. D. Baker, Chairman, Nematology Section, Entomology Research Institute, Research Branch, Ottawa, to Dr. M. W. Allen and Professor G. Thorne, University of Wisconsin, Wisconsin, to Dr. A. C. Tarjan, University of Florida, and to Mr. B. E. Hopper, Nematology Section, Ottawa, for corrections and criticisms of the manuscript; and to Dr. S. A. Sher, University of California, for the loan of some of his nematode specimens.

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