Anchobelondira clavicauda gen. n., sp. n. (Nematoda, Belondiridae) from South Africa

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ABSTRACT: *Anchobelondira clavicauda* gen. n., sp. n. is characterized by its esophageal structure, female gonads, female tail and number of male supplements. It shares characters with both the *Axonchium*- and *Belondira*-groups of genera. This, together with the results from observations on the genus *Axonchium*, led us to the conclusion that the genera previously grouped under Belondirinae and Axonchiinae by Thorne and Belondiridae and Axonchiidae by Siddiqi should be contained in one subfamily, viz. Belondirinae (Thorne, 1939).

Among the slides of belondirid nematodes from South Africa obtained from Dr. J. Heyns, four females and six males were found belonging to a new genus. They are described below as *Anchobelondira clavicauda* gen. n., sp. n. The specimens were killed by gentle heating, fixed with F.A.A. and mounted in glycerine.

Anchobelondira gen. n.

Belondiridae. Body almost straight to slightly arcuate after fixation. Lip region narrow and amalgamated, without sclerotized framework. Esophagus consisting of a slender anterior and an enlarged posterior part, separated by an isthmus-like portion. The slender anterior part forms a pyriform expansion at its posterior end. The enlarged posterior half is surrounded by a sheath of sinistral spiral muscle bands. Cardia almost round to oval in shape. Female gonads paired and reflexed. Female tail clavate, with inner cuticle considerably expanded. Males with an adanal pair and 9–13 ventromedian supplements, well-developed ventrosublateral pores and bluntly-rounded tail.

The generic name *Anchobelondira* is derived from *ancho*, meaning constriction, (referring to the esophageal constriction) and *Belondira* which it resembles in many respects.

TYPE AND ONLY SPECIES: *A. clavicauda* sp. n.

Anchobelondira clavicauda gen. n., sp. n. (Figs. 1–2)

HOLOTYPE FEMALE: L = 2.01 mm; a = 53; b = 5.6; c = 64; V = $^{10}39^{12}$.

For other measurements see Table 1.

FEMALES: Cuticle 3 μ thick near head, slightly less thick at midbody and up to 11 μ in tail region. Transverse striations more prominent and more widely spaced near both extremities, i.e. four annules occupying 3 μ at midbody, but 4 μ near extremities. Inner cuticle considerably thickened in tail region. Body-width greatest at neck-base, gradually diminishing anteriorly to lip region and posteriorly to about one anal-body-width anterior to anus, from where body widens to form typical clavate tail. Lateral chord about 13 μ wide at mid-body. Lateral organs indistinguishable; lateral pores well-visible in only one female, numbering 27 and 30 on right and left side respectively (5–6 in neck region, 20–23 in body region and 2 in caudal region).

Head barely offset from the body (Figs. 1A, 1B). Width of narrow, amalgamated lip region less than one-fifth that of neck base. Lip papillae protruding only very slightly. Amphids are deep pouches occupying more than three-fourth of lip region width (Figs. 1D, 1E); sensillae situated well behind the odontophore. Guiding ring about one lip region width from anterior end of body. Odontostyle conical; its aperture occupying slightly more than one-third of its length. Slender, anterior part of esophagus posteriorly forming a 7–11 μ wide pyriform expansion (Figs. 1A, 2A, 2B). Posterior enlarged part of esophagus occupying 47–52% of entire neck region, tapering anteriorly to a 4–7 μ long isthmus-like structure (Figs. 1A, 2A). Dorsal gland opening into esophageal lumen at 19–23 μ behind pyriform expansion; its nucleus is always situated in front of the aperture. The loose sheath of the esophagus consists of sinistral spiral muscle bands, varying in the specimen sectioned from 6 just behind the isthmus (Fig. 2C) to 10 in the middle (Fig. 2E) and 8 near the posterior

Table 1. Dimensions of *Anchobelondira clavicauda* gen. n., sp. n.

Locality	Holotype ♀	East London		Mpisi
		Paratype ♀♀ (n = 3)	Paratype ♂♂ (n = 5)	Paratype ♂
L (mm)	2.01	1.95–2.01	1.83–2.05	1.79
a	53	45–49	50–55	62
b	5.6	5.6–5.9	5.1–5.9	5.6
c	64	69–73	85–98	73
V or T	38	37–39	42–70	46
Body-width (μ)	38	41–45	36–38	29
L.r.w. = Lip region-width (μ)	8	7–8	7–8	7
Width at neckbase/L.r.w.	5.4	5.6–6.0	5.5–6.2	4.5
L.r.w./lip region height	1.9	1.6–1.9	1.7–1.8	1.4
Amphid-width (μ)	—	7 (n = 1)	——	6
Sensillae . . . μ behind amphid aperture	22	21–23	20–25	24
Odontostyle-length (μ)	8	7–8	7–8	7
Odontophore-length (μ)	13	12–13	11–14	12
Guiding ring from anterior end (μ)	6	6–7	7–8	7
Esophagus—total length (μ)	360	332–360	328–387	319
—length anterior part (μ)	175	168–172	182–195	178
—length posterior part (μ)	185	164–188	156–192	137
Outlet dorsal gland behind anterior esophagus (μ)	23	22–23	20–27	19
Prerectum (pr.)-length (μ)	188	130–178	229–289	236
Pr./anal-body-width	6	4.5–5.9	9.4–11.3	11.0
Rectum/anal-body-width	0.84	0.86–0.92	0.30–0.35	0.44
Tail-length (μ)	31	27–29	20–23	25
Tail-length/anal-body-width	1.0	0.91–1.0	0.82–0.91	1.1
Nerve ring from anterior end (μ)	123	120–123	122–134	116
Hemizonid from anterior end (μ)	118	113–116	114–123	111
G_1 (%)	10.1	9.1–12.2	——	—
G_2 (%)	12.2	12.5–19.2	——	—
Spicules (μ)	—	——	37–43	41
Number of midventral supplements	—	——	9–13	9
Number of copulatory muscles	—	——	23–25	22
Sperm length (μ)	—	——	8–10	8

end. A small disc-like structure usually distinct at esophago-intestinal junction. Cardia round to oval (Figs. 1A, 2D) 8–11 μ long and 12–14 μ wide. Prerectum 4–6 times as long as body-width at anus; rectum less than one anal-body-width long. Anus a 4 μ wide, transverse slit.

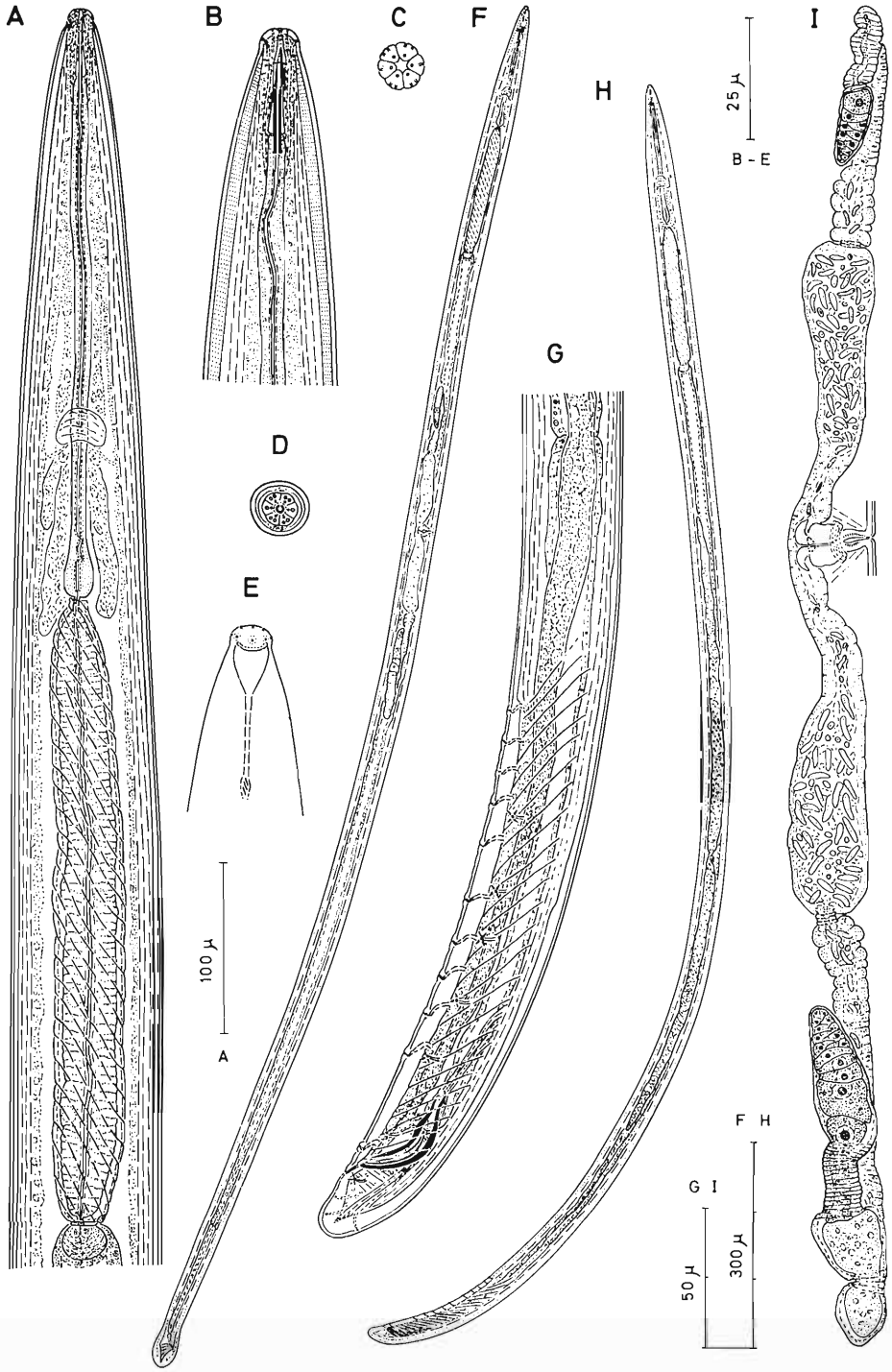
Vulva a 12 μ wide transverse slit (Fig. 2G). Vaginal lumen gradually becoming cross-shaped (Figs. 2H, 2I). Vaginal cuticularization distinct, with the pattern shown in Figs. 2H, 2I. Sphincter restricted to a small area. Both anterior and posterior gonads (Fig. 1I) consisting of a long outstretched uterus, sphincter, oviduct and reflexed ovary. Uteri almost always filled with elongate-ovoid (Figs. 1I, 2M) spermatozoa. In all females examined, the anterior ovary is considerably smaller than the posterior. None of the specimens have eggs or fully-developed oocytes. One female has a more matured posterior ovary, with an ovarial sac containing a 52 μ long oocyte and a 129 μ long granular mass that probably represents a single large oocyte.

Tail clavate (Fig. 2K) with two caudal pores on each side.

MALES: Similar to females in most of the structures. Body slightly arcuate (Fig. 1H). On each side of the body there are 22–25 lateral pores (7 in neck region, 12–15 in body region and 3 in caudal region); pores mostly situated along dorsal side of lateral chord. In addition to these, 5–7 prominent ventrosublateral pores are on each side of body (Fig. 1G); all but one occur in the region of the supplements, the last one is usually postanal, rarely adanal.

In the paratype from Bizana, the cardia is narrower than usual. Prerectum 9–11 times as long as the anal-body-width. Supplements consisting of an adanal pair and 9–13 ventromedian (Fig. 1G), the last one more than one anal-body-width in front of the adanal pair. Copulatory muscles varying from 22 to 25 in number. Spicules arcuate (Figs. 2J, 2L), 37–43 μ long, when measured along the curved median line. Sclerotized lateral guiding pieces absent. Tail dorsally convex-conoid to almost cylindrical with broadly-rounded terminus.

TYPE LOCALITY AND HABITAT: Four females and five males from uncultivated virgin clay soil near a stream bank on the farm 'Silverdale' near East London, Eastern Cape Province. Collected by Messrs. Prinsloo and Erasmus on 9 June 1964.



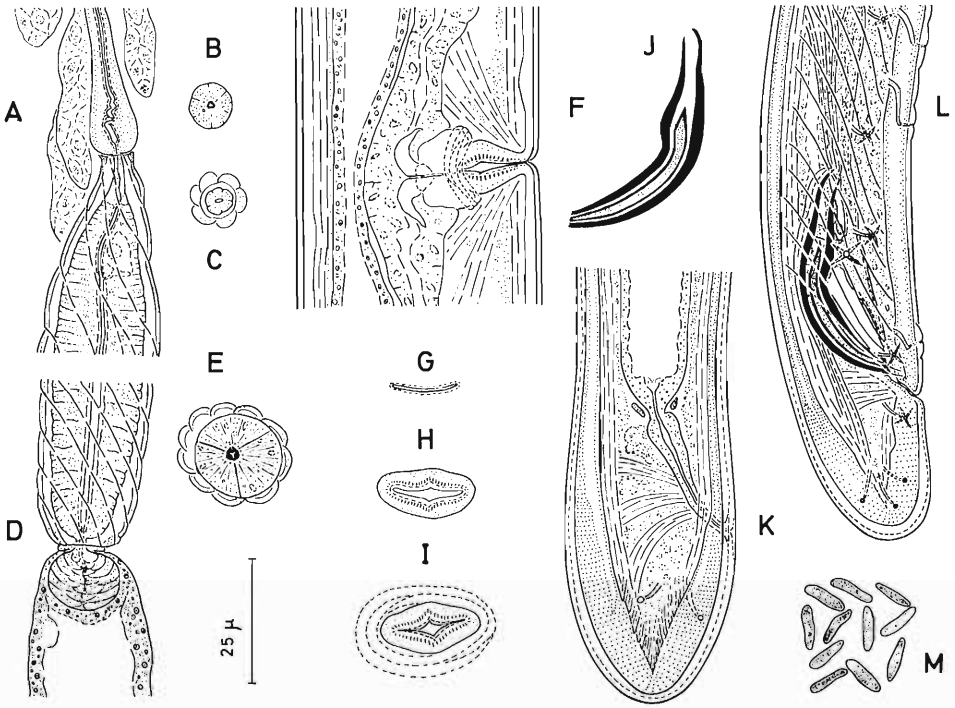


Figure 2. ***Anchobelondira clavicauda*** **gen. n., sp. n. A. Junction between both parts of the esophagus. B. Cross section through pyriform expansion. C. Cross section just behind isthmus. D. Region of the esophago-intestinal junction. E. Cross section through basal part of the esophagus. F. Vulva region. G. Vulva in ventral view. H–I. Optical sections through vagina. J. Spicule. K. Female tail. L. Posterior end of male. M. Sperm.**

OTHER LOCALITY: One male from indigenous forest near Mpisi, Transkei. Heavy black clay soil. Collected by Mr. P. van Niekerk, October 1963.

HOLOTYPE: Slide nr. 300, collection of the Instituut voor Dierkunde, Rijksuniversiteit, Gent, Belgium.

PARATYPES: Two specimens (♂ and ♀) used for sectioning. Remaining specimens (2♀♀ and 5♂♂) distributed as follows: 1♀ and 2♂♂ in the collection of the Plant Protection Research Institute, Pretoria, South Africa; 1♀ and 2♂♂ at the Instituut voor Dierkunde, Gent, Belgium; and 1♂ in the USDA Nematode Collection, Beltsville, Maryland, USA.

Discussion

Anchobelondira gen. n. comes closest to *Belondira* Thorne, 1939 in the shape of the lip region, the structure of the basal enlarged part of the esophagus and the tail shape; to *Belondirella* Thorne, 1964, *Yunqueus* Thorne, 1964, *Durinema* Jairajpuri, 1966, and *Bullaenema* Sauer, 1968 in the possession of two female gonads; but it differs from all these genera in having a constriction between the anterior and posterior portions of the esophagus and in the number of male supplements.

It resembles *Axonchium* Cobb, 1920 in having the isthmus-like region between both parts

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Figure 1. ***Anchobelondira clavicauda*** **gen. n., sp. n. A. Esophageal region of the holotype. B. Anterior body end. C. En face view. D. Optical cross section at the level of the amphids. E. Surface view of anterior end. F. Holotype female. G. Posterior body region of male. H. Male. I. Female gonads.**

of the esophagus and in the number and arrangement of male supplements. Nevertheless, the new genus differs considerably from the latter in the structure of the basal enlarged portion of the esophagus, the b-value, the presence of a pyriform expansion at the posterior end of the anterior esophagus, the possession of two female gonads, the clavate tail of the females and the absence of lateral guiding pieces in males.

In 1964, Jairajpuri divided the family Belondiridae into three subfamilies: Belondirinae, Swangerinae, and Dorylaimellinae. The first of these comprising the genera *Belondira*, *Axonchium*, and *Oxydirus* Thorne, 1939.

Thorne (1964) established the superfamily Belondiroidea with six families, among which Belondiridae comprises two subfamilies, viz. Belondirinae and Axonchiinae. Belondirinae includes the genera *Belondira*, *Yunqueus*, and *Belondirella*; it is differentiated from Axonchiinae mainly by the absence of a constriction between both parts of the esophagus and by the number of supplements in males. In 1967, Thorne added the genus *Axonchoides* Thorne, 1967 to Axonchiinae, although members of this genus do not possess a constriction between both parts of the esophagus!

Jairajpuri (1966) and Sauer (1968) added the genera *Durinema* and *Bullaenema* respectively to Belondirinae.

In his revised classification of Belondiroidea, Siddiqi (1968) included seven families. He raised Axonchiinae to family rank, with *Axonchium* as its only genus. The main diagnostic features between Belondiridae and Axonchiidae are the structure of the anterior part of the esophagus and the constriction between both parts of the esophagus. According to Siddiqi (l.c.), the anterior esophagus of Belondiridae is not offset from the posterior part, has a spindle-shaped muscular swelling anteriorly and is thin and nonmuscular throughout the rest of its length; in Axonchiidae the anterior part of the esophagus is very muscular and offset from the posterior part.

Although it resembles *Axonchium* in most other characters, Siddiqi included *Axonchoides* in the Belondiridae, because of the absence of a constriction and the structure of the anterior part of the esophagus.

During the study of the genus *Axonchium*, it became clear that the anterior part of the esophagus can have either the structure described by Siddiqi for Axonchiidae or Belondiridae, depending upon the species. Furthermore, this study revealed that males of some *Axonchium* species possess a small number (2–4) of supplements. Hence the only diagnostic character that remains differentiating the two families is the constriction between both parts of the esophagus. However, this constriction is very weakly-developed in some *Axonchium* species and is present in the new genus *Anchobelondira*, which shares many characters with Belondirinae.

In view of the above-mentioned facts, we feel that the demarcation drawn earlier between the two subfamilies (Thorne, 1964) or families (Siddiqi, 1968) is questionable. Hence, we propose that the genera *Belondira*, *Belondirella*, *Yunqueus*, *Durinema*, *Bullaenema*, *Anchobelondira*, *Axonchoides*, and *Axonchium* be included in only one taxonomic unit, viz. subfamily Belondirinae (Thorne, 1939) Jairajpuri, 1964.

Acknowledgment

The authors wish to thank Dr. Juan Heyns, Plant Protection Institute, Pretoria, South Africa, for supplying specimens of this new genus.

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