

# The Esophageal Glands of *Pratylenchus* Filipjev and *Apratylenchoides belli* n. gen. n. sp. (Nematoda: Tylenchoidea)

S. A. SHER<sup>1</sup>

**Abstract:** The esophageal glands in the genus *Pratylenchus* occur in a large, single ventral lobe except for four populations in which a few specimens had the glands located dorsally. *Apratylenchoides belli* n. gen. n. sp. in the subfamily Radopholinae is proposed for a species having two esophageal glands in a large dorsal lobe and one gland in a smaller, shorter ventral lobe. **Key Words:** taxonomy, morphology.

Specimens of a nematode collected in Utah by A. H. Bell appeared to be identical to species in the genus *Pratylenchus* Filipjev, 1934, except for two of the esophageal glands which overlap the intestine dorsally.

Only one report could be found in the literature which mentions and illustrates a *Pratylenchus* with the esophageal glands located dorsally; this, one female of *P. zaeae* Graham, 1951, in a normal population reported by Roman and Hirschmann (1). A study was made of *Pratylenchus* specimens in the University of California Nematode Collection to ascertain whether a dorsal position of the esophageal glands occurs, and if so, its frequency. Over 7000 specimens, representing more than 15 species from many areas of the world, were examined. All specimens examined had esophageal glands in the normal ventral position except two populations of an unidentified species from New Zealand and one population of an unidentified species from Yugoslavia. One New Zealand population, consisting of seven specimens, had one specimen with the esophageal gland dorsal; a second New Zealand population of 66 specimens, had five specimens with the gland dorsal. The population from Yugoslavia had 58 specimens, with the glands dorsal in four specimens. The dorsal locations of the esophageal glands in these three populations are considered aberrant and are similar to that illustrated by Roman and Hirschmann (1) for the single female specimen which they considered aberrant.

The arrangement of the esophageal glands in the dorsal position observed in the *Pratylenchus* from New Zealand and Yugoslavia differs from

the esophageal arrangement in the Utah species. In *Pratylenchus*, the esophageal glands are located in one compact lobe with the esophageal nuclei of the glands arranged in tandem as illustrated by Roman and Hirschmann for six species (1). The Utah specimens have a large dorsal lobe containing the dorsal esophageal nucleus with one subventral nucleus arranged in tandem and a smaller, shorter ventral lobe containing one subventral nucleus (Fig. 1A, D, J). The Utah specimens, therefore, can be distinguished from the rare aberrant *Pratylenchus* specimens which have a single dorsal gland lobe. In addition, the Utah specimens have a slightly posterior position of the dorsal esophageal gland opening and a more anterior position of the median bulb than is usually found in the known *Pratylenchus* species.

A new genus, therefore, is proposed in the subfamily Radopholinae to accommodate this species.

## *Apratylenchoides*, new genus

**Diagnosis:** Radopholinae. Dorsal and one subventral esophageal gland forming large compact lobe overlapping intestine dorsally and laterally, one subventral gland forming short ventral lobe. Deirids absent. Monodelphic, postvulvar uterine branch present. Phasmids on tail. Tail length about twice body width at anus. Male same as female except for less well-developed esophageal glands and sexual differences. Caudal alae enveloping tail.

**Type species:** *Apratylenchoides belli* n. sp.

*Apratylenchoides* can be distinguished from the closely related genus, *Pratylenchoides* Winslow, 1958, by having only one ovary and no deirids. It can be distinguished from *Pratylenchus* by the large dorsal and small ventral lobe of the esophageal glands, the usually more posterior position of the dorsal esophageal gland opening, and usually more

Received for publication 24 July 1972.

<sup>1</sup> Department of Nematology, University of California, Riverside 92502. The assistance of A. H. Bell in the collecting and preparation of specimens and W. M. Wouts in reviewing the manuscript is gratefully acknowledged.

anterior position of the median bulb; and from *Antarctylus* Sher, 1973, by the single ovary and shape of the lip region and female tail.

*Apratylenchoides belli* n. sp.

Fig. 1

**Measurements:** 20 ♀paratypes: L = 0.54 mm (0.49 - 0.60); a = 30 (26 - 33); b = 5.5 (4.8 - 5.8); b' = 3.8 (3.6 - 4.2); c = 23 (19 - 28); c' = 2.1 (1.7 - 2.6); V = 78 (77 - 82); stylet = 17  $\mu$  (16 - 18); O = 27 (24 - 34).

10 ♂paratypes: L = 0.51 mm (0.42 - 0.56); a = 30 (29 - 35); b = 5.5 (4.8 - 6.0); b' = 4.2 (3.4 - 4.6); c = 20 (18 - 25); c' = 2.2 (1.8 - 2.5); stylet = 16  $\mu$  (15 - 17); O = 28 (26 - 38); gubernaculum = 7  $\mu$  (5 - 8); spicules = 16  $\mu$  (15 - 18).

Female (holotype): L = 0.52 mm; a = 32; b = 5.8; b' = 4.0; c = 25; c' = 2.0; V = 79; stylet = 17  $\mu$ ; O = 25. Body with slight ventral curve. Lip region not set off, 3 annules. Stylet knobs well-developed, flattened anteriorly. Dorsal esophageal gland opening 6  $\mu$  behind stylet knobs. Median bulb oval, in anterior portion of esophagus. Esophageal glands overlap intestine dorsally two times body width and ventrally one and one half times body width. Spermatheca oval, with sperm. Postvulvar uterine branch 22  $\mu$  long. Tail tapering, terminus round without annulation. Lateral field with 4 incisures. Phasmids just posterior to center of tail.

Male (allotype): L = 0.47 mm; a = 26; b = 5.5; b' = 4.1; c = 20; c' = 2.0; stylet = 16  $\mu$ ; O = 30; gubernaculum = 6  $\mu$ ; spicules = 17  $\mu$ . Same as female except for less well-developed esophageal glands and sexual differences.

The following variations were noted in the paratypes: lip region with two or three annules; stylet knobs anteriorly flattened to forms with distinct anterior projections (Fig. 1B, C); esophageal glands overlapping intestine 1 to 2 times body width with the large dorsal esophageal gland nucleus at the level or posterior to the level of the esophago-intestinal valve (Fig. 1A, D, J). Spermatheca round to oval with sperm (Fig. 1H) to inconspicuous without sperm (Fig. 1F). Postvulvar uterine branch 20 to 30  $\mu$  long.

The face view was the same in the female and male (Fig. 11) as seen under the light microscope.

Holotype: Female collected by A. H. Bell, 10 May 1970, catalog number 19, U.C.R. Nematode Collection, Riverside, California.

Allotype: Male, same data as holotype, catalog number 20.

Paratypes: 63♀♀, 43♂♂, 10 juveniles, same data as holotype, distributed as follows: 52♀♀, 35♂♂, 10 juveniles, Department of Nematology, University of California, Riverside, California; 3♀♀, 3♂♂, USDA Nematode Collection, Nematology Investigations, Beltsville, Maryland; 4♀♀, 2♂♂, Department of Nematology, Rothamsted Experimental Station, Harpenden, England; and 4♀♀, 3♂♂, Plantenziektenkundige Dienst, Wageningen, The Netherlands. Specimens from near the type locality have been sent to the following nematode collections: Nematology Department, Davis, California; DSIR, Nelson, New Zealand, Ottawa, Canada; and Institute of Phytopathological Research, Wageningen, The Netherlands.

Type habitat and locality: Soil around shadscale (*Atriplex confertifolia* Wats.) 1 mile south of Fairfield, Utah.

Additional specimens of *Apratylenchoides belli* were collected from Richfield, Utah, around shadscale on 27 March 1970 (about 90 miles south of the type locality); they are not included as paratypes. No males were found in this collection. The spermathecae in these specimens were inconspicuous and without sperm (Fig. 1F). A population of these specimens was maintained in the greenhouse on shadscale at Riverside for about a year. It was sampled about every two months and large populations of females and juveniles were observed. Males were extremely rare. Mass collections of these populations in 5% formalin are preserved in the U.C.R. Nematode Collection.

## DISCUSSION

Although *Apratylenchoides* is similar to *Pratylenchus*, appearing different only by a dorsal shift of the esophageal glands, it differs also in the arrangement of the glands. In *Pratylenchus*, the esophageal glands are arranged in tandem in one large lobe, including the aberrant specimens whose esophageal glands shifted to a dorsal position. Therefore, it is speculated that if *Apratylenchoides* were derived from *Pratylenchus*, they would have a similar form of esophageal glands, but on the dorsal side of the body (as seen in some *Pratylenchus* specimens). Instead, *Apratylenchoides* has a large dorsal lobe composed of the dorsal esophageal gland and

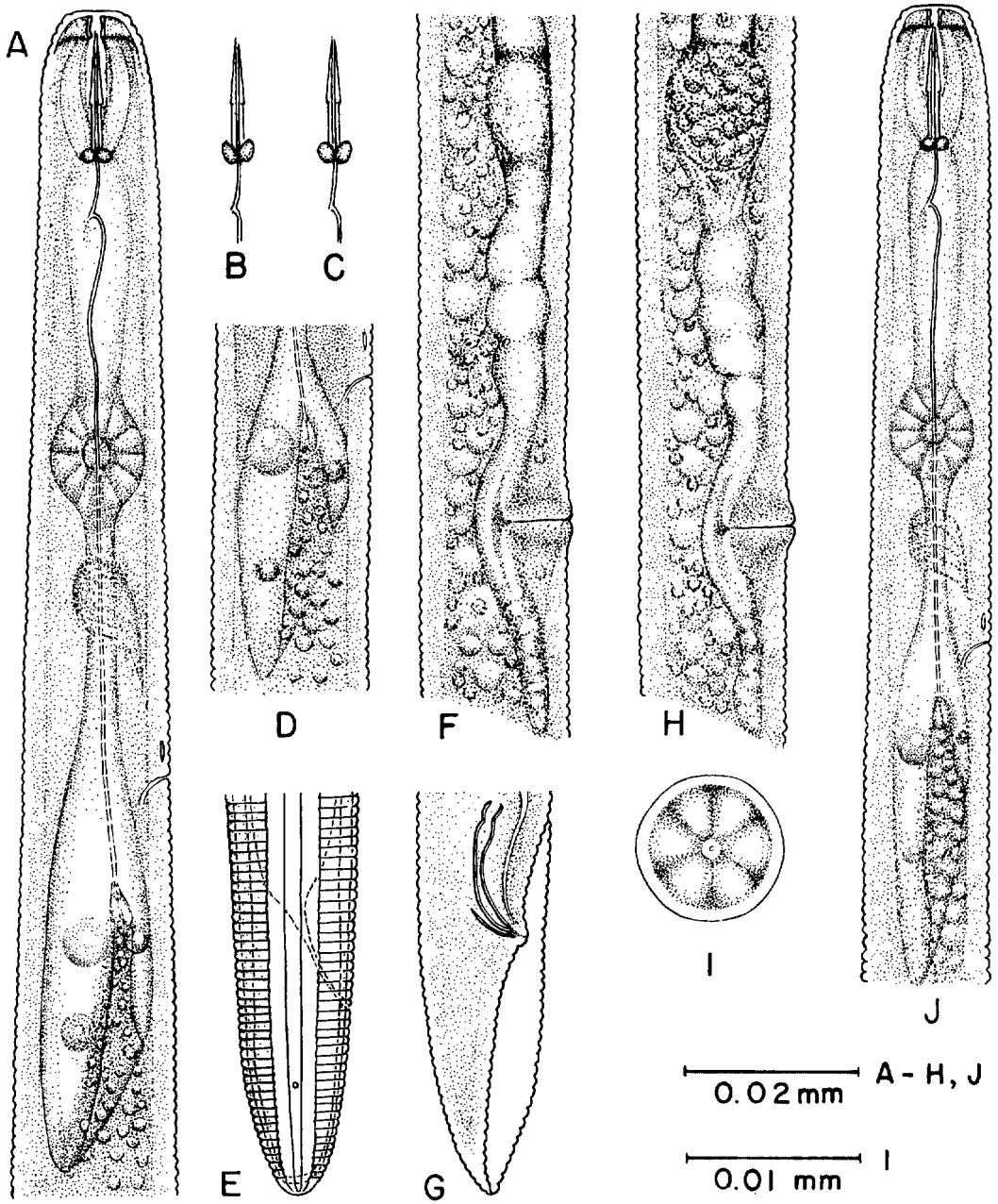


FIG. 1. *Apratylenchoides belli* n. gen. n. sp. A. Female, anterior region. B-C. Female, stilet knob variations. D. Female, esophageal gland region. E. Female, tail. F, H. Fe male, spermatheca and postvulvar uterine branch. G. Male, tail. I. Female, face view. J. Male, anterior region.

one subventral gland and a smaller ventral lobe containing one subventral gland.

In an examination of specimens in all the Tylenchoidea genera with overlapping esophageal glands, some species of the genus *Pratylenchoides* Winslow, 1958 (3) and *Antarctylus* Sher, 1973 (4) most closely

approximate the arrangement of the esophageal glands of *Apratylenchoides*. *Antarctylus humus* Sher, 1973 differs from *Apratylenchoides* in the shape of the lip region, labial framework and tail, in the position of the phasmids and in the number of ovaries. *Pratylenchoides leiocauda* Sher, 1970, and some other species of

*Pratylenchoides*, differ primarily from *Apratylenchoides* in having two ovaries and deirids.

Seinhorst (2) discusses the structure of the glandular part of the esophagus in Tylenchidae and its importance in the classification and evolution of this taxon. *Apratylenchoides belli* fits most closely to some *Pratylenchoides* spp. as discussed and illustrated by Seinhorst.

The arrangement of the esophageal glands in the Radopholinae and Pratylenchinae are considered of more significance than the number of ovaries or presence or absence of deirids, therefore the proposed new genus is regarded as being most closely related to *Pratylenchoides* and it could have been derived

from *Pratylenchoides* by the loss of an ovary and the deirids.

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