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MORPHOLOGICAL OBSERVATIONS OF *ROTYLENCHUS CALVUS* SHER, 1965 AND *R. CAPITATUS* EROSHENKO, 1981 (NEMATODA: HOPLOLAIMIDAE)

by
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Summary. *Rotylenchus calvus* and *R. capitatus* are redescribed. The genus *Pararotylenchus* Baldwin *et* Bell, 1981 is discussed and rejected because it is insufficiently differentiated from *Rotylenchus* Filipjev, 1936.

Rotylenchus calvus Sher, 1965 and *R. capitatus* Eroshenko, 1981, have not been redescribed since the publication of the original descriptions. Therefore, it was considered worthwhile to increase the knowledge of the limits of known variability of these species.The nematodes were examined permanently mounted in glycerine. All measurements are expressed in micrometers.

ROTYLENCHUS CALVUS SHER, 1965

(Fig. 1, Table I)

Female. Body coiled ventrad, more strongly in posterior part. Cuticle about 1.5 µm thick, annuli just anterior to vulva 1.9 (1.6-2.2) µm wide. Lateral field about 6 µm wide, with four equally spaced incisures. Head unstriated, conical, separated by a groove, 5-6 µm high and 8-9 µm wide. No longitudinal lines observed outside of lateral field. Cephalic framework relatively weakly developed, as compared with many other species of the genus. Stylet strongly built; knobs rounded, anteriorly concave or flattened, knobs diameter 4.5-5 µm. Oesophageal corpus narrows just in front of median bulb. Thickening of walls in median bulb 1.5-2 µm long. Oesophageal glands overlap intestine dorsally and laterally. Excretory pore just anterior to oesophago-intestinal junction, hemizonid either anterior or posterior to excretory pore. No fasciculi seen. Vulva with small double epiptygma directed either outward or inward. Spermatheca appears as a slightly offset spherical pouch, no sperm seen in any of the examined females. Both genital branches functional. Phasmids 9 (6-12) annuli anterior to anus. Tail more curved dorsally, with large terminal annulus. Inner incisures on tail join each other and form a short single line.

Male. Similar to female except for the following characters. Body of relaxed specimens an open C-shaped to slightly arcuate. Head 5 µm high and 6-8 µm wide at base. Cephalic framework weaker, refractive marginal ribs smaller. Stylet thinner and shorter, knobs anteriorly concave, 3-4 µm across. Median bulb more fusiform; oesophageal glands less developed. Phasmids 8 (6-11) annuli anterior to cloaca. Spicule slightly refractive, with velum and capitulum well visible.

Locality. Specimens were collected in Mexico, Guerrero State, Iguala, from sandy loam soil at elevation of about 700 m above sea level.

Comment. Examined specimens differ from Sher's (1965) description in having conical truncate head without distinct labial disc and anteriorly indented stylet knobs. However, Siddiqi's (1986) drawing of *R. calvus* shows head slightly more conical than that in Sher's (1965) fig. 7 G. Thus, it is considered a variation between populations of the same species.

ROTYLENCHUS CAPITATUS EROSHENKO, 1981

(Fig. 2; Table II)

Female. Body of relaxed specimens curved ventrad, more so in posterior part, up to tight spiral. Lateral field about 6-8 µm wide, with four uncrenated and equally spaced incisures. Cuticle without longitudinal markings outside lateral field, about 1.5 µm thick. Head 8-9 µm wide at base, conical, anteriorly truncated, separated from adjacent part of body only by smaller and usually more convex annuli. Head annuli mostly 7 or 8, occasionally specimens with 5, 9 or 10 annuli were observed. Cephalic framework moderately robust; basal plate anterior to or at the level of head base; marginal ribs variable in length, usually strongly refractive, 2-4 annuli long. Stylet knobs

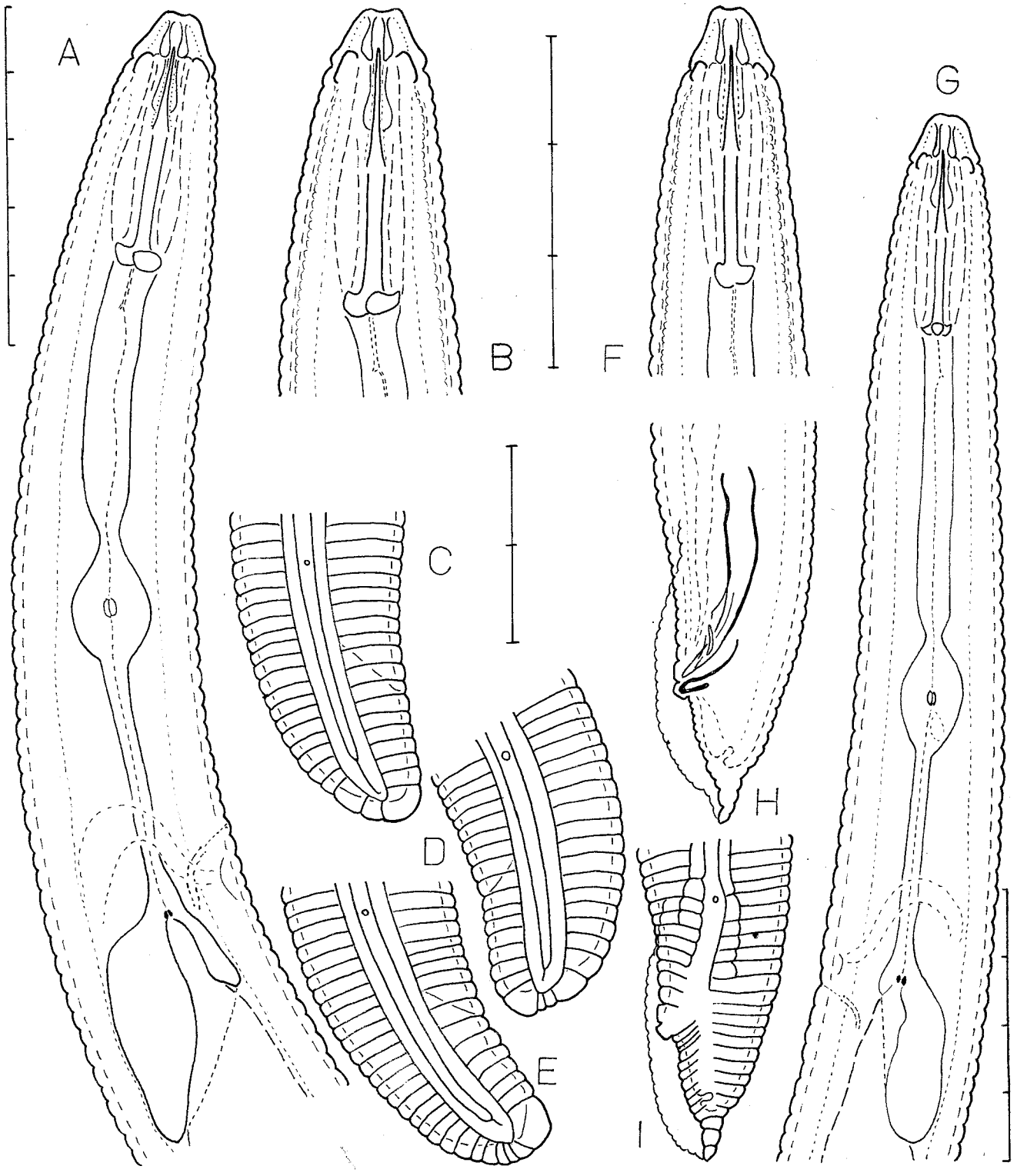

Fig. 1 - *Rotylenchus calvus*: A, oesophageal region of female; B, head of female; C-E, variation of female tail; F, head of male; G, oesophageal region of male; H, male tail showing spicule; I, surface of male tail. Smallest unit of scale bar = 10 µm.

TABLE I - *Measurements of* Rotylenchus calvus.

	Females (n = 5)	Males (n = 4)
Length	627 (569-641)	594 (554-623)
Ant. end/median bulb center	66 (63-69)	65 (61-67)
Ant. end/excretory pore	93 (87-97)	92-93
Ant. end/oes. intest. valve	100 (95-104)	97 (94-104)
Ant. end/end of oes. lobe	118 (116-124)	114 (110-119)
Tail	12 (11-13)	15 (13-16)
Tail annuli	7 (6-8)	
Stylet	25 (24-28)	21 (20-22)
DGO	4 (3-5)	4-5
a	26 (24-28)	27-29
b	6.3 (5.7-6.7)	6.1 (5.9-6.3)
b'	5.3 (4.8-5.6)	5.2 (5.0-5.5)
c	50 (48-55)	39 (36-45)
c'	0.9 (0.8-1.0)	1.2-1.3
V	59 (58-61)	
m	47 (46-48)	47-48
lobe/body width	0.8 (0.7-1.0)	0.9 (0.8-1.1)
Spicule		25 (24-26)
Gubernaculum		9 (8-10)

rounded, anteriorly flattened or concave, occasionally sloping posteriorly. Excretory pore usually opposite, sometimes more anterior or posterior to glandular bulb. Oesophageal glands enclosed in a bulb that usually extends posterior to oesophago-intestinal junction for 1-2 µm, in one specimen up to 5 µm was seen. Lumen of the bulb usually shifted to ventral side, apparently between small subventral glands; the most common situation is shown in Fig. 2 I; occasionally bulb with centrally placed lumen (Fig. 2 J) observed. Fasciculi seen along entire intestine, from oesophago-intestinal valve to anus. Vagina thick-walled, with double epiptygma as flexible outgrowths from the middle of vaginal walls. Epiptygma may be directed either outward or inward. Spermatheca axial, rounded, filled with sperm in most females. Both genital branches functional. Tail dorsally convex, tip usually striated, mostly last ventral annulus larger than other tail annuli (most common type shown in Fig. 2 O and 2 N); sometimes tail terminus unstriated. Phasmids 2-11 annuli posterior to anus, two females lacked a phasmid on one side.

Male. Similar to female but boby C-shaped. Sclerotized marginal ribs of cephalic framework smaller than that in females. Oesophagus less developed; median and glandular bulbs smaller. Spicules slightly arcuate, with velum. Capitulum not seen. Phasmids near the middle of tail.

Locality. R. capitatus has been described from the catchment of Ussuri river, Far Eastern region of the Russian Federation. It was found to be relatively common in Poland, where it inhabits well aerated but wet soils. The species has been collected from peat and sandy soils, from forests, meadows and arable fields.

Comments. Having relatively short stylet and offset glandular oesophageal bulb *R. capitatus* appears most similar to *Pararotylenchus rarus* Eroshenko *et* Korvizhnykh, 1985, *P. pernoxius* Eroshenko *et* Korvizhnykh, 1985, and also *R. feroxcis* Eroshenko, 1981 and *R. pini* Mamiya, 1968. However, *P. rarus* has longer tail (c = 24-29, c' = 1.4-2.0) and probably larger stylet knobs. These differences may not hold at specific level. *P. pernoxius* has slightly longer stylet (stylet = 27.3-31.5 µm), phasmids 3 annuli anterior to annulus posterior to anus, males are not known and spermathecae are described as empty. Oesophageal glands of *R. feroxcis* are described as "short and compact" although it is not known if and how the glands overlap intestine; the drawings 26 A and 26 B of Eroshenko (1981) show curved oesophagus and oesophageal lumen suggesting that the nematodes were not properly relaxed before fixing (cold fixative could be used for killing). Other characters differentiating the two species are: c = 18-24, stylet = 27-31 µm, males not known and spermathecae empty. *R. pini* has stylet 27-31 µm, c' = 0.7-1.0, tail with 6-13 annuli, phasmids 11-30 annuli anterior to anus.

Not having oesophageal glands in the form of a lobe overlaping the intestine, *R. capitatus* fits diagnosis of *Pararotylenchus* Baldwin *et* Bell, 1981. According to Fortuner (1987) "*Pararotylenchus* is very close to

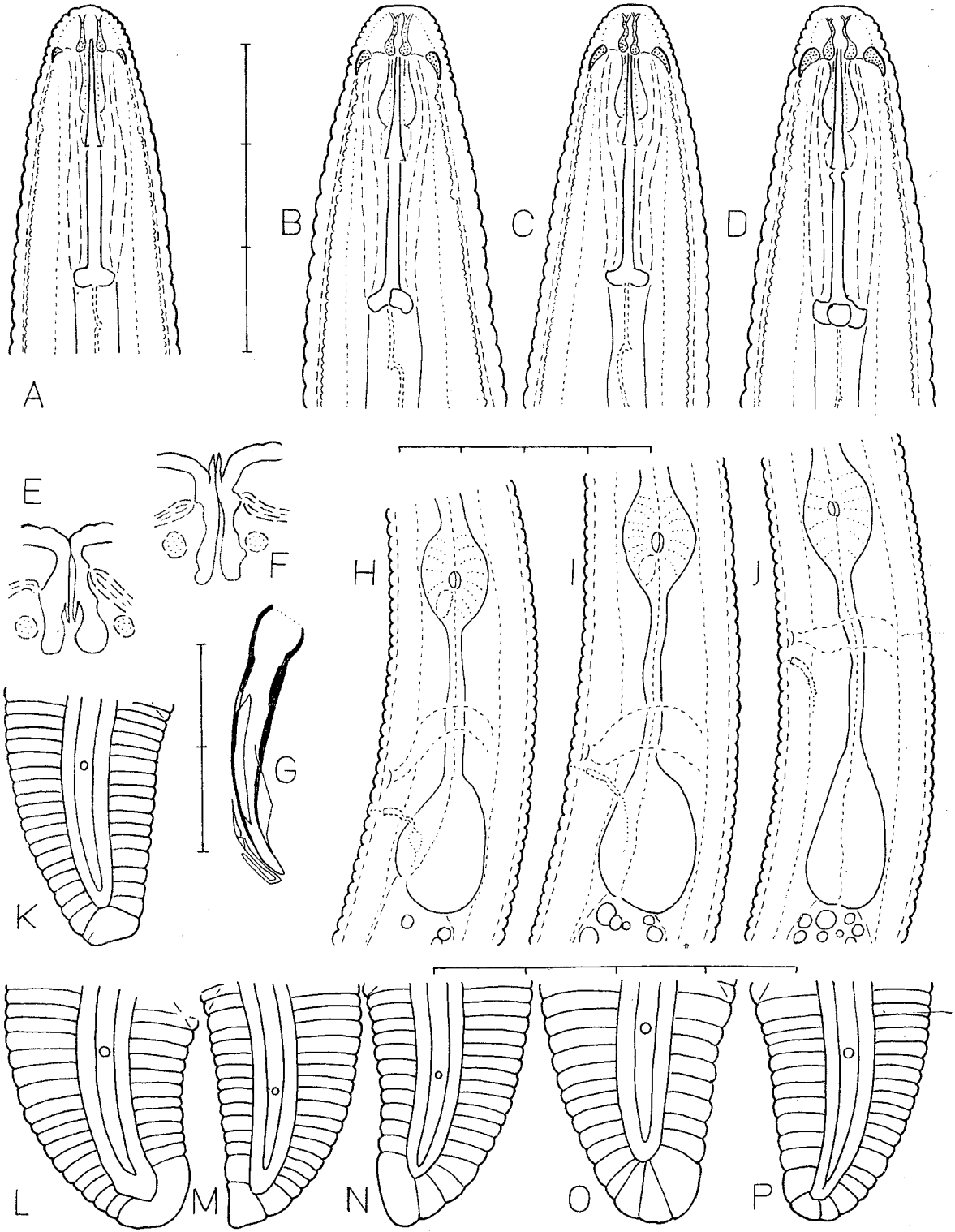

Fig. 2 - *Rotylenchus capitatus*: A, Head of male; B-D, heads of females; E and F, vagina showing various position of epiptygma; G, spicule and gubernaculum; H-J, posterior part of oesophagus; K-P, variation of female tail. Smallest unit of scale bar = 10 µm.

TABLE II - *Measurements of* Rotylenchus capitatus *(all populations from Poland).*

	Lowicz n = 10	Grabie n = 7	Grzmiaca n = 7	Drohiczyn n = 6	Bialowieza n = 4	Bolimów n = 3	Lowicz n = 7	Grabie n = 3	Bialowieza n = 2
Length	792	810	769	874	900	912	769	765	
	702-913	759-888	697-818	796-947	816-995	868-951	733-797	713-802	833-839
Ant. end/excretory pore	115	115	112	123	126	126	115	120	
	109-124	109-124	97-127	111-133	116-139	124-130	103-130	114-125	121-130
Ant. end/oes. intest. junction	131	133	139	136	141	135	131	137	
	124-141	124-141	123-158	128-147	131-150	131-140	124-137	129-149	138-139
Tail	25	25	24	26	26	28	36	29	
	23-27	22-28	21-26	23-29	23-28	23-35	32-34	21-39	32-36
Tail annuli	14	13	14	13	14	15			
	10-19	11-15	12-17	10-15	12-17	11-19			
Head annuli	7	8	7	8			7		
	6-8	7-9	6-8	7-8	7-8	8-10	5-8	6-7	6-8
Stylet	23.7	25.4	24.6	26.7	27.3	27.5	23.0	23.5	
	22-27	24-27	24-26	26-27	26-29	27-28	21-25	22-25	25-27
DGO	5.0	4.1	4.0	5.2	5.2	5.7	7.0		
	4-6	2-6	3-6	4-6	4-6	5-6	5-8	4	6-8
a	27	24	28	28			30	29	
	23-33	23-27	25-31	26-32	26-27	24-25	26-39	27-31	27-31
b	6.0	6.1	5.5	6.4	6.3	6.8	5.9	5.6	
	5.3-6.9	5.6-6.3	5.2-6.0	6.0-6.8	5.9-6.6	6.5-7.3	5.5-6.2	5.4-5.8	6.0-6.1
MB	60	60	61	61	59	63	61		
	57-62	57-62	59-63	59-64	57-60	61-64	58-64	61	57-62
c	32.2	33.1	32.0	33.4	35.7	32.3	21.7	28.5	
	27-35	28-41	29-39	31-36	35-36	24-40	19-24	20-35	23-26
c'	1.2	1.1	1.3	1.2	1.2	1.3	2.1	1.8	
	1.0-1.5	1.0-1.3	1.1-1.4	1.0-1.4	1.1-1.3	1.0-1.6	1.9-2.3	1.5-2.2	1.9-2.1
V	58	57	58	59	56				
	56-61	55-59	56-61	57-63	55-67	56-57			
m	46	46	46	45	46	47	47	49	
	43-48	42-48	43-48	42-46	44-48	44-50	45-48	46-53	46
Spicule							27	27	
							25-29	26-28	26-29
Gubernaculum							10	10	
							9-12	8-11	9-10

Rotylenchus, and except ... for the arrangement of the glands, there is little to separate the two genera". Both contain species with lumen of oesophagus placed centrally or shifted ventrally, the only difference is the length of glands. This character alone is not considered generic in other groups of tylenchs, as *Cephalenchus* Goodey, 1962 and *Pratylenchoides* Winslow, 1958 contain species overlapping or offset glands (Raski and Geraert, 1986; Baldwin *et all*, 1983), *Telotylenchus* Siddiqi, 1970 was synonymized with *Tylenchorhynchus* Cobb, 1913 because the only difference observed was the length of glands (Fortuner and Luc, 1987). I concur with this concept, especially within *Rotylenchus - Pararotylenchus* group, where species with various degrees of overlap (i.e. length of glands) are

known. Consequently, I do not recognize the validity of *Pararotylenchus* until more differences are demonstrated. However, synonimization of both genera considered is not proposed herein because I have not examined sufficient number of species. The discussion of the relations of *Pararotylenchus* to *Tylenchorhynchus*-like forms based on the gland length (Baldwin and Bell, 1981; Fortuner, 1987) is not substantiated by other characters and the gland arrangement may well be treated as shared plesiomorphic state of character or as reduced length and size of glands without any phylogenetic relation to Belonolaimidae.

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