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## ELEVEN SPECIES OF SAPROPHAGOUS NEMATODES AS NEW RECORD FROM RAJASTHAN

P. BOHRA AND R. SULTANA

Desert Regional Centre, Zoological Survey of India, Jhalamand, Pali Road,  
Jodhpur, Rajasthan, India

### INTRODUCTION

The nematology literature reveals that Khera (1968-1975) published a series of papers on nematodes of Rajasthan belonging to order Rhabditida, Araeolaimida, Chromadorida, Monhysterida and Enoplida. Nama & Soni (1979) and Soni & Nama (1981) have also reported some species of free-living nematodes. Baqri and Bohra (2000-2005) and Bohra (upto 2008) reported several new species and new records of nematodes of order Tylenchida, Dorylaimida and Mononchida. However, the information on free-living or saprophagous nematodes from Rajasthan still remains meagre. Keeping this view in point, random surveys were conducted in Rajasthan State under districts of Indira Gandhi Nahar Pariyogna command area of Thar Desert. These samples yielded wide variety of nematodes. In all 11 species of nematodes belonging to orders Araeolaimida (3 spp.), Rhabditida (7 spp.) and Enoplida (1 sp.) are being reported as new records in the present paper. Information on their host(s) and locality(ies) have also been provided.

### MATERIALS AND METHODS

Soil samples were processed by using sieving and decantation and modified Baerman's funnel techniques. For light microscopy (LM), nematodes were fixed in hot 4% formaldehyde, processed to anhydrous glycerine and mounted on glass slides. Measurements and drawings were made using a drawing tube mounted on Nikon Eclipse E600.

Order ARAEOLAIMIDA De Coninck & Schuurmans  
Stekhoven, 1933

Family RHABDOLAIMIDAE

#### 1. *Rhabdolaimus aquaticus* de Man, 1880

(Fig. 1, A-C)

*Material examined* : 3 ♀♀; date of collection : 30.iii.07.

*Measurements* : Females L = 0.6 mm; a = 30-35; b = 4.0-5.1; c = 3.2-4.1; V = 44-46.

*Description* : *Female* : Body slightly ventrally curved, tapering at both extremities, but more towards posterior. Cuticle thin, annulated, annuli less than 1  $\mu$ m wide. Lip region continuous with body contour. Stoma 21-27  $\mu$ m long, with a dorsal tooth at anterior end. Pharynx cylindrical, with pear-shaped basal bulb. Cardia small. Intestine with thin wall and wide lumen. Female reproductive system amphidelphic. Ovaries reflexed. Vagina 3-4  $\mu$ m long. Vulva sunken. Rectum 7-9  $\mu$ m long. Tail 10-12 anal body diameter long, with cylindrical spinneret.

*Male* : Not found.

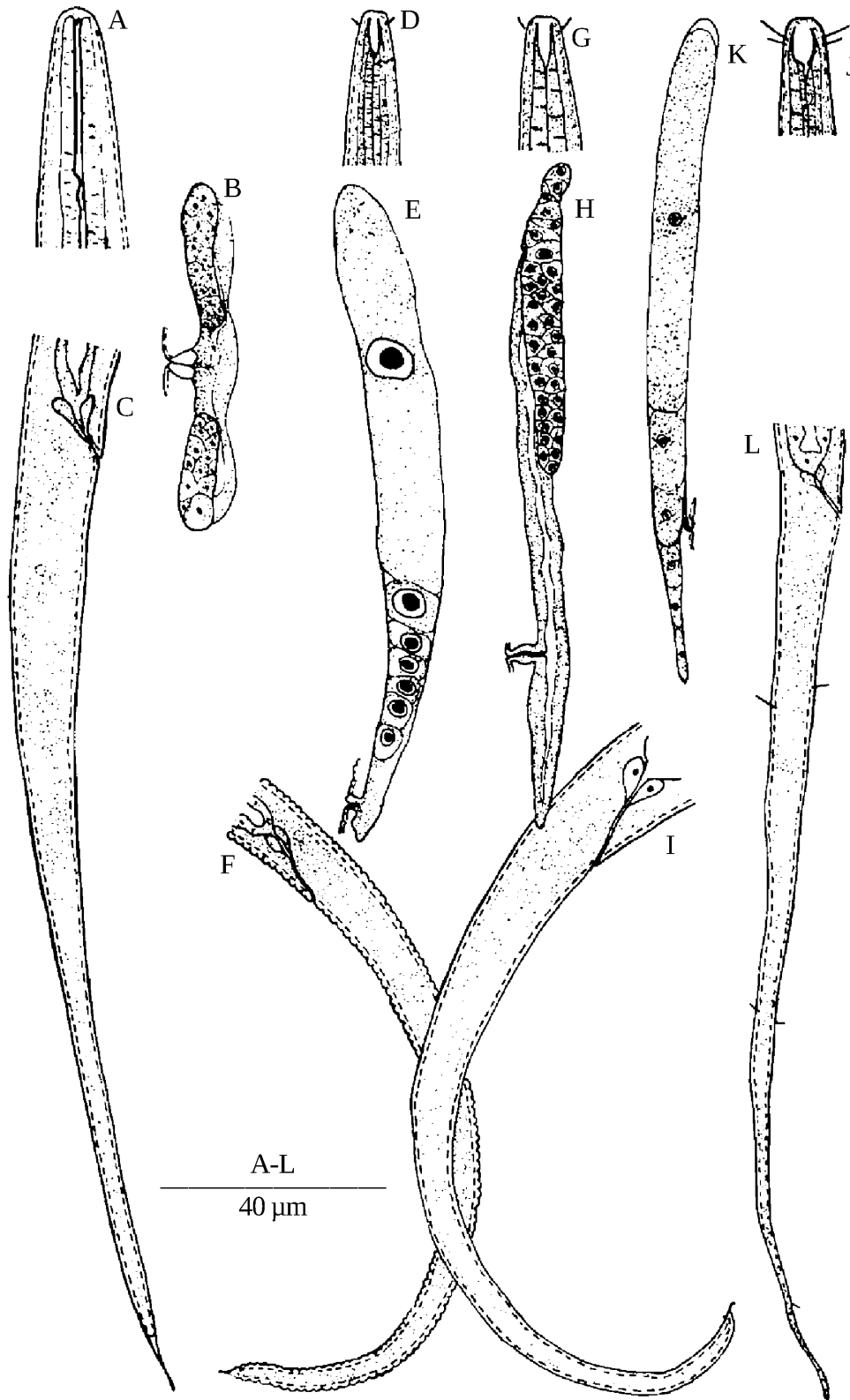
*Habitat and locality* : Around roots of gram (*Phaseolus sp.*) from village Kawas, district Barmer, Rajasthan, India.

Family LEPTOLAIMIDAE Orley, 1880

#### 2. *Chronogaster daoi* Loof, 1964

(Fig. 1, D-F)

*Material examined* : 3 ♀♀; date of collection 20.iv.06.



**Fig. 1.** A-C : *Rhabdolaimus aquaticus* de Man, 1880. A-Female anterior end; B-Female reproductive system; C-Female tail.  
 D-F : *Chronogaster daoi* Loof, 1964. D-Female anterior end; E-Female reproductive system; F-Female tail.  
 G-I : *Chronogaster typica* (De Man, 1921) De Coninck, 1935. G-Female anterior end; H-Female reproductive system; I-Female tail.  
 J-L : *Prigmatolaimus parvus* Milne, 1963. J-Female anterior end; K-Female reproductive system; L-Female tail.

*Measurements : Females* : L = 0.7-0.8 mm; a = 46-51; b = 4.1-4.8; c = 6.8-7.8; V = 49-52.

*Description : Female* : Body, tapering towards both extremities, open C-shaped after fixation. Cuticle annulated, annuli 1.5  $\mu$ m wide. Lip region continuous with body contour. Lips amalgamated, with setose papillae. Cephalic setae 4-5  $\mu$ m or about one labial width long. Anterior part of stoma cylindrical, 5  $\mu$ m long, posterior part 15-16  $\mu$ m long. Amphid at middle of anterior stoma. Pharynx cylindrical, with 13-16  $\mu$ m long basal bulb. Cardia large. Female reproductive system monoprodelphic. Tail 10-11 times of anal body diameter long, ventrally curved with a small mucro.

*Male* : Not found.

*Habitat and locality* : Around roots of wheat (*Triticum aestivum*) from village Manaklaw, district Jodhpur, Rajasthan, India.

### 3. *Chronogaster typica* (De Man, 1921)

De Coninck, 1935

(Fig. 1, G-I)

*Material examined* : 2 ♀ ♀; date of collection : 20.iv.06.

*Measurements : Females* : L = 1.0-1.3 mm; a = 45-62; b = 4.5-5.2; c = 6.1-8.4; V = 45-51.

*Description : Female* : Body tapering towards both extremities. Cuticle 1  $\mu$ m thick, annulated, annuli 1  $\mu$ m wide. Lip region anteriorly rounded, continuous with body contour. Cephalic setae 7-9  $\mu$ m long, 1.0-1.2 times of labial diameter. Lateral fields, 1/5<sup>th</sup>-1/4<sup>th</sup> of corresponding body diameter. Anterior part of stoma 7  $\mu$ m long. Pharynx cylindrical, with 20-25  $\mu$ m long basal bulb. Cardia large, 20-25  $\mu$ m long. Female reproductive system monoprodelphic, with 6-7  $\mu$ m long post-uterine sac. Tail uniformly tapering, 8-11 times of anal body diameter, with small dorsal mucro.

*Male* : Not found.

*Habitat and locality* : Around roots of mustard (*Brassica campestris*) from Kannor, district Hanumangarh, Rajasthan, India.

Order ENOPLIDA FILIPJEV, 1939

Family PRISMATOLAIMIDAE MICOLETZKY, 1922

### 4. *Prismatolaimus parvus* Milne, 1963

(Fig. 1, J-L)

*Material examined* : 4 ♀ ♀; date of collection : 31.iii.06.

*Measurements : Females* : L = 0.4-0.7 mm; a = 39-48; b = 3.6-5.1; c = 2.9-3.7; V = 56-59.

*Description : Female* : Body medium-sized, slender, tapering gradually towards tail tip, ventrally curved upon fixation. Cuticle thin, finely annulated. Somatic setae present; four in pharyngeal region and five in tail region. Cephalic setae in two circles, in 6 + 4 arrangement. Stoma cylindrical with cuticularised walls, twice as long as wide. Pharynx a muscular tube, broaden posteriorly. Cardia spherical. Female reproductive system mono-prodelphic. Ovary reflexed, terminating posterior to vulva. Vulva-anus distance about half of tail length. Tail 15-16 anal body diameter long, tip with a small ventrally curved mucro.

*Male* : Not found.

*Habitat and locality* : Moist soil from a sewage drain of district Jodhpur, Rajasthan, India.

Order RHABDITIDA CHITWOOD, 1933

Family RHABDITIDAE ÖRLEY, 1880

### 5. *Distolabrellus veechi* Anderson, 1983

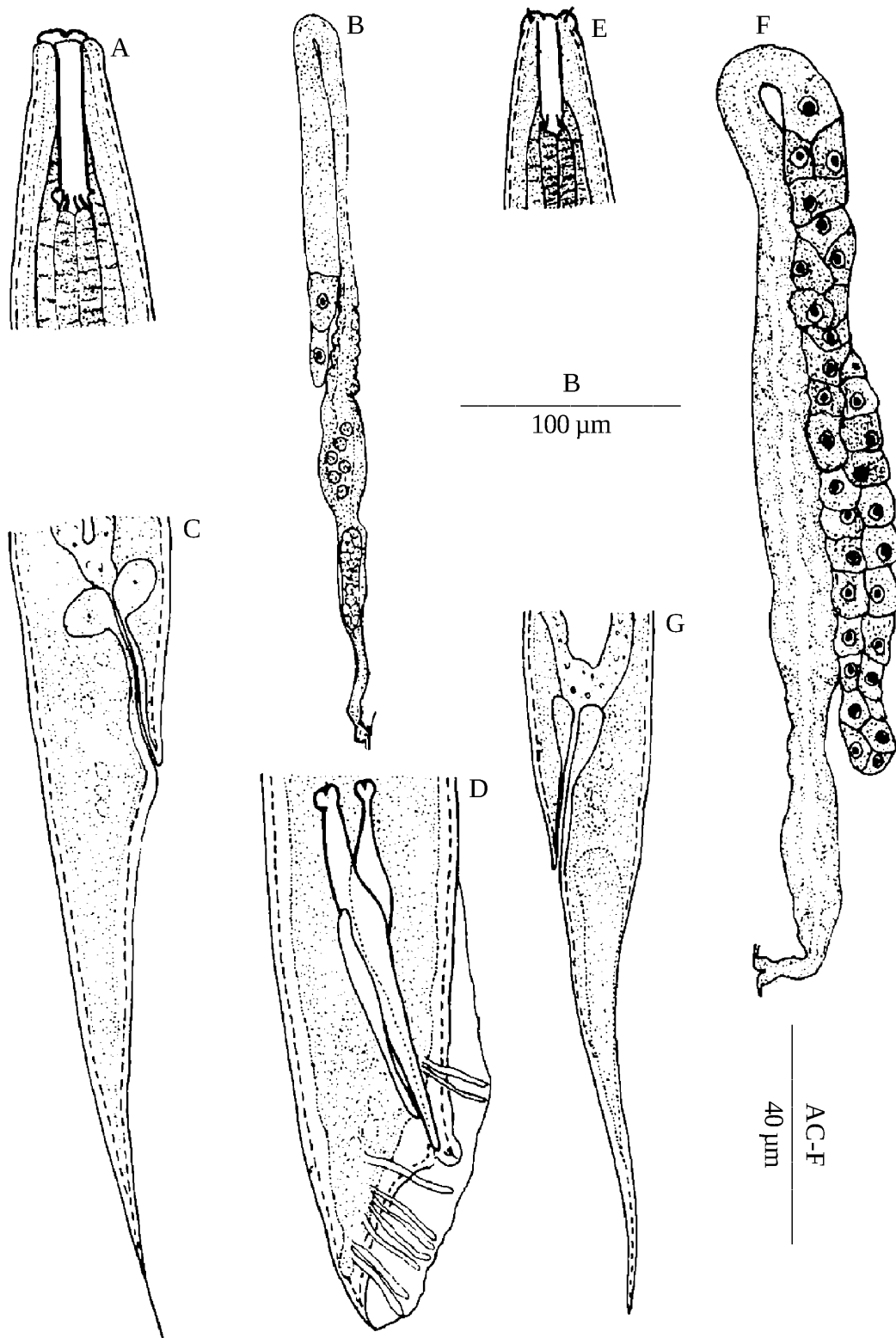
(Fig. 2, A-D)

*Material examined* : 5 ♀ ♀; 4 ♂ ♂; date of collection : 26.xii.06.

*Measurements : Females* : L = 1.2-1.3 mm; a = 14-20; b = 4.9-6.4; c = 10-21; V = 83-87.

*Males* L = 0.8-1.0 mm; a = 17-19; b = 2.9-4.8; c = 18-20.

*Description : Female* : Body large-sized, tapering towards both extremities, almost straight upon fixation. Cuticle about 1  $\mu$ m thick, prominently annulated, annuli 1-2  $\mu$ m wide. Lateral fields 4-5  $\mu$ m wide, comprising of four lateral lines. Lip region slightly offset from adjoining body. Lips six, with six liplets. Lip papillae very small. Stoma 21-25  $\mu$ m long, tubular. Metastegostom with denticles. Pharynx with swollen corpus, narrow isthmus



**Fig. 2. A-D :** *Distolabrellus veechi* Anderson, 1983. A-Female anterior end; B-Female reproductive system; C-Female tail; D-Male tail.

**E-G :** *Mesorhabdites anisomorpha* (Sudhaus, 1978) Andrassy, 1983. E. Female anterior end; F-Female reproductive system; G-Female tail.

and pear-shaped basal bulb. Excretory pore in isthmus region. Female reproductive system monoprodelphic. Ovary reflexed. Uterus filled with eggs. Vagina anteriorly directed. Vulva-anus distance smaller than tail. Tail elongate, 2.3-4.6 anal body diameter long.

*Male* : Similar to female in general morphology. Spicules 60-71  $\mu\text{m}$  long, distally fused. Gubernaculum cuticularised, 34-40  $\mu\text{m}$  long. Genital papillae in 2 + 1 + C + 4 + 2 arrangement.

*Habitat and locality* : Moist soil from a sewage drain of district Jodhpur, Rajasthan, India.

#### 6. *Mesorhabditis anisomorpha* (Sudhaus, 1978)

Andrássy, 1983

(Fig. 2, E-G)

*Material examined* : 4 ♀ ♀; date of collection : 08.xii.06.

*Measurements : Females* : L = 0.6-0.7 mm; a = 14-20; b = 4.1-4.4; c = 8.2-9.8; V = 76-80.

*Description : Female* : Body, almost straight to very slightly curved ventrally upon fixation. Cuticle 1  $\mu\text{m}$  thick, finely annulated. Lip region offset from adjoining body. Lip six, rounded, separate, each with setose papilla. Cheilostom rounded. Stoma tubular, cuticularised, 18-21  $\mu\text{m}$  long. Metastegostomal swelling asymmetrical. Pharynx with narrow isthmus and pear-shaped basal bulb. Cardia small, conoid. Excretory pore in isthmus region. Female reproductive system monoprodelphic, with small post uterine sac. Ovary reflexed. Vulva-anus distance smaller than tail. Tail 4.0-4.5 anal body diameter long.

*Male* : Not found.

*Habitat and locality* : Around roots of soya (*Glycine max*) from district Hanumangarh, Rajasthan, India.

Family CEPHALOBIDAE FILIPJEV, 1934

#### 7. *Chiloplacus sclerovaginitus* Sumenkova &

Razzhivlm, 1968

(Fig. 3, A-D)

*Material examined* : 5 ♀ ♀; 3 ♂ ♂; date of collection : 30.iii.06.

*Measurements : Females* : L = 0.5-0.7 mm; a = 16-22; b = 3.2-4.5; c = 15-20; V = 62-66.

*Males* : L = 0.5-0.7 mm; a = 17-21; b = 3.0-4.5; c = 14-22.

*Description : Female* : Body ventrally curved upon fixation. Lip region continuous with body contour. Cuticle finely annulated. Labial probolae slightly concave, 3-4  $\mu\text{m}$  long. Stoma cephaloboid, with distinct rhabdions. Pharynx cylindrical, with pear-shaped basal bulb. Nerve ring encircles base of corpus. Cardia small, conoid. Intestine wall thick, with distinct lumen. Female reproductive system cephaloboid. Ovary reflexed. Spermatheca distinct. Vagina about half of corresponding body diameter. Tail 1.9-2.3 anal body diameter long, with 12-15 annuli ventrally.

*Male* : Similar to females in general morphology. Testis single. Spicules cephalated, 32-38  $\mu\text{m}$  long, ventrally curved. Gubernaculum 20-24  $\mu\text{m}$  long.

*Habitat and locality* : Around roots of Pearl millet (*Pennisetum americanum*) from Mohangarh, district Jaisalmer, Rajasthan, India.

#### 8. *Zeldia minor* Allen & Noffsinger, 1972

(Fig. 3, E-G)

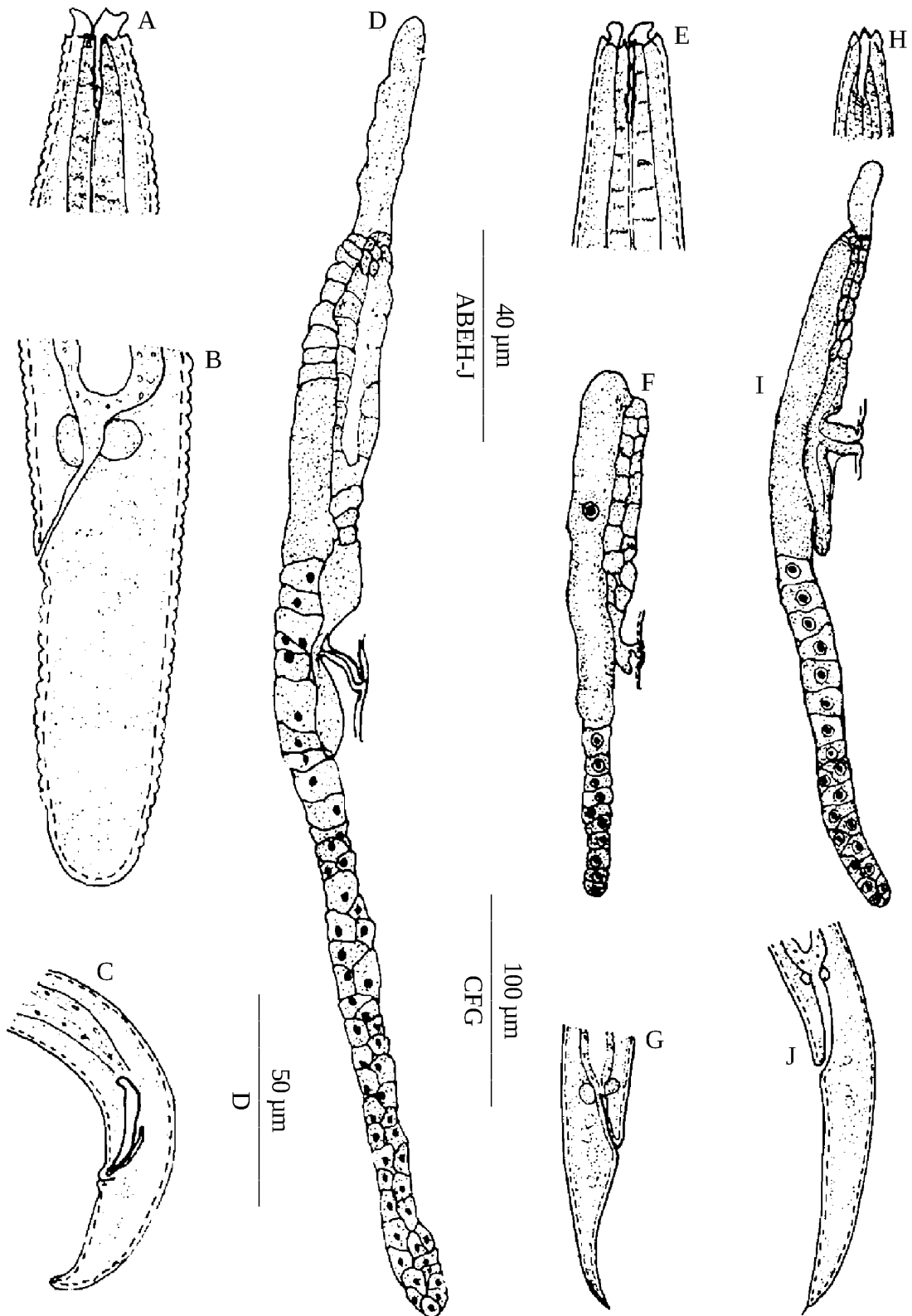
*Material examined* : 6 ♀ ♀; date of collection : 20.iv.06.

*Measurements : Females* : L = 0.7-0.8 mm; a = 15-23; b = 3.1-4.2; c = 15-22; V = 65-67.

*Description : Female* : Body medium-sized, tapering towards both extremities, straight upon fixation. Lip region continuous with body contour. Labial probolae rounded. Cephalic probolae flap-like. Cephalic axils narrow, deep with very small dentate point. Cuticle annulated, annuli 1.5-2.0  $\mu\text{m}$  wide. Stoma cephaloboid. Pharynx cylindrical with pear-shape basal bulb. Nerve ring encircles base of corpus. Cardia small, 3  $\mu\text{m}$  long. Intestine with wide lumen. Female reproductive system typical cephaloboid. Tail 1.4-2.3 anal body diameter long. Phasmid in anterior half of tail.

*Male* : Not found.

*Habitat and locality* : Dry leaf manure from a field of Ramgarh, district Jaisalmer, Rajasthan, India.



**Fig. 3. A-D :** *Chiloplacus sclerovaginitus* Sumenkova & Razzhivlm, 1968. A-Female anterior end; B-Female tail; C-Male tail; D-Female reproductive system.

**E-G :** *Zeldia minor* Allen & Noffsinger, 1972. E. Female anterior end; F-Female reproductive system; G-Female tail.

**H-J :** *Eucephalobus hooperi* Marinari-Palmisano, 1967. H-Female anterior end; I-Female reproductive system; J-Female tail.

9. *Eucephalobus hooperi* Marinari-Palmisano, 1967

(Fig. 3, H-J)

*Material examined* : 5 ♀ ♀; date of collection : 05.iv.07.

*Measurements : Female* : L = 0.3-0.5 mm; a = 16-28; b = 2.6-4.1; c = 9.1-10; V = 62-64.

*Description : Female* : Body small-sized, tapering towards both extremities, ventrally curved upon fixation. Lip region continuous with body contour. Labial probolae pointed. Cuticle 1  $\mu$ m thick, annulated, annuli 1.0-1.5  $\mu$ m wide. Lateral fields 1/6<sup>th</sup>-1/5<sup>th</sup> of corresponding body diameter. Stoma 10-14  $\mu$ m long. Pharynx cylindrical, corpus four times of isthmus length. Cardia 3  $\mu$ m long, conoid. Nerve ring encircles anterior half of isthmus. Female reproductive system cephaloboid. Ovary reflexed. Post uterine sac smaller than half of vulval body diameter. Tail 4-5 anal body diameter long, with 23-26 ventral annuli. Phasmids at mid of tail.

*Male* : Not found.

*Habitat and locality* : Around roots of garlic (*Allium sativum*) from IGNP command area, district Jaisalmer, Rajasthan, India.

Family DIPLOGASTRIDAE MICOLETZKY, 1922

10. *Mononchoides longicaudatus* Andrassy, 1984

(Fig. 4, A-C)

*Material examined* : 3 ♀ ♀; date of collection : 26.xii.06.

*Measurements : Females* : L = 1.1-1.3 mm; a = 21-26; b = 6.0-7.2; c = 2.3-2.4; V = 35-40.

*Description : Female* : Body almost straight upon fixation. Lip region continuous with adjacent body. Metastegostom with claw-like tooth, telostegostom double as long as broad. Pharynx with strong valvated medium bulb, narrow isthmus and weak basal bulb. Intestine with thick wall and wide lumen. Female reproductive system amphidelphic. Ovary reflexed. Tail long filiform, about 20 anal body diameter long.

*Male* : Not found.

*Habitat and locality* : Moist soil from a sewage drain of district Jodhpur, Rajasthan, India.

11. *Butlerius okai* Rahm, 1938

(Fig. 4, D-F)

*Material examined* : 2 ♀ ♀; date of collection : 26.xii.06.

*Measurements : Females* : L = 0.9-1.1 mm; a = 28-34; b = 4.3-5.1; c = 3.9-4.5; V = 48-49.

*Description : Female* : Body large-sized, almost straight upon fixation. Cuticle thin, finely striated. Lip region continuous with body contour. Labial setae 1/5<sup>th</sup> - 1/4<sup>h</sup> of labial diameter. Stoma 10  $\mu$ m long, 6  $\mu$ m wide, with strong dorsal tooth. Pharynx with prominent medium bulb, narrow isthmus and basal bulb of 23-25  $\times$  20-21 dimension. Nerve ring at 75% of pharyngeal length. Cardia small, conoid. Female reproductive system amphidelphic. Ovaries reflexed. Tail long filiform, 255-267  $\mu$ m long, 3.2-3.8 anal body diameter long.

*Male* : Not found.

*Habitat and locality* : Moist soil from a sewage drain of district Jodhpur, Rajasthan, India.

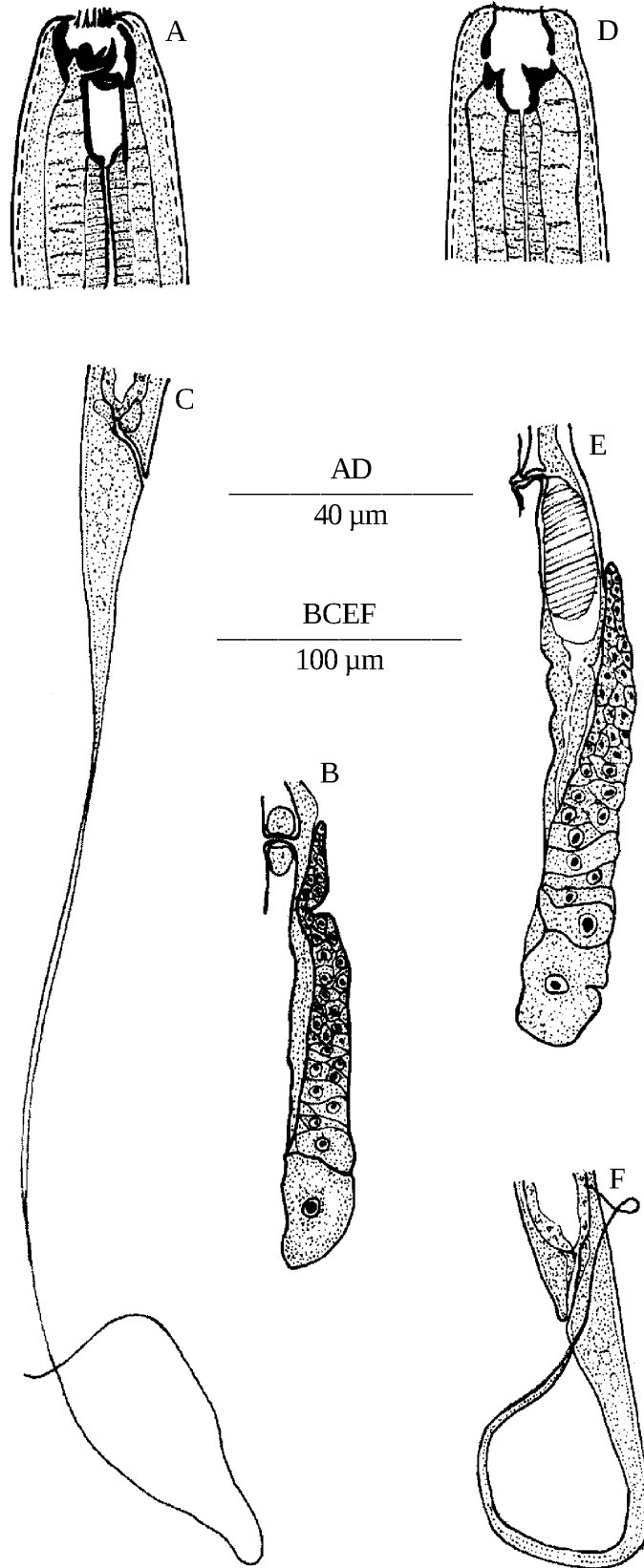
## SUMMARY

Eleven species of free-living nematodes belonging to three orders Araeolaimida (3 spp.), Rhabditida (7 spp.) and Enoplida (1 sp.) have been reported for the first time from Rajasthan.

*Rhabdolaimus aquaticus* de Man, 1880; *Chronogaster daoi* Loof, 1964 *Chronogaster typica* (De Man, 1921) De Coninck, 1935; *Prismatolaimus parvus* Milne, 1963; *Distolabrellus veechi* Anderson, 1983; *Mesorhabditis anisomorpha* (Sudhaus, 1978) Andrassy, 1983; *Chiloplacus sclerovaginus* Sumenkova & Razzhivlm, 1968; *Zeldia minor* Allen & Noffsinger, 1972; *Eucephalobus hooperi* Marinari-Palmisano, 1967 ; *Mononchoides longicaudatus* Andrassy, 1984; *Butlerius okai* Rahm, 1938.

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**Fig. 4. A-C :** *Mononchooides longicaudatus* (Khera, 1965) Andrásy, 1984. A-Female anterior end; B-Female reproductive system; C-Female tail.

**D-F :** *Butlerius okai* Rahm, 1938. D-Female anterior end; E-Female reproductive system; F-Female tail.



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