

SOME KNOWN SPECIES OF THE GENERA *MONONCHUS* BASTIAN, 1865 AND *MYLONCHULUS* (COBB, 1916) ALTHERR, 1953 (NEMATODA: MONONCHINA) FROM SEMNAN PROVINCE, IRAN

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Summary. Six known species of mononchids belonging to the genera *Mononchus* Bastian, 1865 and *Mylonchulus* (Cobb, 1916) Altherr, 1953 are described from Iran, viz. *Mononchus aquaticus* Coetzee, 1968; *M. pulcher* Andrassy, 1993; *M. truncatus* Bastian, 1865; *Mylonchulus brachyuris* (Bütschli, 1873) Altherr, 1953; *M. paitensis* Yeates, 1992 and *M. sigmaturus* (Cobb, 1917) Altherr, 1953. *Mononchus pulcher* and *Mylonchulus paitensis* are new records for the country while the former species is found and illustrated for the first time after its original description. Identification keys for the *Mononchus* and *Mylonchulus* species which have so far been reported from Iran are also given.

Keywords: Mononchina, *Mononchus*, *Mylonchulus*, description, identification, new record, Iran.

Only a few records are available on the occurrence of mononchids in Iran. One new and twelve known species of this group of nematodes have been reported so far from Iran, in the following provinces: Chaharmahal va Bakhtyari (Olia *et al.*, 2004); Hormozgan (Nowruzi and Barooti, 1997); East Azarbaijan and Ardabil (Barooti, 1997); Bushehr (Nowruzi and Barooti, 2001); Zanjan, Gilan, Kerman, Fars, Tehran, Mazandaran, Ghazvin, Khozestan and Hamadan (Loof *et al.*, 1990). This paper deals with description of six known nematode species belonging to the genera *Mononchus* and *Mylonchulus*, collected from cultivated and uncultivated soils of several localities in Semnan province, north-east of Iran. Additional measurements and illustrations are given for each of them. Among the identified species, *Mononchus pulcher* Andrassy, 1993 and *Mylonchulus paitensis* Yeates, 1992 are reported from Iran for the first time. Keys are provided for separation of the Iranian *Mononchus* and *Mylonchulus* species.

MATERIAL AND METHODS

Soil samples were collected from several localities in Semnan province, including Damghan, Mojen, Semnan, Shahmirzad, Shahrood, and their suburbs. Samples were taken to a depth of 10-50 cm by a soil corer (auger) and a spade. Nematodes were extracted using the centrifugal-flotation technique or extraction tray method, then fixed in TAF and mounted in anhydrous

glycerin (Seinhorst, 1959). Measurements and drawings were made with a research microscope (Nikon, Eclipse 50i) equipped with a drawing tube. The general classification of Andrassy (1993) for mononchids was followed here.

DESCRIPTIONS

MONONCHUS AQUATICUS Coetzee, 1968

(Figs 1, 2; Table I)

Female. Body straight after fixation, 52.5-77 µm wide at midbody. Cuticle smooth, 2.8-4.2 µm thick. Lip region not set off, 2.6-3.4 times as wide as high. Amphid cup-like, aperture 2.8-4.2 µm wide, situated 7.0-9.8 µm from anterior end of body or 21.0-32.2 µm from base of buccal cavity. A minute tooth-like projection present on ventral wall opposite to the dorsal tooth apex. Transverse ribs on subventral walls located posterior to the dorsal tooth apex. Pharynx cylindroid, surrounding basal plates of the buccal cavity. Nerve ring located at 29.5-35.8% of the neck length; excretory pore visible, situated behind the nerve ring, at 31.7-39.8% of the neck length. Junction between pharynx and intestine non-tuberculate. Rectum 0.8-1.0 times as long as anal body width. Reproductive apparatus didelphic amphidelphic, ovaries reflexed; vulva transverse; eggs oblong, 70-85×48-55 µm; paravulval papillae absent, sphincter absent at oviduct-uterus junction. Tail elongated conical, somewhat ventrally curved, with rounded and slightly swollen tip. Caudal glands grouped, spinneret with opening terminal.

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Male. Not found.

Locality and habitat. Soil around the roots of *Albagi* sp. and *Echinops* sp. in Ali Abad village, Damghan, and soil under grass in Semnan.

Remarks. *Mononchus aquaticus* is very close to *M.*

truncatus Bastian, 1865, but differs from it in having a smaller buccal cavity and a shorter tail (see Table I). It is also closely related to *M. laminatus* Zullini, Loof et Bongers, 2002, but can be separated from it by different dimensions of its buccal cavity (*vs* 29-31×11-14 μm), smaller dorsal tooth and more anterior position of am-

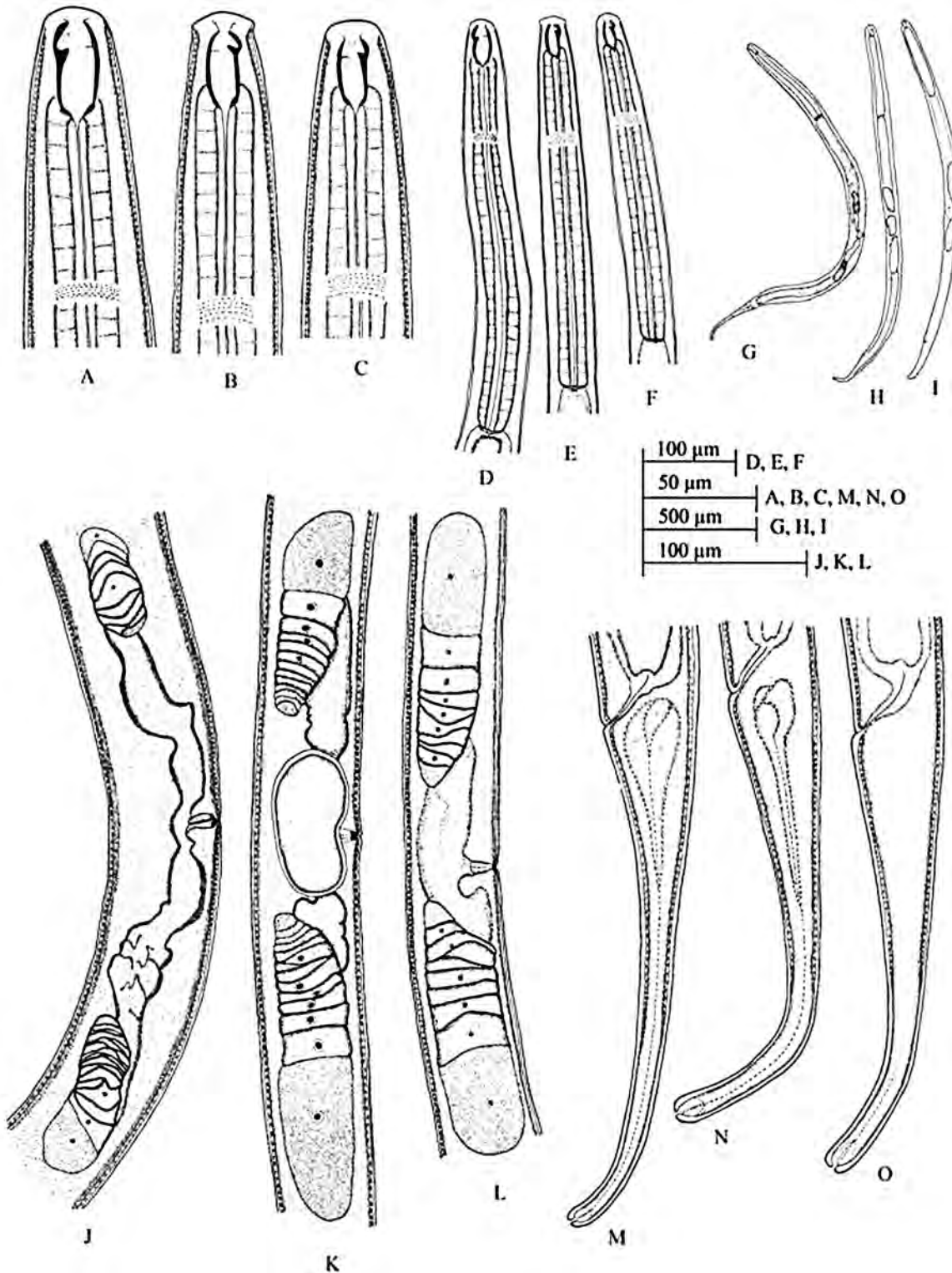


Fig. 1. A, D, G, J, M: *Mononchus truncatus* (female); B, E, H, K, N: *Mononchus pulcher* (female); C, F, I, L, O: *Mononchus aquaticus* (female). A, B, C: Buccal cavity; D, E, F: Anterior region; G, H, I: Entire body; J, K, L: Reproductive apparatus; M, N, O: Tail.

phid aperture relative to the dorsal tooth. Our description and measurements conform well with those given in the literature, except for buccal cavity that is slightly wider in our specimens and tail that is slightly longer (see Table I), but these differences are considered as intraspecific variation and the studied populations are identified as *M. aquaticus*.

MONONCHUS PULCHER Andr ssy, 1993

(Figs 1, 2; Table I)

Female. Body of medium size, slender, 56-80.5 μm wide at midbody. Cuticle smooth, 2.8-4.2 μm thick. Lip region not set off, 2.3-3.2 times as wide as high. Amphid cup-like, aperture 2.8-4.2 μm wide, situated 9.8-16.8 μm from anterior end of body or 25.2-43.4 μm from base of

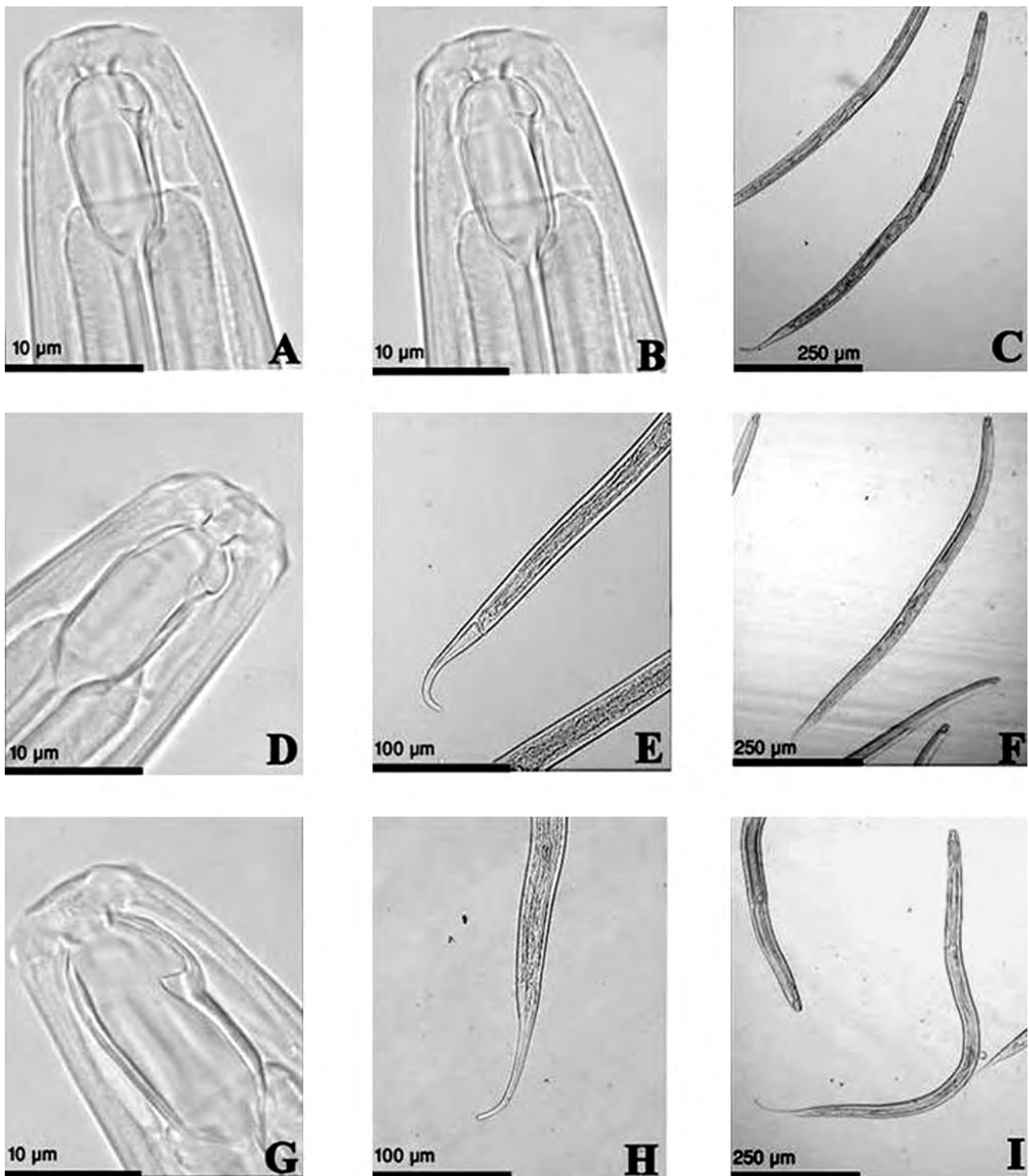


Fig. 2. A-C: *Mononchus aquaticus* (female); D-F: *Mononchus pulcher* (female); G-H: *Mononchus truncatus* (female). A, B, D, G: Buccal cavity; E, H: Tail; C, F, I: Entire body.

Table I. Morphometrics of *Mononchus aquaticus*, *M. pulcher* and *M. truncatus* females (all absolute measurements in μm except L in mm).

Locality n	<i>M. aquaticus</i>			<i>M. pulcher</i>		<i>M. truncatus</i>		
	Ali Abad 5	Semnan 9	Literature ² 114	Mojen 16	Hungary ?	Olang plain 6	Rasmeroodbar 3	Literature ³ 24
L	1.58 ± 0.05 (1.52-1.67)	1.72 ± 0.09 (1.63-1.94)	1.14-2.06	1.73 ± 0.1 (1.50-2.10)	1.94-2.10	1.91 ± 0.1 (1.72-2.19)	2.20 ± 0.2 (2.0-2.44)	1.48-2.14
a	26.8 ± 2.8 (22.9-29.5)	25.2 ± 1.7 (23.5-29.3)	19-44	27.2 ± 2.4 (22.9-31.7)	35-38	29.4 ± 3.3 (26.3-34.9)	28.8 ± 4.6 (24.6-33.7)	26-44
b	4.5 ± 0.5 (3.7-4.9)	4.7 ± 0.2 (4.4-5.2)	2-5.4	4.4 ± 0.2 (4.1-4.7)	4.4-4.8	4.2 ± 0.2 (4.0-4.5)	4.5 ± 0.2 (4.3-4.7)	3.4-6.5
c	8.5 ± 0.8 (7.6-9.3)	8.8 ± 0.7 (7.9-9.8)	7.2-12	8.6 ± 0.7 (7.4-9.4)	8.7-9.4	8.0 ± 0.6 (7.3-8.8)	9.4 ± 0.8 (8.7-10.3)	5-11
c'	5.0 ± 0.5 (4.4-5.8)	5.0 ± 0.5 (4.3-5.9)	-	5.3 ± 0.5 (4.7-6.2)	6-7	6.1 ± 0.9 (5.1-7.2)	5.4 ± 0.4 (5-5.7)	-
V	50.6 ± 3.4 (46.2-55.4)	50.7 ± 1.8 (47.7-53.6)	41-59	51.2 ± 2.6 (48.5-57.7)	49-51	52.4 ± 1.8 (49.7-54.9)	52.6 ± 1.3 (51.1-53.7)	47-55.5
G1%	10.5 ± 1.3 (8.7-11.9)	10.7 ± 2.2 (7.0-13.0)	-	11.1 ± 1.6 (7.4-14.3)	-	10.2 ± 1.6 (7.5-12.3)	11.7 ± 1.3 (10.5-13)	-
G2%	12.0 ± 1.6 (9.8-13.4)	10.4 ± 3.1 (6.3-14.4)	-	12.1 ± 1.6 (9.8-15.4)	-	10.6 ± 1.3 (9.6-12.5)	10.8 ± 1.5 (9.8-11.9)	-
Tail length	187.6 ± 16.5 (168-203)	196.8 ± 15.6 (175-217)	147-215	202.6 ± 17.4 (164.5-234.5)	186-225	241.6 ± 28.3 (196-277)	236.8 ± 37.8 (210-280)	185-300
Pharynx length	352.8 ± 41.8 (308-420)	364.4 ± 14.5 (350-392)	-	391.8 ± 48.4 (329-486.5)	-	452.1 ± 31.6 (399-494)	494.7 ± 59.6 (458.5-563.5)	-
Anal body width	37.8 ± 2.9 (35-42)	39.3 ± 2.9 (35-42)	-	38.1 ± 3.6 (35-49)	-	39.7 ± 3.6 (35-45.5)	44.3 ± 7.3 (38.5-52.5)	-
Buccal cavity length	28.8 ± 2.9 (25.2-32.2)	30.6 ± 1.5 (28-32.2)	26-36	33.4 ± 4.2 (30.8-44.8)	35-38	41.3 ± 3.3 (35-43.4)	37.3 ± 7.7 (32.2-46.2)	31-51
Buccal cavity width	15.7 ± 1.5 (14-18.2)	14.7 ± 1.2 (15.4-19.6)	9-18	16.6 ± 1.7 (14-21)	16-18	19.6 ± 2.2 (15.4-21)	19.1 ± 1.6 (18.2-21)	13-16
Dorsal tooth apex % B.C. length ¹	79.7 ± 0.4 (73.9-84.2)	80.7 ± 2.4 (76.2-82.6)	75-88	79.8 ± 3.1 (73.3-83.3)	78-80	76.4 ± 2.4 (73.3-80)	78.2 ± 5 (72.7-82.6)	70-80
Lip region width	24.4 ± 1.6 (22.4-26.6)	25.8 ± 1.6 (23.8-29.4)	-	26 ± 1.8 (23.8-30.8)	-	25.4 ± 0.6 (25.2-26.6)	28.5 ± 2.1 (26.6-30.8)	-
Lip region height	7.8 ± 0.8 (7-8.4)	9 ± 1 (8.4-11.2)	-	9.5 ± 1.1 (8.4-11.2)	-	8.2 ± 0.6 (7-8.4)	10.3 ± 0.8 (9.8-11.2)	-
Nerve ring from anterior end	111.1 ± 13.8 (91-122.5)	124.4 ± 10.8 (105-136.5)	-	130.6 ± 16.5 (98-150.5)	-	140 ± 12.1 (130-158)	158.7 ± 12.3 (147-171.5)	-
Anterior ovary length	172 ± 1.4 (171-173)	132.2 ± 40.3 (100-182)	-	143.1 ± 32.5 (100-185)	-	125.3 ± 28.8 (103-165)	143 ± 39.6 (115-171)	-
Posterior ovary length	160.5 ± 9.2 (154-167)	134.2 ± 35.8 (103-184)	-	159.6 ± 29.7 (110-197)	-	125.8 ± 19.9 (103-165)	115.5 ± 34.6 (91-140)	-
Uterus length	34 ± 5.7 (30-38)	38.8 ± 5.9 (32-45)	-	27.6 ± 13.4 (10-53)	-	44.3 ± 9.7 (36-55)	43	-
Vagina length	20.5 ± 0.7 (20-21)	13.2 ± 1.3 (12-15)	-	20.9 ± 3.4 (16-26)	-	23.5 ± 2.1 (23-25)	-	-
Rectum length	33.6 ± 1.9 (31.5-35)	35.4 ± 2.2 (31.5-38.5)	-	28.9 ± 3.6 (24.5-38.5)	-	37.1 ± 1.9 (35-38.5)	35	-

¹ The percentage position of the dorsal tooth apex from base of the buccal cavity.² Data from Coetzee (1968), Baqri and Jairajpuri (1972), Chaves (1990), Coomans *et al.* (1995), Barooti (1997), Nowruzi and Barooti (2001) and Zullini *et al.* (2002).³ Data from Clark (1960), Jensen and Mulvey (1968), Zullini *et al.* (2002) and Olia *et al.* (2004).

buccal cavity. Buccal cavity elongate, with arched wall in front of the dorsal tooth, tapering at base, transverse subventral ribs located posterior to the dorsal tooth apex. Dorsal tooth large, directed forward. Pharynx cylindroid. Nerve ring located at 28.6-36.1% of the neck length; excretory pore small, situated behind the nerve ring, at 30.3-44.9% of the neck length. Junction between pharynx and intestine non-tuberculate. Rectum 0.7-1.0 times as long as anal body width. Reproductive apparatus didelphic amphidelphic, ovaries reflexed; vulva transverse; *pars distalis vaginae* very short, *pars refringens vaginae* 3-4 μm long, with small sclerotized pieces; *pars proximalis vaginae* 9-11 μm long, markedly less than one fifth of body width; eggs oblong, 82-105 \times 44-48 μm ; paravulval papillae absent, sphincter absent at oviduct-uterus junction. Tail elongated conical with a clavate tip. Caudal glands grouped, spinneret with terminal opening.

Male. Not found.

Locality and habitat. Soil around the roots of *Populus* sp. and *Elaeagnus* sp. in Mojen.

Remarks. This species was originally described from Hungary and Chile (Andrássy, 1993) and has not been recorded thereafter. It was compared by the author with *M. truncatus* and *M. aquaticus*. These three species are similar in most morphological and morphometrical characteristics, however they can be differentiated from each other by the size of their buccal cavities (see Table I), position of the dorsal tooth apex in proportion to the buccal cavity length and position of the refractive transverse thickening with respect to the level of dorsal tooth apex. In *M. aquaticus* and *M. pulcher* the dorsal tooth apex is situated more anteriorly and the refractive transverse thickening is situated posterior to the level of dorsal tooth apex (*vs* anterior in *M. truncatus*). Morphometrics and general morphology of our examined specimens agree well with the Hungarian population, but the range of some characters, for example, a, c, c' and V indices, buccal cavity length, buccal cavity width, tail length and position of the dorsal tooth apex from base of the buccal cavity, is now changed or expanded with the addition of these new data (see Table I).

This is the first report of *M. pulcher* from Iran and after its original description.

MONONCHUS TRUNCATUS Bastian, 1865

(Figs 1, 2; Table I)

- =*M. macrostoma* Bastian, 1865
- =*M. longicaudatus* Cobb, 1893
- =*M. macrostoma longicaudatus* (Cobb, 1893) Micoletzky, 1922
- =*M. macrostoma armatus* Daday, 1894
- =*M. tenuicaudatus* Stefanski, 1914
- =*M. megalaimus* Cobb, 1917
- =*M. brevicavatus* Keris, 1924
- =*M. fusiformis* Eroshenko, 1972

=*M. scutarius* Eroshenko, 1972; synonymised by Andrásy, 1993

=*M. bellus* Andrásy, 1985; synonymised by Andrásy, 1993

Female. Body slender, 59.5-87.5 μm wide at midbody. Cuticle smooth, 2.8-4.2 μm thick. Lip region not set off, slightly protruding, 2.4-3.6 times as wide as high. Amphid cup-like, aperture 2.8-5.6 μm wide, situated 5.6-11.2 μm from anterior end of body or 32.2-47.6 μm from base of buccal cavity. Buccal cavity oval, with conspicuously arched wall in front of the dorsal tooth, tapering at base; subventral walls without any denticles, but with transverse ribs located at level or in front of the dorsal tooth. Dorsal tooth of medium size, directed forward. Pharynx cylindroid, muscular. Nerve ring located at 28.9-34.1% of the neck length; excretory pore small, situated behind the nerve ring, at 30.5-34.8% of the neck length. Junction between pharynx and intestine non-tuberculate. Rectum short, 0.7-1.1 times as long as anal body width. Reproductive apparatus didelphic amphidelphic, ovaries reflexed; vulva transverse; *pars distalis vaginae* very short, *pars refringens vaginae* with small sclerotized pieces, *pars proximalis vaginae* extending into body for about one third of its width; paravulval papillae absent, sphincter absent at oviduct-uterus junction. Tail elongated conical with a clavate tip. Caudal glands grouped, spinneret with terminal opening.

Male. Not found.

Locality and habitat. Rhizosphere of grass in Olang plain, Shahrood, and soil along the bank of a river in Rasmeroodbar village, Shahmirzad.

Remarks. The description given agrees well with the literature ones, but a small difference in the width of buccal cavity (15.4-21 with av. = 19.4 *vs* 13-16 μm) is observed. It is evident from the data in the literature that this species is very widely distributed and exhibits considerable intraspecific variation, so despite the mentioned difference the examined populations are identified as *M. truncatus*.

KEY TO THE IRANIAN *MONONCHUS* SPECIES

1. Transverse subventral ribs at level or in front of the dorsal tooth apex, buccal cavity 31-51 μm long, apex of dorsal tooth situated at 70-83% from base of the buccal cavity, tail 185-300 μm long.

M. truncatus Bastian, 1865

Transverse subventral ribs posterior to the dorsal tooth apex. 2

2. Buccal cavity small, 25-36 μm long, tail 147-217 μm long.

M. aquaticus Coetzee, 1968

Buccal cavity 31-45 μm long, tail 165-235 μm long.

M. pulcher Andrásy, 1993

MYLONCHULUS BRACHYURIS
(Bütschli, 1873) Altherr, 1953
 (Figs 3, 4; Table II)

=*Mononchus brachyuris* Bütschli, 1873
 =*Mononchus (Mylonchulus) brachyuris* (Bütschli, 1873) Cobb, 1917
 =*Mononchus (Mylonchulus) brachyuris microdenticulatus typicus* Micoletzky, 1922
 =*Mylonchulus agriculturæ* Coetzee, 1967; synonymised by Andrassy (1992)

Female. Body ventrally arcuate upon fixation, 42-52.5 µm wide at midbody. Cuticle smooth, 1.4-2.8 µm thick. Lip region prominent, well set off from adjoining body, 2.3-3.2 times as wide as high. Amphid small, cup-like, aperture 2.8-4.2 µm wide, situated 4.2-11.2 µm from anterior end of body or 18.2-22.4 µm from base of buccal cavity. Buccal cavity goblet-shaped, thick-walled, uniformly tapering to its base, with six rows of rasp-like denticles and submedian teeth. Dorsal tooth large, directed forward. Pharynx cylindroid, muscular. Nerve ring located at 30.4-35.4% of the neck length; excretory pore small, situated behind the nerve ring, at 36.8-39.6% of the neck length. Junction between pharynx and intestine non-tuberculate. Rectum 0.7-1.3 times as long as anal body width. Reproductive system didelphic amphidelphic, ovaries generally small and compact, reflexed; vulva small, transverse; *pars distalis vaginae* very short, *pars refringens vaginae* 3-4 µm long, with small sclerotized pieces; *pars proximalis vaginae* 8-9 µm long, surrounded by strong muscles; eggs 87-107×33-40 µm; paravulval papillae absent, sphincter absent at oviduct-uterus junction. Tail short, conoid, ventrally bent, with rounded terminus. Caudal glands grouped, spinneret with subterminal opening.

Male. Not found.

Locality and habitat. Soil around the roots of apple in Tooyehdarvar village, Damghan, and soil around the roots of walnut in Khoshyeilagh zone, Shahrood.

Remarks. *Mylonchulus brachyuris* is close to i) *M. brevicaudatus* (Cobb, 1917) Altherr, 1954, but can be distinguished from it by its smaller buccal cavity (*vs* 30-36×17-20 µm); ii) *M. subsimilis* (Cobb, 1917) Meyl, 1957, but differs from it in having a spinneret at tail tip (*vs* absence); iii) *M. parabrachyurus* (Thorne, 1924) Schneider, 1939, but differing in its shorter tail (*vs* c = 20-25) and subterminal spinneret (*vs* terminal). Morphometrics and general morphology of our examined specimens conform well with those given in the literature for this species.

MYLONCHULUS PAITENSIS Yeates, 1992
 (Figs 3, 4; Table II)

Female. Body arcuate ventrally, 38.5-56 µm wide at midbody. Cuticle smooth, 1.4-2.8 µm thick. Lip region

somewhat set off from body, with conoid lips, 2.3-3.8 times as wide as high. Amphid cup-like, aperture about 4.2 µm wide, situated 9.8-12.6 µm from anterior end of body or 18.2-22.4 µm from base of buccal cavity. Buccal cavity funnel-shaped, with six rows of rasp-like denticles, tapering at base, about 1.5 times as long as wide. Dorsal tooth large, claw-like, directed forward. Pharynx cylindroid, surrounding base of the buccal cavity. Nerve ring located at 28-32% of the neck length; excretory pore small, located at 29.1-34% of the neck length. Junction between pharynx and intestine non-tuberculate. Rectum short, 0.6-0.9 times as long as anal body width. Reproductive system didelphic amphidelphic with opposed and reflexed ovaries; vulva a transverse slit; *pars distalis vaginae* short, *pars refringens vaginae* 3-4 µm long, with small drop-like sclerotized pieces; *pars proximalis vaginae* 8-10 µm long, markedly less than one fourth of body width; eggs oblong, 100-113×35-47 µm; paravulval papillae absent, sphincter absent at oviduct-uterus junction. Tail conoid, ventrally arcuate. Caudal glands hardly visible, spinneret with terminal opening.

Male. Not found.

Locality and habitat. Soil around the roots of walnut in Ahvanoo village, Damghan, and soil around the roots of *Alhaji* sp. and *Echinops* sp. in Ali Abad village, Damghan.

Remarks. *Mylonchulus paitensis* was originally described from New Caledonia (Yeates, 1992) and then reported from Pakistan (Tabassum *et al.*, 2001). This species is close to *M. sigmaturus*, but can be distinguished from it by the absence of dorsal curvature of the female tail (*vs* presence). It is also fairly close to *M. incurvus* Cobb, 1917, but can be separated from this species by its smaller buccal cavity (*vs* 37×22 µm) and the different shape of pharynx-intestinal junction (clearly projected into the intestinal lumen *vs* flattish). Morphometrics and general morphology of our examined material conform well with the original one, except for having a wider range in some characters including body length, tail length and dimensions of the buccal cavity (see Table II).

This is the first report of *M. paitensis* from Iran.

MYLONCHULUS SIGMATURUS
(Cobb, 1917) Altherr, 1953
 (Figs 3, 4; Table II)

=*Mononchus (Mylonchulus) sigmaturus* Cobb, 1917
 =*Mononchus (Mylonchulus) brachyuris sigmaturoides* Schneider, 1939
 =*Mylonchulus sessus* Jairajpuri, 1982; synonymised by Andrassy (1992)

Female. Body assumes cane-like shape after fixation, 38.5-52.5 µm wide at midbody. Cuticle smooth, 1.4-2.8 µm thick. Lip region set off, slightly wider than adjoin-

ing body, 2.4-3.0 times as wide as high. Amphid small, cup-like, aperture 1.4-2.8 μm wide, situated 8.4-14.0 μm from anterior end of body or 14.0-19.6 μm from base of buccal cavity. Buccal cavity funnel-shaped, tapering at base, with submedian teeth and five to six transverse rows of denticles. Dorsal tooth prominent, claw-like, directed forward. Pharynx cylindroid, muscular. Nerve

ring located at 28.1-40.2% of the neck length, excretory pore obscure. Junction between pharynx and intestine non-tuberculate. Rectum short, 0.7-0.9 times as long as anal body width. Reproductive apparatus didelphic amphidelphic; vulva transverse; *pars distalis vaginae* very short, *pars refringens vaginae* 3-4 μm long, with weakly sclerotized pieces; *pars proximalis vaginae* 7-10 μm long,

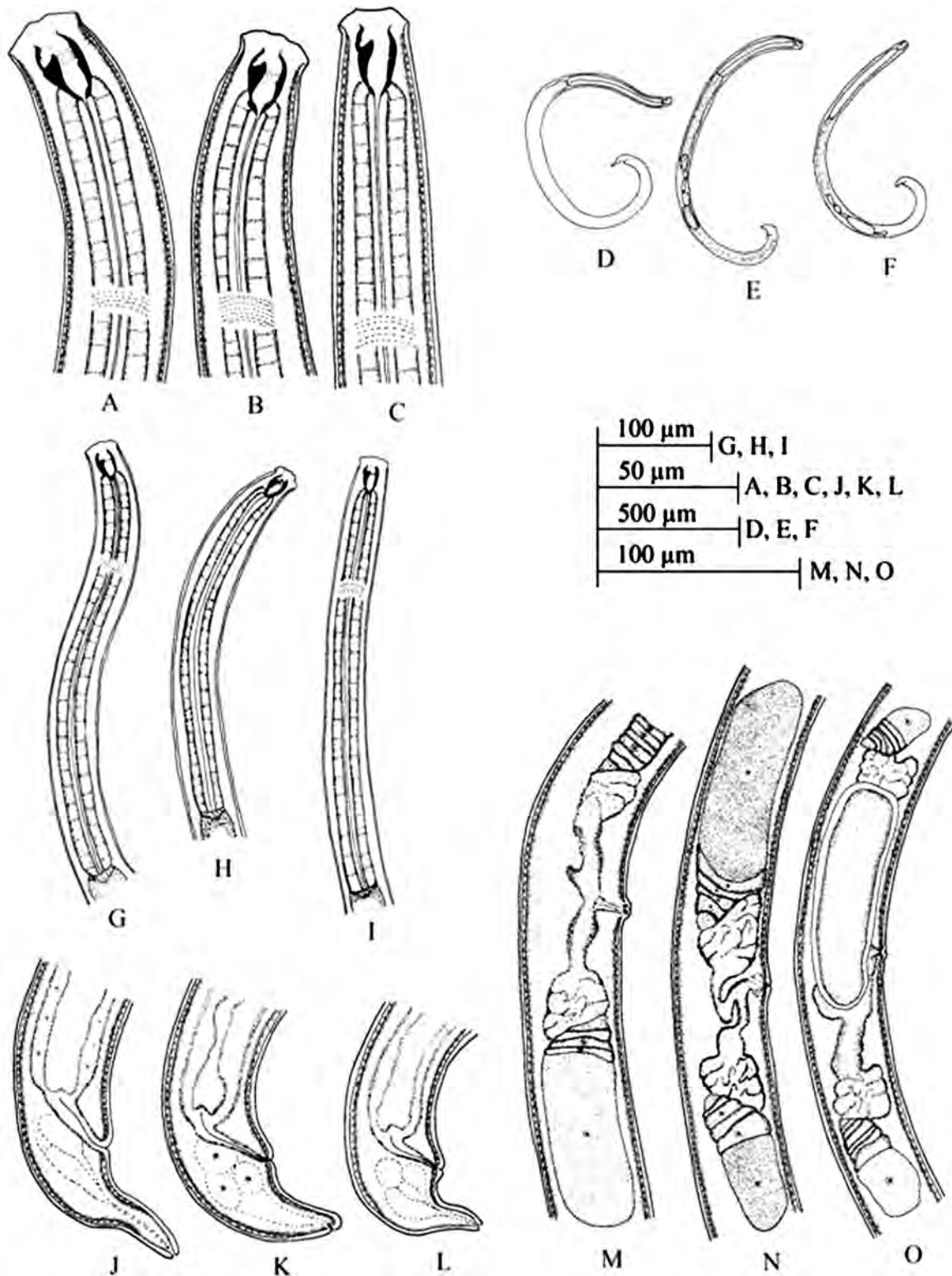


Fig. 3. A, D, G, J, M: *Mylonchulus signaturus* (female); B, E, H, K, N: *Mylonchulus brachyuris* (female); C, F, I, L, O: *Mylonchulus paitensis* (female). A, B, C: Buccal cavity; D, E, F: Entire body; G, H, I: Anterior region; J, K, L: Tail; M, N, O: Reproductive apparatus.

Table II. Morphometrics of *Mylonchulus brachyuris*, *M. paitensis* and *M. sigmaturus* females (all absolute measurements in μm except L in mm).

Locality	<i>M. brachyuris</i>			<i>M. paitensis</i>			<i>M. sigmaturus</i>	
	Tooyehdarvar	Khoshyeilagh	Literature ²	Ahvanoo	Ali Abad	New Caledonia	Semnan	Literature ³
n	6	8	64	7	7	7	11	58
L	1.32 \pm 79.4 (1.21-1.43)	1.28 \pm 41 (1.25-1.37)	0.98-1.42	1.28 \pm 145.1 (1.1-1.48)	1.42 \pm 90.3 (1.31-1.58)	1.28-1.45	1.20 \pm 129.4 (1.01-1.46)	1-1.7
a	27.1 \pm 2.3 (24.8-31.5)	28.7 \pm 1.8 (26.1-31)	20-36	29.5 \pm 0.7 (28.6-30.4)	29.6 \pm 2.8 (24.5-32.3)	28-33	28.0 \pm 2.1 (24.1-30.7)	24-42
b	3.9 \pm 0.2 (3.7-4.2)	3.9 \pm 0.1 (3.8-4)	3.1-4.1	3.3 \pm 0.2 (3.1-3.5)	3.5 \pm 0.2 (3.3-3.7)	3.3-3.6	3.7 \pm 0.2 (3.2-3.9)	3-4
c	28.8 \pm 1.3 (26.6-30.1)	33.1 \pm 3.8 (28-37.2)	25-51	28.2 \pm 2.2 (26.1-32.7)	33.9 \pm 3.2 (30.1-39.2)	32-41	27.5 \pm 2.6 (22.6-30.4)	24-39.2
c'	1.5 \pm 0.1 (1.3-1.8)	1.2 \pm 0.1 (1-1.4)	-	1.3 \pm 0.1 (1.2-1.5)	1.3 \pm 0.1 (1.1-1.3)	1.2-1.4	1.4 \pm 0.2 (1.1-1.8)	1-1.8
V	60.4 \pm 1.6 (58.1-62.0)	61.2 \pm 1.2 (59.2-63.2)	56-65	64.6 \pm 1.7 (61.4-67.0)	65.0 \pm 0.9 (63.3-66.1)	63-67	62.8 \pm 1.9 (59.7-66.4)	50-77
G1%	8.6 \pm 1.5 (6.6-10.5)	11.6 \pm 1.8 (9.4-14.2)	-	10.6 \pm 1.6 (8.4-12.4)	11.4 \pm 3.7 (7.4-19.0)	-	12.1 \pm 0.8 (11.1-12.9)	-
G2%	9.4 \pm 1.6 (7.6-11.6)	10.2 \pm 1.7 (8.1-12.6)	-	10.8 \pm 2.3 (7.0-12.7)	8.8 \pm 2.1 (6.5-12.0)	-	10.5 \pm 1.3 (8.5-11.7)	-
Tail length	46.1 \pm 3.4 (42-49)	39.4 \pm 4.5 (35-45.5)	23-55	45.5 \pm 4.9 (42-56)	42.5 \pm 5.1 (38.5-52.5)	34-44	44.2 \pm 5.5 (35-52.5)	29-57
Pharynx length	337.8 \pm 17.9 (322-360.5)	332.1 \pm 9.8 (322-353.5)	-	387 \pm 26.4 (350-420)	404.5 \pm 33.6 (371-469)	-	330.6 \pm 29.3 (297.5-392)	-
Anal body width	30.9 \pm 2.6 (28-35)	32.8 \pm 3.2 (28-35)	-	34.5 \pm 2.4 (31.5-38.5)	34.0 \pm 3.9 (31.5-42)	-	30.9 \pm 1.4 (28-31.5)	-
Buccal cavity length	22.9 \pm 0.7 (22.4-23.8)	24.7 \pm 0.7 (23.8-25.2)	18-26	24.8 \pm 1.1 (23.8-26.6)	25.4 \pm 1.3 (23.8-26.6)	28-29	22.9 \pm 1.4 (21-25.2)	20-31
Buccal cavity width	14.9 \pm 1.1 (14-16.8)	14.5 \pm 0.7 (14-15.4)	10-16	15.4 \pm 0.8 (14-16.8)	16.6 \pm 1.3 (15.4-18.2)	17-18	15.8 \pm 0.7 (15.4-16.8)	11-17
Dorsal tooth apex % B.C. length ¹	80.6 \pm 4.5 (75-87.5)	78.8 \pm 3.7 (72.2-83.3)	-	83.0 \pm 0.7 (82.4-84.2)	83.6 \pm 4.0 (78.9-88.9)	78-84	80.2 \pm 4.6 (72.2-87.5)	-
Lip region width	25 \pm 2.6 (21-28)	23.8 \pm 1.5 (22.4-26.6)	-	23.2 \pm 1.1 (21-23.8)	23.6 \pm 2 (21-26.6)	-	24.6 \pm 1.8 (22.4-28)	-
Lip region height	9.1 \pm 0.8 (8.4-9.8)	8.9 \pm 0.7 (8.4-9.8)	-	8.8 \pm 0.7 (8.4-9.8)	8.4 \pm 1.6 (7-11.2)	-	9 \pm 0.7 (8.4-9.8)	-
Nerve ring from anterior end	114.3 \pm 7 (107.8-127.4)	111 \pm 5.8 (119-98)	-	117.6 \pm 5.9 (110.6-124.6)	115.5 \pm 3.1 (112-119)	-	99.6 \pm 11.9 (87.5-122.5)	-
Anterior ovary length	77 \pm 19.3 (60-98)	77 \pm 18.8 (52-92)	-	70.5 \pm 24 (51-100)	76.6 \pm 19.7 (60-100)	-	58 \pm 14.5 (42-80)	-
Posterior ovary length	85.7 \pm 13 (73-99)	58.5 \pm 2.5 (56-62)	-	50.5 \pm 14.7 (36-66)	83 \pm 19 (65-108)	-	67.6 \pm 17.3 (48-92)	-
Uterus length	26.3 \pm 7.5 (22-35)	42 \pm 12.1 (31-55)	-	39.8 \pm 10.2 (30-50)	40.6 \pm 9 (30-50)	-	39 \pm 9 (28-52)	-
Vagina length	12.7 \pm 1.5 (11-14)	12.2 \pm 0.4 (12-13)	-	11.8 \pm 0.5 (11-12)	13 \pm 1 (12-14)	-	13.7 \pm 1.5 (11-15)	-
Rectum length	29.3 \pm 7.1 (24.5-42.5)	25 \pm 2.4 (21-28)	-	26.5 \pm 3.4 (21-31.5)	25 \pm 3.1 (21-31.5)	-	24.5 \pm 3.1 (21-28)	-

¹ The percentage position of the dorsal tooth apex from base of the buccal cavity.² Data from Mulvey (1961), Jensen and Mulvey (1968), Jairajpuri (1970), Chaves (1990), Loof *et al.* (1990) and Loof (2006).³ Data from Mulvey (1961), Jensen and Mulvey (1968), Chaves (1990), Loof *et al.* (1990), Nowruzi & Barooti (1997) and Nowruzi and Barooti (2001).

extending into body for about one third of its width; paravulval papillae absent, sphincter absent at oviduct-uterus junction. Tail conoid, bent ventrally, with short and set off digitate portion. Caudal glands grouped, spinneret with terminal opening.

Male. Not found.

Locality and habitat. Rhizosphere of tomato in Semnan.

Remarks. *Mylonchulus sigmaturus* comes close to *M. brachyuris* and *M. signaturellus* Mulvey, 1961. It can be distinguished from them by its different shape of the tail, also from *M. signaturellus* in having a smaller buccal cavity (*vs* 30-39×17-21 μ m) and a shorter tail (*vs* 52-73 μ m). Our description and measurements agree well in all aspects with the literature ones.

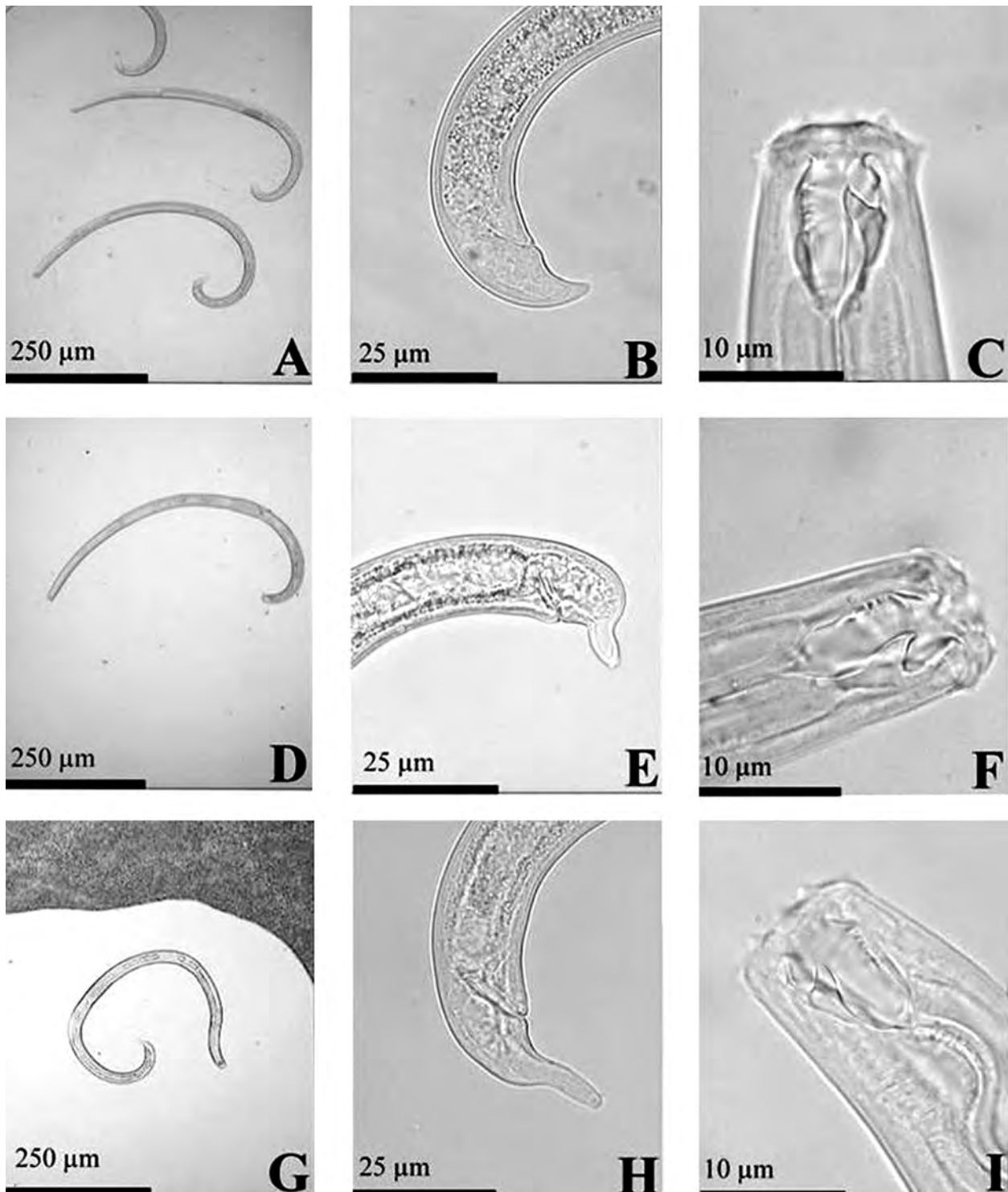


Fig. 4. A-C: *Mylonchulus brachyuris* (female); D-F: *Mylonchulus paitensis* (female); G-I: *Mylonchulus sigmaturus* (female). A, D, G: Entire body; B, E, H: Tail; C, F, I: Buccal cavity.

KEY TO THE IRANIAN *MYLONCHULUS* SPECIES

1. Spinneret subterminal, dorsal. 2
Spinneret terminal. 3
2. Tail shorter, 25 µm long, caudal glands in tandem.
M. nainitalensis Jairajpuri, 1970
Tail longer, 23-55 µm long, caudal glands in group.
M. brachyuris (Bütschli) Altherr, 1953
3. Posterior finger-like portion of tail straight.
M. paitensis Yeates, 1992
Posterior finger-like portion of tail not straight. 4
4. Tail sigmoid, sharply bent near middle and showing concave dorsal contour, caudal glands in group.
M. sigmaturus (Cobb) Altherr, 1953
Tail conoid, showing no concave dorsal contour, caudal glands in tandem.
M. minor (Cobb) Andrassy, 1958

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