

NEMATODES OF THE GENUS NAGELUS (TYLENCHIDA, MERLINIINAE)
WITH A DESCRIPTION OF TWO NEW SPECIES FROM CENTRAL ASIA

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A description is given of two new species of nematodes Nagelus arenosus sp. n. and N. elongatus sp. n., observed on desert plants in the sands of Kashka-Kum and Kara-Dum in southern Tadzhikistan, and also in the desert of Kara-Kum in Turkmenistan. An identification key of the genus Nagelus is given.

In 1979 Siddiqi (1979) made a revision of the subfamily Merliniinae (family Tylenchorhynchidae) in which he included 5 genera. On the basis of a study of the paratypes, diagnoses of the genera Nagelus, Scutylenchus, and Geocenamus were redescribed by him and a regrouping of the species within the subfamily was carried out. Twelve species were placed into the genus Nagelus, and later three more were transferred into it - N. neohexagrammus, N. abalosi, and N. virginalis (Ivanova, 1982; Doucet, 1980).

Ten species of this genus are registered in the Soviet Union at present. One species, N. jamalensis, was observed in the Arctic tundra on the Yamal peninsula, and nine, in the southern regions of the country: N. affinis was noted in Azerbaijan; N. affinis, N. alpinus, N. conicus, N. kirjanovae, and N. macrodens in Kazakstan; and N. grandis, N. hexagrammus, N. leptus, N. macrodens and N. neohexagrammus in Tadzhikistan (Nesterov, 1973; Kasimova, Atakishieva, 1980; Razzhivin, 1969; Sagitov, 1973, 1984; and Ivanova, 1978, 1981).

A description of two new species is given below: N. areonosus sp. n. and N. elongatus sp. n., which we observed in republics of central Asia, Tadzhikistan and Turkmenistan. An identification key for nematodes of the genus Nagelus is given. Nematodes were fixed in a hot 5 percent solution of formalin; whole mounts, in glycerin enclosed in paraffin rings. Original illustrations were completed by the authors with the help of MBI-3, MBI-6 and NU2E (German Democratic Republic) microscopes.

Genus NAGELUS Thorne et Malek, 1968
(emended diagnosis of the genus according to
Siddiqi, 1979)

Merliniinae. Body of medium dimensions (about 1 mm in length), cuticle annulated without longitudinal striation. Lateral field with 6 incisures, usually not areolated in the area of the female tail; deirids well marked.

Head end offset, its annules without radial grooves; labial disc absent or not noticeable. Cephalic capsule moderately to strongly developed. Stylet coarse with a tubular conical section and large knobs at the basal part which are usually sloping backwards. Stylet protractors attached to the base of the cephalic capsule. Metacorporeal bulb situated, as a rule, behind the central part of the esophagus. Vulva open and provided with an epiptygma. Female tail oblong-conical, bent in an arc, and rounded at the tip. Tail tip cuticle not thickened. Spicules straight, wide and strong. Gubernaculum thickened and broadly rounded on the proximal end, concave in the middle part, and becomes thin toward the distal end (lateral view).

Type species: Nagelus leptus (Allen, 1955) Siddiqi, 1979.

Nagelus arenosus sp. n. (Figure 1)

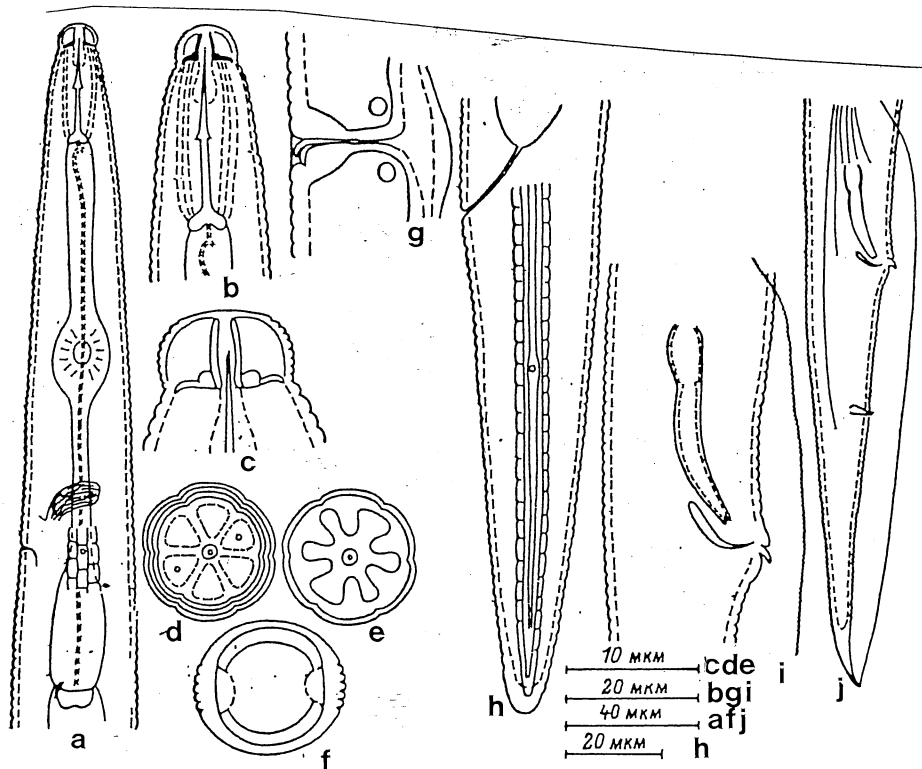


Figure 1. Nagelus arenosus sp. n.

Female: a to c - Front end of body; d - Labial area apically; e - Transverse section of body on the level of the basal annule of the labial area; f - Transverse section of middle part of body; g - Section of body in area of vulva; h - Tail.

Male: i - Section of body in area of spicules; and j - Tail.

Female (n = 12): L = 1.28-1.53 (1.40) mm, a = 33.0-40.0 (35.8), b = 6.0-7.5 (6.5), c = 13.4-16.0 (15.2), c' = 2.6-3.7 (3.3), v = 51.0-56.8 (53.5)%, MB = 44.0-50.0 (48.0)%, stylet = 33.0-36.0 (34.0) μ m.

Male (n = 6): L = 1.30-1.40 (1.35) mm, a = 31.0-42.0 (35.0), b = 6.0-7.3 (6.7), c = 11.6-13.7 (12.7), MB = 47.5-49.7 (48.8)%, stylet = 33.0-36.0 (34.0) μ m, spicules = 30.0-34.0 (32.0) μ m, gubernaculum = 8.4-11.0 (10.0) μ m.

Holotype (female): L = 1.50 mm, a = 36.4, b = 6.8, c = 16.1, c' = 3.1, v = 51.6%, MB = 49.3%, stylet = 36.0 μ m.

Allotype (male): L = 1.40 mm, a = 36.5, b = 7.0, c = 13.5, MB = 48.0%, stylet = 33.0 μ m, spicules = 34.0 μ m, gubernaculum = 9.6 μ m.

Female. Body long and cylindrical, tapering toward the front and rear ends; rounded in transverse section. Cuticular annules in the middle part of the body area 2.3-2.5 μ m. The lateral field occupies 1/3 the width of the body and has 6 incisures, the outermost of them serrated; a distinct areolation is noted in the anterior part, but is faint for the whole length of the body. Excretory pore opens at the level of the base of the isthmus or of the middle part of the glandular widening of the esophagus, at a distance 158-168 μ m from the head end. Hemizonid located immediately in front of excretory pore and extends for two annules of cuticle. Deirids well marked and localized on the level of excretory pore. Head end hemispherical (6.0 x 11.5 μ m), offset from body contours and supplied with 8 annules. Labial area with 6 sectors, labial disc not noticeable, and amphids round, small and situated in the central part of the lateral lips. Cephalic capsule strongly sclerotized (figure 1, c and e). Stylet strong and its conical part is equal to the cylindrical part. Knobs of the basal part of the stylet round and slopping backwards, and reaching 6 μ m in diameter. Opening of the dorsal gland duct situated 2.4 μ m behind the basal part of the stylet. Metacorporeal bulb large (26 x 18 μ m), located in the middle part of the esophagus or somewhat in front (MB = 44.0-50.0%), with a well developed valvular apparatus at the center. Glandular widening of the esophagus oblong, up to 2.5 times larger than its width, and there is a cardia. Ovaries paired and usually poorly visible; spermatheca round (15.0 x 18.5 μ m) and offset. The vulva slit occupies half the diameter of the body, with a double epiptygma, and situated in the front part of the vagina. Tail elongated 78.0-100.0 (92.8) μ m, with conical shape, and supplied with 36-48 annules ventrally. Tail tip narrow, rounded and smooth. Phasmids coarse and protruding, and are located in the front half of the tail, at 33-38% of its overall length.

Male. In accordance with the morphological characters, males are similar to females. Spicules straight and bifurcated on the distal end. Gubernaculum bent like a bow, thickened on the proximal end and pointed on the distal end. Hypoptygma on the posterior lip of the cloaca conical, protruding, and directed towards the rear. Bursa serrated along the edges and reaching the tip of the tail.

Differential diagnosis. N. arenosus sp. n. is close to N. grandis and N. alpinus from which it differs by the dimensions of the body (L = 1.28-1.53 mm), by the number of annules in the labial area (8) and by the length of the stylet (33-36 μ m). N. grandis is characterized by the smaller dimensions of body (L = 0.96-1.11 mm) and stylet

(27-30 μm); the labial area is supplied with 6 annules. In N. alpinus L = 0.83-0.95 mm; the stylet is 39-42 μm , and the labial area contains 9 annules.

Type locality. Soil close to the roots of the small fruit calligonum Calligonum microcarpus Borszcz. in the sands of Kara-Dum. It was found also in the rhizosphere of the black saxaul Haloxylon aphyllum (Minkw.) Iljin and of the Richter saltwort Salsola richteri Karel, in the sands of Kashka-Kum and Kara-Dum on the territory of the "Tiger Gorge" reserve of the Dzhilikul region in southern Tadzhikistan (April 1981).

Holotype (female) No. 516, allotype (male) No. 517 and paratypes No. 518-583 (females - 13, males - 13, larvae - 38) are kept at the Academician E. N. Pavlov Institute of Zoology and Parasitology in the Tadzhik SSR Academy of Sciences.

Nagelus elongatus sp. n. (figure 2)

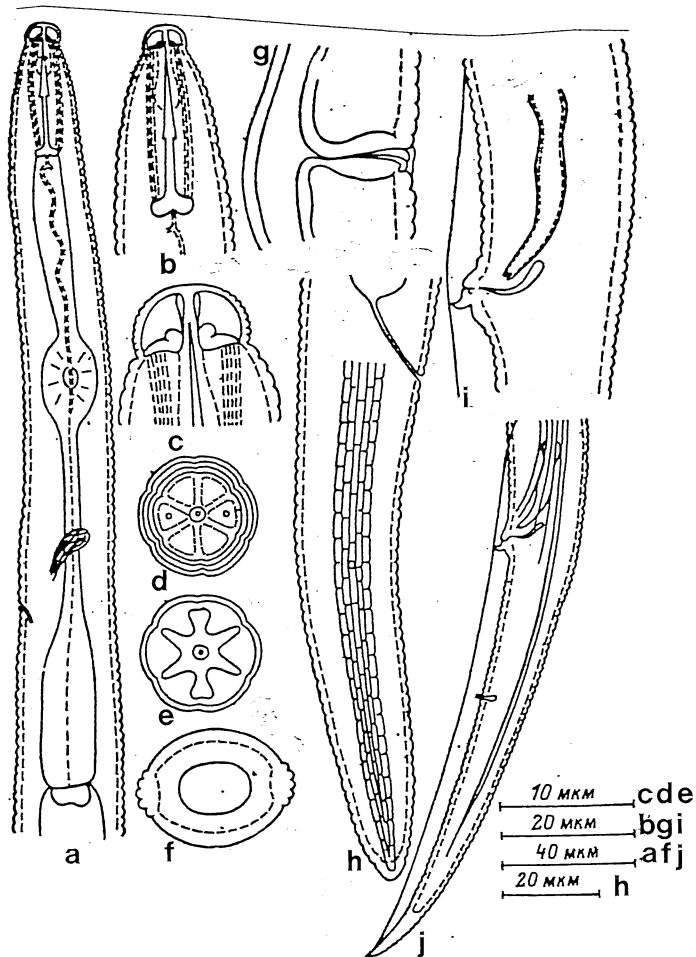


Figure 2. Nagelus elongatus sp. n.

a to h - Female; i and j - Male. Same legends as on Figure 1.

Female (n = 7): L = 1.50-1.76 (1.67) mm, a = 45.6-54.6 (49.1), b = 7.8-8.8 (8.3), c = 14.8-17.0 (15.8), c' = 3.4-4.7 (4.3), v = 49.5-52.9 (51.5)%, MB = 49.5-55.6 (51.5)%, stylet = 34.0-37.0 (34.0) μ m.

Holotype (female): L = 1.76 mm, a = 47, b = 8.4, c = 15.7, c' = 4.3, v = 49.5%, MB = 52%, stylet = 37.0 μ m.

Allotype (male): L = 1.67 mm, a = 53.5, b = 8.4, c = 12.8, MB = 51.5%, stylet = 34.0 μ m, spicules = 31.0 μ m, gubernaculum = 12.0 μ m.

Female. Body long and slender and noticeably tapered on both ends. On a transverse section it is thickened, with projecting cords of the lateral fields. Cuticle clearly annulated; the width of the annules in the middle part of the body comes to 2.5-3 μ m. The lateral field occupies 1/3 of the width of the body, and consists of 6 incisures, the outer ones of which are broadly serrated; areolations along the full length. Excretory pore situated at a distance 193 μ m from the front end of the body - at level of base of isthmus or of the middle of glandular part of esophagus. Head end hemispherical in shape (10.6 x 5.3 μ m), well offset from body contours and with 8 cuticular annules. Labial area with 6 sectors, labial disc not noticeable. Amphids round and large, located on the lateral lips. Cephalic capsule strongly sclerotized (figure 2, c and e). Stylet large and strong and with conical part constituting half its length. Basal knobs of the stylet round and directed slightly forward, and their diameter is 6.2-7.5 μ m. Dorsal gland duct opens into esophagus lumen at a distance 2.5 μ m behind basal part of stylet. Metacorporeal bulb large and round (25.0 x 17.5 μ m) and with a well developed valvular apparatus in the center; it lies approximately at the central position (MB = 51.5%) in the esophagus. Esophageal glands length 2-2.5 times larger than their width; cardia present. Vulva slit comes to half the body diameter; epiptygma double and with reflexed ends which reach the edges of the vulval lips. Ovaries paired, weakly marked, and with an offset round spermatheca. Tail elongated (100-112 μ m), bluntly conical and with a smooth rounded tip. There are 36-50 annules on its ventral side. Phasmids convex, distinctly visible, and located in the front half of the tail, 27-39% of its length.

Male. Morphologically similar to the females. Spicules straight and bifurcated on the distal end. Gubernaculum bent in a bow; broadly rounded on the proximal end and thinned on the dorsal end. On the posterior lip of the cloaca there is a well marked hypopygium bent in the shape of a hook. Bursa narrow and reaching the tip of the tail.

Differential diagnosis. N. elongatus sp. n. differs from all known species of this genus by the large measurements of the body (except N. kirjanovae), and also by the index a which equals 45.6-54.6, the value of which in all [the other] species does not exceed 41.0. N. kirjanovae has a very long stylet, 95-100 μ m, in comparison with N. elongatus sp. n. (34-37 μ m). It is closest to N. arenosus sp. n. from which it differs by shape of the knobs of the stylet, by the measurements of length and width of the body and by the structure of the hypopygium in males which has a bent hook-like shape.

Type locality. Soil near the roots of wild rye Secale silvestre Host, and also the rhizosphere of the Richter saltwort Salsola richteri Karel and of the blushing calligonum Calligonum rubescens Mattei; anchored sands of Kara-Kum in the Giaour region of Turkmenistan (April to June in the years 1976 and 1979).

Holotype (female) No. 40, allotype (male) No. 41 and paratypes (7 females, 2 larvae) No. 37-39 and 42-47 are kept in the Institute of Zoology, Turkmen SSR Academy of Sciences.

IDENTIFICATION KEY OF SPECIES OF THE GENUS NAGELUS

1. (16) Stylet length more than 30 μ m.
2. (5) Stylet length from 67 to 100 μ m.
3. (4) L = 1.50-1.75 mm; tail tip annulated kirjanovae*
(Sagitov, 1973) Siddiqi, 1979.
4. (3) L = 1.15 mm; Tail tip smooth superbus
(Allen, 1955) Siddiqi, 1979.
5. (2) Stylet length from 33 to 48 μ m.
6. (13) Head end with 8-9 annules.
7. (10) Body length more than 1.2 mm; head end with 8 annules.
8. (9) Knobs of basal part of stylet directed slightly forward;
a = 45.6-54.6 elongatus* sp. n.
9. (8) Knobs of basal part of stylet directed backward; a = 33.0-40.0
. arenosus* sp. no.
10. (7) Body length less than 1.2 mm; head end with 9 annules.
- 11.(12) Cephalic capsule weakly sclerotized; female tail with 49-55
annules on ventral side, its tip narrow conicus*
(Allen, 1955) Siddiqi, 1979.
- 12.(11) Cephalic capsule strongly sclerotized; female tail with 54-58
annules on ventral side, its tip broad alpinus*
(Allen, 1965) Siddiqi, 1979.
13. (6) Head end with 6-7 annules.
- 14.(15) Head end not offset from contours of body; stylet 33-36 μ m in
length hexagrammus* (Sturhan, 1976) Siddiqi, 1979.
- 15.(14) Head end offset from contours of body; stylet 43-48 μ m in
length macrodens* (Allen, 1955) Siddiqi, 1979.

Identification Key (Continued)

16. (1) Stylet length 30 μ m or less.
- 17.(22) Female tail conical with annulated tip.
- 18.(19) Head end with 8-9 annules leptus*
(Allen, 1955) Siddiqi, 1979.
- 19.(18) Head end with 6 annules.
- 20.(21) L = 0.60-0.61 mm; stylet 20-21 μ m camelliae
(Kheiri, 1972) Siddiqi, 1979.
- 21.(20) L = 0.80-0.93 mm; stylet 27-28 μ m jamalensis*
(Nesterov, 1973) Siddiqi, 1979).
- 22.(17) Female tail subcylindrical with smooth tip.
- 23.(26) Head end not offset from contours of body; c' = 1.8-2.3.
- 24.(25) Head end with 8-9 annules; a = 30-33 affinis*
(Allen, 1955) Siddiqi, 1979.
- 25.(24) Head end with 6 annules; a = 18-22 neohexamammus*
(Ivanova, 1978) Ivanova, 1982.
- 26.(23) Head end offset from contours of body; c' = 2.8-3.0.
- 27.(28) Cephalic capsule strongly sclerotized; L = 0.96-1.11 mm
. grandis* (Allen, 1955) Siddiqi, 1979.
- 28.(27) Cephalic capsule weakly sclerotized; L = 0.85-0.86 mm
. lineatus (Allen, 1955) Siddiqi, 1979.

Species not entered on identification key: N. abalosi (Doucet, 1978) Doucet, 1980, and N. virginalis (Doucet, 1978) Doucet, 1980.

*: Nematodes observed in the Soviet Union.

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NEMATODES OF THE GENUS NAGELUS (TYLENCHIDA, MERLINIINAE)
AND DESCRIPTION OF TWO NEW SPECIES FROM MIDDLE ASIA

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SUMMARY

Two new species of plant nematodes are described. Nagelus arenosus sp. n. was found in the rhizosphere of Calligonum microcarpum Borszcz. (type host) in the desert of Kara-Dum (type locality) as well as in the rhizosphere of other desert plants in the Tajik SSR. N. elongatus sp. n. was found in the rhizosphere of Secale silvestre Hort., Salsola richteri Karel. and Calligonum rubescens in the Kara-Kum desert in the Turkmenian SSR. A key to 15 known species of the genus Nagelus is given.