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A New Genus and Species of the Family Rhabdolaimidae (Nematoda), with Descriptions of Two Known Species and Taxonomic Discussion

Qudsia Tahseen,* Razia Sultana, Rahmat Khan, Ather Hussain

Abstract: A new genus, one new and two known species belonging to family Rhabdolaimidae are described and illustrated. *Mediolaimus* n. gen. is characterized by small-sized body; papilliform outer labial and cephalic sensilla; long, tubular stoma with stegostom having relatively larger dorsal and smaller sub ventral denticles at same level; cylindrical pharynx with expanded basal bulb having thickened lumen; didelphic gonad having outstretched ovaries; elongate-conoid tail with hemispherical terminus without mucro or spinneret and caudal glands obscure. *Mediolaimus obtusicaudatus* n. gen. n. sp. is characterized by stoma with a relatively larger dorsal denticle and two fine subventral denticles at same level; amphidelphic reproductive system with outstretched ovaries; tail elongate conoid with smooth hemispherical terminus and absence of male. *Rhabdolaimus terrestris* de Man, 1880 and *Udonchus tenuicaudatus* Cobb, 1913 are described with additional details. The inter population variations are discussed in the latter species along with a detailed note on the status of Rhabdolaimidae and its proposed placement under superfamily Rhabdolaimoidea of suborder Campydorina.

Key words: India, *Mediolaimus obtusicaudatus*, *Udonchus tenuicaudatus*, new genus, new species, Rhabdolaimidae, taxonomy.

During the screening of soil samples collected from North India, *Rhabdolaimus terrestris* de Man, 1880; a species from newly raised genus *Mediolaimus*; the type species of the rare genus *Udonchus* Cobb, 1913 were found. All the above species belong to the family Rhabdolaimidae Chitwood, 1951, whose status in Phylum Nematoda has largely remained controversial. According to Lorenzen (1981, 1994) the family does not possess either of the holapomorphic morphological characteristics of suborders Chromadorina and Desmoscolecina, therefore, had to be placed under the ill-defined suborder Leptolaimina. Eyualem and Coomans (1996) placed it under superfamily Microlaimoidea within suborder Chromadorina. Later De Ley and Blaxter (2002, 2004) considered it under Leptolaimoidea Örley, 1880 of Plectida Ma1akhov, 1982 while Andrássy (2005) suggested its placement under the suborder Leptolaimina Lorenzen, 1981 of Araeolaimida De Coninck and Schuurmans Stekhoven, 1933. Holovachov and De Ley (2006) reported Rhabdolaimidae as family *incertae sedis*.

Materials and Methods

Nematodes were extracted by Cobb's (1918) sieving, decantation and a modified Baermann funnel technique. For light microscopy, nematodes were fixed in 4% formaldehyde, processed to anhydrous glycerin (Seinhorst, 1959) and later mounted on slides using the wax ring technique. The nematodes were measured with an ocular micrometer and drawn using a drawing tube. LM photographs were taken by an Olympus C3030 digital camera mounted on an Olympus BX-51 DIC Microscope.

Cluster analysis: Eighteen morphological characters were taken to appraise the status of the newly raised genus *Mediolaimus* along with the supposedly related genera *Rhabdolaimus*, *Rogerus*, *Udonchus*, *Syringolaimus* with genus *Campydora* as an outgroup. All the characters were important with good taxonomic value. Characters were coded as multistate variables with state '0' representing the most commonly occurring trait whilst an increase in value represented increasing deviation from state '0'. Data matrix (Appendix 1, 2) was prepared and cluster analysis was made. The data matrix was analyzed using Statistica-99 software. The relationships were interpreted from the dendrogram (Fig. 11) obtained using the neighbor joining algorithm, treating multistate characters as ordered, and taxa were separated on the basis of linkage distances.

Description

Mediolaimus[1] n. gen.

Diagnosis: Rhabdolaiminae. Body slender, slightly ventrally curved, tapering garadually towards extremities. Cuticle finely annulated. Lateral fields inconspicuous. Lip region continuous with adjoining body. Outer labial sensilla pore-like, cephalic sensilla papilliform. Amphidial apertures small elliptical slits. Stoma tubular, with small cheilo- and gymnostom and long sclerotized tubular stegostom. Three small denticles at anterior edge of stegostom. Dorsal denticle slightly larger than sub ventral denticles. Pharynx cylindrical with an expanded basal bulb having thickened lumen/ valve plates. Cardia small without glandular cells. Female reproductive system amphidelphic; ovaries outstretched. Tail elongate-conoid, tapering to a hemispherical terminus without a spinneret. Caudal glands obscure.

Type species: Mediolaimus obtusicaudatus n.gen. n. sp.

Relationship: The genus *Mediolaimus* n. gen. differs from *Rhabdolaimus* de Man, 1880 in having cuticle with

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[1] The genus represents the intermediate characteristics with characters common to both *Rhabdolaimus* and *Rogerus*.

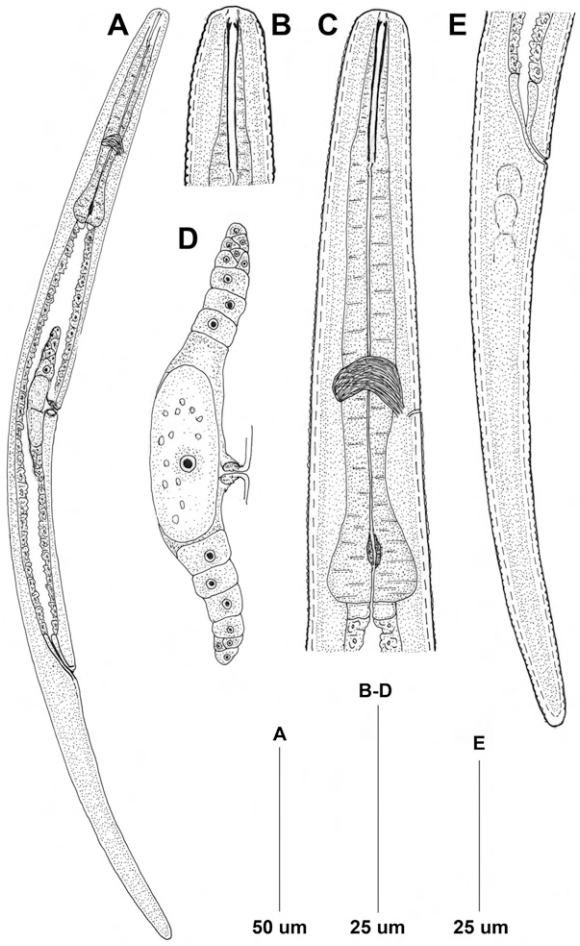

Fig. 1. *Mediolaimus obtusicaudatus* n. gen. n. sp. female. A) *Entire female*. B) Anterior region. C) Pharyngeal region. D) Reproductive system. E) Tail region.

conspicuous transverse striations (*vs* smooth or very finely striated cuticle), amphidelphic reproductive system with outstretched (*vs* reflexed) ovaries; caudal glands obscure (*vs* well developed) and spinneret absent (*vs* present in *Rhabdolaimus* de Man, 1880). The new genus also differs from *Rogerus* Hoeppli and Chu, 1934 in having papilliform (*vs* setose) cephalic sensilla; dorsal denticle (larger than sub ventral denticles *vs* always equal in size); pharyngeal basal bulb with (*vs* without) thickened lumen/ valve plates; caudal glands obscure (*vs* well developed) and conical spinneret absent (*vs* present in *Rogerus* Hoeppli and Chu, 1934).

Etymology: The genus 'name '*Mediolaimus*' is based on the intermediate characteristics it possesses of both genera *Rhabdolaimus* and *Rogerus*.

Mediolaimus obtusicaudatus[2] n. gen. n. sp.
(Figs 1, 2)

Measurements of holotype and paratypes are given in Table 1.

[2] The species name denotes it's obtuse/ bluntly rounded/ hemispheroid tail terminus.

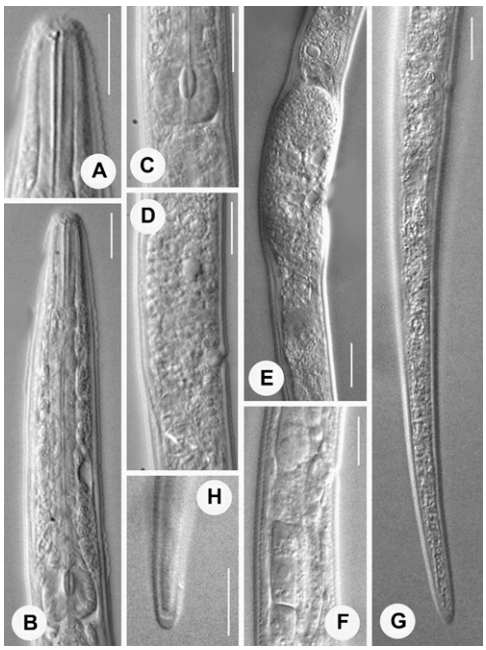

Fig. 2. *Mediolaimus obtusicaudatus* n. gen. n. sp. female. A) Anterior end. B) Pharyngeal region. C) Posterior region of pharynx. D, F) Vulval region. E) Reproductive system. G) Tail region. H) Tail terminus (Scale bar = 10 μm).

Female (n=10): Body small-sized, 0.29-0.31 mm long, ventrally arcuate after fixation, tapering at both extremities, more towards posterior end. Cuticle about 1μm thick, transversely annulated, devoid of somatic setae. Pseudocoelom filled with fine, densely packed crystalloids. Longitudinal striations absent; lateral fields not visible. Lip region low, anteriorly flattened, continuous with adjoining body. Labial and cephalic sensilla inconspicuous under LM. Amphidial fovea usually indistinct; in few specimens small elliptical slit-like, located at 1.4-1.8 lip diameters from anterior end. Stoma isomorphic, tubular with indistinct cheilostom, small gymnostom and long moderately cuticularized stegostom. A relatively prominent dorsal denticle and two very fine subventral denticles located at anterior level of tubular stoma. Pharyngeal sleeve surrounding stoma at level of denticles. Pharyngeal corpus cylindrical, 51-62 μm long, continuing into a pyriform to triangular basal bulb of 9-10 x 9-10 μm dimension with flattened base; basal bulb provided with moderately thickened lumen/ valve plates. Body at pharyngeal end 2.3-3.0 times labial diameters wide. Nerve ring encircling pharynx at 56.3-60.1% of its length from anterior end. Secretory-excretory pore located at 56.9-66.3% of pharyngeal length from anterior end. Cardia 2-3 μm long. Intestine granular, with thick walls and narrow lumen. Rectum 0.6-0.8 times anal body diameter long. Reproductive system didelphic, amphidelphic. Ovaries small, outstretched, both on left or right side of intestine. Gravid female never with more than one intrauterine egg measuring 44-46 x 17-19 μm in dimension (n=5). Vagina 2-3 μm long, at right angle to main body

TABLE 1. Measurements of *Rhabdolaimus terrestris* de Man, 1880 and *Mediolaimus obtusicaudatus* n. gen., n. sp. with mean ± standard deviation (range).

Character	*Rhabdolaimus terrestris* Female (n =15)	*Mediolaimus obtusicaudatus* n. gen., n. sp. Holotype female	*Mediolaimus obtusicaudatus* n. gen., n. sp. Paratype female (n =9)
Body length	603.6 ± 19.1 (567-636)	304	302.1 ± 9.1 (291-311)
Body diameter	24.9± 0.8 (22-26)	16	15.8 ± 0.8 (15-17)
a	25.1 ± 0.8 (23.4-26.1)	19	19.1 ± 0.5 (12.6-19.4)
b	5.1 ± 0.6 (4.9-5.3)	4.4	4.5 ± 0.1 (4.4-4.6)
c	4.0 ± 0.5 (3.9-4.1)	3.5	3.5 ± 0.1 (3.5-3.7)
c′	7.8 ± 0.3 (7.6-7.9)	7.7	7.3 ± 0.5 (6.8-8.2)
V	43.3 ± 1.1 (41.0-45.7)	46.3	46.3 ± 0.4 (45.7-47.0)
G1	16.5 ± 2.8 (12.9-20.4)	9.8	9.5 ± 0.7 (8.9-10.6)
G2	19.3 ±3.3 (12.6-28.8)	5.5	6.7 ±1.3 (5.5-8.0)
Lip height	2.0 ± 0 (2-2)	2	2.0 ± 0 (2-2)
Lip diameter	7.0 ± 0 (7-7)	5	5.4 ± 0.5 (5-6)
Stoma length	35.2± 1.1 (34-37)	20	21.3 ± 1.7 (17-25)
Pharyngeal length	116.6 ± 2.8 (110-119)	69	66.6 ± 2.6 (63-69)
Nerve ring anterior end	76.2 ± 6.2 (63-83)	42	39.2 ± 2.1 (37-42)
Secretory-excretory pore	84.7 ± 2.2 (78-88)	40	38.5 ± 1.2 (37-40)
Vulva-anus distance	211.4 ± 4.9 (198-220)	78	78.2 ± 2.8 (76-83)
Rectum length	13.8 ± 1.4 (11-15)	12	13.4 ± 1.2 (11-17)
Anal Body Diameter	19.1 ± 0.9 (19-20)	11	11.4 ± 0.8 (10-12)
Tail length	158.9 ± 5.3 (145-165)	85	83.6 ± 1.8 (82-86)

axis occupying 1/5th to 1/6th of vulval body diameter in length, with weakly developed cuticularized thickenings. Vulva pre-equatorial, a small slit. Vulva-anus distance 0.8-1.0 times tail length. Tail long, tapering gradually into a hemispherical terminus, without conical spinneret or papilla. Caudal glands obscure.

Male: Not found.

Diagnosis: The new species is characterized by females having very small body, finely annulated, thin cuticle, absence of somatic setae and longitudinal lines; indiscernible labial and cephalic sensilla under LM, moderately cuticularized stoma with relatively larger dorsal and very fine subventral denticles at same level; pyriform basal bulb with moderately thickened lumen/valve plates; didelphic reproductive system with outstretched ovaries, tail terminus smooth hemispherical without any spinneret and inconspicuous or no caudal glands.

Type habitat and locality: Soil (sandy) samples containing *Mediolaimus obtusicaudatus* n. gen. n. sp. were collected from around the roots of Pearl millet (*Pennisetum americanum*) from Malpura, Barmer, Rajasthan, India at 26°17′N, 75°23′E geographical coordinates.

Type designation: Holotype female and eight paratype females mounted on Slide No. *Mediolaimus obtusicaudatus* n. gen. n. sp. 207/1-3 deposited in Nematode Collection of National Zoological Survey of India, Jodhpur, India One female on slide *Mediolaimus obtusicaudatus* n. gen. n. sp. 207/4, deposited at the Laboratory of Nematology, Wageningen University and Research Center (WUR), 6700 ES Wageningen, The Netherlands.

Etymology: The new species is named '*obtusicaudatus*' because of its obtuse/hemispherical tail terminus that lacks an acute mucro or spinneret.

Rhabdolaimus terrestris de Man, 1880
(Fig 3)

Measurements of females are given in Table 1.

Female (n=15): Body small- to medium-sized, slightly ventrally arcuate after fixation, tapering at both extremities, more towards posterior end. Cuticle about 1μm thick, smooth in LM, devoid of somatic setae. Longitudinal striations absent; lateral fields not visible.

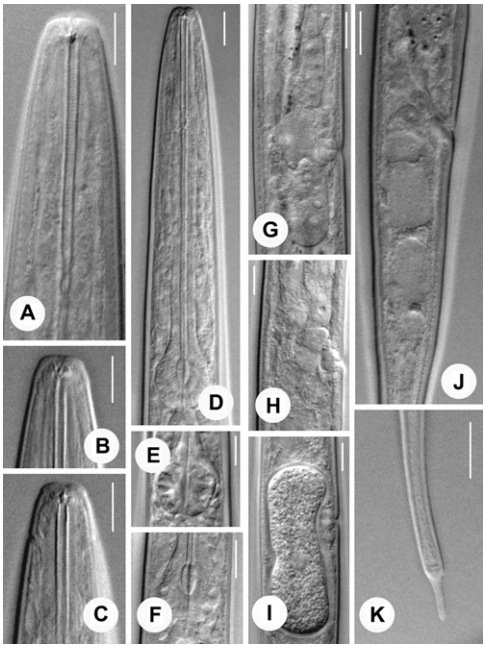

FIG. 3. *Rhabdolaimus terrestris* de Man, 1880 female. A-C) Anterior end. D) Pharyngeal region. E-F) Posterior pharyngeal region. G-I) Vulval region. J) Anal region. K) Tail terminus with spinneret. (Scale bar = 10 μm). q bar = 10 μm).

Lip region rounded or slightly flattened, continuous with adjoining body. Labial and cephalic sensilla inconspicuous under LM. Amphidial apertures small, located at one lip diameter from anterior end. Stoma isomorphic, tubular with non cuticularized cheilostom, small gymnostom and long moderately cuticularized stegostom comprising of the longest telostegostomal component. A thickened piece present in the dorsal wall of stoma at base. A relatively larger dorsal denticle and two subventral denticles located at anterior end of tubular stegostom. Pharyngeal sleeve surrounding stoma at level of denticles. Pharyngeal corpus cylindrical, muscular continuing into a rounded to pyriform basal bulb of 16-20 x 12-15 µm dimension with slightly to moderately thickened valve plates. Body at pharyngeal end 2.5-3.0 times labial diameter wide. Nerve ring encircling pharynx at 56.3-60.1% of its length from anterior end. Secretory-excretory pore not visible. Cardia 3-4 µm long, non glandular. Intestine with thin walls and narrow lumen. Rectum 0.8-1.0 times anal body diameter long. Reproductive system didelphic, amphidelphic. Ovaries antidromously reflexed, on right side of intestine. Gravid female never with more than one intrauterine egg at a time measuring 57-65 x 20-24 µm in dimension (n=9). Vagina small occupying about $1/4^{th}$ to $1/5^{th}$ of corresponding body diameter, at right angle to main body axis, provided with weakly developed round cuticularized thickenings. Vulva preequatorial, a small slit. Vulva- anus distance 1.1-1.4 times tail length. Tail long, tapering gradually, ending into 8-9 µm long conical spinneret. Caudal glands large and conspicuous.

Male: Not found.

Habitat and locality: Wet soil sample from the bank of Shekha wetland, Aligarh, Uttar Pradesh, India at 27°51′28"N 78°13′6"E geographical coordinates.

Voucher specimens: Fourteen females on slide *Rhabdolaimus terrestris* de Man, 1880 No. SN/ 1-6 deposited in the Nematode Collection, Department of Zoology, Aligarh Muslim University, Aligarh, Uttar Pradesh, India. One female on slide *Rhabdolaimus terrestris* de Man, 1880 No. SN/2, deposited at the Laboratory of Nematology, Wageningen University and Research Center (WUR), 6700 ES Wageningen, The Netherlands.

Remarks: Though the species epithet indicates towards its terrestrial preference, *Rhabdolaimus terrestris* de Man, 1880 is found in a variety of habitats including fresh water bodies, mineral springs, leaf litter, moist soil etc. The species is distributed world-wide and is reported from Africa (Canaries, Ethiopia, Ghana, Mauritius, Morocco, South Africa, Zaire), Asia (Bangladesh, Brunei, China, Georgia, India, Mongolia, Sumatra, Tadzhikistan, Uzbekistan, Vietnam), Europe (Austria, Belgium, Bulgaria, Denmark, France, Germany, Hungary, Italy, Lithuania, Norway, Poland, Romania, Russia, Serbia, Slovakia, Spain, Spitsbergen, Switzerland, The Netherlands, United Kingdom), North America (Canada, United States), South America (Venezuela, Paraguay) and Oceania (New Hebrides, New Zealand).

The present population resembled the earlier described populations of *R. terrestris* in most morphological and morphometric characteristics. Compared to the original population of *R. terrestris*, our population showed larger individuals and absence of males (L = 450 µm in the original description while L =450-500 µm in *R. terrestris apud* Andrássy (1984). The allometric values of the present population totally agreed with those reported by Eyualem and Coomans (1996) and Andrássy (2005) with the exception of c' value in the former showing a greater range (9.6-15.1). Earlier Schneider (1939) and Traunspurger (1989) considered *R. terrestris* and *R. aquaticus* to be the same species based on overlapping characters and highly variable length of tail spinneret. However, Eyualem and Coomans (1996) differentiated the two on the basis of spinneret length and vulval sclerotization. The spinneret length of the present population conformed well to the range given for *R. terrestris* by Eyualem and Coomans (1996). However, few characters showed great degree of variability thus indicating their low weight in species diagnosis and differentiation. The basal bulb of pharynx showed variation in shape from round to pyriform in different females with different degree of thickening in lumen. Likewise, the vaginal sclerotization was found to be variable in thickness in different females and did not form a good differentiating character contrary to the observations of Eyualem and Coomans (1996). The appearance of sclerotization is also influenced by fixation, mounting method and microscope optics, all of which render it even more difficult to use consistently as a differentiating character.

Udonchus tenuicaudatus Cobb, 1913
(Figs 4-9)

Measurements of females from five localities are given in Table 2.

Female (n=60): Body medium-sized, 0.4-0.5 mm, slender, almost straight or slightly curved ventrally upon fixation, tapering at both extremities. Cuticle about 0.8-1.2 µm thick, appearing smooth under LM, devoid of longitudinal lines and somatic setae. Body structures usually obscured by small rounded/fusiform crystalloids in pseudocoelom. Lateral field inconspicuous. Lip region rounded, truncate to flattened, continuous with body contour; of same diameter as adjoining body or slightly narrower. Lips fused; labial and cephalic sensilla inconspicuous. Amphidial apertures transverse oval slits, located at middle to posterior level of stoma, or about 0.6-1.2 lip diameter from anterior end. Stoma narrow, tubular, slightly expanded anteriorly, about 1.1-1.2 lip diameter long. Cheilostom modified into 12 fine rugae usually not distinctly demarcated under LM; rest of stomal components moderately cuticularized. Dorsal stegostomal wall bearing a small, pointed, upwardly

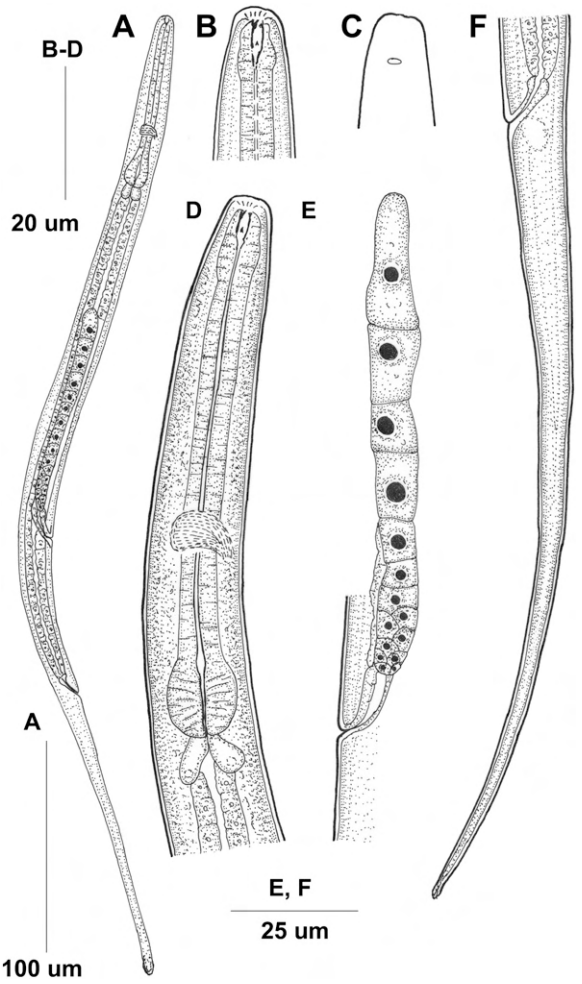

FIG. 4. *Udonchus tenuicaudatus* Cobb, 1913 female. A) *Entire female.* B) Anterior region. C) Anterior region showing amphid position. D) Pharyngeal region. E) Reproductive system. F) Tail region.

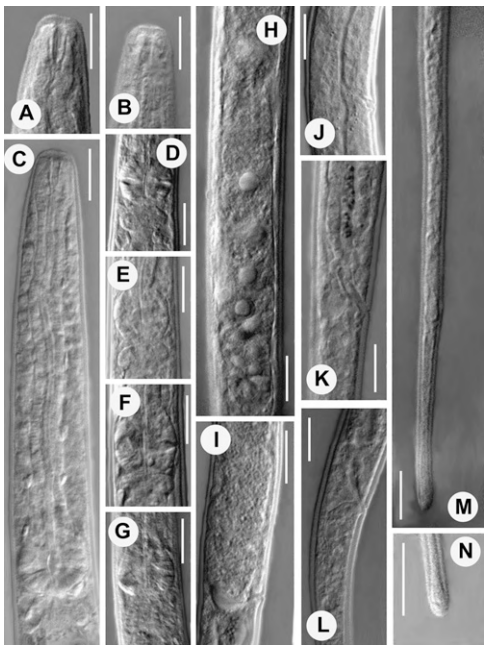

FIG. 5. *Udonchus tenuicaudatus* Cobb, 1913 female (Shekha population). A, B) Anterior end. C) Pharyngeal region. D-G) Posterior pharyngeal region. H) Reproductive system. I, J) Vulval region. K, L) Anal region. M) Posterior tail region. N) Tail terminus with spinneret (Scale bar = 10 μm).

directed denticle at its anterior level; subventral walls bearing two subventral denticles- at level of dorsal denticle and at 2/3rd level of stoma. Pharyngeal tissue encircling entire stoma often forming a prominent buccal capsule. Pharynx comprising of long, slender corpus with thickened refractive lumen terminating in a rounded, pyriform to triangular basal bulb with flattened to conical base. Nerve ring located at 49-67% of pharyngeal length. Secretory-excretory pore usually inconspicuous. Body at pharyngeal end 1.7-2.2 lip diameters wide. Cardia comprising of well developed, rounded to elongated glandular cells, compactly arranged or wide apart or making a 45°-60° angle. Intestine granular without distinct lumen. Rectum thin-walled, 0.8-1.2 anal body diameter long, often with an associated cell hanging from its distal wall. Anal opening crescent-shaped. Reproductive system mono-prodelphic. Ovary antidromously reflexed laterally, on right side of intestine; oocytes arranged in two rows at distal tip continuing into a single row proximally. Eggs usually not observed in uterus with the exception of few individuals (n=5) having one intra-uterine egg of 49-55 x 17-24 μm dimension. Vagina thin-walled, 1/3rd of corresponding body diameter, usually anteriorly directed, perpendicular to body axis in few specimens; vaginal wall simple to weakly sclerotized. Vulva a transverse slit, located at 220-286 μm from anterior end without protruded lips. Post-uterine sac absent; occasionally a small diverticulum present in few specimens posterior to vulval level. Vulva-anus distance 71-109 μm long. Tail elongate, gradually tapering towards terminus, straight or slightly curved ventrally. Tail terminus occasionally fusiform leading to a small, noncuticularized terminus. Caudal glands conspicuous only in few specimens.

Male: Not found

Habitat and locality:

Shekha population: Wet soil sample from the bank of Shekha wetland, Aligarh, Uttar Pradesh, India at 27°51′28"N, 78°13′6"E geographical coordinates.

Aligarh Population: Alluvial soil sample from the bank of agricultural canal at Panethi, Aligarh, Uttar Pradesh, India at 27°51′7"N, 78°10′8"E geographical coordinates.

KNP population: Sample from ditch with decaying leaves at Keoladeo National Park, Bharatpur, Rajasthan, India at 27°09′32″N, 77°30′31″E geographical coordinates.

Mount Abu population: Moist soil sample from Mount Abu, Sirohi, Rajasthan, India at 24°35′33″N, 72°42′ 30″E geographical coordinates.

Keetham population: Wet soil sample from the bank of Keetham Lake, Agra, Uttar Pradesh, India at 27°15′5.99"N, 77°50′48.82"E geographical coordinates.

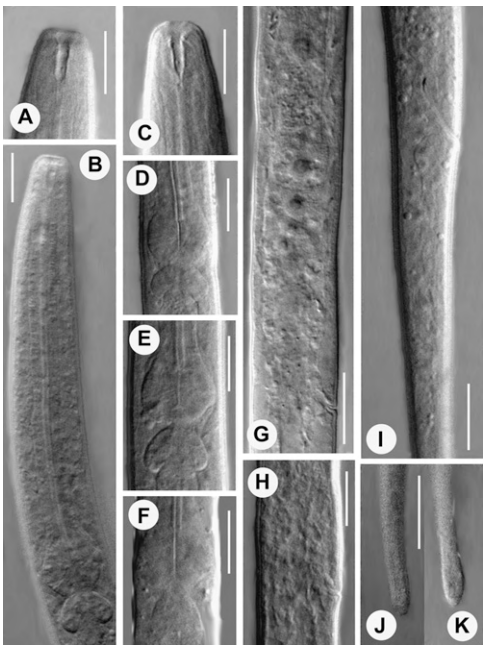

FIG. 6. *Udonchus tenuicaudatus* Cobb, 1913 female (Aligarh population). A, C) Anterior end. B) Pharyngeal region. D-F) Posterior pharyngeal region. G) Reproductive system. H) Vulval region. I) Anal region. J, K) Tail terminus with spinneret (Scale bar = 10 μm).

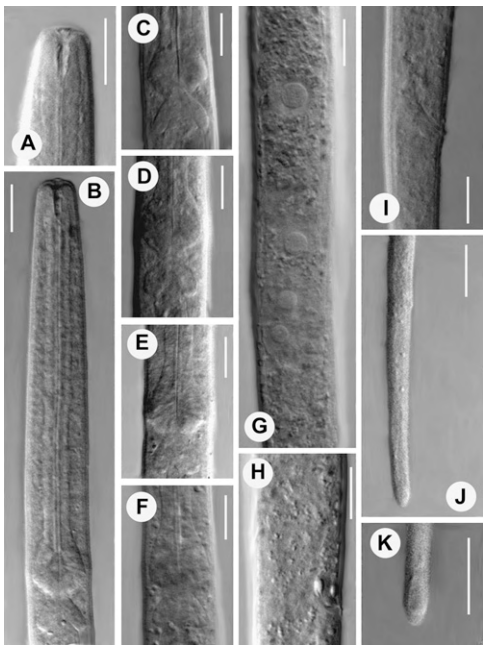

FIG. 7. *Udonchus tenuicaudatus* Cobb, 1913 female (KNP population). A) Anterior end. B) Pharyngeal region. C-F) Posterior pharyngeal region. G) Reproductive system. H) Vulval region. I) Anal region. J) Posterior tail region. K) Tail terminus with spinneret (Scale bar = 10 μm).

Voucher specimens: Nine females of Shekha population, ten females of Aligarh population, eleven females of KNP population, eight females of Mount Abu population, and twenty females of Keetham population deposited in Nematode Collection, Department of Zoology, AMU, Aligarh, India.

One female each of Shekha and Keetham populations on slide *Udonchus tenuicaudatus* No. SN/1 and *Udonchus tenuicaudatus* No. KN/2, deposited at the Laboratory of Nematology, Wageningen University and Research Center (WUR), 6700 ES Wageningen, The Netherlands.

AMENDED DIAGNOSIS

Parthenogenetic species with oviparous females; cuticle smooth under LM without longitudinal lines, punctations and somatic setae; lip region conical, rounded or truncate; lips fused. Stoma tubular to narrow funnel-shaped; cheilostom with rugae; metastegostomal walls with an anteriorly-placed, small, setose, upwardly directed dorsal denticle and two subventral denticles; cardia with rounded to elongate gland cells arranged compactly or making a 45°-60° angle; female genital system mono-prodelphic with antidromously reflexed ovary having oocytes with prominent nuclei; vagina usually anteriorly directed with simple or thickened walls; rectum with a glandular cell associated to its distal wall; tail elongate, gradually tapering towards a hemispheroid or clavate end with an associated terminal spinneret; caudal glands usually distinct.

Remarks: Udonchus is not a geographically restricted taxon and has been collected from aquatic habitats. It has been considered an algivore and reported from periphyton in the thermal lake of Héviz. (Andrássy, 2005). The males are extremely rare in the population and the parthenogenetic mode of reproduction is much suited for the unstable environment. The present specimens of *Udonchus tenuicaudatus* Cobb, 1913 forming the first report of the genus from India, conform well to original population of *U. tenuicaudatus* described by Cobb (1913) and the populations subsequently described by Schneider (1937), Meyl (1957), Schiemer (1978), Ocaña et al. (1990), Ocaña (1991), Eyualem and Coomans (1996) and Andrássy (2005). The species has previously been reported from Asia (Sumatra), Africa (Ethiopia, Zambezi river, Lake Tanganyika), Europe (Germany, Austria, Hungary, Spain, Russia), Central America (Jamaica) and South America (Colombia).

Of the three species considered in the genus *Udonchus sensu* Andrássy (2005), the present populations of *U. tenuicaudatus* showed differences with *U. crassicauda* on account of b, c and c' values. The shape of the tail also is different in *U. crassicauda*. The present populations exhibited the features considered diagnostic for *U. merhatibebi viz.*, truncate lip region, anteriorly-placed amphids, prominent cardiac gland cells separated at 45° angle forming an inverted cone over intestine and also the clavate type of tail tip. These characters were so intermingled with other characters specific for *U. tenuicaudatus* in every population that it was virtually impossible to separate the populations on

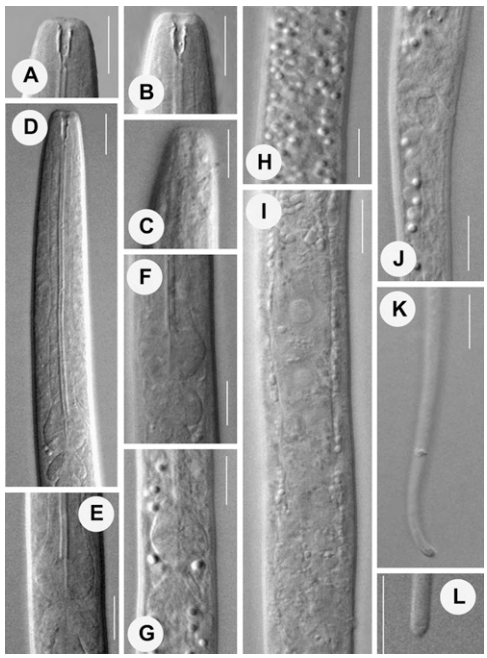

FIG. 8. *Udonchus tenuicaudatus* Cobb, 1913 female (Mount Abu population). A-C) Anterior end D) Pharyngeal region. E-G) Posterior pharyngeal region. H) Body region showing dense crystalloids. I) Reproductive system. J) Anal region. K) Posterior tail region. L) Tail terminus with spinneret (Scale bar = 10 μm).

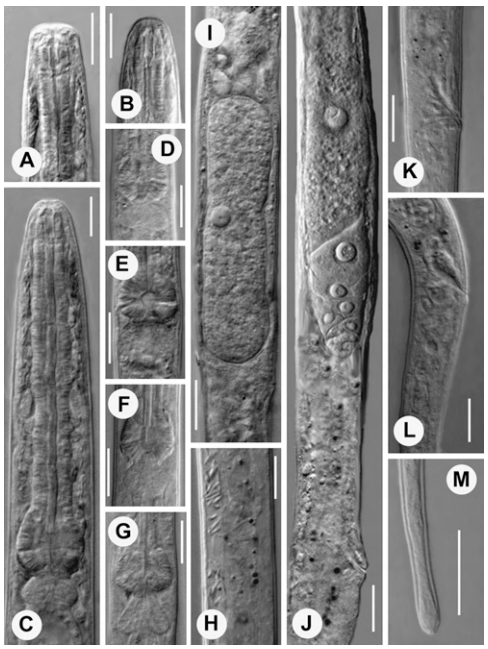

FIG. 9. *Udonchus tenuicaudatus* Cobb, 1913 female (Keetham population). A, B) Anterior end. C) Pharyngeal region. D-G) Posterior pharyngeal region. H) Body region showing dense crystalloids. I, J) Reproductive system. K, L) Anal region. M) Tail terminus with spinneret (Scale bar = 10 μm).

these grounds. This only supported the assumption that this widely distributed species shows variation in populations due to differences in its biogeographical locations. Thus a detailed morphological analysis of five populations collected from different localities of North India indicated towards high level of inter population and intra-population variations within the species. Some characters assumed to be diagnostic proved less reliable *viz*., the shape of lip region, stoma, pharyngeal bulb and cardiac gland cells and the arrangement of latter, nature of vaginal wall and the shape of tail terminus (Fig. 10).

All the populations represented females without any sperms in their genital tract thus indicating parthenogenesis to be the only mode of reproduction. The species seems to be oviparous with only one elongate, smooth-shelled egg occasionally present in the uterus (Fig. 9I). Although the populations exhibited minor morphological differences in a continuum, some assorted features of the populations were also observed. Shekha population showed the smallest individuals with the smaller range of values. The stoma was relatively tubular and less cuticularized (Fig. 9A-C) and the ovary very prominent in the Keetham population (Fig. 9J) whereas the other populations possessed a relatively cuticularized, narrow funnel-shaped stoma. The conoid-rounded lip region, an important character used for separation of *U. tenuicaudatus* from *U. merhatibebi,* did not prove to be a reliable character for any single population particularly Keetham lake population where the proportion of individuals with conoid-rounded to truncate or flattened lip region was 1:1(Fig. 9A, B). The crystalloids in the pseudocoelom gave a translucent appearance to the body structures. The crytalloids were largely small dark rounded to spherical in other populations (Fig. 8G-J) except Keetham population where a good number of fusiform crystalloids were seen (Fig. 9H). In all populations, the dorsal denticle and ventral denticles varied from minute to small-sized. The pharyngeal bulb showed variable shapes within a single population ranging from rounded, pyriform to triangular with a flattened to relatively round or conical base. The cardiac gland cells varied in shape from rounded, ovoid to elongate; compactly arranged, widely separated or showing an inverted cone-like arrangement. The reproductive system was well developed and monoprodelphic type in all populations contrary to the observations of Ocaña (1991) who reported paired genital branches. The gonad was obscure in some specimens due to heavy accumulation of crystalloids in pseudocoelom in the region. The reflexed ovary contained oocytes with prominent and large nuclei and often reached close to vulva but never beyond it. The vagina in all populations was found to be anteriorly directed except few specimens in Shekha population where vagina was perpendicular to main body axis with a uterus hanging slightly beyond vulval level (Fig. 5I). Thickened vaginal walls were observed in few specimens of Keetham population (Fig. 9J) and KNP population (Fig. 7H). The rectum in most specimens was moderately developed with an associated cell hanging from its distal wall.

There was a continuum observed in the range of linear measurements as well as allometric ratios of the

TABLE 2. Measurements of the populations of *Udonchus tenuicaudatus* Cobb, 1913 with mean ± standard deviation (range).

Character	Female (n=10) Shekha population	Female (n=10) Aligarh population	Female (n=11) KNP population	Female (n=8) Mount Abu population	Female (n=21) Keetham population
Body length	399.1±25.4 (349-436)	504.4±40.7 (447-588)	500.5±21.5 (474-520)	447.2±27.2 (430-479)	462.1±20.4 (420-544)
Body diameter	16.4±1.5 (14-18)	16.9±1.4 (14-19)	18±0.8 (17-19)	12.6±3.5 (10-17)	16.4±1.1 (15-19)
a	24.4±3.1 (22.2-27.3)	30.0±3.1 (25.3-37.3)	27.7±0.6 (27.3-28.6)	37.2±9.8 (28.1-47.7)	27.6±1.5 (25.4-33.5)
b	4.8±0.1 (4.7-5.0)	5.8±0.3 (5.4-6.6)	5.6±0.0 (5.6-5.8)	5.7±0.2 (5.4-5.9)	5.7±0.1 (5.4-6.4)
c	2.5±0.1 (2.4-2.6)	3.1±0.1 (2.9-3.4)	3.2±0.1 (3.1-3.3)	3.1±0.1 (3.0-3.3)	3.6±0.1 (3.0-3.9)
c′	13.1±1.3 (11.6-15.4)	13.1±1.3 (11.2-16.5)	12.2±0.4 (11.6-12.6)	16.4±1.6 (14.1-18.5)	9.4±1.6 (8.3-12.4)
V	60.2±1.6 (58.3-62.8)	49.7±2.1 (43.4-51.6)	51.6±1.0 (50.7-52.9)	50.5±0.8 (49.6-51.1)	53.2±2.1 (50.6-56.1)
G1	29.9±7.3 (19.9-37.6)	32.9±9.3 (18.9-49.6)	15.1±0.9 (14.2-26.2)	27.2±3.0 (22.6-30.2)	36.6±7.8 (24.7-44.5)
Lip height	1.7±0.2 (1.5-2.0)	2.1±0.2 (2.0-2.5)	2.5±0.5 (2.0-3.0)	1.7±0.2 (1.5-2.0)	2.5±0.2 (2.0-3.0)
Lip diameter	5.9±0.3 (6-7)	7.9±0.3 (7-9)	7.5±0.5 (7-8)	6.8±0.1 (6-7)	8.2±0.8 (7-9)
Stoma length	9.2±0.6 (8-10)	9.2±0.7 (8-10)	8.7±0.5 (8-9)	8.0±0.2 (7-9)	8.7±0.8 (8-10)
Stoma diameter	1.7±0.2 (1.5-2.0)	1.7±0.2 (1.5-2.0)	2.0±0.0 (2.0-0)	1.8±0.2 (1.5-2.0)	1.8±0.2 (1.5-2.0)
Pharyngeal length	81.7±4.3 (73-86)	86.0±5.2 (79-94)	87±3.6 (83-91)	77.3±3.7 (73-80)	87.2±10.3 (69-100)
Basal bulb dimension	16.1±1.0 x 13.3±0.8 (15-18 x 11-15)	10.9±1.4 x 11.0±1.1 (10-14 x 10-13)	12.0±1.2 x 11.6±0.6 (10-14 x 10-12)	11.1±0.6 x 9.6±0.5 (11-12 x 8-11)	13.1±1.3 x12.8±0.3 (11-15 x)12-14
Nerve ring anterior end	52.1±4.3 (45-60)	56.0±7.4 (50.5-67.4)	55.7±3.5 (52-60)	52.3±6.1 (48-58)	56.5±9.8 (50-71)
Vulva-anus distance	90.3±6.5 (80-100)	92.7±10.8 (71-109)	92.2±7.6 (75-101)	79.8±6.5 (72-86)	94.2±7.6 (81-103)
Rectum length	14.0±1.5 (12-16)	13.5±1.2 (11-16)	11.5±1.2 (10-13)	10.1±0.2 (9-11)	11.8±1.4 (9-14)
Anal Body Diameter	11.9±1.1 (10-13)	12.2±1.1 (10-14)	12.5±0.5 (12-13)	9.1±0.3 (7-10)	10.2±1.7 (11-13)
Tail length	157.9±9.1 (145-172)	158.1±14.4 (141-190)	153.7±11.3 (140-164)	141.6±10.5 (130-155)	135.4±10.9 (115-159)

five populations. The morphometric characteristics of Shekha population showed some minor differences from the previously described populations in b, c and V values [(b= 5.0-6.8; c= 2.8-3.8 and V= 48-56% in *U. tenuicaudatus apud* Andrássy (2005)], however, morphologically the population could not be differentiated distinctly from *U. tenuicaudatus*. It is interesting to note that *U. crassicauda,* the species known to possess a posterior vulva (61.0-66.0), also had a local population as reported by Schneider (1937), having slightly longer tail (c' = 7.0) and less posteriorly situated vulva (V % = 56.4-61.0) very much comparable to the respective V and c' values of our Shekha and Keetham populations. Earlier records also indicate towards such inter population variations when Eyualem and Coomans (1996) reported inadvertent mixing of individuals of the two species, *Udonchus tenuicaudatus* and *U. merhatibebi* in the slides of Schiemer (1978) sent to them by Dr. A. Ocaña and reported that two out of the six females in the slide, belonged to *Udonchus tenuicaudatus*.

Taxonomic position of the family Rhabdolaimidae

The family Rhabdolaimidae Chitwood, 1951 represents predominantly the aquatic nematodes within both continental and marine habitats. A good number of Rhabdolaimidae have been reported from the water runoffs (Villenave et al., 2003). The taxonomic status of the family has remained a matter of controversy and concern and formed the basis of its different taxonomic positions (Lorenzen, 1981; 1994; Eyualem and Coomans, 1996; De Ley and Blaxter, 2002, 2004; Andrássy, 2005 and Holovachov and De Ley, 2006). Lorenzen (1994) considered six genera under the family *viz., Monochromadora* Goodey, 1951, *Rhabdolaimus* Cobb, 1937, *Rogerus* Hoeppli and Chu, 1934, *Tobrilia* Andrássy, 1967, *Sinanema* Andrássy, 1960 and *Udonchus* Cobb, 1913 on the basis of antidromously reflexed ovaries (with the exception of *Rogerus*) and absence of cheilostomal rugae. Schiemer (1978) reported *Monochromadora* to be a junior synonym of *Udonchus*. Eyualem and Coomans (1996) while approving this decision considered five genera under the family namely *Rhabdolaimus*, *Rogerus*, *Sinanema*, *Tobrilia* and *Udonchus* and separated the latter from the rest by raising a subfamily Udonchinae. De Ley and Blaxter (2002) placed Rhabdolaimidae under Leptolaimoidea Örley, 1880 within the order Plectida Ma1akhov, 1982 while Andrássy (2005) considered only three genera *Rhabdolaimus*, *Rogerus* and *Udonchus* under family Rhabdolaimidae within subfamilies Rhabdolaiminae Chitwood, 1951, Rogerinae Andrássy, 1978 and Udonchinae Eyualem and Coomans, 1996 respectively. We approve his (2007) consideration of *Tobrilia* under Tripylidae de Man, 1876 and *Sinanema* under Monhysteridae de Man, 1876. Holovachov and De Ley (2006) considered Rhabdolaimidae family *incertae sedis* along with its two subfamilies Monochromadorinae

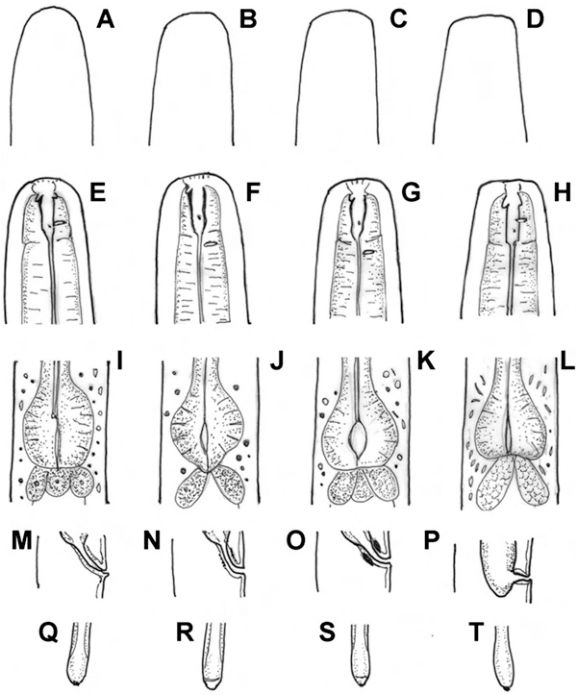

Fig. 10. The degree of morphological variations in *Udonchus tenuicaudatus* Cobb, 1913. A-D) Lip region contour. E-H) Stoma and position of amphids. I-L) Pharyngeal base and crystalloids. M-P) vulval region. Q-T) Tail terminus (Drawings comparable, not to scale).

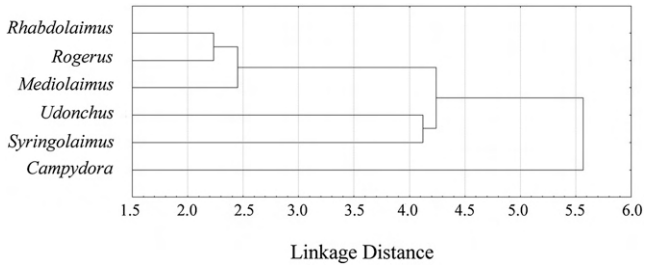

Fig. 11. Dendrogram showing relationship between *Rhabdolaimus*, *Rogerus*, *Mediolaimus*, *Udonchus*, *Syringolaimus* and *Campydora* based on morphological characters.

Andrássy, 1958 and Rhabdolaiminae Chitwood, 1951. Earlier *Syringolaimus* de Man, 1888 was also placed in Rhabdolaimidae by Chitwood (1951: 646), Riemann (1970: 382) and Gerlach and Riemann (1973: 23) due to presence of three denticles in the anterior level of stoma and the basal pharyngeal bulb. In the molecular study (Meldal et al. 2007), *Syringolaimus* was found close to *Campydora* Cobb, 1920. They found no sister relationship between the two sequenced representatives of Ironidae de Man, 1876, *Ironus dentifurcatus* Argo & Heyns, 1972 and *Syringolaimus striatocaudatus* de Man, 1888. van Megen et al. (2009) also reported a close relationship between *Syringolaimus* and *Campydora* with the latter placed close to *Rhabdolaimus*. Seeing the close molecular affinities of these taxa, in addition to the features of largely papilliform anterior sensilla, narrow tubular stoma, conspicuous anteriorly-placed dorsal denticle and pharyngeal end bulb with thickened lumen, the placement of Rhabdolaimidae to Enoplida under the subclass Campydorina may be considered. In view of the affinities of the genera *Syringolaimus*, *Campydora* and *Rhabdolaimus*, there could be three representative families under the two superfamilies Campydoroidea and Rhabdolamoidea. Some of the affinities of *Syringolaimus* with *Rhabdolaimus* that vouch for their placement under same superfamily are non punctated cuticle, pore-like or papilliform labial and cephalic sensilla, oval or slit-like amphidial apertures, narrow and tubular stoma with elongated stegostom provided with one prominent dorsal denticle and two subventral denticles, pharyngeal bulb with thickened lumen and caudal glands and spinneret usually present. Furthermore, the basis of molecular similarity between *Campydora* and *Rhabdolaimus* may be due to the features *viz.*, papilliform anterior sensilla, small oval amphidial apertures, narrow and tubular stoma with short gymnostom and elongated stegostom provided with a prominent dorsal denticle, basal pharyngeal bulb with a thickened lumen and presence of secretory-excretory pore and duct. However, such placements require molecular testing of more species to establish a sound relationship. As far as the genera belonging to Rhabdolaimidae are concerned, we approve of their placement by Holovachov and De Ley (2006) under two subfamilies of Rhabdolaimidae. This hypothesis is further supported by the inventory of the genus *Mediolaimus* that links the genera *Rhabdolaimus* and *Rogerus* on the basis of several features common to both, hence a common subfamily (Rhabdolaiminae) for the three genera seems to be appropriate in view of their relatedness. The genus *Udonchus* is considered under the separate subfamily Mononchromadorinae Andrássy, 1958 due to differences in stoma structure, arrangement of denticles, presence of cheilostomal rugae, conspicuous cardiac gland cells and monoprodelphic gonad in female. Similar relationship trends could be inferred between *Rhabdolaimus*, *Rogerus*, *Mediolaimus*, *Udonchus*, and *Syringolaimus* from the dendrogram (Fig. 11) constructed using some important morphological characters of the above genera and taking *Campydora* as an out group. A close placement of *Rhabdolaimus* and *Rogerus* has been observed based on their morphological affinities, whereas *Mediolaimus* verifies its position as an intermediate taxon having affinities with both *Rhabdolaimus* and *Rogerus*. *Udonchus* stands much closer to *Syringolaimus*, forming a group distinct from *Rhabdolaimus*, *Mediolaimus* and *Rogerus*. *Campydora* seems to be the most distantly related taxon but carries a relationship with both groups.

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Literature Cited

Andrássy, I. 1958. Erd- und süßwassernematoden aus Bulgarien. Acta Zoologica Academiae Scientiarum Hungaricae 4:1–88.

Andrássy, I. 1960. Nematoden aus dem Periphyton der Landungsmolen der Donau zwischen Budapest und Mohács. (Danubialia Hungarica, III). Annales Universitatis Scientiarum Budapestinensis de Rolando Eötvös Nominatae - Sectio biologica 3:3–21.

Andrássy, I. 1967. Ergebnisse der zoologischen Forschungen von Dr. Z, Kaszab in der Mongolei, 92 Weitere Bodennematoden aus denJahren 1964 und 1965, Opuscula Zoologica (Budapest) 6:203–233.

Andrássy, I. 1984. Klasse Nematoda (Ordnungen Monhysterida, Desmolcolecida, Araeolaimida, Chromadorida, Rhabditida). Gustav Fischer Verlag, Stuttgart, Germany, 509 pp.

Andrássy, I. 2005. The free-living nematode fauna of Hungary (Nematoda- errantia), I. *in* Cs. Csuzdi, and S. Mahunka, eds. Pedozoologia Hungarica, Budapest 3:1–518.

Chitwood, B. G. 1951. North American marine nematodes. The Texas Journal of Science 3:617–672.

Cobb, N. A. 1913. New nematode genera found inhabiting freshwater and non-brackish soils. Journal of the Washington Academy of Sciences 3:432–444.

Cobb, N. A. 1918. Estimating the nema population of the soil. U.S. Department of Agriculture. Agricultural Technical Circular of US Department of Agriculture 1:1–48.

Cobb, N. A. 1920. The orders and classes of nemas. Pp 213–216 *in* Contributions to a Science of Nematology, VIII Waverly Press, Baltimore, Maryland.

De Coninck, L. A. P., and Schuurmans Stekhoven, J. H. 1933. The free-living marine nemas of the Belgian Coast. II, with general remarks on the structure and the systems of nemas. Memoires du Museum de Histoire Naturelle de Belgique 58:1–163.

De Ley, P., and Blaxter, M. 2002. Systematic position and phylogeny. Pp. 1–30 *in* D. L. Lee, ed. The Biology of Nematodes. Taylor & Francis, London and New York.

De Ley, P., and B1axter, M. 2004. A new system for Nematoda: combining morphological characters with molecular trees and translating clades into ranks and taxa. Pp 633–653 *in* R. Cook, and D. J. Hunt, eds. Nematology Monographs and Perspectives 2, Proceedings of the fourth lnternational Congress of Nematology. Brill, Leiden, The Netherlands.

de Man, J. G. 1880. Die einheimischen, frei in der reinen Erde und im süssen Wasser lebenden Nematoden. Vorläufiger bericht und descriptivsystematischer Theil. Tijdschrift der Nederlandsche Dierkundige Vereeniging 5:1–104.

de Man, J. G. 1888. Sur quelques Nématodes libres de la mer du Nord nouveaux ou peu connus. Mémoires de la Societé Zoologique de France 1:1–51.

Eyualem, A., and Coomans, A. 1996. Aquatic nematodes from Ethiopia. VII. The family Rhabdolaimidae Chitwood, 1951 *sensu* Lorenzen, 1981 (Chromadorida, Nematoda) with the description of *Udonchus merhatibebi* n. sp. Hydrobiologia 341:197–214.

Gerlach, S. A., and Riemann, F. 1973. The Bremerhaven Checklist of Aquatic Nematodes. Veröffentlichungen des Instituts für Meeresforschung in Bremerhaven, Supplement 4:1–734.

Goodey, T. 1951. Soil and fresh water nematodes – a monograph. London, 390 pp.

Villenave, G., Cadet, P., Planchon, O., Esteve, M., and Lapetite, J. M. 2003. Transport of free living nematodes by runoff water in a Sudano Sahelian area. Applied Soil Ecology 23:85–91.

Hoeppli, R. J. C., and Chu, H. J. 1934. Corrigendum. The Hong Kong Naturalist 5:161.

Holovachov, O., and De Ley, P. 2006. Appendix, Order Mermithida and families *incertae sedis* (Bastianiidae and Rhabdolaimidae). Pp 722–735 *in* A. Eyualem, I. Andrássy, and W. Traunspurger, eds. Freshwater nematodes: Ecology and Taxonomy. CABI Publishing, Wallingford, Oxfordshire OX108DE, UK, 752.

Lorenzen, S. 1981. Bau, Anordnung und postembryonale Entwicklung von Metanemen bei Nematoden der Ordnung Enoplida. Veröffentlichungen des Instituts für Meeresforschung in Bremerhaven 19:89–114.

Lorenzen, S. 1994. The phylogenetic systematics of free-living nematodes (Translation of the 1981 German edition). The Ray Society 162:1–383.

Meldal, B. H. M., Debenham, N. J., De Ley, P., De Ley, I. T., Vanfleteren, J. R., Vierstraete, A. R., Bert, W., Borgonie, G., Moens, T., Tyler, P. A., Austen, M. C., Blaxter, M. L., Rogers, A. D., and Lambshead, P. J. D. 2007. An improved molecular phylogeny of the Nematoda with special emphasis on marine taxa. Molecular Phylogenetics and Evolution 42:622–636.

Meyl, A. H. 1957. Free living nematodes: exploration hydrobiologique du Lac Tanganika (1946–1947). Bulletin de L'Institut Royal des Sciences Naturelles de Belgique, Bruxelles 3:65–75.

Ocaña, A. 1991. A redescription of two nematode species found in hot springs. Nematologia Mediterranea 19:173–175.

Ocaña, A., Picazo, J., and Jimenez-Millan, F. 1990. First record of nematode species in continental water from Spain: taxonomic and ecological considerations. Nematologia Mediterranea 18:179–188.

Örley, L. 1880. Monographie der Anguilluliden. Természetrajzi Füzetek 4:1–165.

Riemann, F. 1970. Freilebende Nematoden aus dem Grenzbereich Meer-saB-wasser in Kolumbien, Sadamerika. Veröffentlichungen des Instituts für Meeresforschung in Bremerhaven 12:365–412.

Schiemer, F. 1978. Verteilung und Systematik der freilebenden Nematoden des Neusiedlersees. Hydrobiologia 28:167–194.

Schneider, W. 1937. Freilebende Nematoden der Deutschen Limnologischen Sunda Expedition nach Sumatra, Java und Bali. Archiv für Hydrobiologie Supplement 15 (Tropische Binnengewasser) 7:30–108.

Schneider, W. 1939. Tierwelt Deutschlands. Würmer oder Vermes II: Fadenwürmer oder Nematoden. Freilebende und pflanzenparasitische Nematoden. Jena, Verlag Gustav Fischer, 1–260.

Seinhorst, W. 1959. A rapid method for the transfer of nematodes from fixative to anhydrous glycerin. Nematologica 4:67–69.

Traunspurger, W. 1989. Bemerkungen zu *Rhabdolaimus terrestris* de Man and *Rhabdolaimus aquaticus* de Man (Nematoda, Araeolaimida). Spixiana 11:175–176.

van Megen, H., van den Elsen, S., Holterman, M., Karssen, G., Mooyman, P., Bongers, T., Holovachov, O., Bakker, J., and Helder, J. 2009. A phylogenetic tree of nematodes based on about 1200 full-length small subunit ribosomal DNA sequences. Nematology 11:927–950.

Appendix 1. Characters and character states.

1) Striations almost indiscernible (0), visible only on tail (1), visible on total body but fine (2), visible on total body and coarse (3)
2) Longitudinal lines absent (0), present (1)
3) Lip region continuous (0), slightly distinct (1), offset (2)
4) Lips amalgamated (0), slightly distinct (1), well separate (2)
5) Lip sensilla papilliform, inconspicuous (0), slightly raised (1), very conspicuous (2)
6) Amphidial fovea small oval (0), transverse slit (1), very small, obscure (2)
7) Stoma tubular with parallel walls (0), converging (1)
8) Stoma 1/3 -1/4 (0), 1/5-1/6 (1), 1/7-1/8 (2), 1/9-1/11(3) times the pharynx length.

9) Stoma with three teeth/ denticles (0), one tooth/ denticle(1)
10) Dorsal tooth small (0), large bifid (1), large and strongly curved (2)
11) Subventral teeth absent (0), smaller, at same level of dorsal (1), smaller, posterior to dorsal (2), larger, equal to dorsal, at same level (3),
12) Pharyngeal bulb merging with anterior part (0), pharyngeal bulb set off (1), pharyngeal bulb with triquetrous chamber (2)
13) Basal bulb with lumen not thickened (0), moderately thickened (1), strongly thickened (2), dilated (3)
14) Cardia small (0), large (1)
15) Female reproductive system didelphic (0), monodelphic with often the trace of a second branch (1)
16) Gonad branches equal (0), unequal (1)
17) Caudal glands conspicuous (0), inconspicuous (1), absent (2)
18) Spinneret long conical (0), short (1), absent (2)

Appendix 2. Matrix and character states.

	Character																	
Taxon	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**
Mediolaimus	3	0	0	0	0	0	0	0	0	0	1	0	2	0	0	0	1	2
Rhabdolaimus	2	0	0	0	0	0	0	0	0	0	1	0	2	0	0	0	0	0
Rogerus	2	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0
Syringolaimus	0	0	1	1	0	1	0	1	0	1	3	1	3	1	0	1	0	0
Udonchus	0	0	0	0	0	0	0	3	0	0	2	0	1	1	1	1	0	1
Campydora	1	1	2	2	2	2	1	2	1	2	0	2	3	1	0	1	2	2