

Rhinodorylaimus kazirangus gen. n., sp. n. (Dorylaimida: Dorylaimidae) from Kaziranga National Park, Assam, India

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Summary – *Rhinodorylaimus kazirangus* gen. n., sp. n. is described and illustrated from Kaziranga National Park, Assam, India. The new genus is characterised by the truncate, slightly elevated, lip region offset by a slight depression, strongly sclerotised, massive odontostyle with prominently furcate base, 'double' guiding ring; odontophore simple with slight thickening at its base; amphidelphic female genital system, pore-like vulva, tail long filiform in female and short conoid in males, dorylaimoid spicules and 18-21 contiguous ventromedian supplements. The new genus closely resembles *Pachydorylaimus* Siddiqi, 1983 but distinctly differs from it in having sexual dimorphism in tail shape, the nature of its odontophore, the characteristic arrangement of the pharyngeal gland nuclei and the number and arrangement of the ventromedian supplements.

Keywords – description, morphology, morphometrics, new genus, new species, taxonomy.

Kaziranga National Park is situated in Assam state, India, on the southern bank of the mighty Brahmaputra River at the foot of the Mikir hills and has an area of approximately 430 km². This area has been notified as a national park since February, 1974. There are three main vegetation types in this Park, *i.e.*, alluvial inundated grasslands, tropical evergreen forests and tropical semi evergreen forest. The study of soil nematode fauna of national parks in general, and Kaziranga National Park in particular, has remained almost completely neglected in India. Since nematodes play a significant role in the soil ecosystem, a thorough study of the diversity, dominance and distribution of nematodes representing different trophic groups in diverse habitats of the park will be highly significant in biomonitoring. With this in mind, the Department of Science and Technology, Government of India, recently sanctioned a project for this study.

Several soil samples collected from various sites in Kaziranga National Park yielded a variety of nematode species representing diverse groups. This is the first paper from the collection and presents an interesting new nematode genus, *Rhinodorylaimus* gen. n., from the family Dorylaimidae de Man, 1876.

Materials and methods

Nematodes were extracted from soil samples by Cobb's sieving and decantation and a modified Baermann's funnel technique. Nematode obtained in clear water were killed and fixed in hot 4% formalin, dehydrated to glycerin by a slow method and mounted on slides in anhydrous glycerin. Measurements were taken using an ocular micrometer and drawings were made using a drawing tube attached to a Nikon Optiphot-2 microscope. Photographs were taken using a DS-Fi 1 digital camera attached to a Nikon Trinocular DIC microscope. The positions of the pharyngeal gland nuclei were calculated using the Andrassy (1998) formula.

*Rhinodorylaimus*** gen. n.

DIAGNOSIS

Dorylaimidae. Medium sized nematodes. Lip region elevated, truncate, offset by slight depression. Amphids with stirrup-shaped fovea. Anterior region of vestibule distinctly thickened. Odontostyle strongly sclerotised, massive with prominently furcate base. Guiding ring

** Kaziranga National Park is known for its flagship animal species, *Rhinoceros unicornis*, a rare species of rhino. The new genus is named *Rhinodorylaimus* in honour of this animal.

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'double'. Odontophore simple, rod-like, with slightly thickened base. Pharyngeal expansion gradual, dorsal pharyngeal gland nucleus small, nucleolus almost at level of or slightly posterior to level of its orifice, first pair of subventral gland nuclei at some distance from each other, nucleus of second gland of first pair exceptionally large; second pair of subventral gland nuclei normal. Cardia conoid. Female genital system amphidelphic. Uterus with median muscular part containing Z-differentiation. *Pars refringens vaginae* absent. Vulva circular or pore-like. Males with slender, slightly arcuate spicules and numerous, contiguous ventromedian supplements. Tail long filiform in female and short conoid in male.

TYPE AND ONLY SPECIES

Rhinodorylaimus kazirangus gen. n., sp. n.

RELATIONSHIPS

In the nature of its characteristic odontostyle, the new genus closely resembles *Pachydorylaimus* Siddiqi, 1983, but differs in showing sexual dimorphism in the tail shape (*vs* no sexual dimorphism). The odontophore is also broad with sclerotised basal flanges in all *Pachydorylaimus* species, except for *P. holovachovi* Esquivel, Guerrero, Peña-Santiago & Powers, 2007 where its base is only slightly thickened. Siddiqi (1983), as well as Andrásy (1997), described radial refractive elements in the cuticle of all the species of *Pachydorylaimus*, and this character, in addition to the nature of its odontostyle, puts *Pachydorylaimus* close to the genera *Metadorylaimus* Jairajpuri & Goodey, 1966 and *Neometadorylaimus* Jairajpuri & Ahmad, 1992 within the family Tylencholaimidae Filipjev, 1934, rather than in Qudsianematidae Jairajpuri, 1965. However, Esquivel *et al.* (2007) did not record radial refractive elements in three species of *Pachydorylaimus* (*P. schizodontus* Loof & Zullini, 2000; *P. notabenus* Siddiqi, 1983 and *P. holovachovi* Esquivel *et al.*, 2007) from Costa Rica. In *Rhinodorylaimus* gen. n., although the odontostyle is similar to *Metadorylaimus*, the cuticle is typical of the family Dorylaimidae.

Males are known only in *Pachydorylaimus*, where sexual dimorphism in tail shape is absent and where there are few, spaced, ventromedian supplements, similar to those generally reported in Tylencholaimoidea. In *Rhinodorylaimus* gen. n., however, the presence of sexual dimorphism in tail shape and the arrangement of the ventromedian supplements demonstrate its close resemblance with the family Dorylaimidae. The arrangement of the pharyn-

geal gland nuclei in *Rhinodorylaimus* gen. n. is characteristic, especially the position of DN close to DO and the exceptional enlargement of AS₂ (S₁N₂). Loof (1969, 1975) reported this unusual enlargement of AS₂ (S₁N₂) in some species of *Mesodorylaimus* Andrásy, 1959 (*M. litoralis*, *M. aberrans*, *M. imperator*, *etc.*). A robust odontostyle has been reported in several genera (*Metadorylaimus*, *Pachydorylaimus*, *Neometadorylaimus*, *Curvidorylaimus* Jairajpuri & Rahman, 1983, *Vanderlindia* Heyns, 1964 and *Tsukubanema* Ahmad & Araki, 2002) in the family Tylencholaimidae (Tylencholaimoidea). On the other hand, in the Dorylaimoidea this trend has never been recorded. Only in the genus *Sivallia* Ahmad & Jairajpuri, 1986 and, to some extent, in *Makatinus* Heyns, 1965 does the tip of the odontostyle show a little thickening. The finding of *Rhinodorylaimus* gen. n. with an odontostyle quite similar to *Metadorylaimus* and *Tsukubanema* in the Tylencholaimoidea and *Pachydorylaimus* in the Dorylaimoidea is a clear case of parallel evolution. Siddiqi (1983) classified *Pachydorylaimus* under Qudsianematidae and compared it with *Eudorylaimus* Andrásy, 1959. Jairajpuri and Ahmad (1992) and Andrásy (1997) also placed it under Qudsianematidae. On the other hand, *Rhinodorylaimus* gen. n. belongs to the family Dorylaimidae close to the genus *Mesodorylaimus* Andrásy, 1959 from which it differs in the nature of the odontostyle and the circumoral thickening of the vestibule.

*Rhinodorylaimus kazirangus** gen. n., sp. n. (Figs 1, 2)

MEASUREMENTS

See Table 1.

DESCRIPTION

Female

Body slightly curved ventrad upon fixation, tapering slightly anterior to base of pharynx, posteriorly ending in a long filiform tail. Cuticle finely striated, 2.5-3.0 μ m thick at mid-body and 3.5-5.0 μ m on ventral surface of tail just posterior to anus. Lateral hypodermal chords occupying *ca* 20% of body diam. at mid-body. Lateral body pores indistinct, ventral pores 9-14 in pharyngeal region, 9-12 between pharynx base to vulva and 10-12 between vulva and anus. Dorsal pores numbering 1-3,

* The species is named after the Kaziranga National Park.

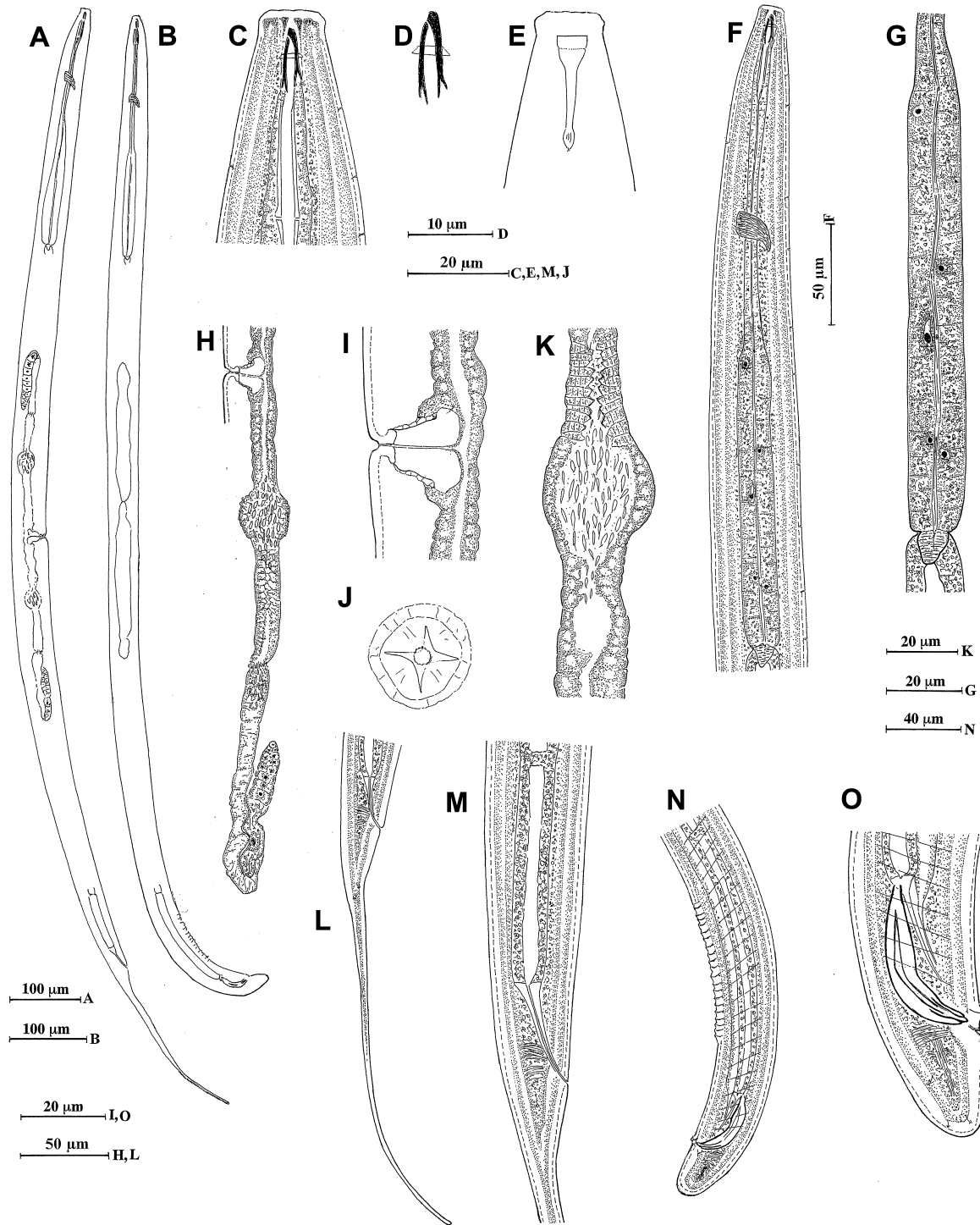


Fig. 1. *Rhinodorylaimus kazirangus* gen. n., sp. n. A: Entire female; B: Entire male; C: Anterior region; D: Odontostyle; E: Anterior region showing amphid; F: Pharyngeal region; G: Expanded part of pharynx; H: Female genital branch; I: Vulval region; J: Vulval region (ventral view); K: Z-differentiation of uterus; L: Female posterior region; M: Female prerectal region; N: Male posterior region; O: Male posterior end.

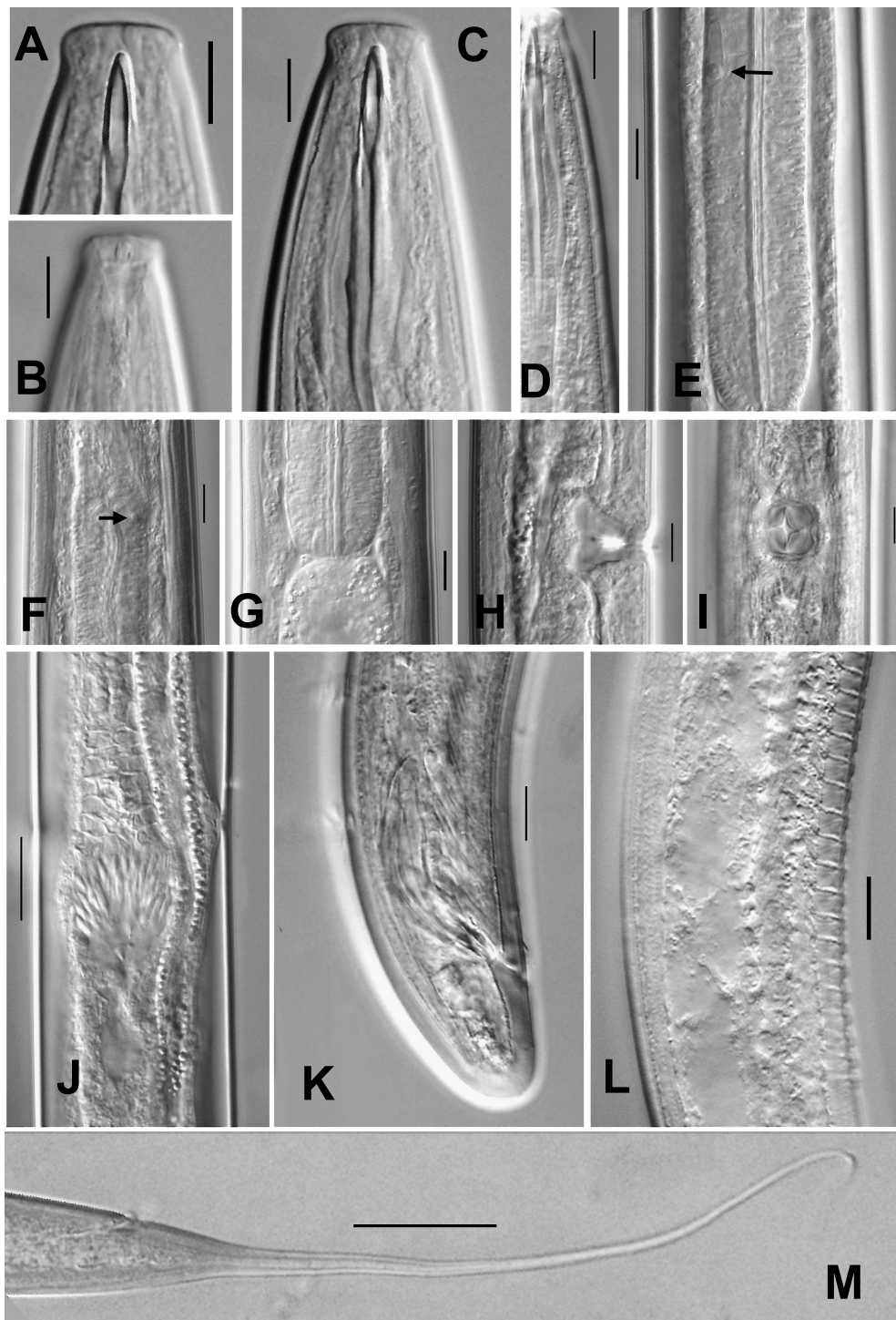


Fig. 2. *Rhinodorylaimus kazirangus* gen. n., sp. n., A: Anterior end; B: Anterior region showing amphid; C: Anterior region; D: Anterior region showing body pores; E: Expanded part of pharynx showing AS2 (arrow); F: Expanded part of pharynx showing DN (arrow), G: Cardia; H: Vulval region (lateral view); I: Vulval region (ventral view); J: Z-differentiation of uterus; K: Male posterior end; L: Ventromedian supplements; M: Female posterior end. (Scale bars: A-I, K, L = 10 μ m; J = 20 μ m; M = 40 μ m.)

Table 1. Morphometrics of *Rhinodorylaimus kazirangus* gen. n., sp. n. All measurements are in μm and in the form: mean \pm s.d. (range).

Character	Female		Male
	Holotype	Paratypes	Paratypes
n	–	4	9
L	1735	1560 \pm 161 (1393-1776)	1302 \pm 53.8 (1202-1397)
a	35	32.5 \pm 2.6 (28.7-36.0)	34.3 \pm 3.9 (29.7-42)
b	5.0	4.7 \pm 0.35 (4.2-5.1)	4.1 \pm 0.21 (3.7-4.1)
c	7.8	6.3 \pm 0.2 (6.0-6.6)	64.0 \pm 4.7 (58.5-71)
c'	9.0	9.7 \pm 0.9 (8.8-11)	0.87 \pm 0.10 (0.69-1.08)
V	43.5	47.8 \pm 1.8 (43-48)	–
G ₁	12.3	17.5 \pm 3.0 (12.5-20.5)	–
G ₂	9.2	17.7 \pm 2.0 (15-20.5)	–
Body diam. at neck base	48	48 \pm 1.8 (45-50)	40.3 \pm 12.3 (38-45)
Body diam. at mid-body	49.5	47.5 \pm 2.2 (45-50)	38.2 \pm 12.0 (32-48)
Body diam. at anus	24	23.5 \pm 1.3 (21-25)	24.7 \pm 1.8 (21-28)
Lip region diam.	15	13 \pm 0.7 (12-14)	12.3 \pm 0.69 (11-13)
Lip region height	5	4.8 \pm 0.2 (4.5-5)	4.3 \pm 0.41 (4-5)
Amphid aperture	8	8.7 \pm 0.4 (8-9)	6.8 \pm 0.38 (6-7)
Odontostyle length	12.5	12.2 \pm 0.2 (12-13)	12.2 \pm 0.36 (12-13.5)
Odontophore length	24.8	25 \pm 0.8 (24-26)	25.7 \pm 1.03 (24-27)
Guiding ring from ant. end	7	7.7 \pm 0.8 (7-9)	8.5 \pm 0.5 (8-9)
Nerve ring from ant. end	116	112 \pm 4.2 (110-120)	113 \pm 7.5 (100-125)
Pharyngeal length	345	333 \pm 13.5 (312-345)	317 \pm 13.5 (293-343)
Expanded part of pharynx	170	153 \pm 8.3 (145-163)	143 \pm 4.5 (137-150)
Cardia length	14.5	17.5 \pm 3.3 (14-23)	13.5 \pm 1.3 (11-15)
Anterior genital branch	215	264 \pm 27.5 (226-303)	–
Posterior genital branch	160	267 \pm 22.5 (236-300)	–
Vaginal depth	21	21, 23	–
Vulva from ant. end	756	697 \pm 45.5 (654-772)	–
Pre-rectum length	80	80.2 \pm 3.8 (74-84)	138 \pm 11.3 (125-160)
Rectum length	25	31.3 \pm 1.6 (29-33)	41 \pm 3.0 (38-47)
Tail length	220	225 \pm 4.9 (222-232)	21.2 \pm 2.5 (18-26)
Spicules	–	–	40.5 \pm 1.25 (39-42)
Lateral guiding pieces	–	–	19.3 \pm 2.06 (17-22)
Ventromedian supplements	–	–	18-21

located anterior to nerve ring. Lip region elevated, truncate, offset by slight depression, slightly wider than adjoining body, *ca* 26.5-30% of body diam. at neck base; labial papillae indistinct. Circumoral region of vestibule distinctly thickened. Amphids stirrup-shaped, fovea duplex, their aperture *ca* 60-67% of lip region diam. wide. Odontostyle robust, strongly sclerotised with very thick wall and prominently furcate base, *ca* 0.86-1.0 lip region diam. long and with its aperture quite small. Guiding ring 'double', fixed ring at 0.58-0.60 lip region diam. from anterior end. Odontophore simple, with slight thickening at its base, *ca* 2.0 times odontostyle length. Nerve ring at

ca 34.5-35% of neck length from anterior end. Pharyngeal expansion gradual; expanded portion occupying *ca* 45-47% of total neck length. Cardia short conoid, *ca* 31-46% of corresponding body diam. long. Dorsal pharyngeal gland slightly posterior to its orifice, DO-DN 4-6 μm , its nucleus 4.0-4.5 \times 3.0-3.5 μm , nucleolus 1.50-2.0 \times 2.0 μm ; AS₁ (S₁N₁) 3.0 \times 3.5-4.0 μm , nucleolus 1.50-2.0 \times 2.0 μm ; AS₂ (S₁N₂) exceptionally large, elongate, 9-10 \times 4-5 μm , nucleolus 4.0-4.5 \times 4; PS₁ (S₂N₁) 3.0 \times 3.5 μm , nucleolus 1.50 \times 2 μm ; PS₂ (S₂N₂) 3.0 \times 4 μm , nucleolus 2-3 \times 2.0 μm . Pharyngeal gland nuclei located as follows: D = 57-59%; AS₁ = 36-40%; AS₂ = 52-

56%; PS₁ = 76-79%; PS₂ = 81-83%. Genital system amphidelphic, both branches almost equally developed. Ovaries reflexed, measuring 67-142 μm (anterior) and 67-146 μm (posterior) with oocytes arrange in single row except near tip. Oviduct joining ovary subterminally, measuring 110-148 μm (anterior) and 105-190 μm (posterior). Sphincter present at oviduct-uterus junction. Uterus a wide tube with median muscular part containing Z-differentiation, measuring 102-164 μm (anterior) and 80-195 μm (posterior). Vagina thick-walled, ca 0.40-0.42 corresponding body diam. deep; *pars proximalis vaginae* 13-15 μm long with straight walls, encircled by circular musculature; *pars refringens vaginae* absent, *pars distalis vaginae* 3.5-4.0 μm with curved wall. Vulva circular, pore-like. Prerectum 3.3-3.5 anal body diam. long. Rectum 1.0-1.5 anal body diam. long. Tail long, filiform, 8.8-11 anal body diam. long with three caudal pores on each side.

Male

Supplements comprising an adcloacal pair and a contiguous series of 18-21 ventromedians. Spicule slender, slightly ventrally arcuate, ca 1.50-1.65 anal body diam. long. Lateral guiding pieces rod-like, slightly less than half of spicule length. Prerectum 5.5-5.7 anal body diam. long, terminating beyond range of supplements. Tail short, conoid, 0.69-1.08 anal body diam. long, with a pair of caudal pores on each side.

TYPE HABITAT AND LOCALITY

Soil around the roots of elephant grass (*Pennisetum purpureum* L.) from Kaziranga National Park, Assam, India.

TYPE MATERIAL

Holotype female on slide *Rhinodorylaimus kazirangus* gen. n., sp. n./1; paratype males and females on slides *Rhinodorylaimus kazirangus* gen. n., sp. n./2-5 in the nematode collection of the Department of Zoology, Aligarh Muslim University, Aligarh, India.

DIAGNOSIS

Rhinodorylaimus kazirangus gen. n., sp. n. is characterised by having 1.39-1.77 mm long body; lip region elevated, truncate, offset by slight depression; circumoral region of vestibule distinctly thickened, odontostyle 12-13 μm long, strongly sclerotised with prominently furcate

base, simple odontophore, characteristic arrangement of the pharyngeal gland nuclei, uterus with median muscular part containing Z-differentiation, long, filiform, female tail, male with a contiguous series of ventromedian supplements, prerectum terminating beyond the range of the supplements and a short, conoid, tail in the male.

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