

## RE-DESCRIPTION OF *KOERNERIA FILICAUDATA* (KHERA, 1970) ANDRÁSSY, 1984 AND FIRST REPORT OF ITS MALE

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**Summary.** The males of *Koerneria filicaudata* (Khera, 1970) Andrassy, 1984 are described for the first time. They are usually smaller than the females and have four additional cephalic setae. Spicules are slender, somewhat setose and strongly curved. Gubernaculum is boat-shaped with a sleeve at the distal end. Nine pairs of genital papillae; three pairs pre-cloacal, six pairs post-cloacal. Tail long and filiform, divisible into two parts, a short conoid part and a long filamentous part. Most measurements and morphometric values agree with the original description. The structure of the stoma has been clarified and information added on the nature of cuticle, vulva, phasmid and pharyngo-intestinal junction.

**Keywords:** Cheilorhabdions, description, male, Rhabditida, taxonomy.

In a survey of rhabditid nematodes, *Koerneria filicaudata* (Khera, 1970) Andrassy, 1984 was collected from farmyard manure in Himachal Pradesh, India. Khera (1970) first described *K. filicaudata* as *Gobindonema filicaudatum* from the banks of a freshwater lake near Dehradun, Uttarakhand, India. There have been no reports of the species since its description, either from India or elsewhere. Males of the species were not reported in the original description. Khera's description is rather meagre and does not dwell on several important taxonomic features in detail. The figures, too, are inconveniently small and lack details. Hence, we decided it proper to give a more elaborate description of the species. A re-description by comparing it with the type material would have been most appropriate but repeated requests for paratype specimens to the Department of Zoology at the University of Jodhpur, went unanswered. An inquiry to the ZSI, Calcutta revealed that there are no slides of *Koerneria filicaudata* in their collection.

### MATERIALS AND METHODS

The nematodes were extracted using a combination of the modified Cobb's sieving and decantation with the modified Baermann's funnel techniques, killed and fixed in hot 4% formaldehyde, dehydrated in a desiccator by the slow method and mounted in anhydrous glycerin by the wax ring method. Measurements were made with an ocular micrometer, and all morphological observations and drawings were made with an Olympus BX50 DIC microscope equipped with a Jenoptik ProgRes C3 digital camera.

### DESCRIPTION

*KOERNERIA FILICAUDATA*  
(Khera, 1970) Andrassy, 1984  
= *Gobindonema filicaudatum* Khera, 1970  
(Figs 1, 2; Table I)

*Measurements.* See Table I.

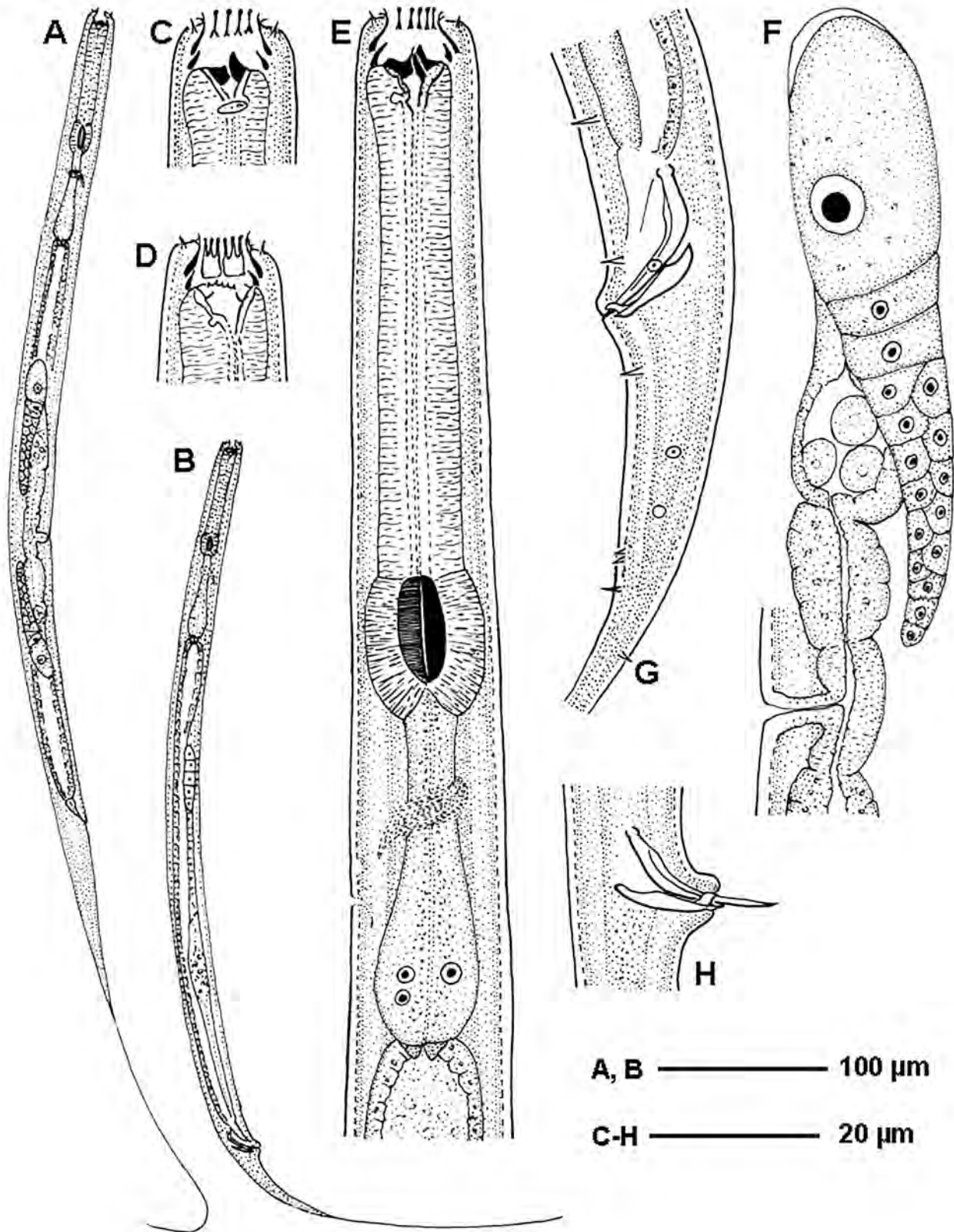
*Females.* Body slightly curved upon fixation, gradually tapering posteriorly. Cuticle with fine transverse and longitudinal striae; lateral lines three, outer crenate. Punctations small, equally spaced, appearing as transverse and longitudinal rows. Amphidial apertures elliptical, at base of stoma. Lip region continuous with body contour, lips six, fused, labial papillae setose. Stoma wide and shallow, cheilostom cuticularized. Cheilorhabdions plate-like, six in number; each plate with three bifid filaments, outer short and inner long. Tips of inner filaments expanded. Gymnostom wider than long, walls arching inwards. Dorsal stegostomal wall with a large claw-like tooth, right subventral wall also with a similar tooth. Left subventral wall with a serrated plate bearing 5-6 denticles. Post-dental region of stegostom funnel-shaped, tapering posteriorly, the subventral walls with prominent apodemes. Procorpus long and muscular, median bulb ovoid. Isthmus short, expanding to a basal bulb. Anterior pharynx 69-72% of total pharyngeal length. Nerve ring encircling isthmus. Hemizonid slightly posterior to nerve ring, 86-105 µm from anterior end. Excretory pore further posterior to hemizonid, 89-109 µm from anterior end. Cardia small. Intestine cells with large prominent nuclei, lumen wide.

Reproductive system amphidelphic, anterior branch on right side and posterior on left side of intestine. Ovaries reversed, oocytes arranged in one or more rows. Oviduct long, gradually expanding to form a round or

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oval spermatheca separated from uterus by a constriction. Uterus divided into a long and thick glandular and a short muscular part. Vagina muscular, about half vulval body diameter long. Vulva circular, flush with body

contour or vulval lips slightly raised. Rectum 1.1-1.5 times anal body diameters long. Phasmids prominent, 0.8-1.3 anal body diameters posterior to anus. Tail long, filiform, whip-like.



**Fig. 1.** Drawing of *Koerneria filicaudata*: A, entire female; B, entire male; C, D, female anterior end; E, female pharyngeal region; F, female reproductive system (anterior branch); G, male posterior region; H, spicules and gubernaculum.

*Males.* Body usually smaller than females, curved in posterior region. Anterior region similar to that of females except for four cephalic setae. Cuticle similar to females with transverse and longitudinal striations and punctations. Testis single, reflexed. Spicules slender, strongly curved at about  $1/3^{\text{rd}}$  of their length from the proximal end, 0.8-1.2 anal body diameters long. Gubernaculum somewhat boat-shaped, 55-60% of spicules length, with a distal sleeve. Genital papillae well developed, setose, nine pairs; three pairs precloacal, six pairs postcloacal. Genital papillae formula: v1, v2, v3d / v4, ad, phasmid, (v5,6,7), pd. Genital papilla v1 anterior to range of spicules when retracted and pd well posterior to v5-7 group. Papilla v7 at a slight distance from v5, 6. Cloacal lips protruded. Phasmids about two anal body diameters posterior to cloaca. Tail divisible into two parts, a short conoid part and a long filiform part.

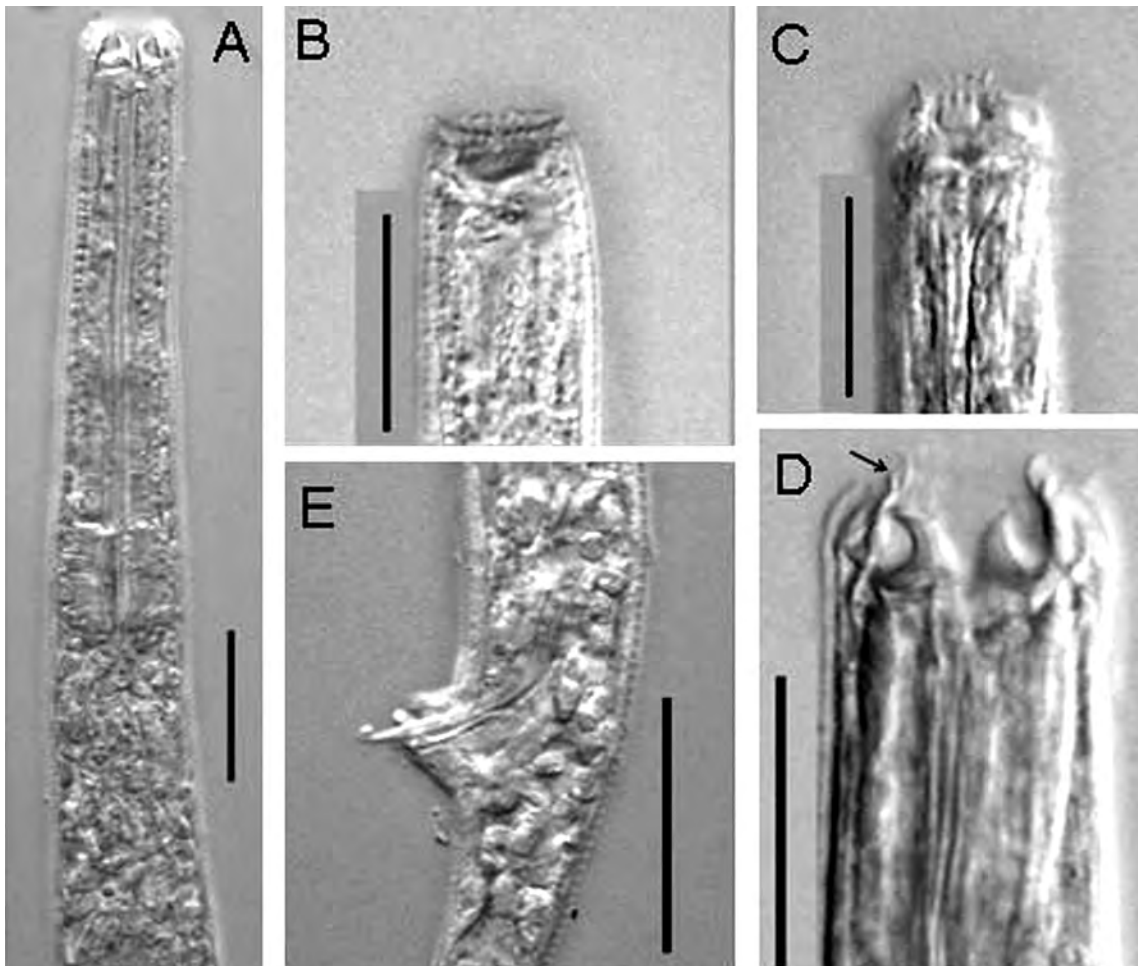
*Habitat and locality.* Farmyard manure collected from Kullu, Himachal Pradesh, India.

*Voucher specimens:* 15 females and 8 males on slides *Koerneria filicaudata*/ HP4/1-6.

## REMARKS AND DISCUSSION

The males of *K. filicaudata* (Khera, 1970) Andrassy, 1984 are characterized by slender spicules strongly curved at about one third of their length from the proximal end, boat-shaped gubernaculum with a distal sleeve and nine pairs of genital papillae. The shape of the spicules closely resembles that of *K. aquatica* (Dassonville *et* Heyns, 1984) Sudhaus *et* Fürst von Lieven, 2003 but *K. filicaudata* can be clearly distinguished by its gubernaculum (boat-shaped *vs* broad keel-shaped); the position of the genital papilla (v3d *vs* v2d; v2d midway between v1 and v3); a substantially longer tail (194-252 *vs* 104-132  $\mu\text{m}$ ;  $c = 2.5-2.8$  *vs* 5.1-6.0) and a more slender body ( $a = 34.1-39.4$  *vs* 24.8-28.1).

The measurements and morphometrics of the females in our population agree well with that given by Khera (1970). However, minor differences did occur in some characteristics. The stoma is slightly longer in our specimens (11-13 *vs* 8-9  $\mu\text{m}$ ) as is the median bulb (17-20 *vs* 14-16  $\mu\text{m}$ ) and rectum (15-18 *vs* 12  $\mu\text{m}$ ). Notwithstanding these minor variations certain discrepancies and anomalies need to be put in proper perspective. There is probably an omission or error in the descrip-



**Fig. 2.** Photographs of *Koerneria filicaudata*: A, female pharyngeal region; B,C, female anterior end showing cheilorhabdions and filaments; D, anterior end showing bifid cheilorhabdial filaments (arrow); E, male posterior region (scale bar = 20  $\mu\text{m}$ ).

**Table I.** Measurements (in  $\mu\text{m}$ ) of *Koerneria filicaudata* (Khera, 1970) Andr ssy, 1984. Mean  $\pm$  S.D. given in parenthesis.

Character	Females (n = 15)	Males (n = 8)
L	694 – 835 (735 $\pm$ 45)	560 – 648 (603 $\pm$ 33)
a	28.8 – 35.9 (32.3 $\pm$ 1.9)	34.1 – 39.4 (36.5 $\pm$ 1.8)
b	5.6 – 6.6 (5.9 $\pm$ 0.3)	5.6 – 6.0 (5.8 $\pm$ 0.1)
c	2.3 – 3.1 (2.8 $\pm$ 0.2)	2.5 – 2.8 (2.6 $\pm$ 0.1)
c'	15.3 – 24.2 (19 $\pm$ 2.7)	13.2 – 16.7 (15.1 $\pm$ 1.2)
V	36 – 43 (40.7 $\pm$ 1.8)	-
Maximum body width	21 – 24 (23 $\pm$ 1)	16 – 17 (16.5 $\pm$ 0.5)
Lip width	11 – 12 (11 $\pm$ 0.5)	7 – 9 (8 $\pm$ 0.4)
Length of stoma	11 – 13 (11 $\pm$ 0.5)	8 – 10 (8.5 $\pm$ 0.8)
Pharynx	113 – 137 (122 $\pm$ 8)	98 – 107 (102 $\pm$ 3.5)
Excretory pore from anterior end	89 – 109 (102 $\pm$ 7)	74 – 87 (83 $\pm$ 5)
Hemizonid from anterior end	86 – 105 (99 $\pm$ 5)	69 – 82 (78.5 $\pm$ 5)
Nerve ring from anterior end	81 – 97 (88 $\pm$ 5)	66 – 75 (70 $\pm$ 3)
Median bulb (length)	17 – 20 (18.5 $\pm$ 1)	13 – 15 (14 $\pm$ 0.5)
Anterior ovary/testis	78 – 101 (86 $\pm$ 8)	169 – 213 (198 $\pm$ 15.5)
Posterior ovary	76 – 97 (86.5 $\pm$ 6)	-
VBD	21 – 24 (23 $\pm$ 1)	-
Vulva-anus distance	158 – 196 (176 $\pm$ 12)	-
Rectum	15 – 18 (17 $\pm$ 1)	16 – 20 (18 $\pm$ 1.5)
Tail	223 – 351 (260 $\pm$ 35)	194 – 252 (226 $\pm$ 22)
ABD	12 – 16 (14 $\pm$ 1)	13.5 – 15.5 (15 $\pm$ 0.8)
Phasmids from anus/cloaca	18 – 29 (23 $\pm$ 3)	18 – 21 (19 $\pm$ 1)
Spicules along axis	-	23 – 24 (23.5 $\pm$ 0.5)
Spicules along cord	-	19 – 21 (20.5 $\pm$ 0.7)
Gubernaculum	-	13 – 15 (14 $\pm$ 0.7)

tion of the stoma by Khera (1970) “..... dorsal metarhabdion with a large blunt tooth, left subventral segment very small carrying a slender, curved tooth; all three project into the lumen of the stoma far out into cheilostom;”. This would imply that apices of three teeth project anteriorly whereas only two large teeth are known in *Koerneria*. Further, besides the dorsal tooth, the right subventral wall has a tooth and not the left, as mentioned, which has a serrated plate (Sudhaus and F rst von Lieven, 2003). Khera (1970) very correctly observed paired knob-like thickenings (apodemes) at the base of the telostom and even stated that his new genus (*Gobindonema*) “comes closest to *Koerneria*”. The importance of this observation was probably lost in the uncertain and fluid state of the taxonomy of the diplogastrids that prevailed at that time.

Additional features as compared to the original description include the cuticle with fine transverse and longitudinal striations and small punctations, three lateral lines and a circular vulva. Further, contrary to Khera’s (1970) description, the phasmids are clearly visible in both sexes, a distinct cardia is present at the pharyngo-intestinal junction and the uterus is differentiated into a thick-walled glandular region and a slightly thinner muscular region. The habitats of the two populations differ, the type occurring in a freshwater lake and the present population in farmyard manure. Never-

theless, both share a common geographical region of the Shivalik mountain range in two adjacent states of northern India, Uttarakhand and Himachal Pradesh.

#### ACKNOWLEDGEMENTS

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