

# Redescription of *Kalicephalus (Kalicephalus) costatus indicus* (Ortlepp, 1923) Schad, 1962 (Nematoda, Diaphanocephalidae) recovered in *Xenochropis piscator* (Schneider, 1799) (Reptilia, Squamata, Colubridae) from West Bengal, India

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## Abstract

*Kalicephalus (Kalicephalus) costatus indicus* (Ortlepp, 1923) Schad, 1962, recovered from the intestine of Asiatic water snake, *Xenochropis piscator* (Schneider, 1799), from the Suri town, Birbhum district of West Bengal, India, is redescribed. The nematode is characterised by presence of buccal capsule and well developed copulatory bursa. The buccal capsule consists of two lateral valves. Each valve is composed of four anterior plates, one posterior ventral plate and one posterior dorsal plate. Perioral groove in each valve is delimited by one anterior chitinoid ridge. Externally on each valve three parenchymatous bands lead to the circumoral papillae. Spicules are equal with finely pointed distal end. Posterior third of the spicules are provided with ala. Gubernaculum is lanceolate shaped. Birbhum district is recorded as new geographical locality for this parasite.

**Key Words:** *Kalicephalus (Kalicephalus) costatus indicus*, *Xenochropis piscator*, Snake, West Bengal, India.

## Introduction

The checkered keelback or Asiatic water snake, *Xenochrophis piscator* (Schneider, 1799) is a common species of non-poisonous snake of West Bengal. They are commonly found in or near fresh water lakes, ponds and rivers (Whitaker, 2006). It should be noted that of the host groups, works on reptilian nematodes are rare in West Bengal. De (1998), reported *Paracapillaria (Ophidiocapillaria) najae* De, 1998 from *Naja naja* in West Bengal. Sou *et al.* (2018) redescribed *Camallanides prashadi* Khera, 1954 from *X. piscator* in West Bengal, India. Sou and Nandi (2011) reported the presence of two reptilian nematodes from Birbhum district, West Bengal.

During an ongoing survey for reptilian nematodes, 4 male and 6 female nematodes were recovered from the intestine of one, *X. piscator*. Host is collected from Suri town (23.9041° N, 87.5247° E) in Birbhum district, West Bengal, India. On examination, the collected nematodes were found to be *Kalicephalus (Kalicephalus)*

*costatus indicus* (Ortlepp, 1923) Schad, 1962. The purpose of this article is to provide a detailed description of *K* (*K*) *costatus indicus* with more new morphological characters recovered from *X. piscator*.

## Materials and Methods

One Asiatic water snake, *X. piscator* was collected from Suri town, Birbhum district, West Bengal, India and killed with solvent ether and examined for nematode parasites. The body cavity, digestive tract and other organs were removed and placed in a glass petridish along with normal saline water. Four male and 6 female nematodes were recovered from the intestine of the host. Recovered nematodes were freed from ingesta by shaking them in 0.67% NaCl solution, killed and fixed in steaming 70% alcohol. 5% glycerine was used as mounting media for light microscopic observation. After observation nematodes were transferred to fresh 70% alcohol and could be stored satisfactorily. All recovered nematode specimens have been submitted in the Helminthological collection, Parasitology Laboratory, Burdwan University, Purba Bardhaman, West Bengal, India (Registration No. BUPL-161). All given measurements are in millimetres unless otherwise indicated.

## Results

### *Kalicephalus* (*Kalicephalus*) *costatus indicus* (Ortlepp, 1923) Schad, 1962

(Fig. 1: a-j)

**General morphology:** Small and slender worms. Anterior end of the worm slightly tilted dorsally. Mouth dorsoventrally elongated. Lips and corona radiata absent. Buccal capsule consists of two lateral valves. Each valve composed of four anterior plates, one posterior ventral plate and one posterior dorsal plate. Perioral groove in each valve delimited by one anterior chitinous ridge. Externally on each valve three parenchymatous bands lead to the circumoral papillae. In addition to these three papillae one dorsal and one ventral papilla on each valve also present. Buccal cavity without membranous cuticular processes at base. Dorsal gutter well developed extending from oesophagus to the middle of the buccal capsule. Oesophagus claviform without posterior bulb. Body cuticle thin, smooth and finely striated. Nerve ring situated in the anterior part of oesophagus and the excretory pore located posterior to the nerve ring at the level of greatest oesophageal width. A pair of symmetrically placed lateral cervical papillae which spherical at base and tapering abruptly, present just below to the excretory pore.

**Male:** Males smaller than the females. Body length 4.25-4.30 and 0.18-0.19 wide. Buccal capsule 0.09-0.10 long and 0.11-0.12 wide. Oesophagus 0.38-0.40 long and 0.11-0.12 wide. Distance of nerve ring 0.20-0.21, of cervical papillae 0.327-0.337, of excretory pore 0.30-0.31 from anterior end. Anus 0.092-0.10 from posterior end. The caudal region provided with well-developed copulatory bursa supported by bursal rays. Prebursal papillae absent. Bursa continuous and trilobed with two large lateral lobes and a small dorsal lobe. Ventral rays closely apposed and extend to the bursal margin. Lateral rays arising from a common root and well separated distally. Antero-lateral rays shorter than the medio-lateral and postero-lateral rays which touch the bursal margin. Externodorsal rays originate from the main stem of the dorsal ray near its base. The dorsal ray gives off a pair of accessory

branches after its bifurcation. Its terminal branches bidigitate. Spicules equal, 0.357-0.37 long, with finely pointed distal end. Posterior third of the spicules provided with ala. Gubernaculum lanceolate shaped and 0.060-0.062 long. Phasmids located 0.19-0.20 from posterior end.

**Female:** Body 4.85-4.99 long and 0.24-0.25 wide. Buccal capsule 0.09-0.10 long and 0.12-0.13 wide. Oesophagus 0.42-0.43 long and 0.12-0.13 wide. Distance of nerve ring 0.19-0.21, of cervical papillae 0.33-0.347, of excretory pore 0.312-0.325 from anterior end. Body abruptly tapering in the post vulvar region. Tail 0.13-0.14 long, conical gradually tapering to a fine point. One pair of postanal papillae present at the base of the narrow posterior end. Phasmids 0.11-0.13 from posterior end, located slightly posterior to the postanal papillae. Vulva 1.23-1.26 from posterior end, postequatorial with anterior bulging. Vagina short and transversely directed followed by two divergent uterine branches, one running anteriorly and the other runs posteriorly for a distance and then turns anteriorly. Eggs oval and thin-shelled.

### Taxonomic Summary

Family: Diaphanocephalidae Travassos, 1920

Subfamily: Diaphanocephalinae Travassos, 1920

Genus: *Kalicephalus* Molin, 1861

Subgenus: *Kalicephalus (Kalicephalus)* (Molin, 1861)

Species: *Kalicephalus (Kalicephalus) costatus indicus* (Ortlepp, 1923) Schad, 1962

Host: *Xenichropis piscator* (Schneider, 1799)

Location: Intestine.

Locality: Suri, Birbhum, West Bengal, India.

### Discussion

The family Diaphanocephalidae Travassos, 1920 is constituted by the genera *Diaphanocephalus* Diesing, 1851 and *Kalicephalus* Molin, 1861. Schad (1962) revised the genus *Kalicephalus* and arranged 22 of 23 species and numerous subspecies into six groups. Lichtenfels (1980) stated that the 23<sup>rd</sup> species (*Kalicephalus willeyi* Linstow, 1904) and species described since 1962 can also be placed in Schad's six groups. Lichtenfels (1980) divided this genus into six subgenera using Schad's group names for 3 subgenera, older generic names for two subgenera and a sixth subgenus was named in Schad's honour. However, Baker (1987) pointed out that the subgeneric name *Kalicephalus (Kalicephalus)* was not used in the classification by Lichtenfels (1980) which violated the International Code of Zoological Nomenclature (ICZN). Baker (1987), therefore, regarded *Kalicephalus (Schadius)* Lichtenfels, 1980 as a synonym of *Kalicephalus (Kalicephalus)* Molin, 1861.

The nematodes under review come close to *K (K) costatus indicus* in metrical range of the body (Table-I). This species has a cosmopolitan in distribution. Schad (1962) synonymised *Kalicephalus indicus* Ortlepp, 1923, *Kalicephalus bengalensis* Maplestone, 1929, *Kalicephalus parvus* Maplestone, 1932, *Kalicephalus maplestoni* Chatterji, 1935, *Kalicephalus obesus* Baylis, 1933, *Kalicephalus natricis* Yamaguti, 1935 and *Diaphanocephalus*

sp Johnston, 1912 with *Kalicephalus costatus*. Since Lichtenfels (1980) included *K. costatus*, the type species of the genus *Kalicephalus*, under the subgenus *Kalicephalus (Schadius)* and Baker (1987) synonymised it with *Kalicephalus (Kalicephalus)*, *K. costatus* now the subgenus *Kalicephalus (Kalicephalus)*. Schad (1962) divided *Kalicephalus costatus* into four subspecies with their geographical distribution viz. *K. costatus costatus*- South and Central America, *K. costatus parvus*- North America, *K. costatus micrurus*- Tropical and South Africa, *K. costatus indicus*- Oriental and Australasia.

In India it has been recorded from *Ptyas mucosus* (Rat Snake), *Tropidonotus piscator*, *Dryophis mycterizans* (Grass Snake), *Naja naja* (Cobra), *Naja hannah* (King Cobra), *Varanus monitor* (Indian Monitor Lizard) and a wild Cat in Zoological Gardens, Calcutta (Maplestone, 1929, 1931). Subsequently this species have been reported from *Ptyas mucosus* in Andhra Pradesh, India (Subbarao *et al.* 1985), from *Natrix piscator* in Maharashtra, India (Ilyas, 1982).

Moreover, present parasites have been recovered from *X. piscator (=Natrix piscator)* though from a different locality. Present nematodes differ from *K (K) costatus indicus* as described by earlier authors in having two additional circumoral papillae on each valve. The dorsal ray instead of giving a pair of accessory branches before its bifurcation gives off branches after its bifurcation in the present material. Presence of ala in the posterior third of the spicule is specifically mentioned in the present occasion. Ilyas (1982) reported presence of a genital cone, a pair of prebursal and a single median papilla along with other pair of papillae on genital cone. Moreover, he reported the presence of telamon in his specimens. Present parasites lack these characters. Ilyas (1982) also reported ala only on left spicule though it is not evident

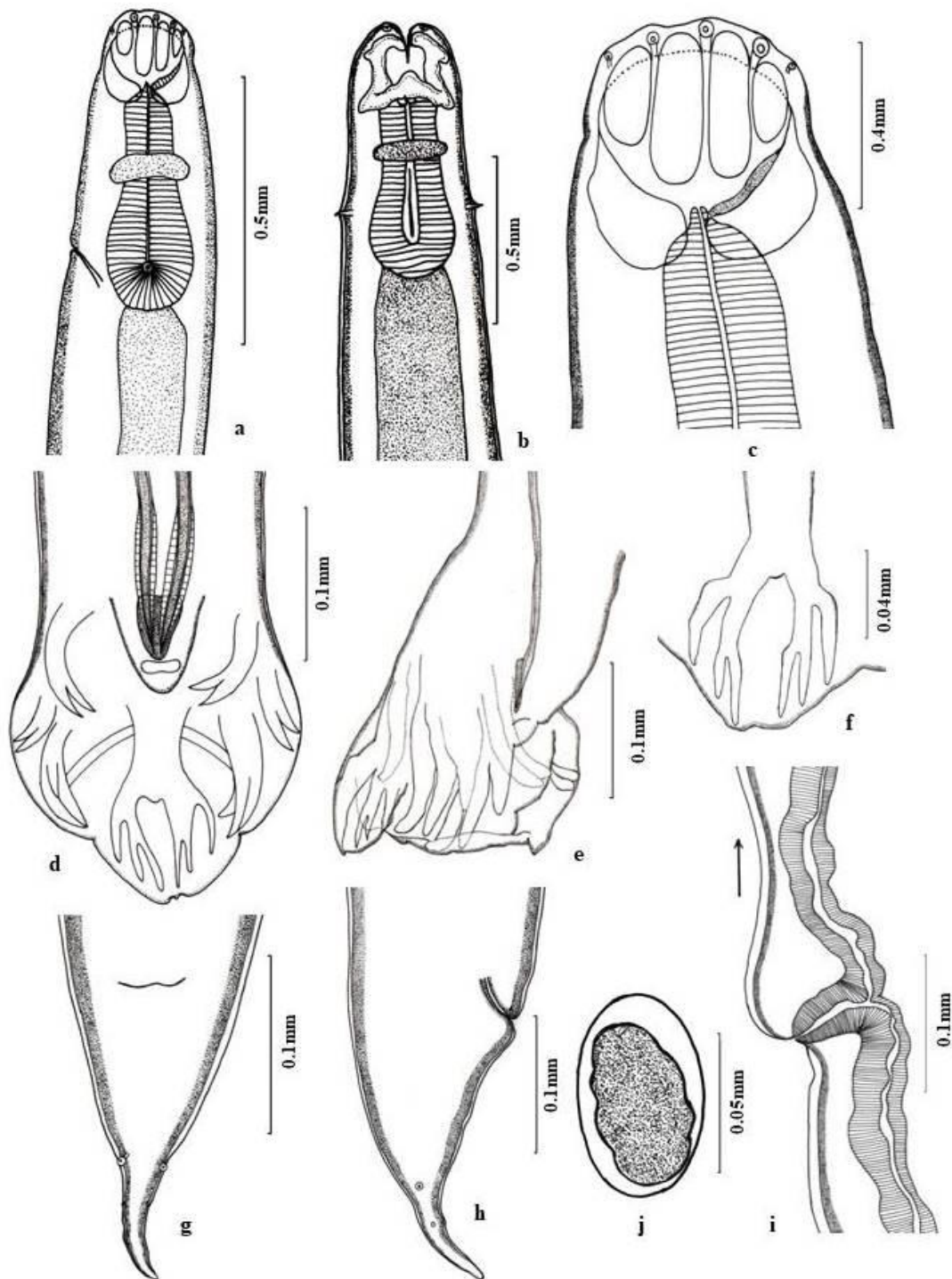
**Table-1:** Metrical range of *Kalicephalus (Kalicephalus) costatus indicus* (Ortlepp, 1923) Schad, 1962

Description	<i>Kalicephalus costatus indicus</i> Ortlepp, 1923 (after Schad, 1962)		<i>Kalicephalus indicus</i> Ortlepp, 1923 (after Fotedar and Tikoo, 1968)		<i>Kalicephalus indicus</i> Ortlepp, 1923 (after Ilyas, 1982)	
	Male	Female	Male	Female	Male	Female
Locality			Kashmir, India		Maharashtra, India	
Host			<i>Tropidonotus platyceps</i>		<i>Natrix piscator</i>	
Body length	4.62-6.00	5.17-7.32	4.00	5.20-5.60	4.82-5.44	7.36
Maximum body width	0.19-0.23	0.20-0.32	0.18	0.24	0.380-0.383	0.32
Length of buccal capsule	0.12-0.15	0.15-0.17	0.10	0.12		
Width of buccal capsule			0.10	0.10		
Length of oesophagus	0.26-0.29	0.28-0.31	0.21	0.23	0.24-0.29	0.35
Width of oesophagus	0.12-0.15	0.15-0.17	0.09	0.10	0.15-0.16	0.18
Nerve ring from anterior end	0.18-0.21	0.20-0.24	0.16		0.21	0.21
Cervical papillae from anterior end	0.33-0.45	0.38-0.50				
Excretory pore from anterior end	0.29-0.38	0.35-0.45			0.40-0.46	0.40
Vulva from posterior end				1.50		1.46
Phasmids from posterior end						
Anus from posterior end		0.12-0.16		0.19	0.19	
Length of right spicules	0.35-0.38		0.22 <sup>2</sup>		0.37-0.40	
Length of left spicules	0.35-0.38				0.36-0.38	
Width of right spicules						
Width of left spicules						
Length of gubernaculum			0.09			
Width of gubernaculum						

Table- I (Continued)

Description	<i>Kalicephalus (costatus) indicus</i> (Ortlepp, 1923) (after Subbarao <i>et al.</i> 1985)		Present material		Range of variation	
	Andhra Pradesh, India		West Bengal, India			
Host	<i>Ptyas mucosus</i>		<i>Xenchropis piscator</i>			
	Male	Female	Male	Female	Male	Female
Body length	7.27-7.53	9.94-10.74	4.25-4.30	4.85-4.99	4.00-7.53	4.25-10.74
Maximum body width	0.22-0.25	0.22-0.25	0.18-0.19	0.24-0.25	0.18-0.383	0.20-0.32
Length of buccal capsule	0.12-0.13	0.15-0.18	0.09-0.10	0.09-0.10	0.09-0.15	0.09-0.18
Width of buccal capsule	0.15-0.16	0.18-0.19	0.11-0.12	0.12-0.13	0.10-0.16	0.10-0.19
Length of oesophagus		0.31-0.34	0.38-0.40	0.42-0.43	0.21-0.40	0.23-0.43
Width of oesophagus			0.11-0.12	0.12-0.13	0.09-0.16	0.10-0.18
Nerve ring from anterior end	0.22-0.24	0.25-0.30	0.20-0.21	0.19-0.21	0.16-0.24	0.16-0.30
Cervical papillae from anterior end			0.327-0.337	0.33-0.347	0.327-0.45	0.33-0.50
Excretory pore from anterior end	0.42-0.58	0.48-0.61	0.30-0.31	0.312-0.325	0.29-0.58	0.312-0.61
Vulva from posterior end		2.22-2.27		1.23-1.26	1.23-2.27	1.23-2.27
Phasmids from posterior end			0.19-0.20	0.11-0.13	0.19-0.20	0.11-0.13
Anus from posterior end		0.18-0.20	0.092-0.10	0.13-0.14	0.092-0.19	0.12-0.20
Length of right spicules	0.36-0.40		0.36-0.37		0.35-0.40	
Length of left spicules	0.36-0.40		0.357-0.362		0.35-0.40	
Width of right spicules			0.010		0.010	
Width of left spicules			0.010		0.010	
Length of gubernaculum			0.060-0.062		0.060-0.062	
Width of gubernaculum			0.047-0.050		0.047-0.050	

?probably an error



**Figure 1:a-j:** *Kalicephalus (Kalicephalus) costatus indicus* (Ortlepp, 1923) Schad, 1962. **a.** Anterior end of male, lateral view. **b.** Anterior end of male, dorsal view. **c.** Enlarged anterior end of male, lateral view. **d.** Posterior end of male, ventral view. **e.** Posterior end of male, lateral view. **f.** Enlarged view of a part of caudal region of male showing caudal alae, ventral view. **g.** Posterior region of female, ventral view. **h.** Posterior region of female, lateral view. **i.** Vulvar region of female, lateral view, arrow points towards cephalic end. **j.** Egg, morulate stage.

from his drawing (fig. no. B). Presence of one pair of postanal papillae in female and the location of phasmids and length of gubernaculum have been reported in the present occasion. The differences which are recorded in the present nematodes are thought to be intraspecific in nature and the present nematodes are thus assigned to *K. (K) costatus indicus*. Birbhum district is recorded as new geographical locality for this parasite.

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