FOLIA PARASITOLOGICA (PRAHA) 31: 105–111, 1984.

REDESCRIPTION OF NEOCAMALLANUS SINGHI (NEMATODA: CAMALLANIDAE) WITH A NOTE ON RELATED SPECIES

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Abstract. The present paper deals with the redescription of the nematode *Neocamallanus singhi* Ali, 1957 based on specimens collected from the fish, *Channa striata* from Burdwan, West Bengal, India. Comparative study of this species with other related forms described from freshwater fishes of India and Pakistan indicates that *Neocamallanus bengalensis* Soota et Chaturvedi, 1971 and *N. ophiocephali* Rehana et Bilquees, 1972 are synonyms of *N. singhi*.

The genus *Neocamallanus* Ali, 1957 comprises several species parasitizing freshwater fishes of tropical regions. Some of them, however, were described very poorly and their differential diagnoses were often based on features which are less important taxonomically and may have a bearing in discriminating variants in allopatric populations only. Yeh (1960) and Fernando and Furtado (1963) concluded that the shape and measurements of the spicules of this group of nematodes are highly variable. Such variability primarily depends on the degree of their sclerotization. There is also a considerable variation in the number of caudal papillae in male.

It is thought that further studies of type specimens may prove the conspecificity of some other nominal species which are considered valid at present.

A large number of nematodes were collected from Burdwan, West Bengal, India; they were identified as *N. singhi*. The present collection made it possible to study in detail the morphology of this species and to redescribe it.

Neocamallanus singhi Ali, 1957 Figs. 1, 2

Syn.: *Neocamallanus bengalensis* Soota et Chaturvedi, 1971; *Neocamallanus ophiocephali* Rehana et Bilquees, 1972.

Description: Small, slender worms with thin, transversely striated cuticle. Body pink in colour when fresh. Dorso-ventrally elongated mouth opening with a narrow membranous rim. Four submedian cephalic papillae and two lateral amphids present. Well sclerotized yellow — brown buccal capsule with two lateral valves. Each buccal valve bears 22 smooth-walled longitudinal ridges on inner surface. Two well sclerotized triangular thickenings present near anterior margin of each buccal valve. A variable number of longitudinal ridges are longer extending from the anterior margin of buccal capsule up to the basal ring, while others are shorter. Oesophagus divided into anterior club-shaped, muscular and posterior elongated glandular parts. Nerve ring surrounds muscular oesophagus at its anterior half; excretory pore lies at posterior part of muscular oesophagus. Small, simple deirids at level of excretory pore.

Male (15 specimens): Body length 4.40—4.70*, width 0.11—0.13. Length of buccal

*All measurements are in mm.

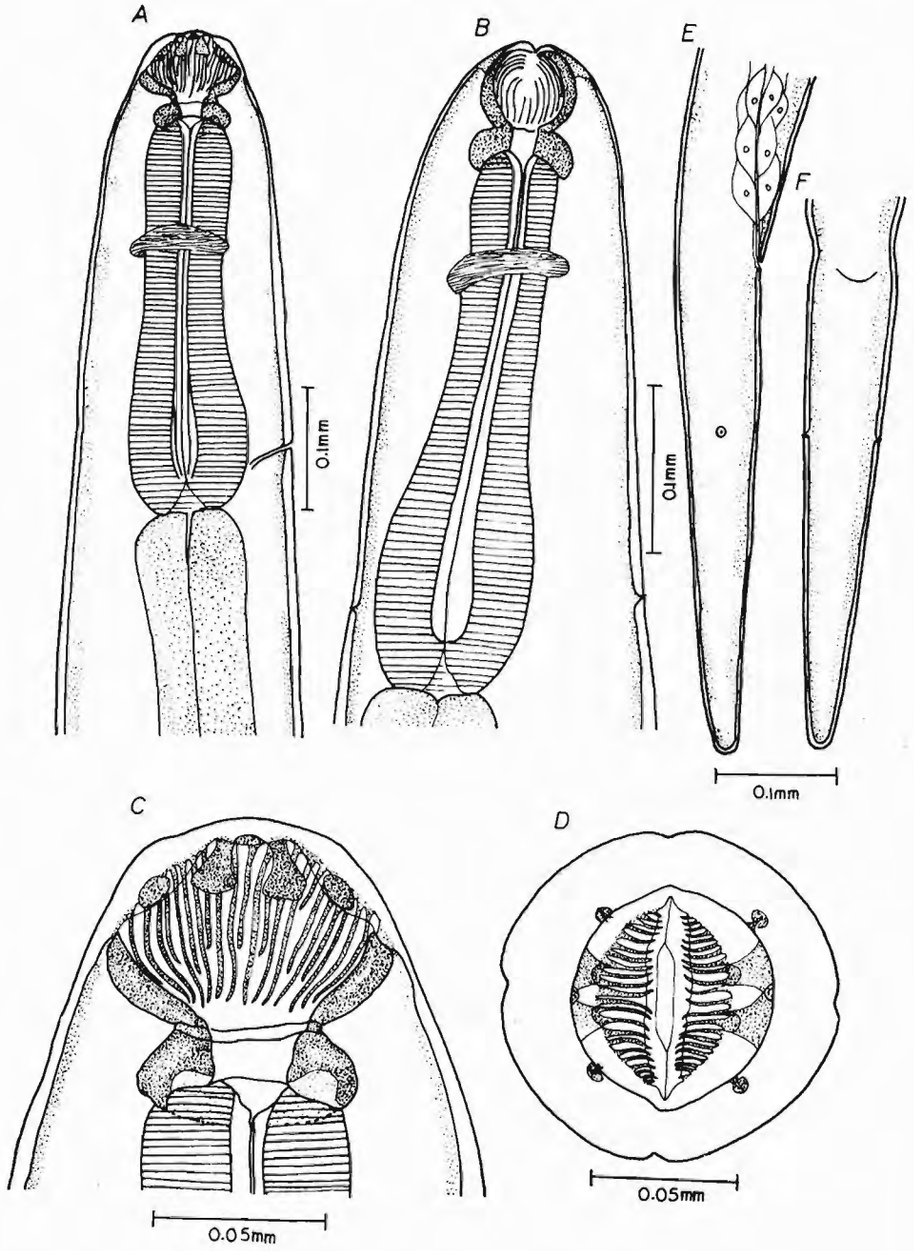

Fig. 1. A—F — *Neocamallanus singhi:* A — anterior end of female (lateral view), B — anterior end of female (dorsal view), C — anterior end of female (enlarged lateral view), D — anterior end of female (apical view), E — posterior end of female (lateral view), F — posterior end of female (ventral view).

capsule 0.039, width 0.039—0.052, length of basal ring 0.013. Muscular oesophagus 0.221—0.234 long and 0.052—0.065 wide, glandular oesophagus 0.442—0.494 long and 0.065 wide. Nerve ring 0.130, excretory pore 0.215—0.226 and deirids 0.20—0.22

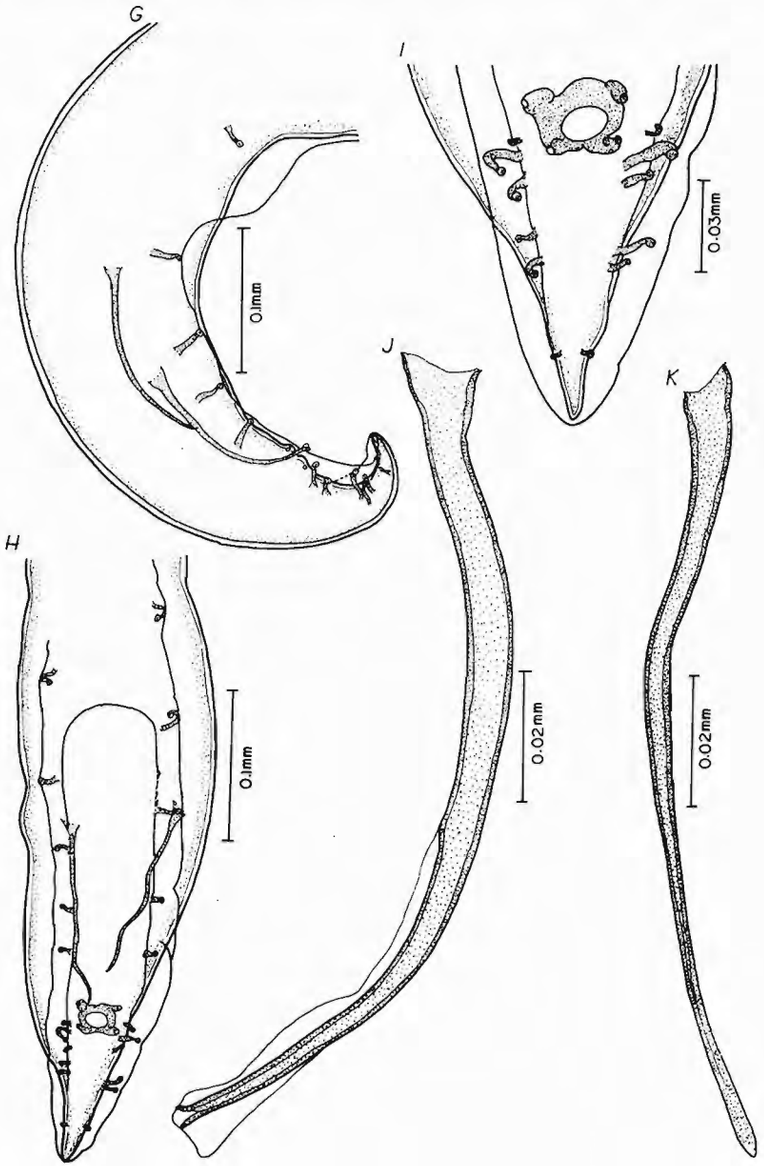

Fig. 2. G—K — *Neocamallanus singhi:* G — posterior end of male (lateral view), H — posterior end of male (ventral view), I — posterior end of male (enlarged ventral view), J — right spicule, K — left spicule.

from anterior end. Narrow caudal alae 0.35—0.42 long, inner margins join and form a sucker-like structure proximally. Tail ventrally bent, conical, 0.078—0.091 long. Preanal papillae: 5 pairs subventral, pedunculate, and slightly asymmetrically placed. Circumanal papillae: 2 pairs with broad base forming a ring around cloacal aperture. Postanal papillae: 6 pairs subventral, pedunculate; first two pairs at or just below cloacal level, 3rd to 5th pairs juxtaposed and 6th pair isolated and small; in some worms, 3rd pair lies nearer to 2nd than 4th. Two weakly sclerotized, unequal spicules; right spicule slender, 0.142—0.145 long, with forked and alate distal end; left spicule slender, 0.125—0.134 long, with bluntly pointed distal end. Gubernaculum absent. **Female** (20 specimens): Body length 9.750—13.676, maximum width 0.195—0.286. Length of buccal capsule 0.052, width 0.052—0.078, length of basal ring 0.013—0.020. Length of muscular oesophagus 0.299—0.351, width 0.065—0.091; length of glandular oesophagus 0.559—0.663, width 0.078—0.130. Nerve ring 0.156—0.208, excretory pore 0.247—0.340, and deirids 0.245—0.336 from anterior end. Vulva preequatorial 4.251—5.538 from anterior end. Tail 0.312—0.455 long, tapering, ending bluntly; phasmids lying at its anterior third.

Host: *Channa striata* (Bloch)
Location: Caecum.
Locality: Fish pond at Burdwan, West Bengal, India (20th November, 1979).
Deposition of specimens: Parasitology Laboratory, Zoology Department, Burdwan University, Burdwan, India.

Table 1. Range of variation of some related species of *Neocamallanus*

	N. singhi after Ali 1957		*N. bengalensis* after Soota and Chaturvedi 1971	
	♂♂	♀♀	♂♂	♀♀
Length of body	3.69—4.66	6.35—6.48	5.5—6.82	12.6—14
Width of body	0.13—0.15	0.15—0.19	0.13—0.15	0.24—0.27
Length of buccal capsule	0.051	0.073	0.033—0.044	0.044—0.055
Width of buccal capsule	0.061	0.076	0.055	0.066—0.077
Length of muscular oesophagus	0.26—0.30	0.38—0.42	0.26—0.33	0.33—0.36
Length of glanduar oesophagus	0.52—0.56	0.74—0.85	0.6—0.7	0.73—0.77
Nerve ring from anterior end	—	—	—	—
Length of right spicule	0.178		0.11—0.13	
Length of left spicule	0.088		0.055—0.066	
Extension of caudal alae	0.39		0.34—0.38	
Distance of vulva from anterior end		2.9—3.34		4.8—6
Number of caudal papillae: preanal	5 pairs		5 pairs	
circumanal	2 pairs		—	
postanal	4 pairs		6 pairs	
Host	*C. punctata*		*C. orientalis*	
Distribution	India		India	

DISCUSSION

The genus *Neocamallanus* was created by Ali (1957) with the type species *N. singhi*. Yeh (1960) synonymized this genus with *Camallanus* Railliet et Henry, 1915 as he did not give any importance to tridents. Sahay and Narayan (1967), however, revived the genus *Neocamallanus*. Chabaud (1975) treated *Neocamallanus* as a synonym of the genus *Paracamallanus* Yorke et Maplestone, 1928. The present paper accepts the validity of the genus *Neocamallanus* as it distinctly differs from *Paracamallanus* in the nature of buccal capsule and absence of tridents.

Besides *N. singhi*, eight more species have been added to this genus. These are: *Neocamallanus vachii* Wahid, 1969, *N. bengalensis* Soota et Chaturvedi, 1971, *N. maculati* Ha Ky, 1971, *N. apapillatus* Ghosh et Majumdar, 1972, *N. ophiocephali* Rehana et Bilquees, 1972, *N. sindensis* Akram, 1976, *N. thapari* Agarwal et Misra, 1978 and *N. bareilliensis* Sharma et Sharma, 1980. Sahay (1968) again transferred *Camallanus trichogastrae* Pearse, 1933, *C. ophiocephali* Pearse, 1933, *C. salmonae* Chakravarty, 1942 and *C. atridentus* Khera, 1954 to the genus *Neocamallanus* as these species lack tridents. But male of *C. ophiocephali* was reported to bear small tridents (Pearse 1933) and its inclusion under the genus *Neocamallanus* is therefore doubtful.

The present nematodes recovered from *Channa striata* are morphologically similar to *N. singhi* (from *C. punctata*), *N. bengalensis* (from *C. orientalis*) and *N. ophiocephali* (from *C. striata* and *Wallago attu*). The main points of disagreement of the

Table 1. (continuation)

N. ophiocephali after Rehana and Bilquees 1972				*N. singhi* present specimens	
♂♂	♀♀	♂♂	♀♀	♂♂	♀♀
5.18—6.69	5.22—14.75	5.96—6.29	5.20—14.73	4.40—4.70	9.750—13.696
0.143—0.179	0.143—0.286	0.133—0.172	0.141—0.282	0.11—0.13	0.195—0.286
0.068—0.072	0.069—0.072	0.064—0.071	0.068—0.071	0.039	0.052
0.068—0.072	0.067—0.072	0.067—0.071	0.066—0.071	0.039—0.052	0.052—0.078
0.186—0.215	0.286—0.393	0.212—0.261	0.284—0.319	0.221—0.234	0.299—0.351
0.561—0.679	0.607—0.857	0.549—0.675	0.602—0.854	0.442—0.494	0.559—0.663
0.163—0.180	0.188—0.199	0.161—0.181	0.188—0.195	0.130	0.156—0.208
0.90 (?)		0.90 (?)		0.142—0.145	
0.72 (?)		0.73 (?)		0.126—0.134	
—		—		0.35—0.42	
	2.499—6.19		2.484—6.12		4.251—5.538
3—4 pairs		3 pairs		5 pairs	
1 pair		1 pair		2 pairs	
3 pairs		3 pairs		6 pairs	
C. striata		*W. attu*		*C. striata*	
Pakistan		Pakistan		India	

present nematodes from *N. singhi* lie in the number of longitudinal ridges of the buccal valves, size of the shorter spicule, number of postanal papillae and smaller size of the females. Though *N. bengalensis* and *N. ophiocephali* are described very poorly, morpho-metrically they seem to be very close to the present worms. The nematodes under consideration differ from *N. bengalensis* in the number of longitudinal ridges of the buccal valves, spicular measurements and number and disposition of caudal papillae in male and from *N. ophiocephali* also in the number and disposition of caudal papillae in male.

As to the variation in the number of longitudinal ridges of the buccal valves it may be said that the above-mentioned species have not been studied thoroughly, as it is apparent from the text figures. The differences in the number of caudal papillae in individual species may be due to either considerable intraspecific variability or inaccurate data in the literature; these papillae, especially the circumanal and postanal ones, can be studied properly only in ventral view of male. The shape and size of spicules depend on the degree of sclerotization (Yeh 1960, Fernando and Furtado 1963) and can be determined only with difficulty. In this regard it needs mentioning that in *N. bengalensis* the spicules are labelled and described erroneously (Text Fig. 1b). Again scales given in the text Figures 3 and 18 of *N. ophiocephali* clearly indicate that spicular measurements given by Rehana and Bilquees (1972) are wrong. Though females of *N. singhi* are smaller than those of the present forms, they come within the metrical ranges of female of *N. ophiocephali*. Sahay (1972) synonymized *N. bengalensis* with *N. atridentus* (Khera, 1954). However, *N. atridentus* does not bear any caudal alae, precloacal sucker-like formation and differs also in the number and arrangement of caudal papillae in male.

The above discussion reveals that there are no substantial morphometrical differences (Table 1) among *N. singhi*, *N. ophiocephali* and *N. bengalensis* as also present nematodes. It is, therefore, suggested that *N. bengalensis* and *N. ophiocephali* should be treated as synonyms of *N. singhi*. The present nematodes are also considered to be identical with *N. singhi*.

ПЕРЕОПИСАНИЕ НЕМАТОДЫ *NEOCAMALLANUS SINGHI* (NEMATODA: CAMALLANIDAE) С ПРИМЕЧАНИЕМ О РОДСТВЕННЫХ ВИДАХ

Н. Ц. Де и Г. Маджумдар

Резюме. Нематода *Neocamallanus singhi* Ali, 1957 переописана на основе экземпляров от рыб *Channa striata* из Бурдвана, Западная Бенгалия, Индия. Сравнение этого вида с другими родственными видами, описанными от пресноводных рыб Индии и Пакистана показывает, что *Neocamallanus bengalensis* Soota et Chaturvedi, 1972 и *N. ophiocephali* Rehana et Bilquees, 1972 являются синонимами *N. singhi*.

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Received 20 July 1983.

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FOLIA PARASITOLOGICA (PRAHA) 31: 111—112, 1984.

SOME OBSERVATIONS ON THE EGG STRING OF A NEMATOMORPH WORM, PARAGORDIUS SP.

On 12 September 1981 J. D. Jarnette, a graduate student in the Biology Dept., U. of L., brought to one of our offices (F. H. W.) 2 living female specimens of *Paragordius* sp., one of which was ovipositing. The worms and egg string were placed in a container with

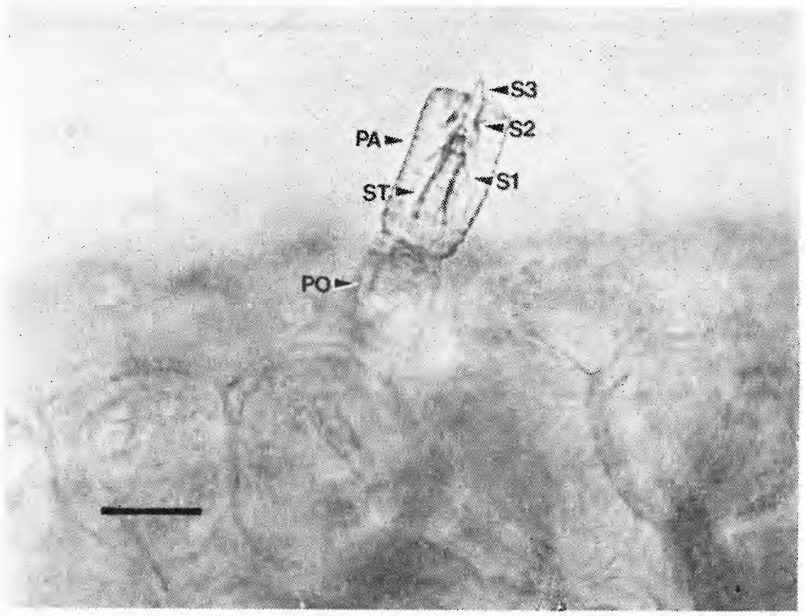

Fig. 1. Larva of *Paragordius* sp. in egg string. A part of the postseptum is visible. Retracted within the annulated postacanthal region of the preseptum can be seen the stylets of the proboscis and some spines of all three rows. Abbreviations used: PA, postacanthal region; PO, postseptum; S1, spines of row 1; S2, spines of row 2; S3, spines of row 3; ST, stylets of proboscis. Bar equals 0.0058 mm.