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Parasites of the relict fauna of Ceylon

VI. More new Helminths from Amphibians and Reptiles, with a new host-record and redescription of *Acanthocephalus serendibensis* Crusz and Mills, 1970

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Summary

A monogenetic trematode *Polystoma hakgalense* sp. nov. is described from the urinary bladder of the frog *Rhacophorus cruciger eques,* from the Hakgala Strict Natural Reserve (1 707 m). The following combination of characters distinguishes it from all other species of the genus: the random and reticulate anastomoses of the gut, the entire nature of the base of the opisthaptoral hooks, and the lack of vitellaria in the spaces between the opisthaptoral suckers.

Acanthocephalus serendibensis is redescribed after a study of the original type specimens, and of fresh specimens from the horn-nosed lizard *Ceratophora stoddarti* from the Hakgala S.N.R. and from the gecko *Cnemaspis kandianus kandianus* from Haputale (1 418 m). The gecko is a new host record for *A. serendibensis*. The original description has been modified as regards the proboscis, which carries 10-12 longitudinal rows of hooks with 3-4 hooks in each row, the embryo within the egg, which bears minute spines over its body-surface and a row of hooks at one end, and the bursa of the male, which lacks bursal rays.

Acanthocephalus srilankensis sp. nov. is described from the small intestine of *Rhacophorus cruciger eques* and *Rhacophorus microtympanum* collected at the Hakgala S.N.R., and Horton Plains (2 195 m). It is most like *A. domerguei,* but differs from it and other nearly related species in having 15-16 longitudinal rows of proboscis hooks with 4-5 hooks in each row.

Meteterakis sinharajensis sp. nov. is described from the rectum of the hump-nosed lizard *Lyriocephalus scutatus* collected at Godekande (305 m), near the Sinharaja rain forest and from the rectum of the uropeltid snake *Pseudotyphlops philippinus* from Dewatura Estate (860 m) below Namunukula. It differs from all other species of *Meteterakis* mainly in the shape of the head, the shape of the tip of each spicule, where the alae are non-tessellated and hyaline in appearance, and the presence of an extra pair of large fleshy papillae lateral to the cloacal opening. The rectum of the same specimen of *Lyriocephalus scutatus* also yielded a new heterakid genus and species, *Cometeterakis lyriocephali*. The new genus, while having all the other features of the genus *Meteterakis,* is characterised by its markedly unequal spicules.

Résumé

Parasites de la faune relique de Ceylan. VI. Nouveaux Helminthes d'Amphibiens et de Reptiles, avec un hôte nouveau et redescription d'*Acanthocephalus serendibensis* Crusz et Mills, 1970.

Un Trématode monogénétique, *Polystoma hakgalense* n. sp., provenant de la vessie urinaire du Batracien *Rhacophorus cruciger eques,* de Hakgala Strict Natural Reserve (1 717 m), est décrit. Les caractères suivants le distinguent des autres espèces du genre : les anastomoses intestinales réticulées et irrégulières, l'aspect général de la base des crochets de l'opisthaptor et l'absence de vitellaria dans les espaces séparant les ventouses opisthaptorales.

Acanthocephalus serendibensis est redécrit après étude des types originaux et de spécimens frais provenant du lézard cornu *Ceratophora stoddarti* de Hakgala S.N.R., et du gecko *Cnemaspis kandianus kandianus* de Haputale (1 418 m). Le gecko est un nouvel hôte pour *A. serendibensis.* La description originale a été modifiée en ce qui concerne le proboscis qui porte 10-12 rangées longitudinales de crochets à raison de 3-4 crochets par rangée, l'embryon dans l'œuf qui présente de fines épines à la surface du corps et une rangée de crochets à une extrémité, la bourse copulatrice du mâle qui n'a pas de rayons bursaux.

Acanthocephalus srilankensis n. sp., provenant de l'intestin grêle de *Rhacophorus cruciger eques* et de *Rhacophorus microtympanum* capturés à Hakgala S.N.R. et à Horton Plains (2 195 m) est décrit. Il est très semblable à *A. domerguei ;* mais il en diffère, de même que d'autres espèces voisines, par la présence sur le proboscis de 15 à 16 rangées longitudinales de crochets comportant chacune 4 à 5 crochets.

Meteterakis sinharajensis sp. nov. du rectum du lézard dit « hump nosed », *Lyriocephalus scutatus,* originaire de Godekande (305 m) près de Sinharaja rain forest et du rectum du Reptile Uropeltidé *Pseudotyphlops philippinensis* de l'Etat de Dewatura (860 m) au-dessous de Namunukula est ici également décrit. Il se distingue de toutes les autres espèces de *Meteterakis* essentiellement par la forme de la tête, la forme des extrémités de chaque spicule — les ailes étant unies et d'apparence hyaline —, la présence d'une paire supplémentaire de papilles charnues, latérales par rapport à l'ouverture cloacale. Le rectum du même spécimen de *Lyriocephalus scutatus* a fourni une espèce nouvelle et un genre nouveau d'Hétérakidé, *Cometeterakis lyriocephali.* Ce nouveau genre, tout en possédant les autres caractères du genre *Meteterakis,* s'en distingue par ses spicules typiquement inégaux.

Introduction

« Mountains are islands on the land. »
Charles Darwin, 1859.

« La faune parasitaire d'un groupe d'organismes présente, au point de vue biologique, de grandes similitudes avec une faune insulaire. »
Jean G. Baer, 1946.

Of all the faunal elements of Sri Lanka, it is the herpetofauna that still proves to be the most interesting from the standpoint not only of the degree of endemism, but also, correspondingly, of the parasites harboured. This paper describes (*Table I*) a new

TABLE I. — Details of helminth collections from herpetofauna

Parasite	No. collected	Male	Female	Habitat	Host	Male	Female	Locality
Trematoda : Monogenea : Polystomatidae.								
Polystoma hakgalense sp. nov. .	12	—	—	Urinary bladder	*Rhacophorus cruciger eques* (Günther, 1858) ..	63	—	Hakgala Strict Natural Reserve (1707 m).
Acanthocephala : Palaeacanthocephala : Echinorhynchidae.								
Acanthocephalus serendibensis Crusz and Mills, 1970	12	5	7	Small intestine	*Cnemaspis kandianus kandianus* (Kelaart, 1852)	2	—	Haputale Estate (1418 m).
» »	14	5	9	»	*Ceratophora stoddarti* Gray, 1835	1	1	Hakgala S.N.R.
Acanthocephalus srilankensis sp. nov.	18	7	11	»	*Rhacophorus cruciger eques*	74	—	Hakgala S.N.R., and Horton Plains (2195 m).
» »	3	1	2	»	*Rhacophorus microtympanum* (Günther, 1858) .	9	1	» »
Nematoda : Heterakidae : Meteterakinae.								
Meteterakis sinharajensis sp. nov.	33	3	30	Rectum	*Lyriocephalus scutatus* (L.)	—	1	Godekande (305 m).
» »	7	1	6	»	*Pseudotyphlops philippinus* Schlegel, 1839	—	1	Dewatura Estate (860 m).
Cometeterakis lyriocephali gen. et sp. nov.	77	33	44	»	*Lyriocephalus scutatus* ..	—	1	Godekande.

species of monogenetic trematode from a rhacophorid frog, a new *Acanthocephalus* species from rhacophorid frogs, and two new species of heterakid nematode, one of them belonging to a new genus, from a hump-nosed lizard and an uropeltid snake. It has also become necessary to give a new host record (a tree-gecko), and a redescription, of *Acanthocephalus serendibensis* Crusz and Mills, 1970.

Specimens of 5 out of the 6 host species were collected on hill stations in the Central Province of Sri Lanka. A specimen of the sixth one, namely the hump-nosed lizard, was caught at Godekande, which belongs to the southern group of hills, and borders on the Sinharaja tropical rain forest which itself is of considerable interest as representing perhaps a relict biome in Sri Lanka.

Our conception of what constitutes a relict species is postponed for detailed discussion later. A hint has already been given (Crusz and Sanmugasunderam, 1971) regarding the advantage to be gained by not being restricted by a definition at this stage and not losing sight of the range of infestation by a parasite species, not only of relict hosts, but of non-relict endemics, and non-endemics, as well. For the present it would be sufficient merely to state that there have long been indications that several of Sri Lanka's faunal species belong to the category of relict forms (Sarasin, 1910 ; Phillips, 1935; Taylor, 1950; Kirtisinghe, 1957; Ripley, 1961).

All specimens in this study were freshly collected. The type specimens are deposited in the Department of Zoology, University of Sri Lanka, Peradeniya.

Polystoma hakgalense sp. nov.

(Trematoda : Monogenea : Polystomatidae)
(*fig. 1-3*)

Twelve specimens of this monogenetic trematode were recovered from the urinary bladder of 8 specimens of *Rhacophorus cruciger eques*, from a total of 63 specimens of this endemic tree-frog, collected in September 1973 and in May and September 1974, from the Hakgala Strict Natural Reserve (2.41-3.22 km. through the Hakgala Gardens). The worms were fixed in Bouin's fluid. Eight of them were subsequently stained in Mayer's Carmalum and mounted in Canada Balsam, while serial horizontal sections, 8 microns thick, and stained in Ehrlich's haematoxylin and eosin, were made of the other four. These were all studied with the aid of both the ordinary light-microscope and a polarisation microscope.

Description:

The specimens are elongate and taper towards the anterior end. They are 3.87-9.23 mm. long and 0.89-1.79 mm. at their greatest width. The oral sucker, 0.189-0.402 mm. in diameter, is subterminal and encircles the mouth, which leads into a well-developed, muscular pharynx, 0.135-0.197 mm. in diameter. The intestine bifurcates immediately posterior to the pharynx, and the two lateral caeca bear irregularly

branched diverticula which anastomose randomly, giving it a reticulate appearance. The caeca unite immediately anterior to the opisthaptor and extend into it (*fig. 1*).

The opisthaptor is disc-like, 0.635-0.794 mm. long and 1.016-1.509 mm. broad. It bears three pairs of well-developed, cuticularized suckers, 0.25-0.32 mm. in diameter. It is also provided with a pair of large hooks which are 0.38-0.44 mm. long and 0.123-0.164 mm. wide at the base. Each large hook is sharply pointed and has a recurved tip and entire base (*fig. 2*). These features are specially evident when the hooks are examined between crossed nicols in the polarisation microscope. Also present are two pairs of micro-hooks 0.0205-0.0369 mm. in length, which lie between the large hooks.

The testes are numerous and situated ventrally between the lateral intestinal caeca. They begin at the level of the vitello-vaginal ducts and extend posteriorly to a level which is two-third to three-fourth the total body length, from the anterior end.

The ovary, measuring 0.492-0.874 mm. long and 0.207-0.349 mm. wide, is pretesticular and situated either on the right or on the left of the median line (*fig. 3*). The oviduct joins the vitelline

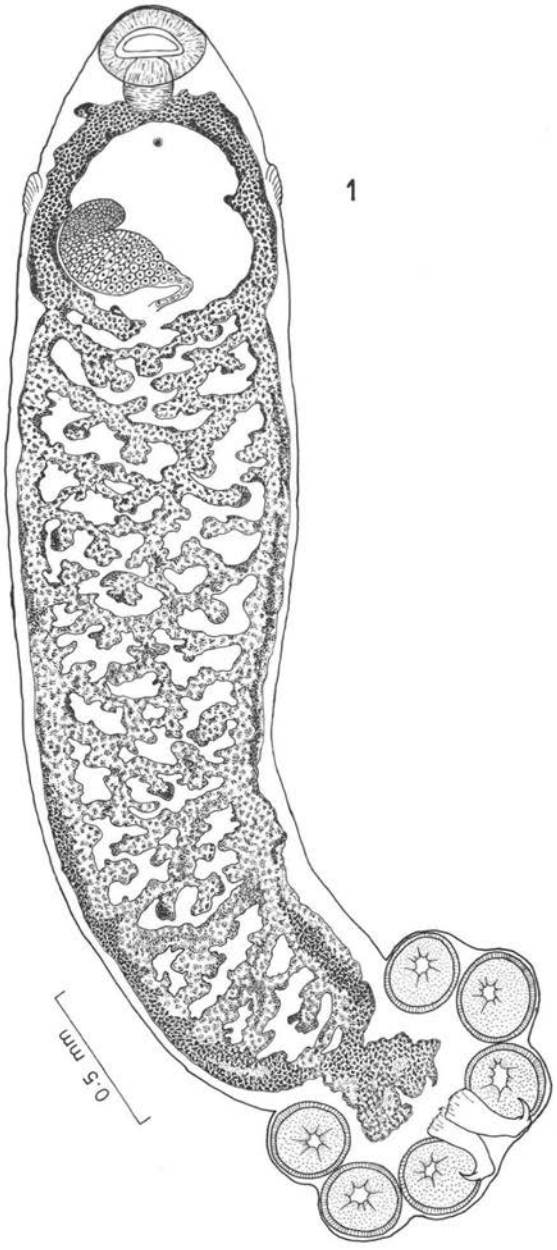

FIG. 1. — *Polystoma hakgalense* sp. nov.

reservoir from which proceeds the uterine duct. From this junction is given off the genito-intestinal canal which opens into the intestinal caecum of the ovarian side. The Mehlis's gland lies opposite the ovary. The vitellaria are follicular and extend over the intestinal branches, beginning from the level of the pharynx up to where the two lateral intestinal caeca unite at their posterior end. The vaginae lie on either lateral margin of the body, immediately behind the level of the genital pore. The vaginal duct of each side unites with the vitelline duct of that side to continue as the vitello-vaginal duct which meets and unites with its fellow of the opposite side to form the vitelline reservoir. In none of the specimens studied could an egg be distinguished.

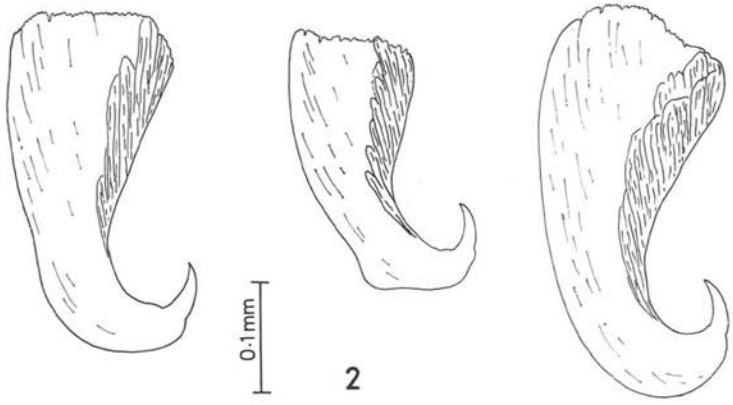

FIG. 2. — *Polystoma hakgalense* sp. nov. Opisthaptoral hooks.

Discussion:

The general features of this monogenetic trematode clearly relegates it to the genus *Polystoma.*

The present form can be distinguished from *P. africanum* Szidat, 1932, *P. gallieni* Price, 1939, *P. xenopi* Price, 1943, *P. grassei* Euzet et al., 1966 and *P. prudhoei* Saoud, 1967, in that these latter forms lack pre-haptoral intestinal anastomoses, and from *P. mashoni* Beverly-Burton, 1962, where the intestinal caeca do not unite in front of the opisthaptor.

P. integerrimum (Froelich, 1791), *P. palancai* Lopez-Neyra, 1952, *P. pricei* Vercammen-Grandjean, 1960, *P. mangenoti* Gallien, 1957, *P. baeri* Euzet et al., 1970, *P. dorsalis* Euzet et al., 1970, *P. ragnari* Euzet et al., 1970, *P. perreti* Maeder, 1973, *P. vaucheri* Maeder, 1973, all have a fixed number of pre-haptoral transverse intestinal anastomoses, in contrast to the random and reticulate anastomosing of the gut in the present form.

The post-ovarian position of the testes in the present species sets it apart from *P. brygoonis* Euzet et Combes, 1964, where the testes are pre-ovarian; and the ante-

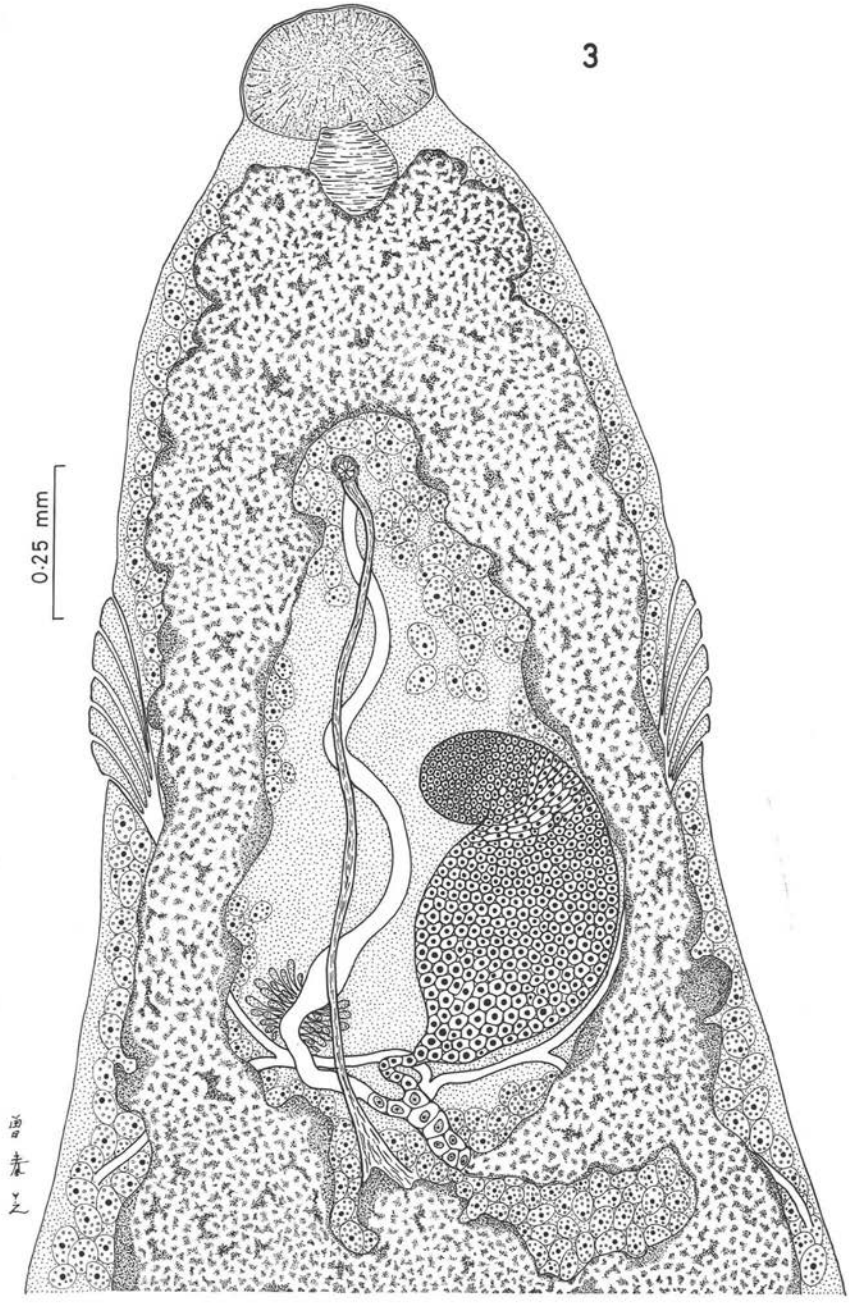

FIG. 3. — *Polystoma hakgalense* sp. nov. — A dorsal view of the anterior region, reconstructed from camera lucida drawings of horizontal sections.

rior position of the ovary differentiates it from *P. cachani* Gallien, 1957, where the ovary is posteriorly situated.

The present species, though resembling *P. uncinulatum* Macé, 1880, *P. ozakii* Price, 1939, *P. nearcticum* (Paul, 1935), *P. naevius* Caballero e Cerecero, 1941 and *P. stellai* Perez Vigueras, 1955, in that it has reticulate intestinal anastomoses, differs from them in the nature of the base of the hook, which is deeply cleft in the latter species but is entire in the present form. In this respect it very closely resembles *P. rhacophori* Yamaguti, 1936. However, in *P. rhacophori* only a few transverse anastomoses connect the two main intestinal caecal limbs and the vitellaria intrude into the spaces between the suckers of the opisthaptor, two features that differentiate it quite clearly from the present species.

The most characteristic features of the present form are therefore: the random and reticulate anastomoses of the gut, the entire nature of the base of the opisthaptoral hooks, and the lack of vitellaria in the spaces between the opisthaptoral suckers. These three features taken together set this species apart from all the other species of *Polystoma* hitherto recorded, and we name it *Polystoma hakgalense*.
Type-specimens: Reg. No. RTS 39.

Acanthocephalus serendibensis Crusz and Mills, 1970

(Acanthocephala : Palaeacanthocephala : Echinorhynchidae)
(*fig. 4-8*)

Acanthocephalus serendibensis is redescribed after a study of the type specimens, and of further specimens, namely 5 males and 7 females obtained from the intestine of 2 male specimens of the gecko *Cnemaspis kandianus kandianus* collected on March 4, 1973 from Haputale Estate, and 5 males and 9 females from the intestine of 1 male and 1 female horn-nosed lizard *Ceratophora stoddarti* collected on September 16, 1973 from the Hakgala Strict Natural Reserve. The gecko is a new host record for this species.

The various measurements of the specimens collected from these two hosts are given in *Table II*. Those from *Cnemaspis kandianus kandianus* are seen to be very much smaller than the ones from *Ceratophora stoddarti*. Indeed, they have entirely different size-ranges. This may well be due to the great difference in size between their respective hosts.

The general features of *A. serendibensis* agree with those given by Crusz and Mills, 1970. The description of the proboscis armature has however to be modified. The proboscis hooks are arranged in 10 to 12 longitudinal rows with either 3 or 4 hooks per longitudinal row (*fig. 4*). In some specimens the same proboscis bears 3, as well as 4, hooks per longitudinal row. In general, the hooks increase in length up to the third hook, and thereafter decrease in length when there is a fourth hook.

TABLE II. — Measurements (in mm.) of *Acanthocephalus serendibensis*

	From *Ceratophora stoddarti*		From *Cnemaspis kandianus kandianus*	
	Male (5)	Female (4)	Male (3)	Female (3)
Body length	3.915-4.851	7.956-11.360	1.144-1.223	1.860-6.730
Body width	0.642-1.276	1.489-2.425	0.190-0.428	0.302-0.715
Proboscis :				
length	0.254-0.334	0.318-0.445	0.123-0.135	0.172-0.324
width	0.111-0.175	0.125-0.334	0.123-0.127	0.152-0.205
Proboscis sac :				
length	0.334-0.619	0.429-0.572	0.119-0.197	0.205-0.369
width	0.143-0.286	0.207-0.365	0.086-0.107	0.164-0.242
Lemnisci :				
— left :				
length	0.572-0.969	0.778-0.953	0.152-0.185	0.287-0.418
width	0.111-0.191	0.159-0.286	0.029-0.045	0.107-0.111
— right :				
length	0.604-0.985	0.826-1.018	0.111-0.148	0.267-0.410
width	0.127-0.206	0.127-0.301	0.033-0.037	0.082-0.098
Testis :				
— ant. :				
length	0.635-0.842	—	0.205-0.221	—
width	0.397-0.556	—	0.111-0.160	—
— post. :				
length	0.588-0.746	—	0.164-0.287	—
width	0.381-0.476	—	0.103-0.172	—
Bursa :				
length	0.588-0.651	—	—	—
width	0.476-0.572	—	—	—
Egg dimensions		0.0615-0.0738 × 0.0123-0.0246	—	0.0492-0.0533 × 0.0123-0.0164

However, variations of this pattern also occur. For instance, the maximum size is reached by the second hook in a row of 3 hooks, and by the fourth hook in a row of 4 hooks (*Table III*). The root of the proboscis hook is well developed and curved (*fig. 5*).

The penis (*fig. 6*), which does not show up in the original type specimens, but is seen clearly in two of the present paratypes, is short and conical, and leads to the centre of the eversible copulatory bursa which does not have any muscular bursal rays. The bursal rays previously observed appear to be folds simulating bursal rays.

Contrary to the earlier observation that the embryo is devoid of hooks and spines, there are minute spines scattered over its body. These are however so small that they can be seen only under an oil-immersion lens and can hardly be represented in

TABLE III. — Measurements * (in mm) of the proboscis hooks of *Acanthocephalus serendibensis* from *Ceratophora stoddarti* and *Cnemaspis kandianus kandianus*

Host	Parasite specimen	Hook 1		Hook 2		Hook 3		Hook 4	
		Length	Max. width	Length	Max. width	Length	Max. width	Length	Max. width
C. stoddarti	1. ♂	0.0574	0.0082	0.0738	0.0123	0.0984	0.0164	0.0697	0.0082
	(4 rows)	0.0574	0.0082	0.0738	0.0123	0.0861	0.0164	0.0984	0.0205
	2. ♂	0.0369	0.0082	0.0533	0.0123	0.0656	0.0123	0.0574	0.0082
	(1 row)	0.0410	0.0082	0.0629	0.0123	0.0738	0.0123	0.0820	0.0123
	3. ♂	0.0492	0.0082	0.0779	0.0123	0.1030	0.0164		
	(1 row)	0.0492	0.0082	0.0574	0.0123	0.0410	0.0082		
	4. ♂	0.0451	0.0082	0.0779	0.0123	0.0902	0.0164		
	(3 rows)	0.0738	0.0123	0.0902	0.0205	0.0656	0.0123		
	5. ♀	0.0492	0.0082	0.0861	0.0164	0.1272	0.0246	0.1148	0.0205
	(2 rows)	0.0410	0.0082	0.0861	0.0123	0.1162	0.0205	0.1435	0.0246
	6. ♀	0.0697	0.0123	0.1108	0.0164	0.1394	0.0246	0.1272	0.0205
	(2 rows)	0.0451	0.0082	0.0656	0.0123	0.1111	0.0164	0.1229	0.0205
	7. ♀	0.0820	0.0123	0.1190	0.0205	0.1312	0.0246		
	(1 row)	0.0902	0.0164	0.1230	0.0205	0.0697	0.0123		
	8. ♀	0.0492	0.0123	0.1108	0.0205	0.1272	0.0123		
C. kandianus kandianus	1. ♂	0.0410	0.0082	0.0574	0.0123	0.0738	0.0164		
	(3 rows)	0.0287	0.0082	0.0615	0.0123	0.0492	0.0082		
	2. ♂	0.0451	0.0082	0.0574	0.0123	0.0615	0.0123		
	(2 rows)	0.0492	0.0123	0.0533	0.0164	0.0492	0.0082		
	3. ♂	0.0492	0.0123	0.0697	0.0164	0.0902	0.0205		
	4. ♀	0.0656	0.0123	0.0820	0.0164	0.1066	0.0246		
	5. ♀	0.0779	0.0123	0.1190	0.0246	0.1435	0.0246		

* For each specimen, a set of measurements of hooks (from tip to base of proboscis), typical of one of the normal longitudinal rows, is followed by a set of measurements typical of one of the abnormal rows. The number of such abnormal rows in a proboscis is indicated within brackets.

a drawing. In addition, there are a few large hooks at one end of the embryo. As many as five of them were counted on each lateral face. The embryos were studied from whole mounts (*fig. 7*) and from transverse sections (*fig. 8*).

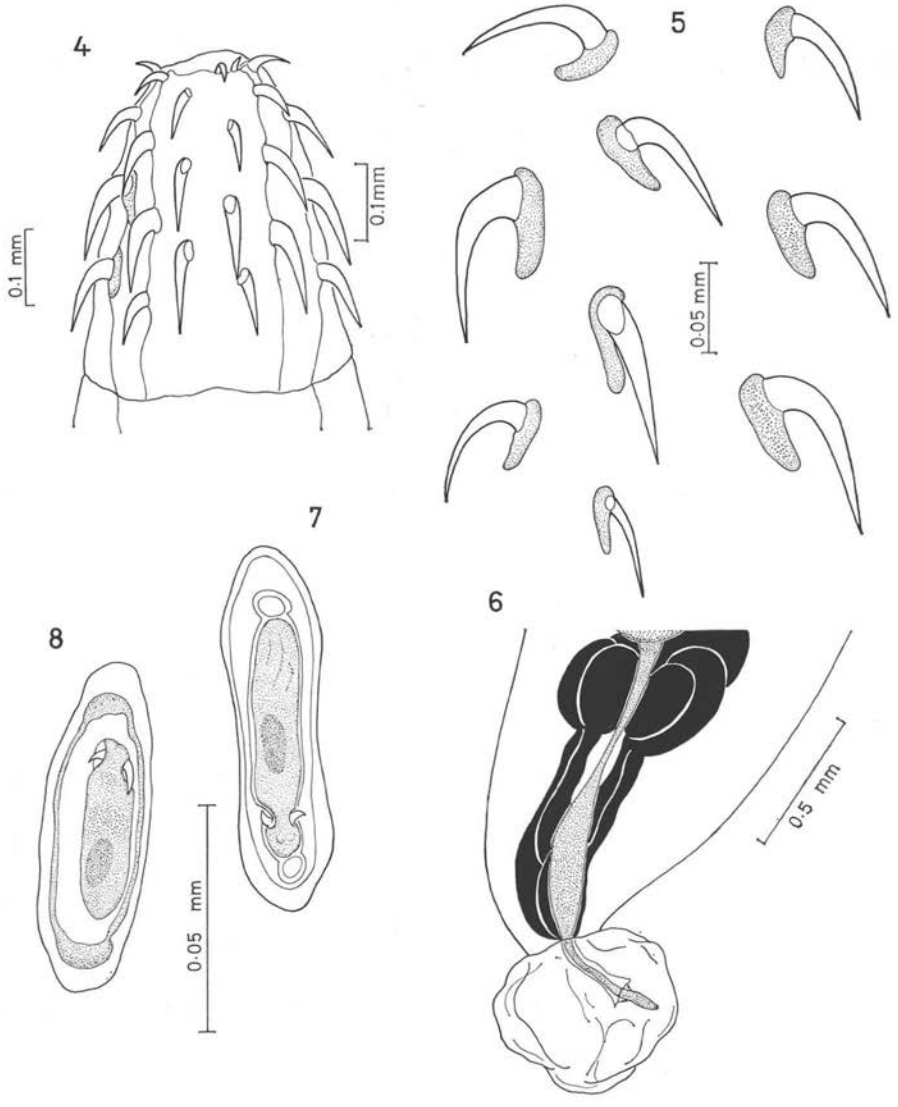

FIG. 4-8. — *Acanthocephalus serendibensis* Crusz and Mills, 1970.

Specific diagnosis.

Body small, nearly cylindrical. Males 1.14-4.85 mm. long, 0.19-1.28 mm. maximum diameter. Females, 1.86-11.36 mm. long, 0.30-2.43 mm. maximum diameter. Proboscis hooks quincunxially arranged in 10-12 longitudinal rows with 3-4 hooks in each row, maximum size at third hook, rarely at second or fourth hook. Proboscis receptacle double-walled. Leminisci unequal in length, not much longer than proboscis receptacle. Cement glands six, bunched together just below posterior testis, with their ducts leading from them in two groups of three each. Eggs fusiform, 0.049-0.074 by 0.012-0.025 mm., with polar prolongations of the middle membrane. Embryo armed.

Type-specimens: Reg. No. RTS 30.

Acanthocephalus srilankensis sp. nov.

(Acanthocephala: Palaeacanthocephala : Echinorhynchidae)

(*fig. 9-13*)

This species was studied from a total of 7 males and 11 females collected from the small intestine of 3 specimens, out of a total of 74 specimens, of *Rhacophorus cruciger eques,* and 1 male and 2 females from the same habitat of 1 specimen, out of a total of 10 specimens, of *Rhacophorus microtympanum.* Both these hosts were collected from the Hakgala Strict Natural Reserve and Horton Plains, in September 1973 and in May and September 1974.

The morphology of the present form, but for the proboscis armature and the copulatory bursa, agrees closely with that of *A. domerguei* Golvan, Brygoo and Gassmann, 1972. Its body dimensions are given in *Table IV*.

The proboscis, unlike that of *A. serendibensis* Crusz and Mills, 1970, *A. domerguei* Golvan, Brygoo and Gassmann, 1972 and *A. madagascariensis* Golvan, 1965. bears 15 to 16 longitudinal rows of hooks with 4 to 5 hooks per longitudinal row (*fig. 10 and 11*). In the majority of rows, of the same proboscis, the hooks steadily increase in size antero-posteriorly, but there could also be an increase in size up to the third hook followed by a decrease in size at the fourth hook. The detailed measurements are given in *Table V*.

The male reproductive system is similar to that described for *A. domerguei.* The copulatory bursa, however, has along its outer edge a « frill » of finger-shaped processes simulating bursal rays (*fig. 9*).

The female reproductive system is typical of the Palaeacanthocephala (*fig. 12*). The embryo has the characteristic polar prolongations of the middle membrane, the minute spines scattered over its body, and the larger hooks at one end (*fig. 13*).

TABLE IV. — Measurements (in mm.) of *Acanthocephalus srilankensis*

	From *Rhacophorus cruciger eques*		From *Rhacophorus microtympanum*	
	Male (6)	Female (7)	Male (1)	Female (2)
Body length	2.340-3.145	2.766-8.164	2.680	4.980-5.190
Body width	0.413-0.699	0.638-1.112	0.590	0.723-0.808
Proboscis :				
length	0.205-0.267	0.221-0.316	0.240	0.254-0.286
width	0.144-0.172	0.158-0.229	0.190	0.175-0.191
Proboscis sac :				
length	0.275-0.349	0.318-0.537	0.320	0.413
width	0.078-0.135	0.115-0.222	0.170	0.191
Lemnisci :				
— left :				
length	0.250-0.508	0.683-1.096	0.335	
width	0.111-0.191	0.095-0.191	0.095	
— right :				
length	0.275-0.461	0.746-1.381	0.318	
width	0.127-0.159	0.127-0.191	0.079	
Testis :				
— ant :				
length	0.295-0.476	—	0.445	
width	0.201-0.334	—	0.270	
— post :				
length	0.269-0.413	—	0.365	
width	0.197-0.397	—	0.302	
Bursa :				
length	0.191-0.318	—	0.318	
width	0.334-0.349	—	0.429	
Egg dimensions	—	0.0123-0.0205 × 0.0369-0.0492		

The characteristic proboscis armature of 15 to 16 longitudinal rows with 4 to 5 hooks per longitudinal row (*Table VI*) distinguishes the present form as a new species which we name *Acanthocephalus srilankensis*.

Type-specimens: Reg. No. RTS 40.

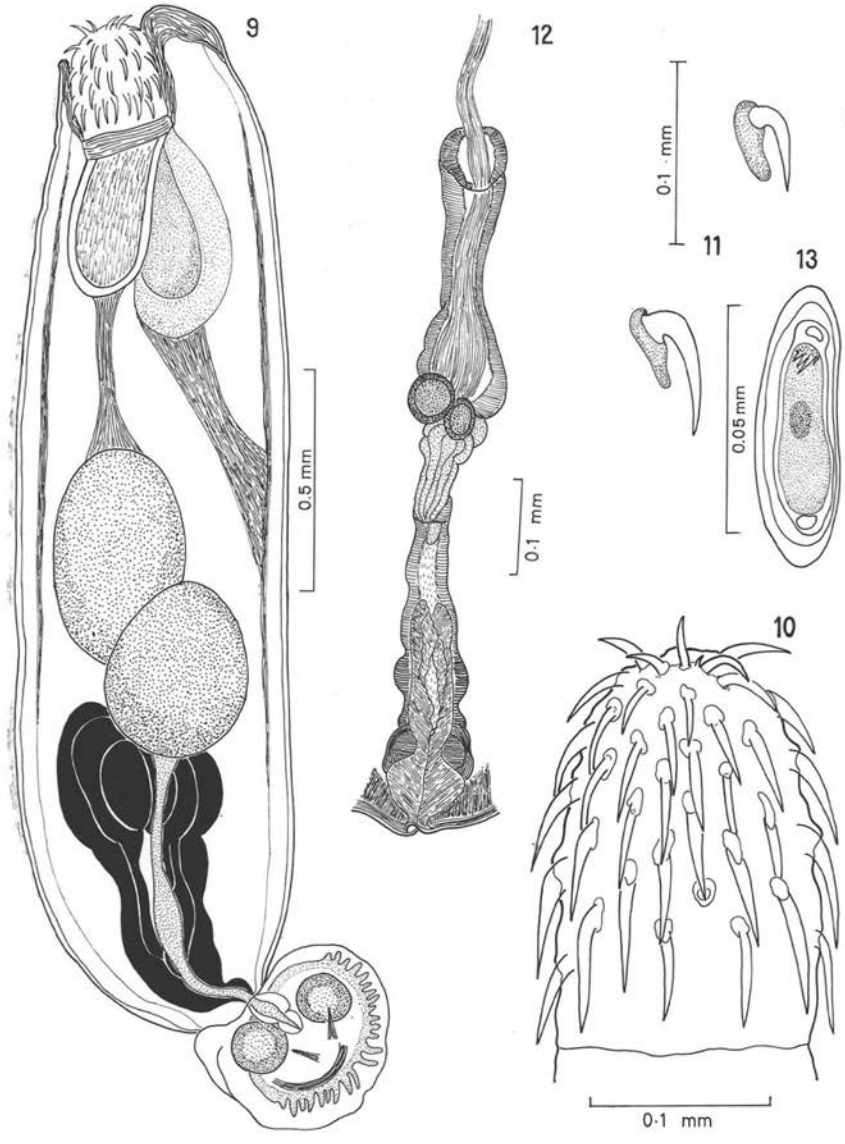

FIG. 9-13. — *Acanthocephalus srilankensis* sp. nov.

TABLE V. — Measurements * (in mm.) of the proboscis hooks of *Acanthocephalus srilankensis* from *Rhacophorus cruciger eques* and *R. microtympanum*

Host	Parasite specimen	Hook 1		Hook 2		Hook 3		Hook 4		Hook 5	
		Length	Max. width	Length	Max. width	Length	Max. width	Length	Max. width	Length	Max. width
R. cruciger eques	1. ♂	0.0451	0.0082	0.0533	0.0082	0.0629	0.0123	0.0679	0.0123		
	(2 rows)	0.0492	0.0082	0.0574	0.0082	0.0679	0.0123	0.0533	0.0082		
	2. ♂.	0.0451	0.0082	0.0533	0.0082	0.0656	0.0123	0.0738	0.0164		
	(2 rows)	0.0492	0.0082	0.0629	0.0123	0.0779	0.0164	0.0574	0.0123		
	3. ♂.	0.0328	0.0082	0.0410	0.0082	0.0615	0.0123	0.0697	0.0164	0.0779	0.0164
	4. ♂.	0.0451	0.0123	0.0615	0.0123	0.0697	0.0164	0.0788	0.0164		
	5. ♀	0.0410	0.0082	0.0656	0.0123	0.0738	0.0164	0.0820	0.0164		
	(4 rows)	0.0697	0.0123	0.0738	0.0164	0.0861	0.0164	0.0492	0.0082		
	6. ♀	0.0451	0.0082	0.0533	0.0082	0.0738	0.0164	0.0861	0.0164		
	(2 rows)	0.0451	0.0082	0.0653	0.0123	0.0820	0.0164	0.0653	0.0123		
	7. ♀.	0.0492	0.0082	0.0653	0.0123	0.0820	0.0164	0.0943	0.0164		
	(2 rows)	0.0574	0.0123	0.0779	0.0123	0.0943	0.0164	0.0820	0.0123		
R. microtympanum ...	1. ♂.	0.0410	0.0082	0.0533	0.0082	0.0656	0.0123	0.0738	0.0123		
	(1 row)	0.0492	0.0082	0.0574	0.0082	0.0738	0.0123	0.0656	0.0123		
	2. ♀.	0.0656	0.0082	0.0738	0.0123	0.0902	0.0164	0.1025	0.0164		
	(1 row)	0.0615	0.0123	0.0738	0.0164	0.0984	0.0205	0.0779	0.0164		
	3. ♀.	0.0369	0.0082	0.0656	0.0123	0.0779	0.0164	0.0861	0.0164		
	(1 row)	0.0533	0.0082	0.0656	0.0123	0.0779	0.0164	0.0656	0.0082		

* See note at bottom of Table III.

TABLE VI. — Comparative Table for *Acanthocephalus* spp.

	A. serendibensis Crusz & Mills, 1970	*A. srilankensis* sp. nov.	*A. domerguei* Golvan, Brygoo & Gassmann, 1972	*A. madagascariensis* Golvan, 1965
Host	*Ceratophora stoddarti.* *Cnemaspis kandianus kandianus.*	*Rhacophorus cruciger eques.* *R. microtympanum.*	*Anodontohyla montana.*	*Rhacophorus* sp.
Habitat	Intestine.	Intestine.	Intestine.	Intestine.
Locality	Sri Lanka : Nuwara Eliya (1 885 m). Haputale (1 418 m).	Sri Lanka : Hakgala (1 707 m).	Madagascar : Fianarantsoa (2 500/ 2 600 m).	Madagascar : Montagnes d'Ambre (1 475 m).
Proboscis hooks :				
No. of longit. rows	10-12	15-16.	16	18-20.
No. in each longit. row	3-4	4-5	5-6	5-6
Arrangement	alternating (quincunxial).	alternating (quincunxial).	alternating (quincunxial).	alternating (quincunxial).
Antero-posterior size increase/decrease				
Most rows :	Maximum at 3rd hook.	Max. at 4th hook.	Max. at 3rd hook.	Max. at 4th hook.
Few rows :	Maximum at 2nd or 4th hook.	Max. at 3rd hook.		
Eggs :				
Dimensions	0.049-0.074 × 0.012-0.025	0.037-0.049 × 0.012-0.021	0.05 × 0.018	0.075 × 0.023
Polar prolongations of middle membrane, and embryo with minute spines and hooks	Present.	Present.	Present.	Present.

Meteterakis sinharajensis sp. nov.

(Nematoda: Heterakidae: Meteterakinae)
(*fig. 14-19*)

A single specimen of the hump-nosed or lyre-headed lizard *Lyriocephalus scutatus* was collected at Godekande in Hiniduma, bordering on the great Sinharaja rain forest, on September 29, 1974, and one of the uropeltid snake *Pseudotyphlops philippinus* from Dewatura Estate below Namunukula on November 23, 1974. The specimen of *L. scutatus* was infested with nematodes of which 28 immature females were recovered from the duodenum and 110 adult worms from the rectum. Of the latter, 3 males and 30 females belong to the genus *Meteterakis*, while 33 males and 44 females belong to a new genus close to *Meteterakis*. The 28 immature females from the duodenum belong to one or the other of the two species in the rectum, as seen by the differences in their head structure. The specimen of *Pseudotyphlops philippinus* had 1 male and 6 female nematodes in the rectum, also belonging to the same species of *Meteterakis* as that found in the rectum of *Lyriocephalus scutatus* from Godekande.

Description:

The worms (4 males and 36 females) are small, with sessile body papillae and a cuticular inflation at the head region. The head is distinctly set off from the rest of the body, but is not separate as in the Spinicaudinae (*fig. 14*). The mouth has three distinct rounded lips, one dorsal and two ventro-lateral, each provided with a single pharyngeal tooth and two papillae, one papilla being larger than the other. The amphids are situated, one on each of the ventro-lateral lips (*fig. 15*). A cuticular flange projects anterior to each lip mass.

The mouth leads into a distinct, relatively long pharynx which is followed by a long narrow muscular oesophagus that ends in a pear-shaped valvulated bulb. The nerve ring lies anterior to the excretory pore which is situated ventrally and leads into a lobulate excretory vesicle.

The intestine is simple and swollen at its anterior end, where it meets the oesophagus, and at this point it is wider than the post-oesophageal bulb.

Male:

The tail bears three pairs of small sessile papillae, is curved ventrally and ends in a sharply pointed, terminal spike (*fig. 17 and 18*). Narrow caudal alae are present, each supported by four pairs of fleshy papillae, two pairs lateral to the pre-cloacal sucker and two pairs lateral to the cloaca. In addition are found a number of smaller sessile papillae randomly distributed. The pre-cloacal sucker is small and surrounded by a chitinous rim.

The spicules are large, equal and similar in form and structure. They are strongly curved ventrally at their anterior ends, narrow rapidly about half-way along their

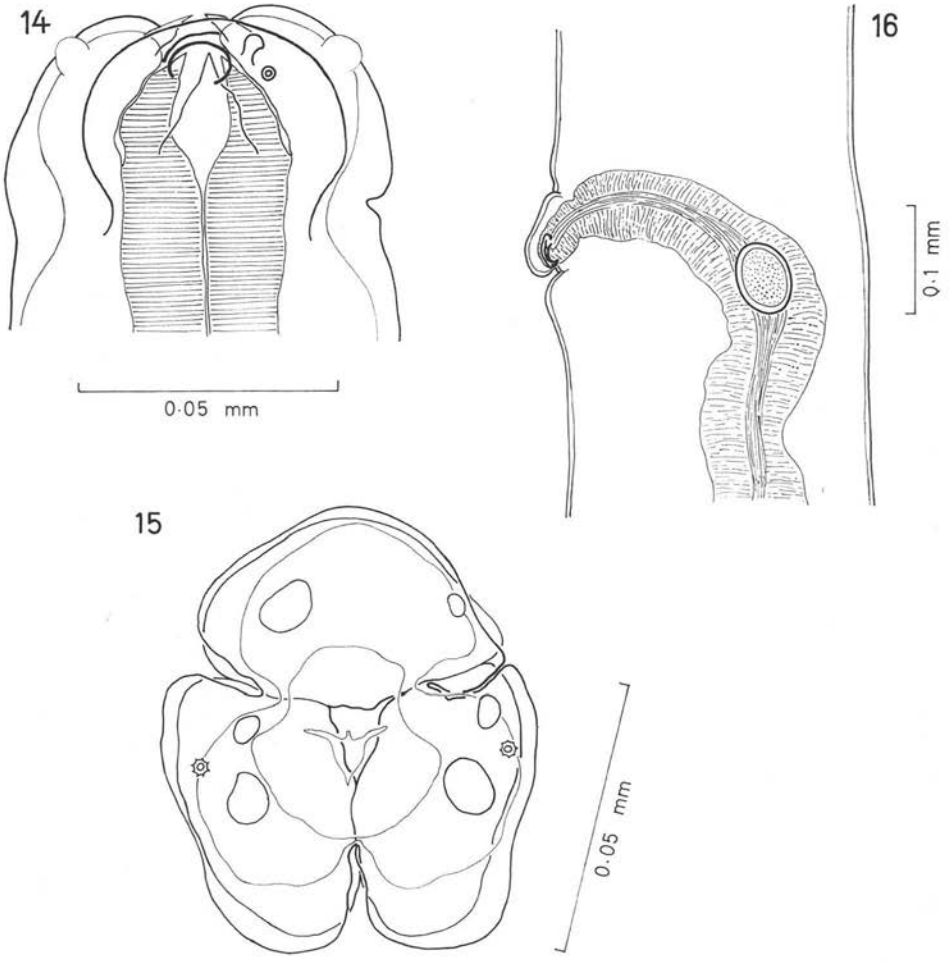

FIG. 14-16. — *Meteterakis sinharajensis* sp. nov. Anterior region.

length, and from there on are alate. They are strongly tessellated throughout their length, the alae being only feebly tessellated. The most characteristic feature of each spicule is its conical tip where the alae are non-tessellated and hyaline in appearance (*fig. 19*). A gubernacular mass is present.

Female:

The vulva is situated anterior to the middle of the body and is covered by a prominent flap of the anterior lip (*fig. 16*). It opens into a distinct vagina which turns posteriorly and divides into two parallel uteri containing thick-shelled eggs. The tail is long and pointed.

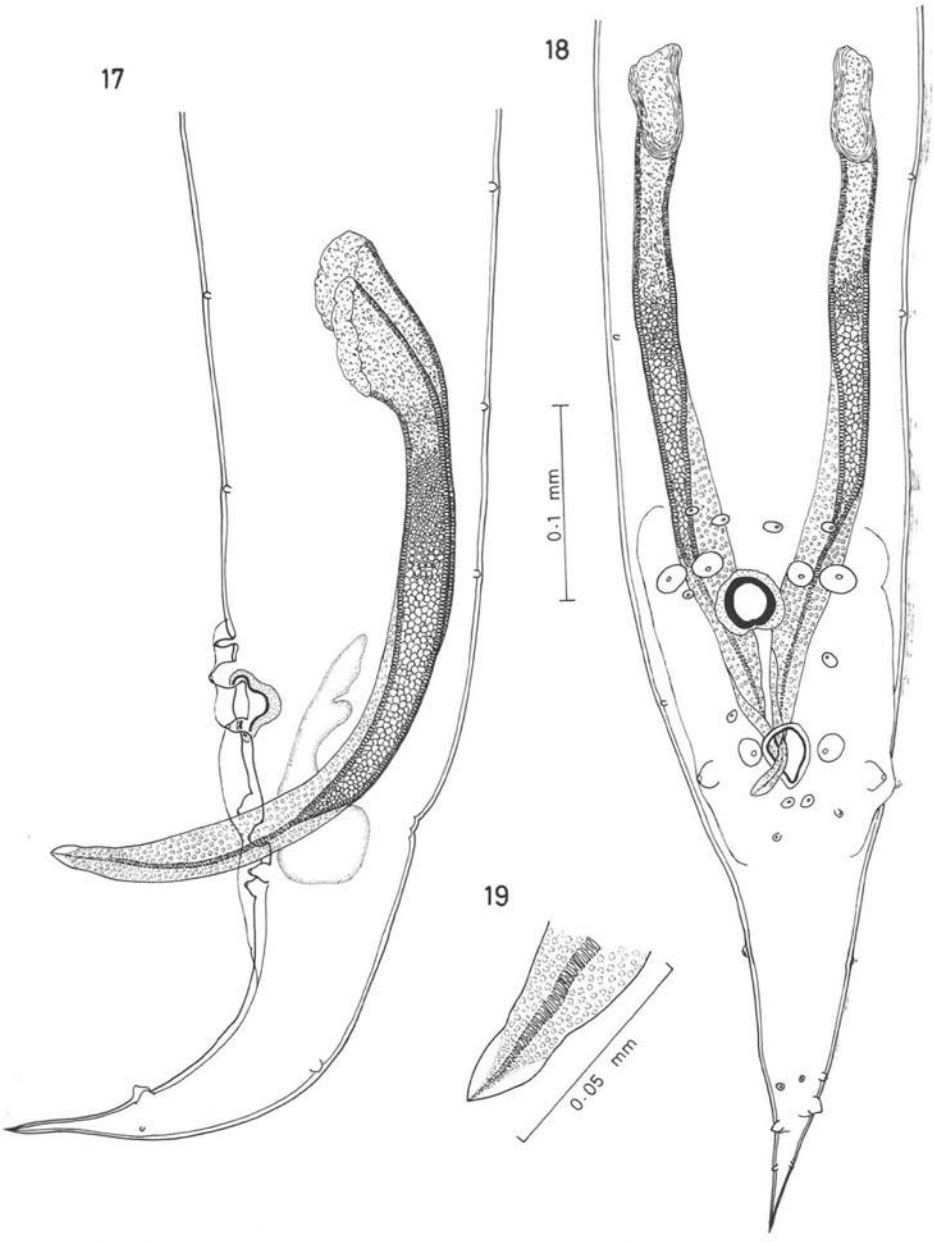

FIG. 17-19. — *Meteterakis sinharajensis* sp. nov. Posterior region of two males.

TABLE VII. — Measurements (in mm.) of *Meteterakis sinharajensis*

	From *Lyriocephalus scutatus*		From *Pseudotyphlops philippinus*	
	Male (3)	Female (8)	Male (1)	Female (2)
Body length	2.445-3.589	2.638-4.595	5.225	5.797-8.258
Body width	0.190-0.240	0.190-0.290	0.255	0.334-0.349
Head diameter	0.062-0.074	0.066-0.082	0.041	0.053-0.057
Pharynx length	0.094-0.107	0.098-0.119	0.082	0.094-0.107
Œsophagus length	0.731-0.826	0.889-1.191	0.874	1.128-1.144
Length of post-oes. bulb.	0.143-0.159	0.111-0.207	0.175	0.191-0.222
Breadth of post-oes. bulb.	0.111-0.143	0.111-0.175	0.159	0.207-0.254
Nerve ring from ant. end	0.262-0.328	0.271-0.398	0.332	0.353-0.385
Excretory pore from ant. end	0.349-0.476	0.318-0.524	0.556	0.667-0.699
Sucker diameter	0.037-0.041	—	0.041	—
Distance from sucker to cloaca	0.049-0.066	—	0.103	—
Spicule length	0.344-0.451	—	0.537	—
Tail length	0.189-0.250	0.286-0.392	0.230	0.381-0.413
Vulva from ant. end	—	1.144-2.271	—	2.684-3.018
Egg dimensions	—	0.0656-0.0820 × 0.0369-0.0451	—	0.0615-0.0656 × 0.0369-0.0410

Discussion:

The main features that distinguish the present form from all other species of *Meteterakis* hitherto recorded are:

1) the head which is distinctly set off from the rest of the body;

2) the two outer cephalic papillae on each lip, one of which is distinctly smaller than the other;

3) the distribution of the large fleshy papillae supporting the caudal alae, two pairs being lateral to the precloacal sucker and two pairs lateral to the cloaca, in contrast to that seen in other members of the genus where there are usually three pairs (exceptionally four), of which two (exceptionally three) lie about the level of the pre-cloacal sucker and the remaining pair at the level of the cloacal opening;

4) the conical shape of the tip of the spicule, which is neither narrowly tapering to a point as in *M. longispiculata* nor distinctly set off as a separate cap-like or dome-shaped prominence as in *M. baylisi.*

We therefore consider the present form to be a new species and name it *Meteterakis sinharajensis*. In the absence of any noteworthy morphological differences between the specimens found in the two different hosts, the all-round differences in size-ranges appear to be host-determined rather than specific differences.
Type-specimens: Reg. No. RTS 41.

Cometeterakis lyriocephali gen. et sp. nov.

(Nematoda : Heterakidae : Meteterakinae)
(*fig. 20-26*)

Description:

The worms (33 males and 44 females) from the rectum of the same specimen of *Lyriocephalus scutatus* collected at Godekande on September 29, 1974, are of medium size, with a few small sessile body papillae. The anterior end has the typical heterakid structure. The mouth is bounded by three small but distinct lips, each bearing two papillae. In addition, each ventro-lateral lip bears an amphid (*fig. 21*). A cuticular flange projects anterior to each lip mass. Each lip is also provided with a pharyngeal tooth. The dorsal tooth has a characteristic tridentated edge, in contrast to the two lateral teeth each of which has a single pointed edge (*fig. 22*).

The mouth leads into a distinct pharynx followed by a long muscular oesophagus which ends in a pear-shaped bulb (*fig. 20*). The nerve ring encircles the oesophagus anterior to the excretory pore which is situated ventrally and opens into an excretory vesicle. The intestine is simple.

Male:

The most striking feature of the male is the difference in size between the two spicules, the left one being distinctly longer and stouter than the right. They however have the same shape and structure, being non-alate and strongly tessellated throughout their length. The anterior end of each spicule is expanded and curved ventrally, and the posterior end has a characteristic kink followed by an upward curvature leading to the pointed tip (*fig. 25*).

The tail carries three pairs of small sessile papillae, is curved ventrally and ends in a sharply pointed terminal spike (*fig. 23 and 24*). Large caudal alae are present, supported by three pairs of fleshy papillae, two pairs being lateral to the pre-cloacal sucker and one pair lateral to the cloaca. There are, in addition, a varying number of smaller sessile papillae that are asymmetrically distributed, there being more on the right side, which carries the smaller spicule. A gubernacular mass is present.

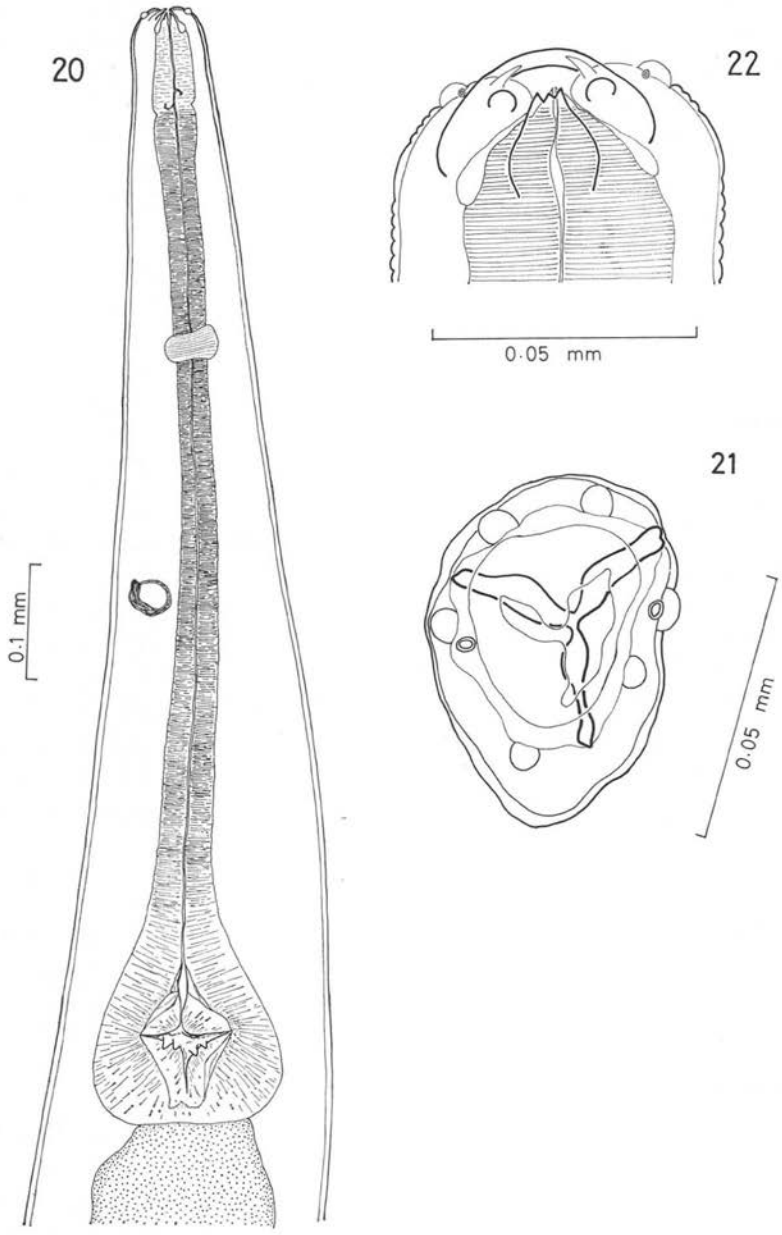

FIG. 20-22. — *Cometeterakis lyriocephali* gen. et sp. nov. Anterior region.

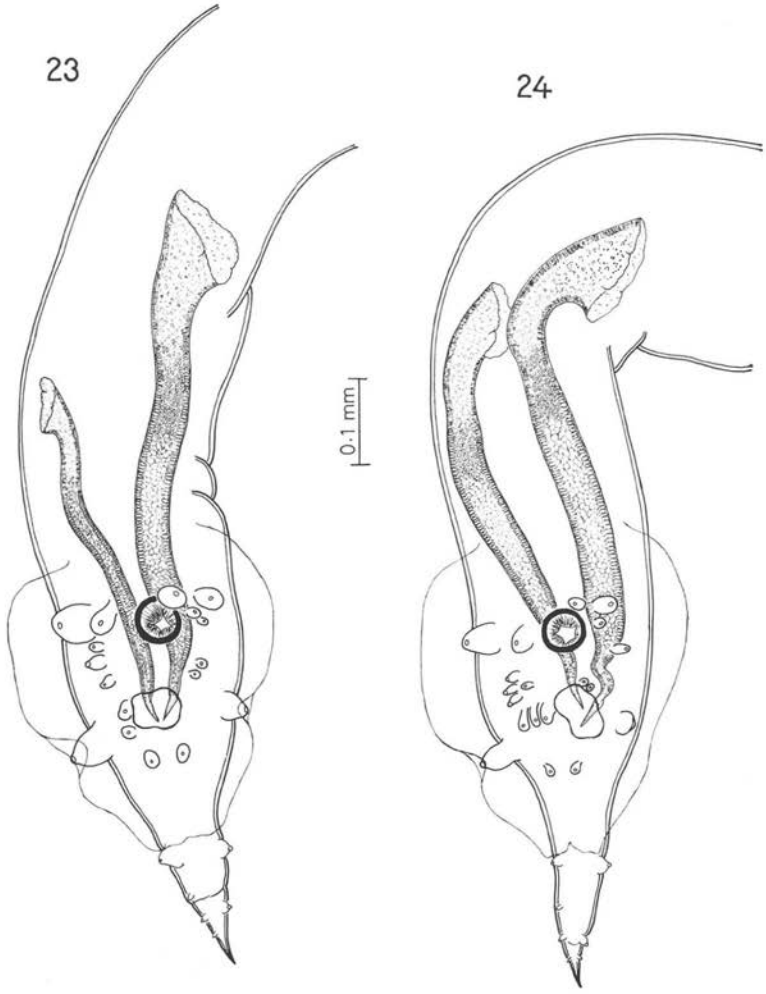

FIG. 23-24. — *Cometeterakis lyriocephali* gen. et sp. nov. Posterior region of two males.

Female:

The female does not differ in general characteristics from that of *Meteterakis sinharajensis*. Its tail too is long and pointed (*fig. 26*), but it is very clearly distinguishable from the latter species in the form of the head, which is more typically like that of a species of *Meteterakis*.

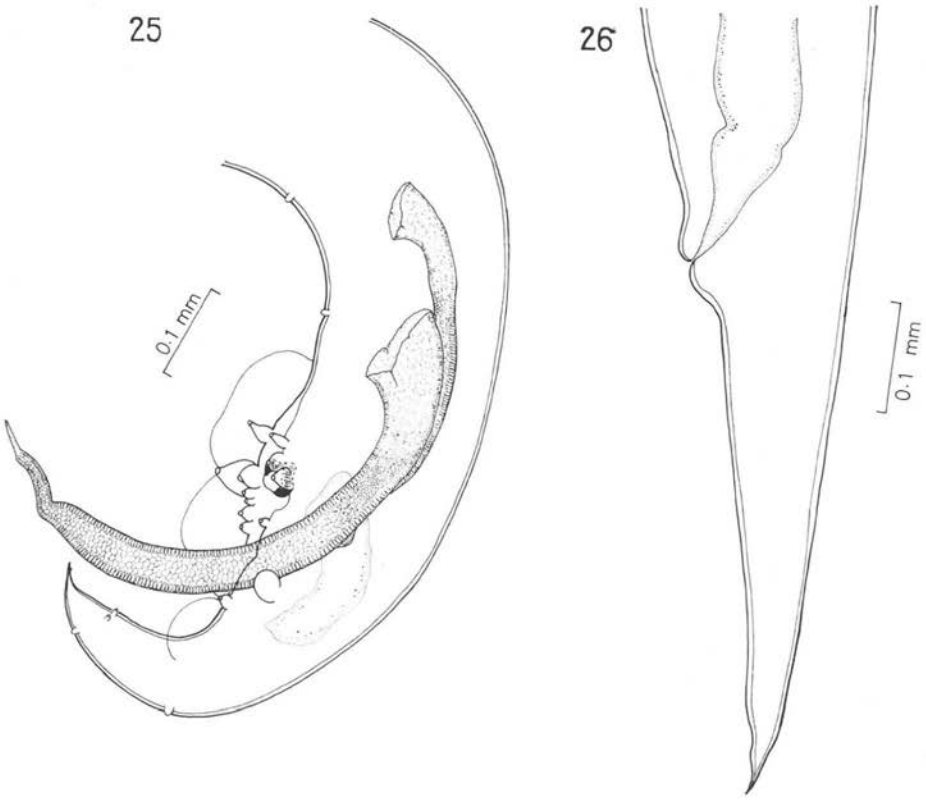

FIG. 25-26. — *Cometeterakis lyriocephali* gen. et sp. nov. Posterior region of male and female.

TABLE VIII. — Measurements (in mm.) of *Cometeterakis lyriocephali*

	Male (14)	Female (1♀)
Body length	4.680-5.990	5.530-6.890
Body width	0.240-0.290	0.290-0.370
Head diameter	0.040-0.050	0.050-0.060
Pharynx length	0.074-0.082	0.078-0.094
Œsophagus length	0.810-0.937	0.874-1.064
Length of post-oes. bulb.	0.207-0.254	0.207-0.270
Breadth of post-oes. bulb.	0.159-0.191	0.191-0.222
Nerve ring from ant. end	0.254-0.306	0.279-0.357
Excretory pore from ant. end	0.476-0.556	0.492-0.588
Sucker diameter	0.049-0.066	—
Distance from sucker to cloaca	0.090-0.123	—
Spicule length (left)	0.595-0.754	—
Spicule length (right)	0.340-0.561	—
Tail length	0.246-0.303	0.397-0.524
Vulva from ant. end	—	2.144-2.749
Egg dimensions	—	0.0451-0.0656 × 0.0369-0.0410

Discussion:

The form described here comes closest to the genus *Meteterakis* in head structure, and in the caudal alae, which are typically supported by three pairs of large fleshy papillae, two pairs lying about the level of the pre-cloacal sucker and the third lateral to the cloacal opening.

In the genus *Meteterakis*, « the paired spicules vary considerably in appearance from species to species, but are always identical in structure and equal in length. The form of the spicules is the best character for distinguishing one species from another ». (Inglis, 1958). The spicules of the present form, however, differ from those of *Meteterakis* spp. in being distinctly unequal in size. We therefore consider the present form as belonging to a new genus whose characters, but for the spicules, are identical with those of the genus *Meteterakis*. We name this genus *Cometeterakis* as it was found co-existing with *Meteterakis sinharajensis* in the same habitat in one and the same host specimen.

The definition of the sub-family Meteterakinae (see: Chabaud, 1965) would therefore have to be changed as follows so as to include forms with unequal spicules as well: — Heterakidae. Lips not separated from the body. Interlabia absent. Male: Precloacal sucker relatively small. Spicules identical in structure, but equal or unequal in size. Caudal alae large and supported by 3 or 4 large papillae. Numerous sessile caudal papillae. Female: Vulva covered by a cuticular dilatation of its anterior lip.

Type-specimens: Reg. No. RTS 42.

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ERRATA

We take this opportunity to make the following corrections in two previous papers (Parts I and IV, of this series) published in this journal.

Tome 45 (1), 1970.

— Page 18. Specific diagnosis : the present paper gives an amended specific diagnosis of *Acanthocephalus serendibensis*.
Host : for 1935, read 1835.

Tome 48 (6), 1973.

— Page 805, fig. 1 : that this is a dorsal view is confirmed, but, contrary to what is shown in the figure, the vitelline ducts cross the gut caeca *ventrally*, and the vas deferens runs *ventral* to the uterus.

— Page 806, paragraph 2 : read : 'It is disposed slightly to the right or left of the median line'.