

# STUDIES ON INDIAN WATER-MITES. I. GENUS *ARRENURUS* (ARRENURIDAE : PROSTIGMATA) FROM WEST BENGAL

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ORIENTAL  
HYDRACHNELLAE

ABSTRACT : This paper contains the description of three new species of genus *Arrenurus* viz. *Arrenurus* (Arr.) *rhopalopetiolatus* sp. nov., *A. (Mega.) dorsu-*  
*setosus* sp. nov. and *A. (Micr.) bengalensis* sp. nov.

## INTRODUCTION

Taxonomy of Water-mites of the genus *Arrenurus* Dugés, 1834 has received good attention in some parts of the world and as a result the global fauna is fairly known. This, however, is not the case with India where the knowledge of not only the genus *Arrenurus* but also of the hydracarine fauna in general is meagre. Till the present work only 36 species of the *Arrenurus* were known from India (VIETS, 1926; WALTER, 1928; LUNDBLAD, 1941 & 1969; COOK, 1967 and NAYAR, 1969). It was therefore felt that extension of the previous works may reveal more species of this genus from India. With this idea survey of different parts of West Bengal was started since 1975 because of availability of watermasses of different nature. Till the end of 1978 such watermasses were visited for collecting these mites. Examination of these materials has till now revealed the existence of 3 new species which are described in the present communication.

## 1. *Arrenurus* (*Arrenurus*) *rhopalopetiolatus* sp. nov. (fig. 1-8)

### ■ Male :

Body with petiole about 900  $\mu$ m-1020  $\mu$ m long with 540  $\mu$ m-640  $\mu$ m as maximum width; anterior end of body concave between eyes; dorsal furrow incomplete and joining lateral sides near caudal lobes (fig. 1), dorsal shield about 350  $\mu$ m-430  $\mu$ m long with 360  $\mu$ m-460  $\mu$ m as maximum width, bearing 3 pairs of setae, 2 pairs of glandularia and a pair of medially situated humps; one pair of humps situated antero-laterally between  $L_1$  and  $L_3$  glandularia, and one more pair located near postero-medial region of cauda (fig. 1, 2). Cauda short, bearing setae of variable shape and length; caudal lobes well developed, distance between outer margins of lobes about 430  $\mu$ m-490  $\mu$ m; posteriorly cauda nearly rounded and bearing a well developed bag-pipe shaped median petiole, 250  $\mu$ m-290  $\mu$ m long with 100  $\mu$ m-140  $\mu$ m as maximum width; dorsally petiole bearing a pair

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of setae near tri-foliated structure and lateral to tri-foliated structure strips of hyaline appendage present which are attached to the petiole.

Epimera I, II, III and IV bearing 3, 1, 3 and 5 pairs of setae, respectively; epimera IV with well developed condyles. Acetabular plates narrow, extending well upto the lateral sides and bearing 4 pairs of setae (fig. 3).

Chelicera (fig. 4) including claw about 130  $\mu$ m-160  $\mu$ m long with 60  $\mu$ m-90  $\mu$ m as maximum width. Lengths of palpal segments given in table; proportion and chaetotaxy of segments shown in fig. 5.

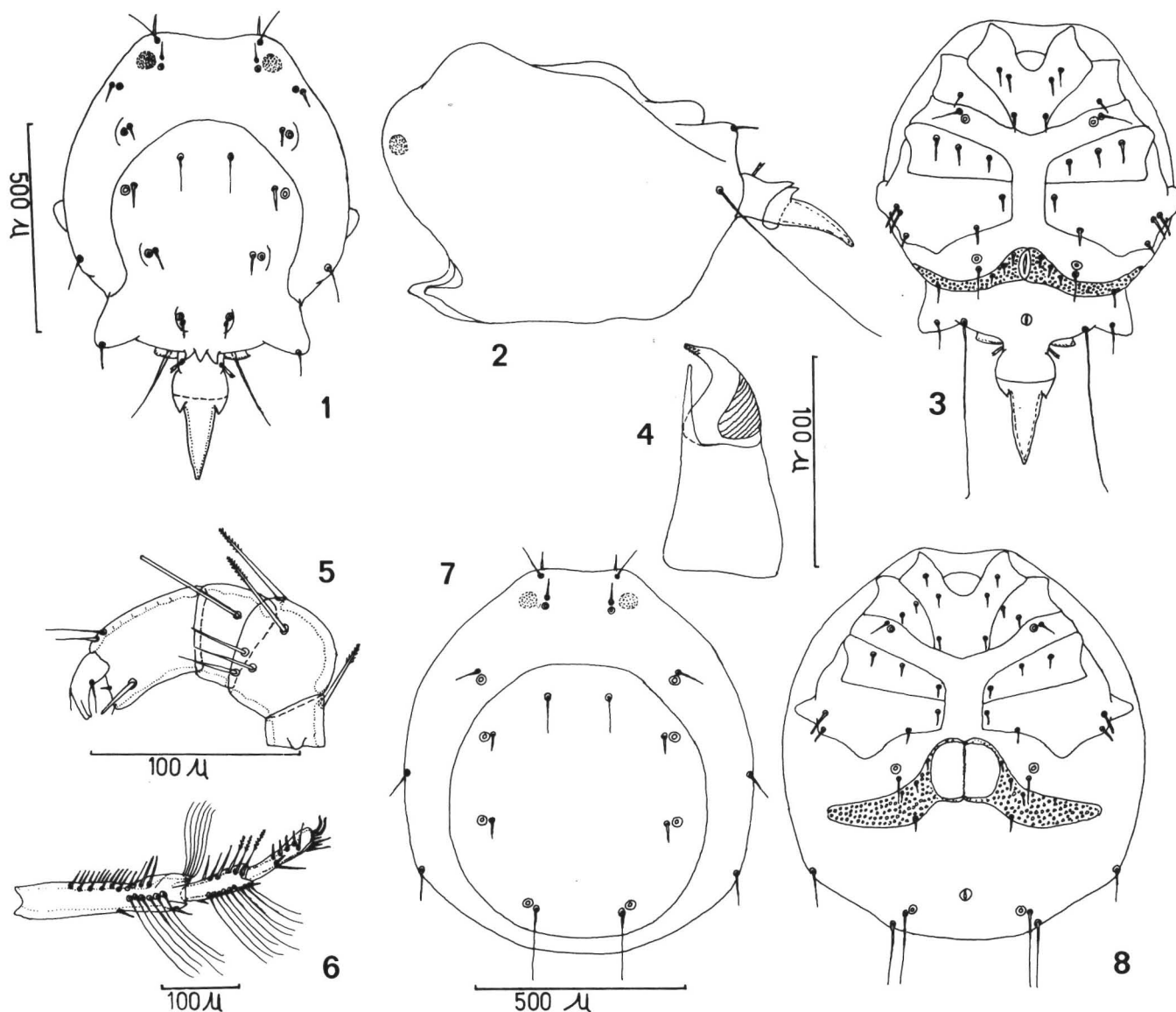


FIG. 1-8 : *Arrenurus* (Arr.) *rhopalopetiolatus* sp. nov., male and female.

1. — Dorsum of male. 2. — Lateral view of male. 3. — Venter of male. 4. — Chelicera of male. 5. — Pedipalp of male. 6. — Genu, tibia and tarsus of leg IV (male). 7. — Dorsum of female. 8. — Venter of female.

Lengths of palpal segments in microns ( $\mu\text{m}$ ).

Segments	1	2	3	4	5
Extensor Surface	20-30	50-60	30-40	60-90	30-40
Flexor Surface	10-20	20-30	10-20	40-70	30-40

Lengths of leg segments shown in the table ; genu of fourth pair legs distally slightly elongated and bearing setae (fig. 6).

Lengths of leg segments in  $\mu\text{m}$ .

Leg Segments	1	2	3	4	5	6 (Excluding claw)
I	60-80	60-80	80-100	100-130	120-150	190-230
II	60-80	90-110	90-120	110-140	120-160	200-240
III	80-100	100-120	100-130	130-160	130-170	170-210
IV	130-160	150-180	160-190	210-250	90-120	100-140

■ Female :

Body about 860  $\mu\text{m}$ -940  $\mu\text{m}$  long with 730  $\mu\text{m}$ -810  $\mu\text{m}$  as maximum width ; dorsal furrow complete ; dorsal shield 620  $\mu\text{m}$ -680  $\mu\text{m}$  in length and 540-600  $\mu\text{m}$  in width, bearing, 4 pairs of setae and 3 pairs of glandularia ; humps and  $L_1$  glandularia absent. Caudal region having 4 pairs of setae and a pair of glandularia (fig. 7, 8) ; postero-lateral margin of cauda slightly wavy.

Epimera II with 2 pairs and epimera IV with 4 pairs of setae. Acetabular plates broader than in male (fig. 8).

Chelicera about 130  $\mu\text{m}$ -150  $\mu\text{m}$  long with 50  $\mu\text{m}$ -70  $\mu\text{m}$  as maximum width.

Lengths of palpal segments in  $\mu\text{m}$

Segments	1	2	3	4	5
Extensor Surface	20-40	40-60	30-40	50-80	30-40
Flexor Surface	10-20	20-30	10-20	30-60	30-40

Lengths of leg segments in  $\mu\text{m}$

Leg Segments	1	2	3	4	5	6
I	50-70	80-100	80-110	90-120	90-120	130-160
II	50-70	80-110	100-120	100-130	110-140	140-170
III	70-90	90-120	100-130	100-130	120-150	140-170
IV	110-120	120-150	140-170	150-180	140-170	120-150

Otherwise as in male.

HOLOTYPE : ♂, INDIA : West Bengal : 24-Parganas, Achipur, 10.XII.1976, pond, S. S. TOMAR Coll., deposited in the Zoological Survey of India, Calcutta. PARATYPES : 7 ♂♂, 5 ♀♀, same data ; 2 ♂♂, West Bengal : 24-Parganas, Dum Dum, 29.XII.1976, pond, S.S.T. Coll. Z.S.I. ; 14 ♂♂, 6 ♀♀, W.B. : 24-Parganas, Noapara, 6.I.1977, S.S.T., Z.S.I. ; 5 ♂♂, 2 ♀♀, W.B. : Howrah, Bally, 16.III.1977, S.S.T. ; 2 ♂♂, 1 ♀, W.B. : 24-Parganas, Bonhooghly, 15.VII.1977 ; 2 ♂♂, 3 ♀♀, W.B. : Hooghly, Chandan-Nagar, 20.VII.1977 ; 3 ♂♂, 3 ♀♀, W.B. : Burdwan, 24.VIII.1977 ; 5 ♂♂, 3 ♀♀, 24-Parganas, Bongaon, 10.IX.1977 ; 10 ♂♂, 6 ♀♀, 24-Parganas, Maheshtala, 4.X.1977.

■ Remarks :

This new species resembles closely the Japanese species, *Arrenurus agrionicolus* Imamura, 1953, in the general faces and can be distinguished from the latter by the nature of the dorso-medial humps, acetabular plates and in the shape of the distomedial portion of petiole.

In some cases the males and the females could be collected in copula.

2. *Arrenurus (Megaluracarus) dorsusetosus* sp. nov.  
(fig. 9-15)

■ Male

Body about 840  $\mu\text{m}$  long with 720  $\mu\text{m}$  as maximum width ; anterior end slightly concave between eyes ; dorsal furrow complete and confined to the antero-medial region of body ; dorsal shield about 280  $\mu\text{m}$  long with 410  $\mu\text{m}$  as maximum width, bearing 3 pairs of setae, 2 pairs of glandularia and a pair of small humps situating postero-laterally ; area antero-lateral to dorsal shield with 5 pairs of setae, 2 pairs of glandularia and a pair of humps locating posterior to eyes ; variable number of setae in two groups present posteriorly to the dorsal shield (fig. 9) near cauda ; structure of humps best seen in lateral view (fig. 10). Cauda short and without lobes, distinctly set off from body proper ; posterior margin of cauda emarginated, bearing 5 pairs of setae and a pair of glandularia.

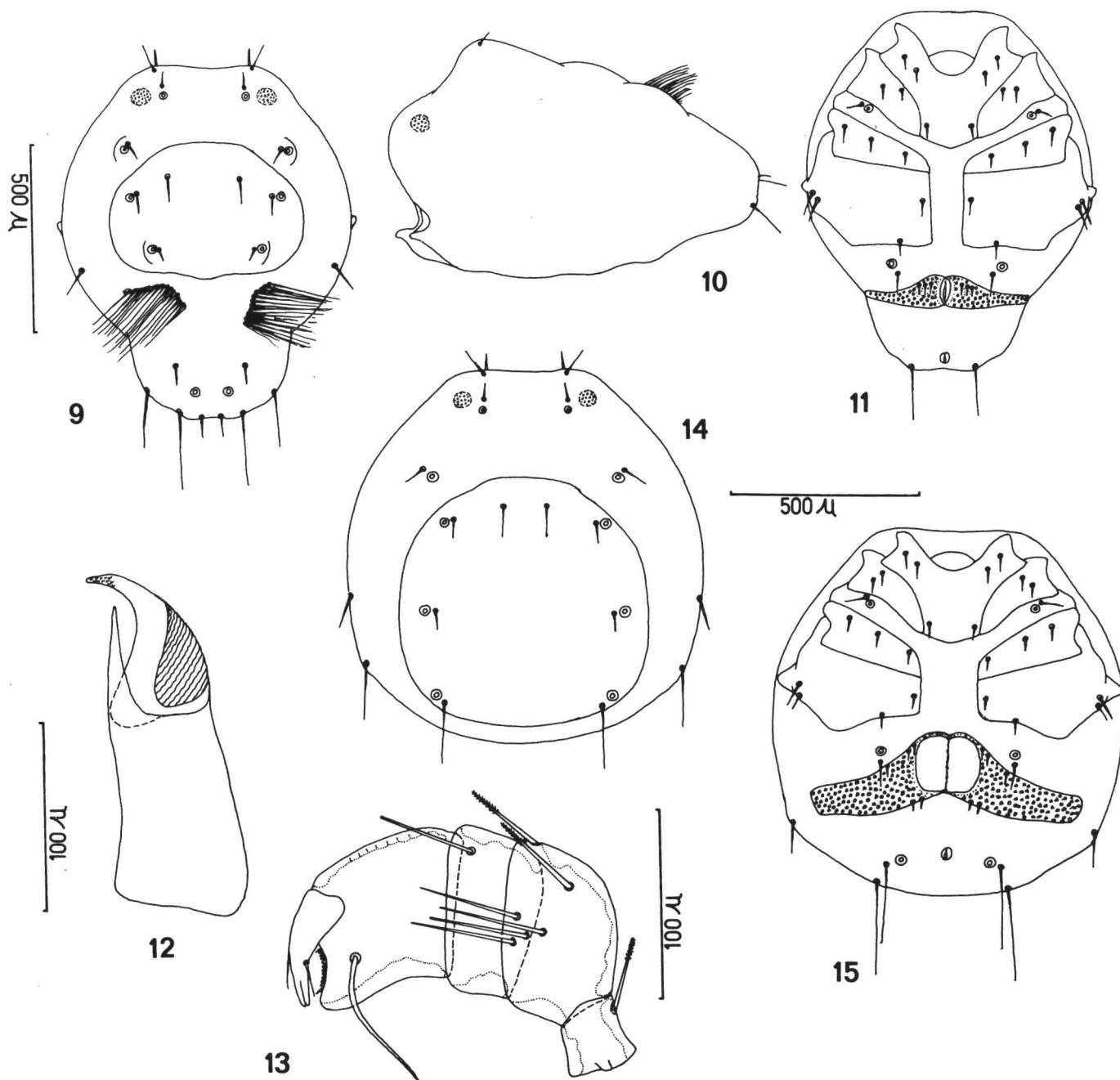


FIG. 9-15 : *Arrenurus* (Mega.) *dorsusetosus* sp. nov., male and female.

9. — Dorsum of male. 10. — Lateral view of male. 11. — Venter of male. 12. — Chelicera of male. 13. — Pedipalp of male. 14. — Dorsum of female. 15. — Venter of female.

Epimera I with 3 pairs of setae, epimera II with 2 pairs, epimera III with 3 pairs and epimera IV with 4 pairs of setae; condyles of epimera IV poorly developed. Acetabular plates narrow and small, extending to the lateral

body margin and bearing 3 pairs of setae (fig. 11). Anal pore lying near posterior margin of cauda.

Chelicera (fig. 12) including claw about 200 μm long with 70 μm as maximum width. Length of palpal segments given in table;

distal end of P-IV bearing 7 sensory hairs ; antagonistic seta highly developed ; proportion and chaetotaxy of the segments shown in fig. 13.

Lengths of palpal segments in  $\mu\text{m}$

Segments	1	2	3	4	5
Extensor Surface	30	100	60	100	60
Flexor Surface	20	40	30	80	50

Lengths of leg segments in  $\mu\text{m}$

Leg	Segments	1	2	3	4	5	6
	I	90	100	110	130	140	180
	II	100	110	120	140	150	180
	III	120	120	140	150	170	170
	IV	130	140	160	190	170	150

■ *Female* :

Body about 920  $\mu\text{m}$  long with 840  $\mu\text{m}$  as maximum width ; humps absent ; dorsal shield approximately as long as its maximum width (660  $\mu\text{m}$ ), bearing 4 pairs of setae and 3 pairs of glandularia. Caudal region having 4 pairs of setae and a pair of glandularia (fig. 14, 15) ; postero-laterally cauda slightly wavy.

Epimeral chaetotaxy similar to male but condyles of epimera IV relatively well developed. Acetabular plates wider than in male and with 5 pairs of setae (fig. 15). Anal pore lying postero-medially near the pair of glandularia.

Chelicera about 220  $\mu\text{m}$  in length and 80  $\mu\text{m}$  in width.

Lengths of palpal segments in  $\mu\text{m}$

Segments	1	2	3	4	5
Extensor Surface	30	110	70	110	60
Flexor Surface	20	40	30	80	60

Lengths of leg segments in  $\mu\text{m}$

Leg	Segments	1	2	3	4	5	6
	I	80	100	120	130	140	160
	II	90	110	130	150	150	170
	III	100	120	130	150	170	170
	IV	130	140	160	190	180	160

Otherwise as in male.

HOLOTYPE : ♂ INDIA : WEST BENGAL : 24-Parganas, Maheshtala, 10.XII.1976, pond, S. S. TOMAR Coll., deposited in the Z.S.I., Calcutta. PARATYPES : 1 ♂, 4 ♀♀, same data.

■ *Remarks* :

In the shape of cauda and of the body of males this new species closely resembles *Arrenurus* (Mega.) *dinotoformis* Cook 1954, A. (Mega.) *neobirgei* Cook, A. (Mega.) *birgei* (Marshall, 1903) and A. (Mega.) *rotundus* (Marshall, 1908) described from North America. However, the present species differs sharply from the North American species by the nature of the dorsal furrow which unlike the North American ones is complete and placed antero-medially. Moreover, presence of a large number of hairs in two groups posterior to the dorsal furrow is very characteristic of this species.

3. *Arrenurus* (*Micruracarus*) *bengalensis* sp. nov.  
(fig. 16-22)

■ *Male* :

Body about 600  $\mu\text{m}$ -660  $\mu\text{m}$  long with 460  $\mu\text{m}$ -520  $\mu\text{m}$  as maximum width ; anteriormost end slightly concave ; dorsal furrow incomplete near mid region of cauda (fig. 16) ; dorsal shield about 320  $\mu\text{m}$ -360  $\mu\text{m}$  long with 320  $\mu\text{m}$ -370  $\mu\text{m}$  as maximum width, bearing 4 pairs of setae and 2 pairs of dorsoglandularia ; area antero-lateral to dorsal shield with 5 pairs of setae and 2 pairs of dorso-lateroglandularia. Cauda short, with short postero-laterally expanded lobes, bearing 4 pairs of setae ; width between lobes about 370  $\mu\text{m}$ -420  $\mu\text{m}$  ; posterior end of cauda with a median cleft ; anterior to cleft present a well developed pit having a small, poorly developed antero-medially located petiole (fig. 16).

Epimera bearing setae. Epimera I with 3 pairs, epimera II with 1 pair, epimera III with 3 pairs and epimera IV with 4 pairs of setae, condyles of epimera IV well developed. Acetabular plates narrow, extending well up on to

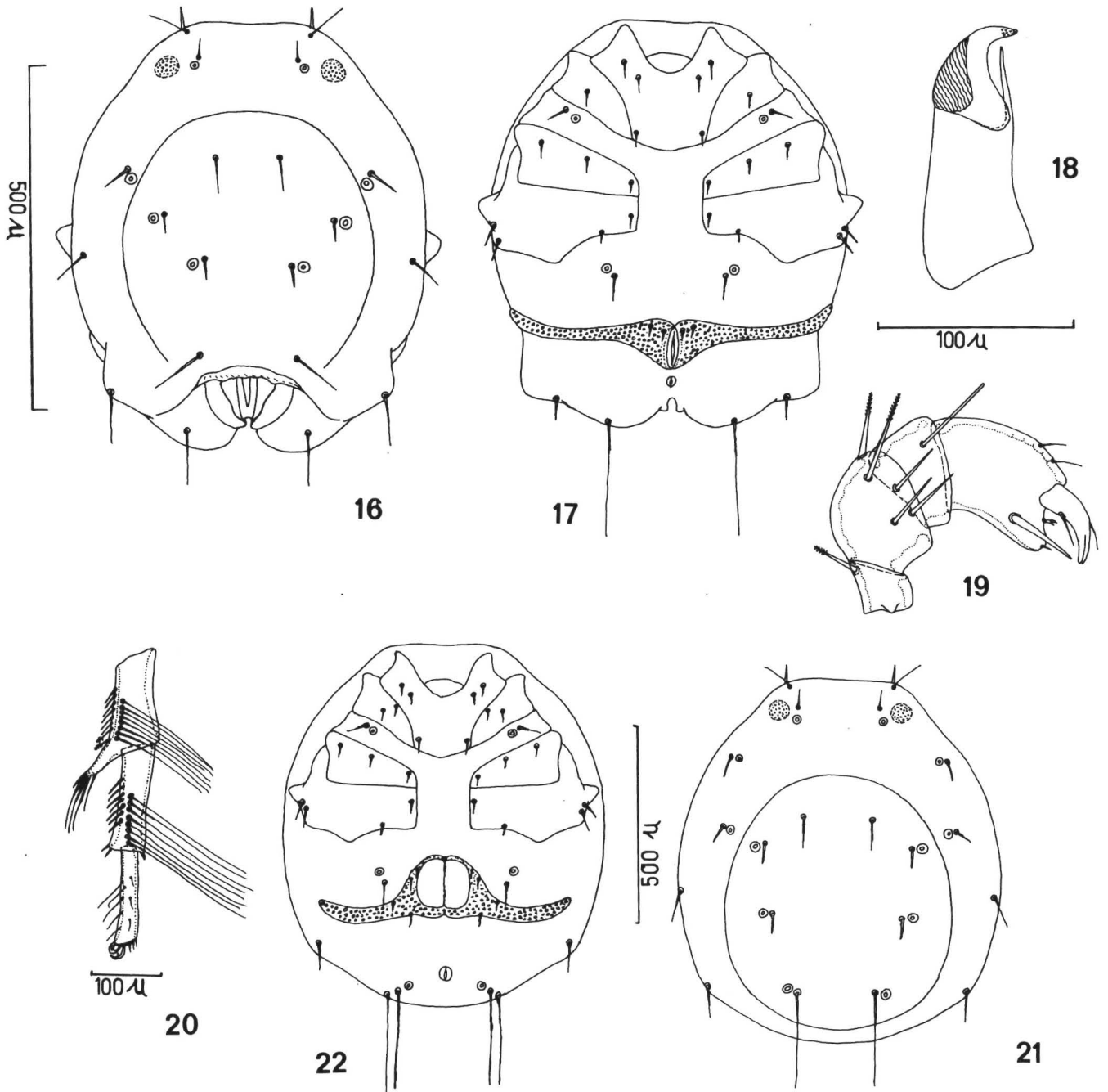


FIG. 16-22 : *Arrenurus* (*Micr.*) *bengalensis* sp. nov., male and female.

16. — Dorsum of male. 17. — Venter of male. 18. — Chelicera of male. 19. — Pedipalp of male. 20. — Genu, tibia and tarsus of leg IV (male). 21. — Dorsum of female. 22. — Venter of female.

sides of body and bearing 2 pairs of setae (fig. 17). Anal pore situated just posterior to gonopore.

Chelicera (fig. 18) including claw about 130  $\mu$ m-150  $\mu$ m long with 50  $\mu$ m-70  $\mu$ m as

maximum width. Lengths of palpal segments given in table ; P-IV bearing a forked sensory hair ; proportion of segments and chaetotaxy shown in fig. 19.

Lengths of palpal segments in  $\mu\text{m}$

Segments	1	2	3	4	5
Extensor Surface	20-30	50-70	40-50	70-90	30-40
Flexor Surface	10-20	20-40	10-20	40-60	30-40

Lengths of leg segments given in the table ; genu of fourth pair legs distally elongated and bearing setae at the tip (fig. 20).

Lengths of leg segments in  $\mu\text{m}$

Leg Segments	1	2	3	4	5	6
I	50-70	50-80	60-90	80-110	90-120	120-150
II	50-70	60-90	60-90	90-120	100-130	140-170
III	70-100	80-110	70-110	100-130	120-150	130-160
IV	100-130	100-130	90-120	160-200	120-150	120-150

■ *Female* :

Body about 800  $\mu\text{m}$ -900  $\mu\text{m}$  long with 700  $\mu\text{m}$ -800  $\mu\text{m}$  as maximum width ; dorsal furrow complete ; dorsal shield 440  $\mu\text{m}$ -520  $\mu\text{m}$  in length, 480  $\mu\text{m}$ -580  $\mu\text{m}$  in width, having 4 pairs of setae and 3 pairs of dorsoglandularia ; area antero-lateral to dorsal shield with 6 pairs of setae and 3 pairs of dorso-lateroglandularia ; cauda postero-laterally waved (fig. 21).

Epimera II with 2 pairs of setae. Acetabular plates shorter than in male and with 3 pairs of setae (fig. 22).

Chelicera about 140  $\mu\text{m}$ -170  $\mu\text{m}$  in length and 60  $\mu\text{m}$ -80  $\mu\text{m}$  in width.

Lengths of palpal segments in  $\mu\text{m}$

Segments	1	2	3	4	5
Extensor Surface	30-40	70-90	40-60	70-100	40-50
Flexor Surface	10-20	20-30	10-20	40-70	40-50

Lengths of leg segments in  $\mu\text{m}$

Leg Segments	1	2	3	4	5	6
I	60-80	80-100	70-100	100-130	100-130	120-160
II	70-90	80-100	80-110	120-150	130-150	130-160
III	70-100	80-110	100-130	120-150	140-160	140-160
IV	130-160	140-170	140-170	170-190	150-180	150-180

Otherwise as in male.

HOLOTYPE : ♂ INDIA : West Bengal : 24-Parganas, Behala, 14.III.1976, pond, S. S. TOMAR coll, deposited in Z.S.I., Calcutta.

PARATYPES : 5 ♂♂, 3 ♀♀, same data ; 8 ♂♂, 1 ♀, West Bengal : 24 Parganas, Agarpura, 26.III.1976, pond S.S.T. Coll., Z.S.I., 7 ♂♂, 4 ♀♀, 24 Parganas, Noapara, I.VI.1976 ; 2 ♂♂, 1 ♀, W.B. : Nadia, Kalyani, 8.VI.1976 ; 2 ♂♂, 2 ♀♀, W.B. : Howrah, Bally, 16.VI.1976 ; 3 ♂♂, 2 ♀♀, W.B. : Burdwan, 20.VI.1976 ; 1 ♂, 2 ♀♀, W.B. : 24 Parganas, Barrackpore, 16.VII.1976 ; 2 ♂♂, 1 ♀, W.B. : Bribhum, Santiniketan, 25.VII.1976 ; 5 ♂♂, 3 ♀♀, W.B. : Bankura, 11.VIII.1976 ; 1 ♂, 1 ♀, W.B. : Murshidabad, Berhampore, 8.IX.1976 ; 4 ♂♂, 4 ♀♀, W.B. : Hooghly, Chandan-Nagar, 6.XII.1976 ; 2 ♂♂, W.B. : Howrah, Srirampore, 6.XII.1976 ; 4 ♂♂, W.B. : 24-Parganas, Maheshtala, 10.XII.1976.

■ *Remarks* :

This new species resembles *Arrenurus* (*Micr.*) *laticaudatus* (Marshall, 1908) in the structure of cauda but differs in the shape of body proper, i.e., in *laticaudatus* it is elongated while in *bengalensis* sp. nov. it is nearly oval. Moreover, in *laticaudatus* the margin of body proper is wavy and in the new species it is smooth.

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REFERENCES

- COOK (D. R.), 1954. — Preliminary list of the Arrenuri of Michigan, Part II. The subgenus *Megaluracarus*. — Trans. Am. micr. Soc., **73** : 1-35.
- COOK (D. R.), 1967. — Water Mites from India. — Mem. Amer. Ent. Inst., **9** : 1-411, figs. 1-901.
- DUGÉS (A.), 1834. — Recherches sur l'ordre des Acariens en général et la famille des Trombidiés en particulier — Premier Mémoire. — Ann. Sci. nat., Paris (S. 2), **1** : 5-46.
- IMAMURA (T.), 1953. — Some watermites from Hiroshima Prefecture. — J. Fac. Sci. Hokkaido Univ. (S. 6) Zool., **11** (2) : 1-39.
- LUNDBLAD (O.), 1941. — Neue Wassermilben. Vorläufige Mitteilung. — Ent. Tidskr., **62** : 97-121.
- LUNDBLAD (O.), 1969. — Indische Wassermilben hauptsächlich von Hinterindien. — Ark. Zool., **22** : 289-443, fig. 1-109.
- MARSHALL (R.), 1903. — Ten species of Arrenuri belonging to the subgenus *Megalurus* Thon. Trans. Wiscon. Acad. Sci., **14** (1) : 145-172.
- MARSHALL (R.), 1908. — The Arrenuri of the United States. — Trans. Am. micr. Soc., **28** : 85-140, fig. 1-127.
- NAYAR (E.), 1969. — New species of Watermites (Hydracarina) from Kerala. Part II. — Bull. Ent. ent. Soc. India., **10** : 71-77, fig. 18-39.
- VIETS (K.), 1926. — Indische Wassermilben. — Zool. Jb. (Syst.), **52** (5-6) : 369-394, fig. 1-34.
- WALTER (C.), 1928. — Zur Kenntnis der Mikrofauna von British Indien. II. Hydracarina. — Rec. Indian Mus., Calcutta, **30** : 57-108, fig. 1-43.

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