

THE GENERA *LOMBARDINIELLA* WOMERSLEY, *BOERIHEMIA* N. GEN., *HYLLOSIHEMIA* N. GEN. AND *MORVIHEMIA* N. GEN. (ACARI, MESOSTIGMATA, DIARTHROPHALLIDAE) IN INDONESIA

R. HAITLINGER

Haitlinger, R., 1993-1994. The genera *Lombardiniella* Womersley, *Boerihemia* n. gen., *Hyllosihemia* n. gen. and *Morvihemia* n. gen. (Acari, Mesostigmata, Diarthrophallidae) in Indonesia. *Misc. Zool.*, 17: 87-97.

The genera Lombardiniella Womersley, Boerihemia n. gen., Hyllosihemia n. gen. and Morvihemia n. gen. (Acari, Mesostigmata, Diarthrophallidae) in Indonesia.— Three genera and four new species of diarthrophallid mites from Indonesia are described and illustrated: *Boerihemia* n. gen., *Hyllosihemia* n. gen., *Morvihemia* n. gen., *Lombardiniella rogburi* n. sp. from Batjan Island; *Boerihemia ajzoni* n. sp., *Hyllosihemia belerofoni* n. sp. and *Morvihemia ghizari* n. sp. from Sumatra. A classification key for the genera of the subfamily Diarthrophallinae is given.

Key words: Acari, Diarthrophallidae, Indonesia.

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Ryszard Haitlinger, Dept. of Zoology, Agricultural University, 50-205 Wrocław, Cybulskiego 20, Polska (Poland).

INTRODUCTION

Diarthrophallid mites are exclusively associated with passalid beetles. At present 52 species classed in two subfamilies Diarthrophallinae Trägårdh, 1946 and Passalobiinae Womersley, 1961 are known. The subfamily Diarthrophallinae includes 11 genera and 20 species mainly occurring in the Old World; of them only three genera and nine species are represented in the Neotropical Region. Among the species occurring in the Old World, one species is known from Japan, two species from New Guinea and three species from Australia; the remaining ones are known from Africa (LOMBARDINI, 1926, 1938, 1943, 1951;

TRÄGARDH, 1946; WOMERSLEY, 1961a, 1961b; HUNTER & GLOVER, 1968a, 1968b, 1968c; ISHIKAWA, 1968; SCHUSTER & SUMMERS, 1978).

The knowledge of the relationships between diarthrophallids and their hosts is still poorly known, undoubtedly there are more of them on passalid beetles than it is at present known. SCHUSTER & SUMMERS (1978) mentioned the list of diarthrophallid mites and their passalid hosts and they stated that diarthrophallids are highly specialized associates of passalid beetles.

The specimens of the subfamily Diarthrophallinae were most frequently observed in antennal and maxillary crevices on the clypeus or in the area of the precoxae;

some specimens were also frused from beneath the elytra (SCHUSTER & SUMMERS, 1978). Such observation was also made by PEARSE et al. (1936) in relation to *Diarthrophallus quercus*; this species resides mainly on the anterior parts of hosts.

In this paper descriptions of three new genera and four new species of the subfamily Diarthrophallinae from Indonesia (Sumatra and Batjan Island) are given.

MATERIAL AND METHODS

The examined specimens of mites were obtained from the collection of undetermined passalids in the Institute of Zoology, Polish Academy of Sciences - IZPAS, Warsaw, Poland. The new species are deposited in the same institute.

The specimens were mainly in maxillary crevices and in the area of the precoxae.

Seta and other terminology follows SCHUSTER & SUMMERS (1978).

RESULTS

Fam. Diarthrophallidae Trägårdh, 1946
Subfam. Diarthrophallinae Trägårdh, 1946
Genus *Lombardiniella* Womersley, 1961

Lombardiniella rogburi n. sp. (figs. 1-9)

Examined material: holotype, ♀, Waterstradt, Batjan Island, Moluccas, Indonesia, from undetermined Passalidae; paratype, ♀, same data as in holotype. Both specimens are deposited in IZPAS.

Description: body elongated with anterior part somewhat larger than the posterior part. Dorsal plate covers all of idiosoma except narrow band at both lateral margins and the

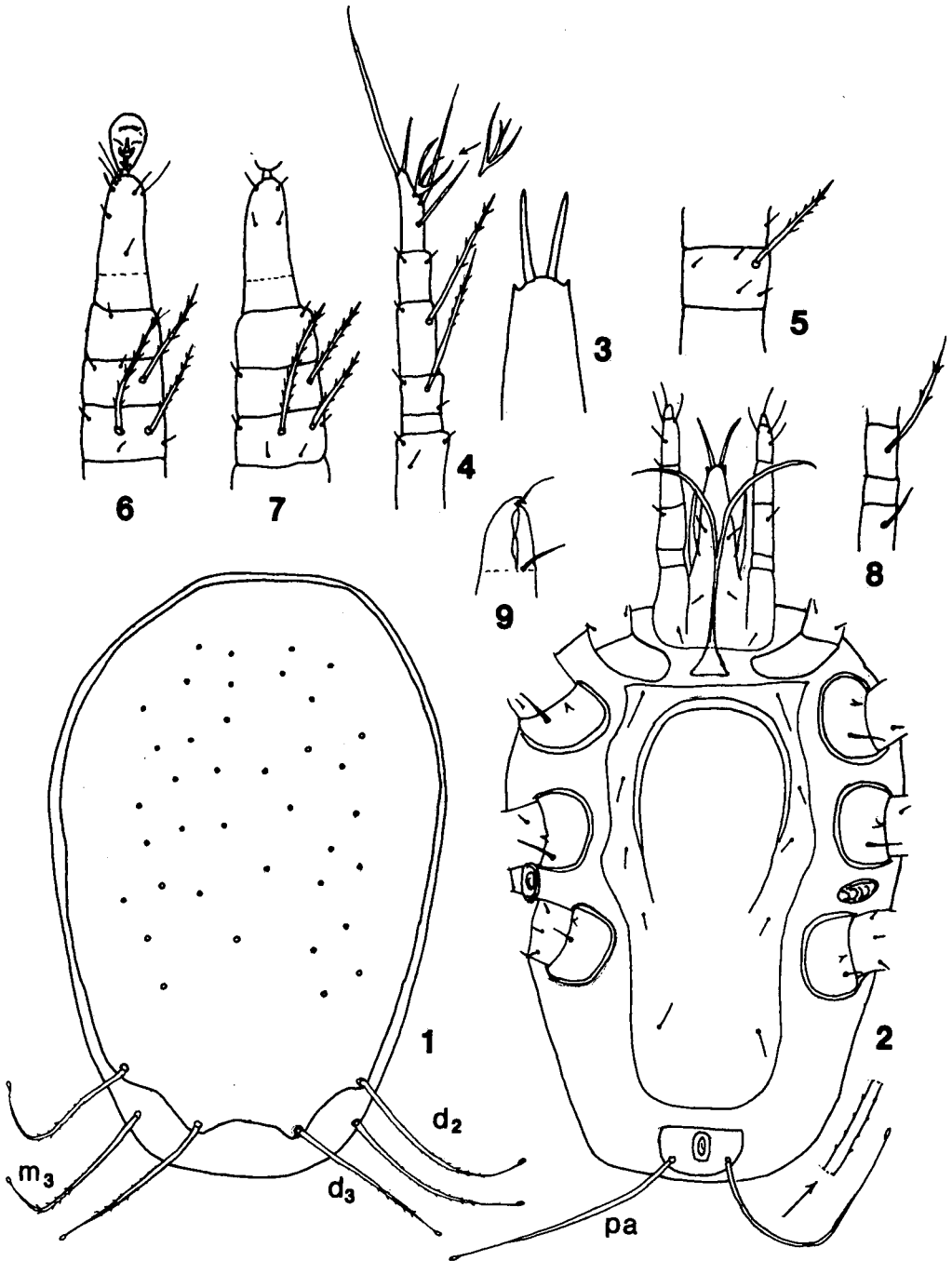
posterior part of opisthosoma. Peripheral body setae: two pairs (d_2 , d_3) placed on dorsal plate, setae m_3 on integument. Dorsum with pores. Setae d_2 and m_3 somewhat longer than d_3 (fig. 1). All these slightly barbed. No dorsomedian microsetae. Sternoventral plate widest between legs II-III; its posterior border not longer than wide between coxae IV. The first sternal setae and the last pair on sternoventral plate are somewhat longer than setae II, III, IV on this plate. All these setae are smooth. Epigynial plate horseshoe-shaped, large in area (fig. 2). L:W = 1.41 in holotype, 1.49 in paratype. Anal plate with long pair of setae (pa) very slightly barbed. Tectum wide with a small two acute lateral processes on anterior border and bearing two spur-like processes (fig. 3).

Leg I with tarsus with long terminala over three times longer than subterminala (table 1). Genu and femur with long seta each, both distinctly barbed, equal in length (fig. 4). Leg II with one barbed macroseta on femur (fig. 5). Legs III and IV bear one barbed macroseta on each genu and with two barbed macrosetae, unequal in length, on each femur (figs. 6-7).

Palps with short setae, except dorsal side of femur; palpfemorala is barbed and distinctly longer than the second nude seta (fig. 8). Malae externae robust, conspicuous, sharply pointed. Cheliceral spur thin (fig. 9).

Measurements of holotype and paratype are given in table 1.

Diagnosis: SCHUSTER & SUMMERS (1978) redefined the genus. They mentioned as its basic features: four pairs of ultralong peripheral body setae, all on opisthosoma and femora III-IV with two barbed macrosetae (in their key is: one or two barbed macrosetae on femora III-IV). The presence of four pairs of ultralong setae, epigynial plate horseshoe-shaped, tectum with two long spurlike processes, one macroseta on femur II and two



Figs. 1-9. *Lombardiniella rogburii* n. sp. ♀: 1. Dorsal view of idiosoma; 2. Ventral view of idiosoma; 3. Tectum; 4. Leg I; 5. Leg II, femur; 6. Leg III; 7. Leg IV; 8. Palp; 9. Chelicerae.

macrosetae on femora III-IV give the reason to include *L. rogburi* n. sp. in the genus *Lombardiniella*. It can be distinguished from *L. lombardinii* Wom. by shape of sternoventral plate; posterior part narrow, in *L. lombardinii* distinctly enlarged, the presence of macroseta on genu III and IV *L.*

lombardinii without such setae, almost twice longer terminala, shorter setae d_2 , d_3 and longer setae pa.

SCHUSTER & SUMMERS (1978) also included in this genus *Brachytremella bornemisszai* Womersley. This species was described on the base of the nymph.

Table 1. Metric data of four new diarthrophallid mites: H. Holotype; P. Paratype.

Measurements (nm)	<i>Lombardiniella</i> <i>rogburi</i> n. sp.		<i>Boerihemia</i> <i>ajzoni</i> n. sp.		<i>Hyllosihemia</i> <i>belerofoni</i> n.sp.		<i>Morvihemia</i> <i>ghizari</i> n. sp.	
	H	P	H	H	H	P	P	
Length of idiosoma	544	568	680	464	448	432	488	
Width of idiosoma	388	384	400	352	332	304	344	
Sternoventral plate-L	400	400	568	416	296	296	328	
Width between coxae IV	142	132	164	96	92	90	108	
Largest width beyond coxae IV	132	142	274	86	100	100	110	
Epigynial plate-L	184	182	210	120	108	106	114	
Epigynial plate-W	130	122	124	84	82	80	92	
Terminala	102	-	80	84	80	80	80	
Subterminala	30	-	22	42	38	42	44	
m_1	56	-	44	134	-	-	-	
m_2	-	-	-	-	-	-	-	
m_3	180	162	144	?	-	-	-	
d_1	-	-	42	?186	-	-	-	
d_2	186	182	206	430	52	56	54	
d_3	164	158	106	194	50	44	52	
pa	224	218	170	132	80	80	88	
Ta I	46	-	48	42	30	30	32	
Ta II	72	82	76	76	60	60	64	
Ta III	74	80	76	76	60	62	60	
Ta IV	78	80	76	76	62	62	?	
Macroseta								
Ge Ia	86	?	80	78	40	40	42	
Ge Ib	-	-	-	64	40	34	38	
Fe Ia	84	80	?	60	34	30	32	
Fe Ib	-	-	-	60	34	28	30	
Fe IIa	66	64	46	26	32	26	30	
Fe IIb	-	-	-	14	-	-	-	
Ge III	66	64	44	16	30	28	28	
Fe IIIa	80	82	40	26	24	26	28	
Fe IIIb	58	58	-	10	22	24	26	
Ge IV	54	62	54	22	30	32	32	
Fe IVa	86	86	52	22	28	26	26	
Fe IVb	54	62	-	10	28	22	26	

According to Schuster & Summers the peculiar bicornate tectum, furthermore the types of *B. bornemisszai* and *L. lombardini* described by Womersley were taken on the same date, from the same species of beetle, from the same locality warranted inclusion of *B. bornemisszai* in the genus *Lombardiniella*. Nevertheless due to the five ultralong setae, of which one pair is placed on podosoma, the inclusion of *B. bornemisszai* in the genus *Lombardiniella* is probably doubtful.

Boerihemia n. gen.

Dorsum bears five pairs of setae, among them are short setae m_1 , d_1 in the anterior part of dorsal plate. Two pairs of setae beyond dorsal plate. All dorsal setae at most semilong. Sternoventral plate enlarged beyond coxae IV; postgenital setae near to epigynial plate. Posterior margin of epigynial plate invisible. The macrosetae formula (for legs and papils): I - Ge 1B, Fe 1B; II - Fe 1B; III - Ge 1B, Fe 1B; IV - Ge 1B, Fe 1B; Palp - Fe 1B.

Type species: *Boerihemia ajzoni* n. sp.

Gender: feminine.

Diagnosis: *Boerihemia* n. gen. differs from other genera of the subfamily Diarthrophallinae by the following combination of the features: opisthosoma and sternoventral plate are distinctly enlarged; dorsal plate bears on podosoma two short and barbed setae; posterior margin of epigynial plate invisible; leg I with one macroseta on genu.

Boerihemia ajzoni n. sp. (figs. 10-17)

Examined material: holotype, ♀, Sumatra, Indonesia, from undetermined Passalidae. The specimen is deposited in IZPAS.

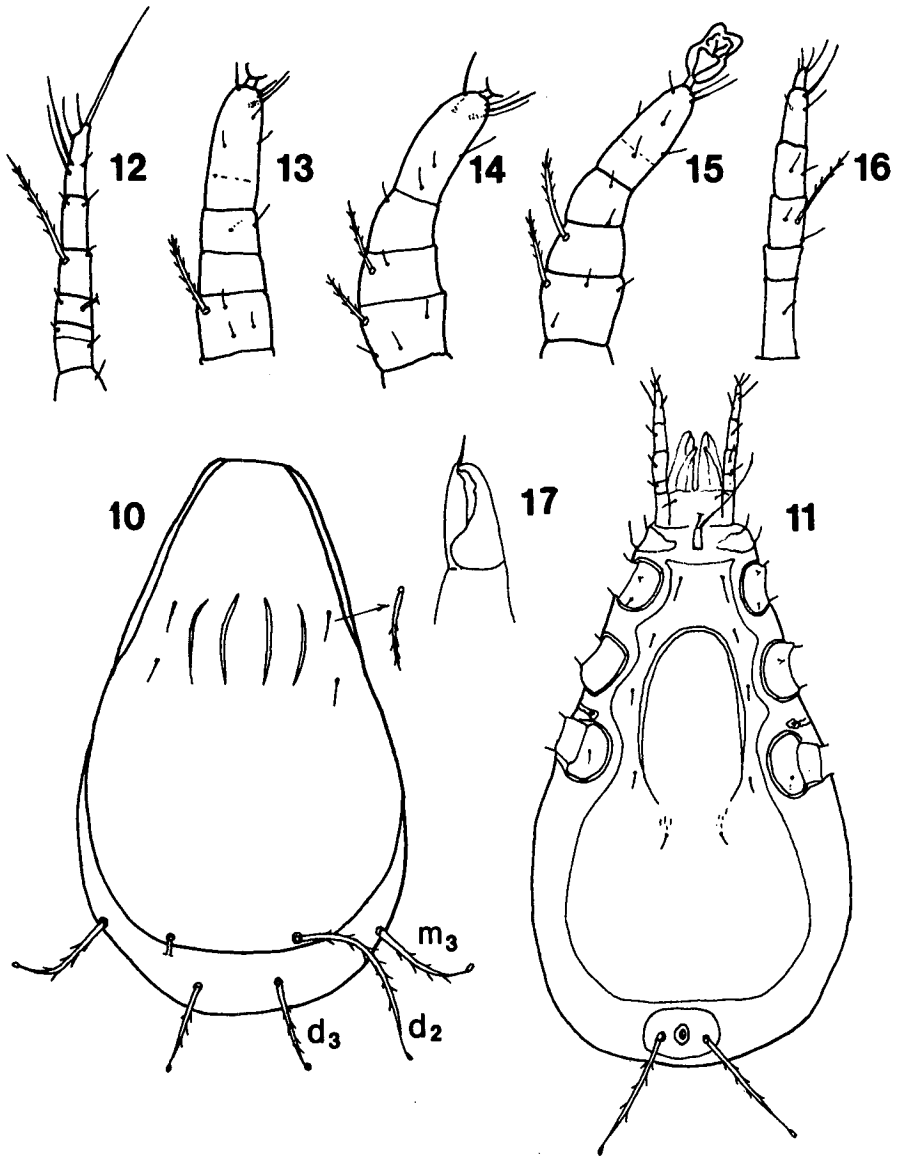
Description: body elongated with enlarged opisthosoma. Dorsal plate covers almost all dorsum except integument of opisthosoma and bands at lateral margins of the body. Dorsal plate bears four cuticular structures, two pairs of weakly barbed and short setae m_1 , d_1 and semilong barbed setae d_2 . Behind this plate semilong barbed setae d_3 (fig. 10). Ventrums with two pairs of semilong barbed setae m_3 and pa. Among semilong setae the longest are setae d_2 . Sternoventral plate enlarged beyond coxae IV. The first sternal setae somewhat longer than the remaining setae on the plate. Postgenital setae shifted to fourth pair of sternalae near to the epigynial plate. This plate is oval, its posterior margin invisible (fig. 11). L:W = 1.69. Tectum invisible.

Leg I with long terminala about four times longer than subterminala. Genu and femur each with long and barbed macroseta (fig. 12). Leg II with only one macroseta on femur (fig. 13). Legs III and IV with rather short barbed macroseta on each genu and femur (figs. 14-15). Palps bear relatively long and barbed seta on femur (fig. 16). Malae internae and externae damaged. Chelicerae with short spur (fig. 17).

Measurements of holotype are given in table 1.

Hyllosihemia n. gen.

Six pairs of ultralong peripheral body setae. Sternoventral plate narrow, specially in opisthosomal part. Anal plate fused with sternoventral plate. Postgenital setae near fourth pairs of sternal setae. Epigynial plate oval. Tectum broad; its anterior plicated margin with divergent process. Terminala about two times longer than subterminala. The macrosetae on legs II-IV short;



Figs. 10-17. *Boerihemia ajzoni* n. sp. ♀: 10. Dorsal view of idiosoma; 11. Ventral view of idiosoma; 12. Leg I; 13. Leg II; 14. Leg III; 15. Leg IV; 16. Palp; 17. Chelicerae.

macrosetae on leg I relatively long. Legs II with two macrosetae on femur. The macrosetae formula: I - Ge 2B, Fe 2B; II - Fe - 2B; III - Ge 1B, Fe 2B; IV - Ge 1B, Fe 2B; Palp - Fe 1B.

Type species: *Hyllosihemia belerofoni* n. sp.

Gender: feminine.

Diagnosis: *Hyllosihemia* n. gen. differs from other genera of the subfamily

Diarthrophallinae by the following combination of the features: shape of tectum (somewhat similar to *Lombardiniella*); shifted postgenital setae to fourth pairs of sternal setae; long and narrow sternoventral plate fused with anal plate; very short macrosetae on genua and femora of legs II-IV.

Hyllosihemia belerofoni n. sp. (figs. 18-25)

Examined material: holotype, ♀, Soekaranda, Sumatra, Indonesia; January 1894, from undetermined Passalidae. The specimen is deposited in IZPAS.

Description: body oval, longer than wide. Dorsal plate covers idiosoma except anterior and lateral part of idiosoma. Dorsum bears five pairs of barbed ultralong setae (d_3 broken), all these setae on the dorsal plate (fig. 18). The ventrum with one pair of barbed long setae; postgenital setae shifted to area between coxae IV near fourth pairs of sternal setae. The anal plate fused with sternoventral plate (fig. 19). The tectum broad, its anterior margin plicated with divergent spur in medial part (fig. 20).

Leg I with terminala two times longer than subterminala. Genu bears two barbed macrosetae, unequal in length; femur with two barbed macrosetae, equal in length (fig. 21). Leg II with two short and barbed macrosetae on femur, unequal in length (fig. 22). Legs III-IV with short macroseta on genu and two macrosetae on femur, unequal in length (figs. 23-24). Palps, except palptarsus, with only two longer setae; on femur one barbed seta (fig. 25). Malae internae long, curved, reaching to tips of palptarsus.

Measurements of holotype are given in table 1.

Morvihemia n. gen.

Three pairs of short and barbed peripheral setae, all on opisthosoma. The dorsal plate with no setae. The tectum broad with smooth anterior margin and two short processes at lateral edges. Postgenital setae whip-like longer than sternals, set far apart on midsection of sternoventral plate. Epigynial plate with posterior margin almost straight. All legs with short and barbed macrosetae. Palps with no barbed setae. The legs macrosetae formula: I - Ge 2B Fe 2B; II - Fe 1B; III - Ge 1B, Fe 2B; IV - Ge 1B, Fe 2B; Palp - Ge 1N.

Type species: *Morvihemia ghirazi* n. sp.

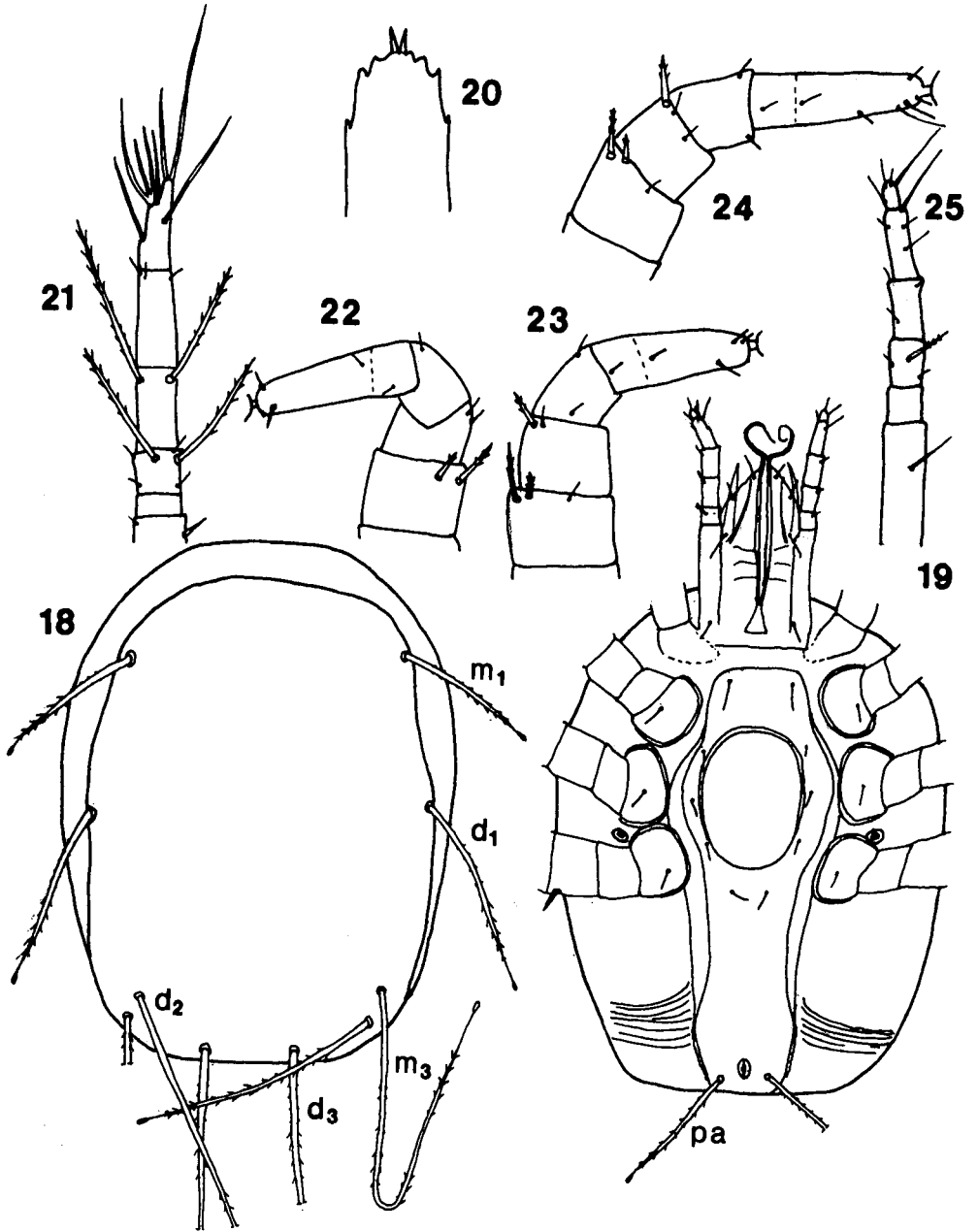
Gender: feminine.

Diagnosis: *Morvihemia* n. gen. differs from other genera of the subfamily Diarthrophallinae by the following combination of the features: three pairs of peripheral barbed setae; no setae on dorsal plate; postgenital setae longer than sternalae; posterior margin of epigynial plate almost straight; tectum broad with smooth anterior margin.

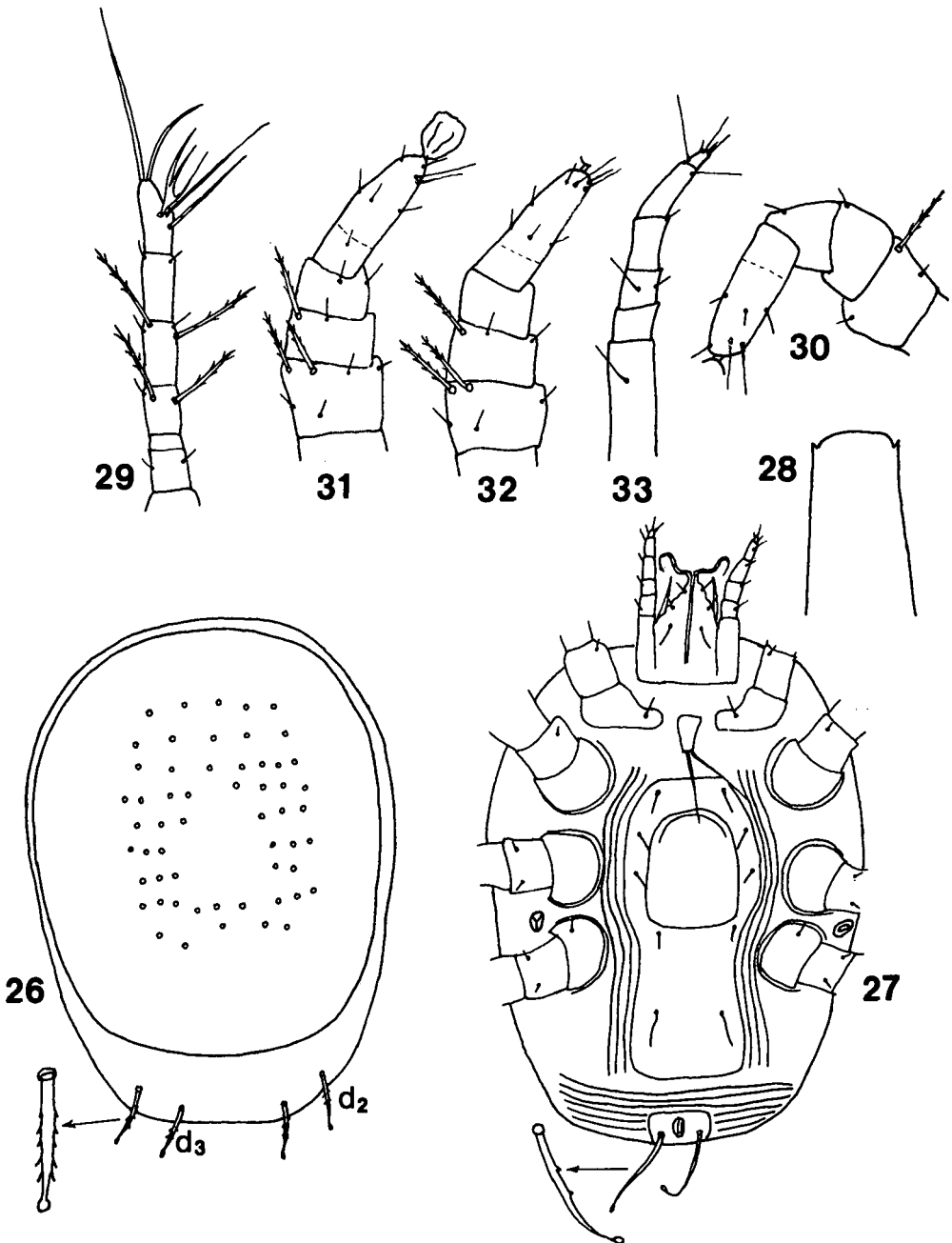
Morvihemia ghirazi n. sp. (figs. 26-33)

Examined material: holotype, ♀, Sumatra, Indonesia, from undetermined Passalidae; paratypes, 2 ♀♀, same data as in holotype. All specimens are deposited in IZPAS.

Description: body oval, longer than wide. Dorsal plate covers all idiosoma except posterior part of opisthosoma. Middle part of the plate with pores. Dorsum bears only two pairs of short and barbed setae d_2 , d_3 at posterior margin of opisthosoma (fig. 26). Ventrum with one pair of paranal setae very slightly barbed about two barbs. Sternoventral plate with enlarged posterior part. Postgenital setae whip-like, longer than sternals, set far



Figs. 18-25. *Hyllosiemia belerofoni* n. sp. ♀: 18. Dorsal view of idiosoma; 19. Ventral view of idiosoma; 20. Tectum; 21. Leg I; 22. Leg II; 23. Leg III; 24. Leg IV; 25. Palp.



Figs. 26-33. *Morvihemia ghizari* n. sp. ♀: 26. Dorsal view of idiosoma; 27. Ventral view of idiosoma; 28. Tectum; 29. Leg I; 30. Leg II; 31. Leg III; 32. Leg IV; 33. Palpus.

apart on mid-section of sternoventral plate. Epigynial plate with posterior margin almost straight (fig. 27). Tectum broad with smooth anterior margin and two short processes at lateral edges (fig. 28).

Leg I with terminala about two times longer than subterminala. Genu bears two barbed macrosetae, unequal in length; on femur two such setae (fig. 29). Leg II with only one barbed macroseta on femur (fig. 30). Legs III and IV bear one macroseta on each genu and two barbed macrosetae on each femur (figs. 31, 32). Palps without barbed setae (fig. 33). Malae internae long and curved.

Measurements of holotype and paratypes are given in table 1.

KEY TO GENERA OF THE SUBFAMILY DIARTHROPHALLINAE BASED ON FEMALES

1. Three pairs of peripheral body setae. Tectum broad with smooth anterior margin. Epigynial plate with almost straight posterior margin *Morvihemia* n. gen.
 - More than three pairs of peripheral body setae. Tectum usually with distinct rami or at least plicated its anterior margin. Posterior margin of epigynial plate rounded or absent 2
2. Opisthosoma and sternoventral plate distinctly enlarged. Dorsal plate on podosomal part with two short and barbed setae. Posterior margin of epigynial plate absent. Leg I with only one macroseta on genu *Boerihemia* n. gen.
 - Opisthosoma not enlarged. Short barbed setae on podosomal part of dorsal plate absent. Posterior margin of epigynial plate present or absent. Leg I with one or two macrosetae on genu 3
3. Tectum with six or more, long primary rami *Acardryas* Schuster & Summers, 1978
 - Tectum with not more than five primary rami 4
4. Sternoventral plate fused with anal plate, genu I, femur I and femur II each with two macrosetae *Hyllosihemia* n. gen.
 - Sternoventral plate and anal plate divided, genu I, femur I and femur II each with one macroseta 5

5. No macrosetae on genua III and IV *Paralana* Schuster & Summers, 1978
 - One macroseta on genua III and IV 6
6. No macrosetae on femora III and IV *Trochognathus* Schuster & Summers, 1978
 - One or two macrosetae on femora III and IV 7
7. One macroseta on femora III and IV 8
 - Two macrosetae on femora III and IV 10
8. All peripheral body setae semilong and smooth; postgenital setae on membrane behind ventral apron *Miniplx* Schuster & Summers, 1978
 - All peripheral body setae ultralong, barbed; postgenital setae on ventral apron 9
9. Six pairs of ultralong peripheral body setae. Sternoventral plate greatly expanded behind coxae IV *Brachytremella* Trägårdh, 1946
 - Seven pairs of ultralong peripheral body setae. Sternoventral plate not such greatly expanded *Tenuiplanta* Schuster & Summers, 1978
10. Four pairs of ultralong peripheral setae; setae m_1 and d_1 absent *Lombardiniella* Womersley, 1961
 - Seven pairs of ultralong peripheral setae; setae m_1 and d_1 present 11
11. Setae d_1 about two times shorter than setae m_1 ; dorsum bears at least three pairs of microsetae; posterior margin of epigynial plate invisible *Eurysternodes* Schuster & Summers, 1978
 - Setae d_1 and m_1 subequal in length, if unequal then dorsum without microsetae; epigynial plate with visible posterior margin 12
12. Postgenital setae on middle one-third of ventral apron; epigynial plate bears posterior margin *Diarthrophallus* Trägårdh, 1946
 - Postgenital setae on posterior one-third of ventral apron or beyond posterior margin of sternoventral plate; posterior margin of epigynial plate present or absent 13
13. Postgenital setae on posterior margin or beyond plate; posterior part of sternoventral plate only somewhat enlarged beyond coxae IV *Malasudis* Schuster & Summers, 1978
 - Postgenital setae relatively far from posterior margin of sternoventral plate; posterior part of sternoventral plate distinctly enlarged behind coxae IV; posterior margin of epigynial plate absent *Notoporus* Schuster & Summers, 1978

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