

## ORIBATID MITES OF THE GENERA *BASILOBELBA* AND *HETEROBELBA* (ACARI: ORIBATIDA: AMEROIDEA) FROM BALE MOUNTAINS NATIONAL PARK (ETHIOPIA)

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ABSTRACT: We describe *Basilobelba gigantea* sp. n. and redescribe *Heterobelba spumosa*, collected in soil of Bale Mountains National Park (African region, Ethiopia). *Basilobelba gigantea* sp. n. is most similar in morphology prodorsal and epimeral setae, number of notogaster setae, morphology of arched scalp-attachment structures, weakly neotrichy on ventral plate to the Ghanaian species *Basilobelba africana*, but differs from it by body size, length of interlamellar setae and number of neotrichous setae on the ventral plate. For the first time the data about morphology of gnathosoma, legs, and length of body setae are given for *Heterobelba spumosa*.

KEY WORDS: oribatid mites, new species, redescription, *Basilobelba gigantea* sp. n., *Heterobelba spumosa*, Bale Mountains National Park, Ethiopia

### INTRODUCTION

In the course of taxonomic studies of oribatid mite fauna of Bale Mountains National Park (Ethiopia, African region) we have found one species belonging to each of two genera of Ameroidea: *Basilobelba* Balogh, 1958 (Basilobelbidae) and *Heterobelba* Berlese, 1913 (Heterobelbidae).

The pantropical genus *Basilobelba* was proposed by Balogh (1958) with *Damaeus retarius* Warburton, 1912 as type species. Currently, the genus comprises 14 species and one subspecies (Subías 2004). Only five species of *Basilobelba* have been recorded from the African region: *B. aethiopica* Bernini, 1988 (Distribution: Ethiopia), *B. africana* Wallwork, 1961 (Ghana), *B. insularis* Mahunka, 1985 (Tropical), *B. monstruosetosa* Mahunka, 1974 (Cameroon), and *B. retaria* (Warburton) (Pantropical and Japan). Distinctive morphological characters of these and other species of *Basilobelba* were given earlier (see Bernini 1988; Balogh and Balogh 2002). Our specimens represent yet another species, which is proposed and described herein.

The genus *Heterobelba* was proposed by Berlese (1913) with *Heterobelba galerulata* Berlese, 1913 as type species. Currently, the genus comprises 14 species and one subspecies (Subías 2004) that are collectively distributed in the Pan-tropical (except Australian region) and southern Palearctic regions. The single species of this genus that is represented in our collections is clearly *Heterobelba spumosa*, which was proposed by Mahunka (1983) from the African region (Tanzania). However, *H. spumosa* was incompletely de-

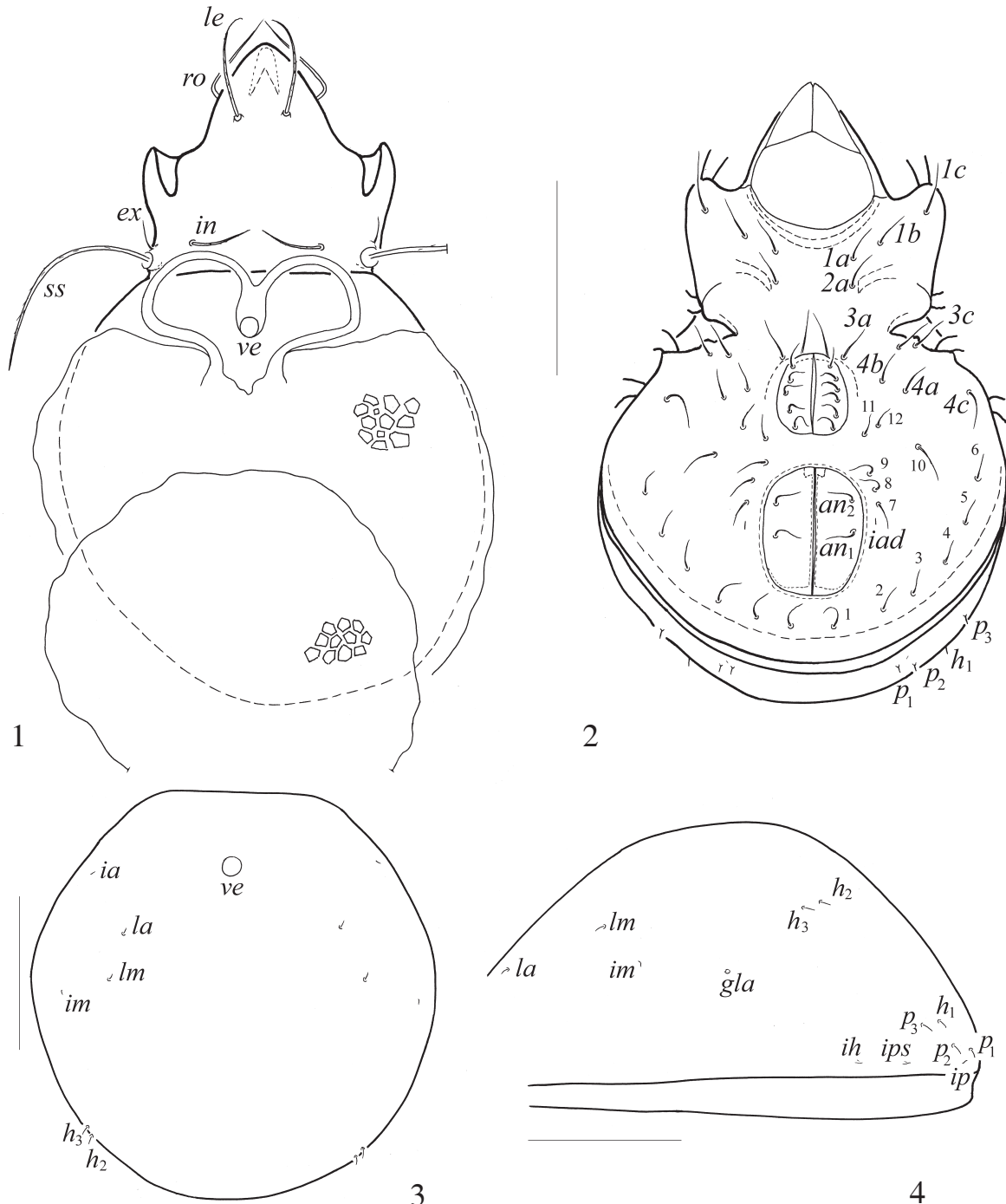
scribed, in that length of body setae, morphology of lamellar setae, morphology of gnathosoma, formulae and homology of leg setae and solenidia were not mentioned. Herein, we redescribe this species based on a paratype and our additional material.

### MATERIAL AND METHODS

Material: two adult specimens of *Basilobelba gigantea* sp. n., and two adult specimens of *Heterobelba spumosa*. The locality and habitat characterization of the collections are given in the respective «Material examined» sections. Paratype of *Heterobelba spumosa* from collection of the Hungarian National History Museum (collected in Tanzania, Mts. Uluguru, 2100 m, 01.01.1980, leg. T. Pócs, sample from litter with humus from stones).

Specimens were studied and illustrated in lactic acid, mounted on temporary cavity slides for the duration of the study. All body measurements are presented in micrometers. Body length was measured in lateral view, from the tip of the rostrum to the posterior edge of the ventral plate, to avoid discrepancies caused by different degrees of notogastral distension. Notogastral width refers to the maximum width in dorsal aspect. Length of body setae was measured in lateral aspect.

Formulae for leg setation are given according to the sequence trochanter–femur–genu–tibia–tarsus (famulus included); formulae for leg solenidia are given according to the sequence genu–tibia–tarsus.



Figs. 1–4. *Basilobelba gigantea* sp. n.: 1 — dorsal view, posterior part of deutonymphal scaps removed; 2 — ventral view, legs partly removed; 3 — notogaster, scaps removed; 4 — lateral view of notogaster, anterior part removed, scaps removed. Scale bars (1, 2, 3) 200 (4) 100  $\mu$ m.

**DESCRIPTION OF NEW SPECIES**

**Family Basilobelbidae Balogh, 1961**

**Genus *Basilobelba* Balogh, 1958**

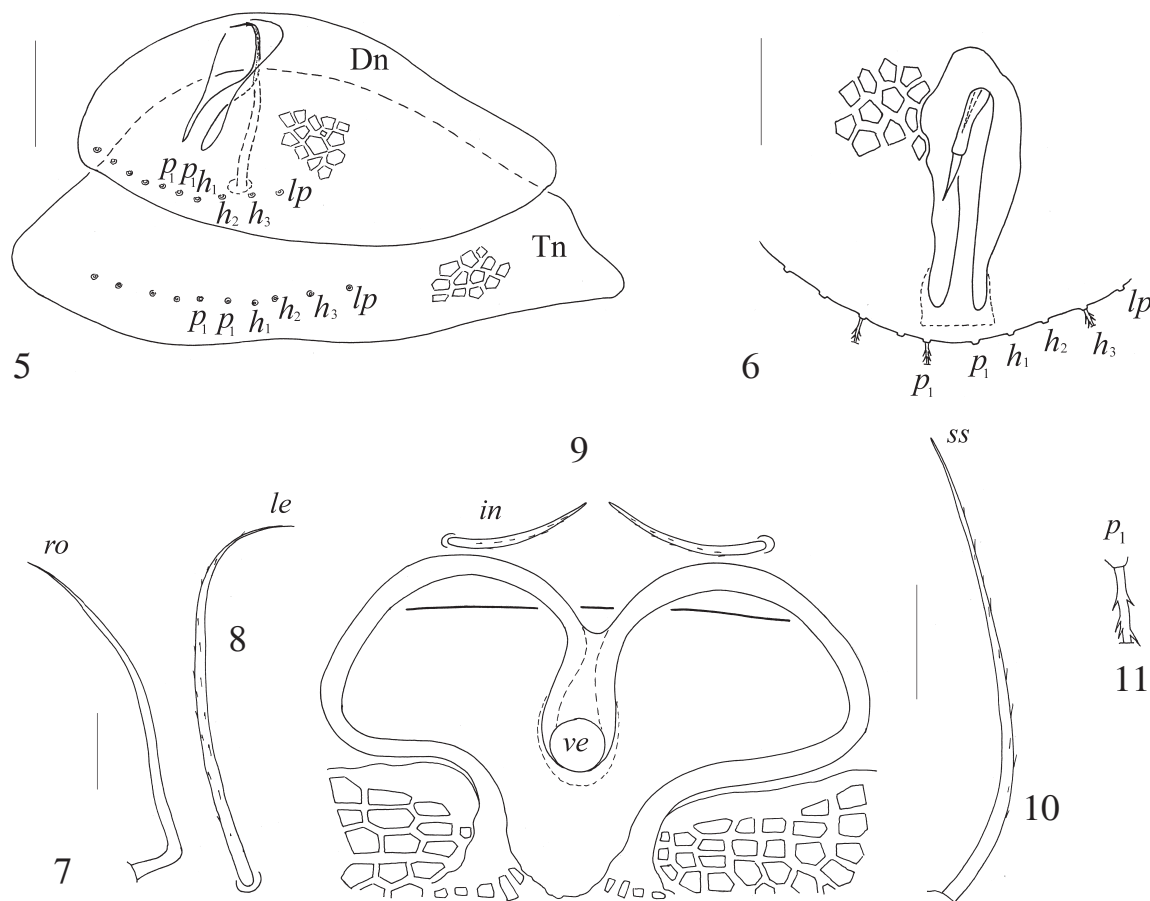
***Basilobelba gigantea* sp. n.**

Figs. 1–18

With character states of *Basilobelba* as proposed by Balogh (1958), and summarized by Balogh and Balogh (1992).

**Diagnosis.** Body size 680  $\times$  448; rostral setae (*ro*) smooth, markedly curved near base; lamellar

setae (*le*) barbed; interlamellar setae (*in*) barbed, directed mediad; sensilli (*ss*) long, with few thin cilia; exobothridial setae (*ex*) short, thin, smooth; arched scalp-attachment structures without setae *c* or their alveoli, their span subequal to distance between bothridia; eight pairs of minute notogastral setae; ventral plate with 12 pairs of neotrichous setae; genital plates with six pairs of setae (rarely a seventh unilaterally); epimeral setae setiform, smooth.



Figs. 5–11. *Basilobelba gigantea* sp. n.: 5 — deutonymphal (Dn) and tritonymphal (Tn) scapals; 6 — posterior part of deutonymphal scalp; 7 — rostral seta; 8 — lamellar seta; 9 — supporting structures and interlamellar setae; 10 — sensillus; 11 — scalpal seta  $p_1$ . Scale bars (5) 100  $\mu\text{m}$ , (6, 9, 10) 50  $\mu\text{m}$ , (7, 8, 11) 20  $\mu\text{m}$ .

**Measurements and form of body.** Body shape typical of genus, measurements of holotype and paratype identical: body length 680, notogaster length 431, notogaster width 448.

**Integument.** Body color pale brown to brown. Cuticle of body smooth, with inconspicuous amorphous cerotegumental layer (except under scapals).

**Prodorsum** (Figs. 1, 7–10). Rostrum rounded in dorsal aspect. Rostral setae 102–110, smooth, markedly curved near the base. Lamellar setae 102–110, barbed. Interlamellar setae 73–77, barbed, directed mediad; their tips nearly touching each other. Sensilli 229, with few thin cilia on dorsal side. Exobothridial setae short, 36, thin, smooth.

**Notogaster** (Figs. 1, 3–6, 11). Covered with reticulate nymphal scapals. Only deutonymphal and tritonymphal scapals present, their morphology and attachments typical for the genus (see Grandjean 1959; Bernini 1988). Attachment arches span distance equal to that between bothridia. Tubercle *ve* well-developed. Morphology of scalpal setae

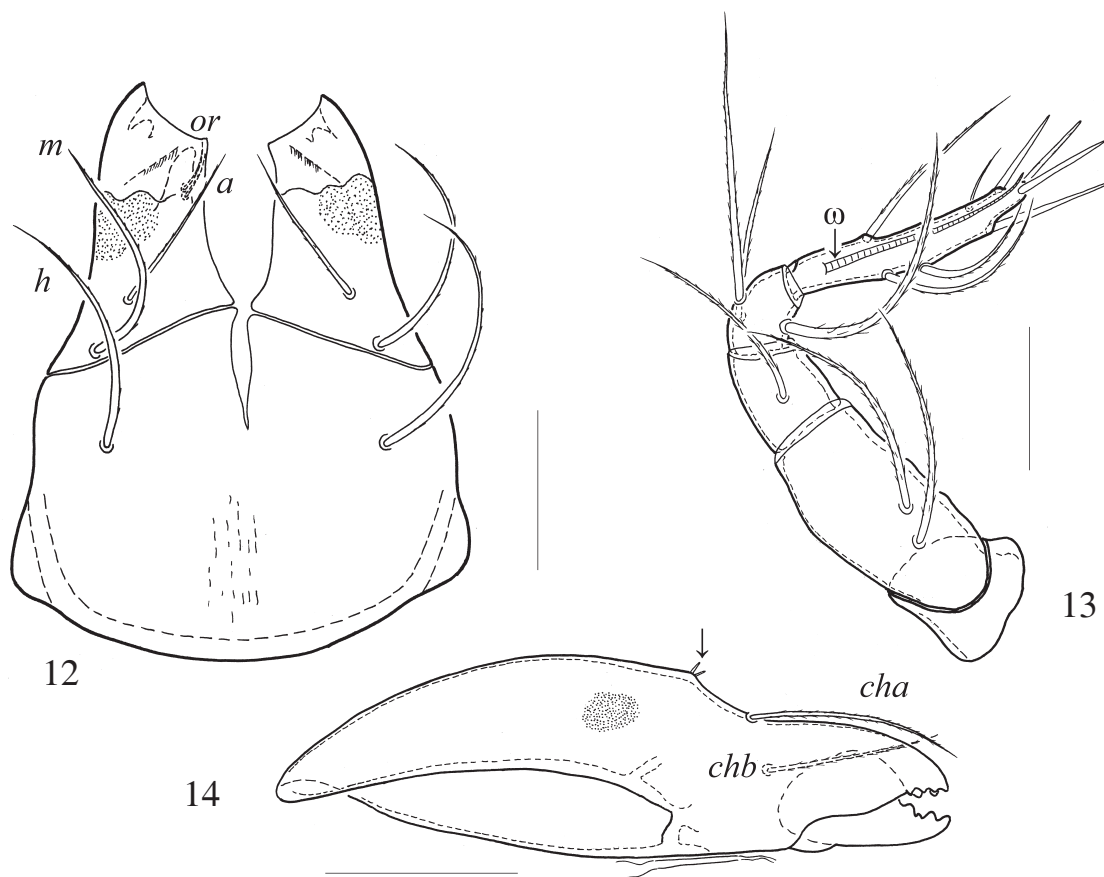
unknown (most damaged or broken from specimens).

Notogaster oval in dorsal view. Eight pairs of minute notogastral setae (*la*, *lm*,  $h_1$ – $h_3$ ,  $p_1$ – $p_3$ ) present. Attachment arches without setae *c* or their alveoli. All lyrifissures (*ia*, *im*, *ip*, *ih*, *ips*) and opisthonotal gland opening (*gla*) developed.

**Anogenital region** (Fig. 2). All setae setiform, smooth: two pairs of anal setae ( $an_1$  and  $an_2$ , 49), six pairs of genital setae (one plate of holotype unilaterally with seven) (45, anterior pair 53), 12 pairs of neotrichous setae (41–49). Lyrifissures *iad* located near and parallel to anal plates.

**Epimeral region** (Fig. 2). Apodemes *ap2* and *apsj* developed. Epimeral setae all similar in form, 53–57, setiform, smooth; formula 3–1–3–3.

**Gnathosoma** (Figs. 12–14). Subcapitulum longer than wide: 180 × 131. Hypostomal setae *h* and *m* long, equal in length (77), setiform, curved, barbed; setae *a* shorter (53), straight, barbed. Lateral lips with two pairs of short (16), setiform, smooth adoral setae (*or*). Palp (length 118) with setation 0–2–1–3–8(+1 $\omega$ ). All setae (except some



Figs. 12–14. *Basilobelba gigantea* sp. n.: 12 — subcapitulum, 13 — palp, 14 — chelicera. Scale bars (12, 14) 50 μm, (13) 20 μm.

Table 1. Leg setation and solenidia of *Basilobelba gigantea* sp. n.\*

Leg	Trochanter	Femur	Genu	Tibia	Tarsus
I	v'	d, (l), bv'', v''	d, (l), v', σ	dφ <sub>1</sub> , (l), (v), φ <sub>2</sub>	(ft), (tc), (it), (p), (u), (a), s, (pv), (pl), l'', v', e, ω <sub>1</sub> , ω <sub>2</sub>
II	v'	d, (l), bv'', v''	d, (l), v', σ	d, (l), (v), φ	(ft), (tc), (it), (u), (a), s, (pv), l'', ω <sub>1</sub> , ω <sub>2</sub>
III	l', v'	d, l', ev'	d, l', σ	d, l', (v), φ	(ft), (tc), (it), (u), (a), s, (pv)
IV	v'	d, l', ev'	d, l'	d, l', (v), φ	ft'', (tc), (u), (a), s, (pv)

\*Roman letters refer to normal setae (*e* — famulus), Greek letters refer to solenidia; *dφ* — solenidion and seta coupled. One apostrophe (') marks setae on anterior and double apostrophe (") setae on posterior side of the given leg segment. Parentheses refer to a pair of setae.

on tarsus) long, setiform, barbed. Palpal eupathidium and solenidion independent; solenidion very long (little shorter than tarsus), pressed to surface of tarsus. Chelicera (length 164) with two small thorns dorsally. Cheliceral setae long, setiform, barbed: *cha* (61) longer than *chb* (41).

**Legs** (Fig. 15–18). Formulae of leg setation and solenidia: I (1–5–4–5–20) [1–2–2], II (1–5–4–5–14) [1–1–2], III (2–3–2–4–13) [1–1–0], IV (1–3–2–4–10) [0–1–0]; homology of setae and solenidia indicated in Table 1. Most setae well barbed; some setae rather thick, with well developed thickened barbs.

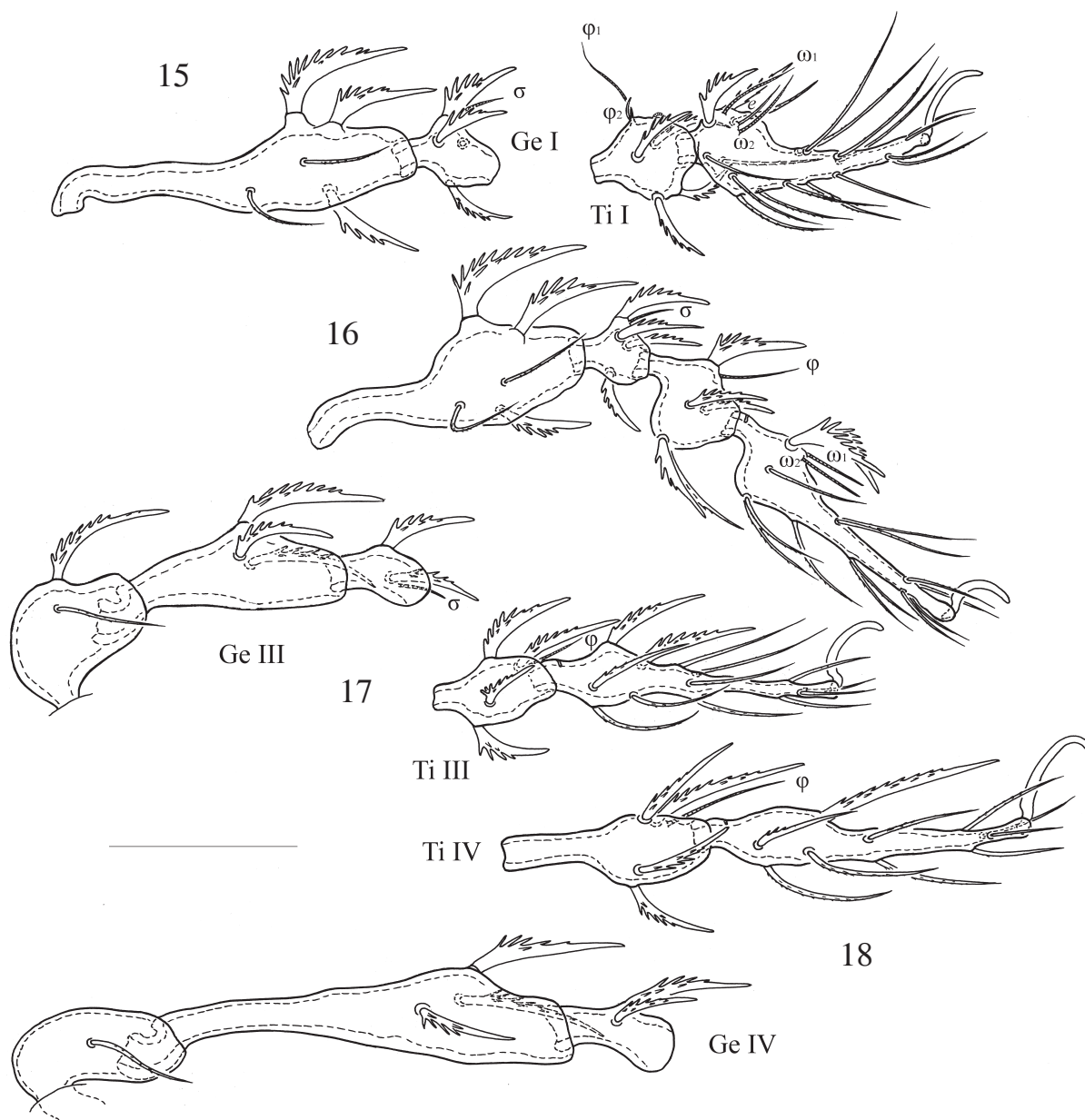
**Material examined.** Holotype and paratype, obtained from: Ethiopia, 6°38'N, 39°43'E, 1883 m

above sea level, Bale Mountains National Park, Harena Forest, in soil, collected by L.B. Rybalov, 23.11.2009.

**Type deposition.** The holotype and paratype are deposited in the collection of the Zoological Institute of the Russian Academy of Sciences, St. Petersburg, Russia.

**Etymology.** The name “*gigantea*” refers to *Basilobelba gigantea* sp. n. being the largest known species in the genus.

**Remarks.** *Basilobelba gigantea* sp. n. is most similar in morphology prodorsal and epimeral setae, number of notogaster setae, morphology of arched scalp-attachment structures, weakly neotrichy on ventral plate to the Ghanaian species *Basi-*



Figs. 15–18. *Basilobelba gigantea* sp. n.: 15 — leg I, left, antiaxial view, without trochanter; 16 — leg II, left, antiaxial view, without trochanter; 17 — leg III, left, antiaxial view; 18 — leg IV, left, antiaxial view; Ti, Ge — tibiae, genua, respectively. Scale bar 100  $\mu$ m.

*lobelba africana* (see Wallwork 1961; Balogh and Balogh 2002), but the latter is smaller (426–497  $\times$  248–319), has rather short interlamellar setae and only 10 pairs of neutrichous setae on the ventral plate. Also *Basilobelba gigantea* sp. n. is similar in morphology prodorsal and epimeral setae, weakly neutrichy on ventral plate to *Basilobelba retiaria* (see Warburton 1912; Grandjean 1959; Wallwork 1961; Balogh and Balogh 2002), but the latter is smaller (length 400–469), has attachment arches bearing setae or alveoli *c* and a span narrower than the distance between bothridia, has notogastral setae *lp* present, and has 10–11 pairs of neutrichous setae on the ventral plate.

**Distribution.** At present, this species is only known from the type locality in Ethiopia.

**REDESCRIPTION OF SPECIES**

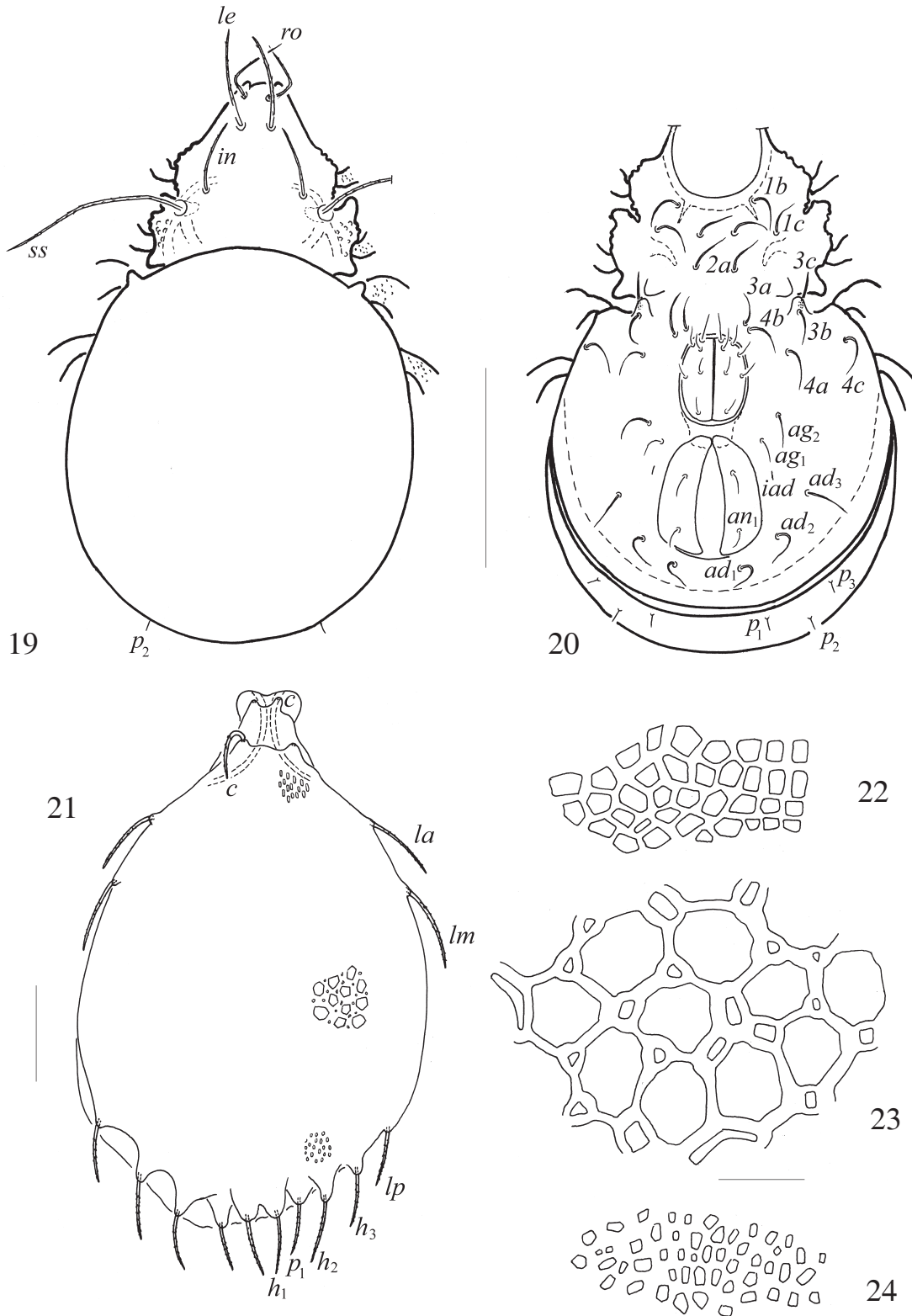
**Family Heterobelbidae Balogh, 1961**  
**Genus *Heterobelba* Berlese, 1913**  
***Heterobelba spumosa* Mahunka, 1983**

Figs. 19–37

**Measurements and form of body.** Body form typical of genus. Total length 531–547; notogastral length 381, width 348. Tanzanian paratype of similar size, respectively: 564, 398, 348.

**Integument.** Body color light brown. Cuticle of body smooth, with inconspicuous amorphous



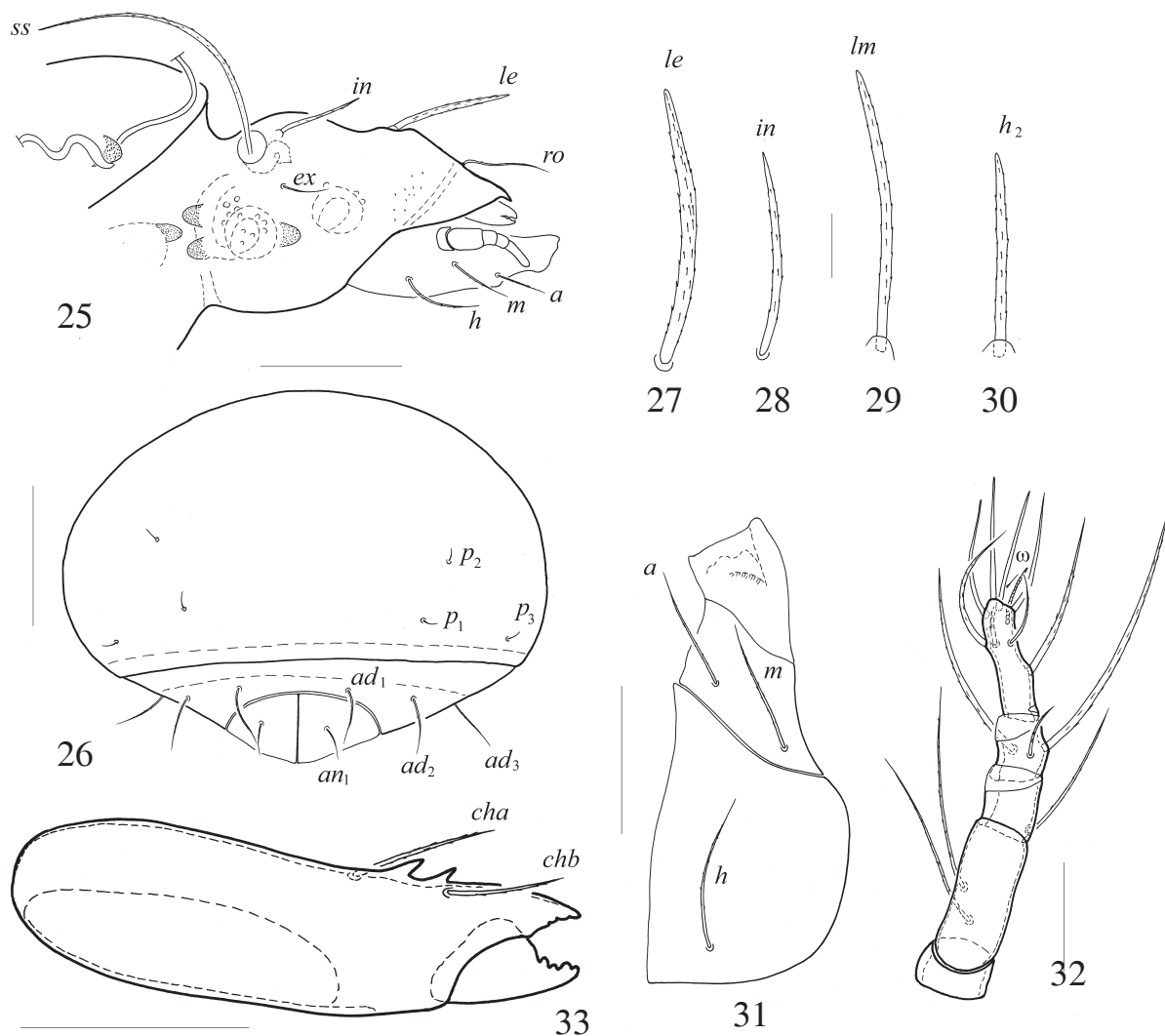


Figs. 19–24. *Heterobelba spumosa* Mahunka: 19 — dorsal view, without scalp, legs partly removed; 20 — ventral view, legs partly and anterior part of prodorsum removed. Tritonymphal scalp: 21 — dorsal view; 22–24 — ornamentation of scalp in the anterior, middle, posterior parts, respectively. Scale bars (19, 20) 200  $\mu\text{m}$ , (21) 100  $\mu\text{m}$ , (22–24) 20  $\mu\text{m}$ .

cerotegumental layer. Granular cerotegument partly covers prodorsum and legs; granules very small (up to two  $\mu\text{m}$ ).

**Prodorsum** (Figs. 19, 25, 27, 28). Rostrum tridentate in dorsal aspect (see also Mahunka

1983); teeth blunt-ended distally. Rostrum distinctly projects anteroventrally in lateral view. Rostral setae 69–73, setiform, barbed, located dorsally, near each other. Interlamellar setae 77–82, thickened, barbed. Lamellar setae 94, thicker than



Figs. 25–26. *Heterobelba spumosa* Mahunka: 25 — lateral view of prodorsum; 26 — caudal view; 27 — lamellar seta; 28 — interlamellar setae; 29 — scalpal seta *lm*; 30 — scalpal seta *h*<sub>2</sub>; 31 — subcapitulum; 32 — palp; 33 — chelicera. Scale bars (25, 26) 100 μm, (27–30) 20 μm, (31, 33) 50 μm, (32) 20 μm.

interlamellar and rostral setae, barbed, located dorsally, near each other. Sensilli longest setae on prodorsum, 176–188, setiform, thickened, with thin cilia. Exobothridial setae short, 28–32, thin, smooth. Lateral part of prodorsum with sparse tubercles (up to eight μm). Setae of Tanzanian paratype of similar size: *ro* 73, *le* 90, *in* 73, *ex* 28, *ss* 184.

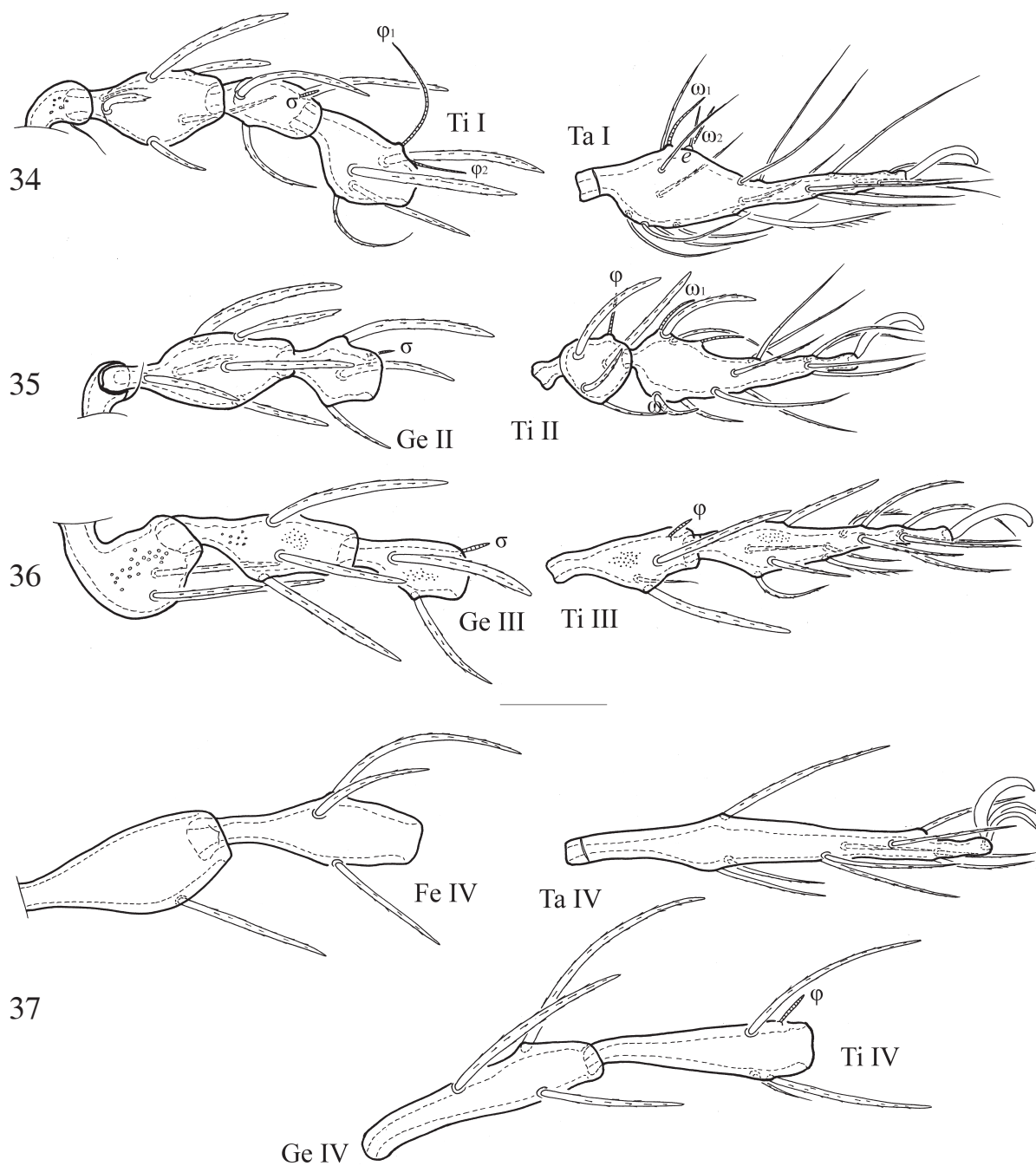
**Notogaster** (Figs. 19, 21–24, 26, 29, 30). Covered with tritonymphal scalp having foveolae of different sizes. Scalp with nine pairs of setae. Scalpal setae 61–94, thickened, barbed; lateral setae slightly longer than anterior and posterior ones. Tanzanian paratype with scalpal setae of similar size (69–82).

Notogaster oval in dorsal view. Three pairs of small notogastral setae (*p*<sub>1</sub>–*p*<sub>3</sub>, 12–16) visible. All lyrifissures and opisthonotal gland opening not observed.

**Anogenital region** (Fig. 20). All setae setiform, barbed: two pairs of anal setae (20–24), three pairs of adanal setae (*ad*<sub>1</sub>–*ad*<sub>3</sub>, 32–45), one pair of aggenital setae (*ag*, 28–32), seven pairs of genital setae (one plate with six setae unilaterally) (24–36). Lyrifissures *iad* located some distance from anal plates, parallel to them. Corresponding setae in Tanzanian paratype somewhat longer: anal setae 28, adanal setae up to 61 μm, aggenital setae 32–41, genital setae 28–36.

**Epimeral region** (Fig. 20). Apodemes *ap*<sub>2</sub> well developed. Epimeral setae 36–49, setiform, barbed; formula 3–1–3–3. Epimeral setae in Tanzanian paratype somewhat longer (41–57).

**Gnathosoma** (Figs. 31–33). Subcapitulum longer than wide: 151–155 × 94–98. Hypostomal setae long (*h* 57–61, *m* 45–49, *a* 36–41) setiform, barbed. Adoral setae not observed. Palp (length 77) with setation 0–2–1–3–8(+1ω). All setae (ex-



Figs. 34–37. *Heterobelba spumosa* Mahunka: 34 — leg I, left, paraxial view; 35 — leg II, left, antiaxial view; 36 — leg III, right, antiaxial view; 37 — leg IV, right, antiaxial view. Ta, Ti, Ge, Fe — tarsi, tibiae, genua, femora, respectively. Scale bar 50  $\mu$ m.

cept some on tarsus) long, setiform, barbed. Palpal eupathidium and solenidion independent; solenidion rather short, rod-like, curved. Chelicera (length 127) with two thorns dorsally. Cheliceral setae setiform, barbed: *cha* (36) slightly longer than *chb* (28).

**Legs** (Figs. 34–37). Legs I–III monodactylous, legs IV tridactylous with stronger median and slender lateral claws. Formulae of leg setation and solenidia: I (1–6–3–4–19) [1–2–2], II (1–6–3–4–13) [1–1–2], III (3–3–2–3–13) [1–1–0], IV (1–3(or 2)–

3–3–10) [0–1–0]; homology of setae and solenidia indicated in Table 2. Most setae well barbed, many rather thick. Setae *p* on legs II–IV absent (see «Remarks» section). Solenidion  $\phi_1$  rather long, setiform; other solenidia shorter, rod-like or with expansions in medio-distal parts. Famulus well developed, shorter than solenidia on tarsi I.

**Material examined.** Two specimens obtained from: Ethiopia, 6°38'N, 39°43'E, 1883 m above sea level, Bale Mountains National Park, Harena Forest, in soil, collected by L.B. Rybalov,



Table 2. Leg setation and solenidia of *Heterobelba spumosa* Mahunka\*

Leg	Trochanter	Femur	Genu	Tibia	Tarsus
I	v'	d, (l), bv'', (v)	(l), v', $\sigma$	(l), (v), $\phi_1$ , $\phi_2$	(ft), (tc), (it), (p), (u), (a), s, (pv), (pl), v', e, $\omega_1$ , $\omega_2$
II	v'	d, (l), bv'', (v)	(l), v', $\sigma$	(l), (v), $\phi$	(ft), (tc), (it), (u), (a), s, (pv), $\omega_1$ , $\omega_2$
III	d, l', v'	d, l', ev'	l', v', $\sigma$	l', (v), $\phi$	(ft), (tc), (it), (u), (a), s, (pv)
IV	v'	d, l', ev'	d, l', v'	l', (v), $\phi$	ft'', (tc), (u), (a), s, (pv)

\*See Table 1 for explanation.

23.11.2009. The one specimen is deposited in the collection of the Zoological Institute of the Russian Academy of Sciences, St. Petersburg, Russia; second specimen is in the personal collection of the first author.

**Distribution.** At present, this species is known only from Tanzania (Mahunka 1983), Kenya (Mahunka and Mahunka-Papp) and Ethiopia (our data).

**Remarks.** Adults of *Heterobelba spumosa* from Ethiopia and Tanzania are similar in general appearance, but there is slight morphometrical difference. Ventral (epimeral, aggenital and adanal) setae are somewhat longer in the Tanzanian paratype. We believe this difference represents intraspecific (perhaps geographical) variability.

Balogh and Balogh (2002) listed several characters of *Heterobelba spumosa*, one of which was scalpal setae being longer than lamellar and interlamellar ones. However, in both our specimens and the Tanzanian paratype scalpal setae are shorter than or equal to lamellar and interlamellar setae.

Norton and Behan-Pelletier (2009) listed several characters of the family Heterobelbidae, one of which was the presence of setae *p* on legs II–IV. However, *Heterobelba spumosa* have no such setae. This should be indicated in any future diagnosis of the family.

#### ACKNOWLEDGEMENTS

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