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SUPPLEMENTARY DESCRIPTION OF *BELBA CORNUTA* WANG ET NORTON, 1995 (ACARI, ORIBATIDA, DAMAEIDAE)

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ABSTRACT: The oribatid mite, *Belba cornuta* Wang et Norton, 1995 (Oribatida, Damaeidae), is redescribed and illustrated in detail on the basis of specimens collected in Taiwan. The main morphological traits for this species are summarized.

KEY WORDS: Oribatid mite, *Belba cornuta*, systematics, morphology, supplementary description, Taiwan.

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INTRODUCTION

The oribatid mite *Belba cornuta* (Acari, Oribatida, Damaeidae) was described by Wang and Norton (1995) based on specimens from southeast China. At present, the species' distribution is limited to this country only (Subías 2004, online version 2018).

During a taxonomic survey of oribatid mites from Taiwan, I found *B. cornuta*. The original description (Wang and Norton 1995) is not complete. In particular, it lacks the information about some measures of morphological structures, the identification of leg setation and solenidia, and morphology of gnathosoma. Also, the figures are not numerous. The main goal of this paper is to present supplementary description of *B. cornuta* on the basis of specimens from Taiwan, and to summarize its main morphological traits, which will help with the identification of this species in the future.

MATERIAL AND METHODS

Material examined. Five specimens, all females: Taiwan, Taipei City, Beitou Dist., Shamao Rd., Yangmingshan National Park, 25°8.573′ N, 121°32.607′ E, 352 m a.s.l., sample #16, lichen and soil, 17.IX.2017 (coll. J.-R. Liao and H.C. Lee). All specimens (in ethanol with drop of glycerol) have been deposited in the Tyumen State University Museum of Zoology, Tyumen, Russia.

Methods. Specimens were mounted in lactic acid on temporary cavity slides for measurement and illustration. Body length was measured in lateral view, from the tip of the rostrum to the posterior edge of the ventral plate. Notogastral width refers to the maximum in dorsal aspect. Lengths of body setae were measured in lateral aspect. All body measurements are presented in micrometers. Formulas for leg setation are given in parentheses according to the sequence trochanter–femur–genu–tibia–tarsus (famulus included). Formulas for leg solenidia are given in square brackets according to the sequence genu–tibia–tarsus.

Drawings were made with a camera lucida using a Leica transmission light microscope "Leica DM 2500".

General morphological terminology used in this paper mostly follows that of F. Grandjean: see Travé and Vachon (1975) for references, Norton (1977) for leg setal nomenclature, and Norton and Behan-Pelletier (2009) for overview.

The following abbreviations are used: *car*—carina; *P*—propodolateral apophysis; *ro*, *le*, *in*, *bs*, *ex*—rostral, lamellar, interlamellar, bothridial and exobothridial setae, respectively; *bo*—bothridium; *Ba*, *Bp*—prodorsal tubercles; *c*, *la*, *lm*, *lp*, *h*, *p*—notogastral setae; *ia*, *im*, *ip*, *ih*, *ips*—notogastral lyrifissures; *gla*—opisthonotal gland opening; *cs*—circumgastric scissure; *csb*—circumgastric sigillar band; *h*, *m*, *a*—subcapitular setae; *or*—adoral setae; *v*, *l*, *d*, *cm*, *acm*, *ul*, *sul*, *vt*, *lt*—palp setae; ω—palp and leg solenidion; *cha*, *chb*—cheliceral setae; *Tg*—Trägårdh's organ; *Sa*, *Sp*—parastigmatic tubercles; *dis*—discidium; *1a*, *1b*, *1c*, *2a*, *3a*, *3b*, *3c*, *4a*, *4b*, *4c*, *4d*—epimeral setae; *Va*, *Vp*—ventrosejugal tubercles; *g*, *ag*, *an*, *ad*—genital, aggenital, anal and adanal setae, respectively; *iad*—adanal lyrifissure; *p.o.*—preanal organ; Tr, Fe, Ge, Ti, Ta—leg trochanter, femur, genu, tibia, tarsus, respectively; *p.a.*—leg porose area; σ, φ—leg solenidia; ε—leg famulus; *v*, *ev*, *bv*, *l*, *d*, *ft*, *tc*, *it*, *p*, *u*, *a*, *s*, *pv*—leg setae.

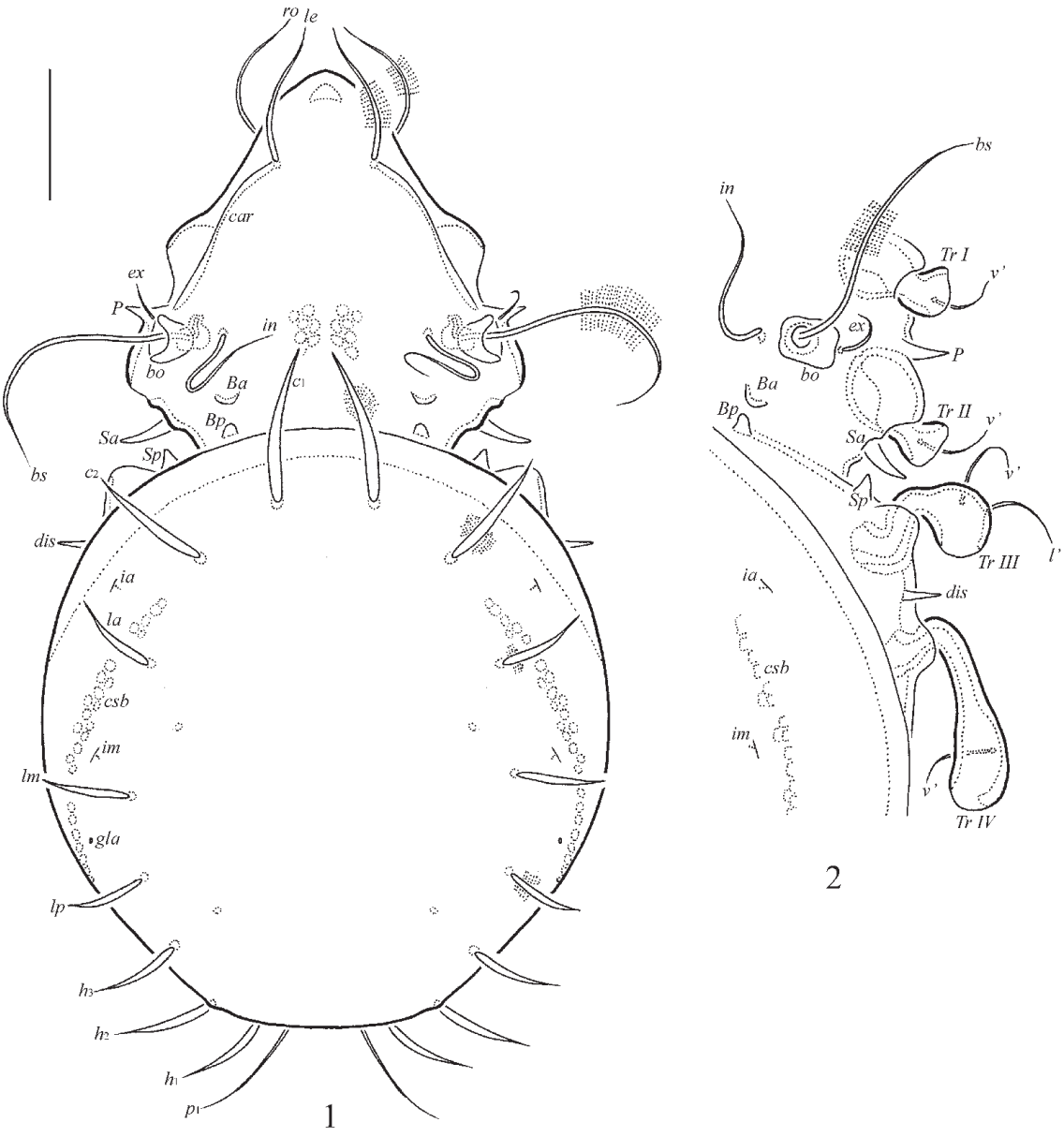
SYSTEMATICS

Belba cornuta Wang et Norton, 1995

Adult

Figs. 1–12

Supplementary description. *Measurements*. Body length: 348–365 (five specimens: all females); notogaster width: 208–232 (five specimens).



Figs. 1–2. *Belba cornuta* Wang et Norton, 1995: 1—dorsal view (legs not shown); 2—partial dorsolateral view (legs except trochanters not shown). Scale bar 50 μm.

Integument. Body color light brown. Body surface microfoveolate (visible under high magnification), covered by filamentous cerotegument. Setae of prodorsum and notogaster usually with cerotegument partially.

Prodorsum (Figs. 1, 2, 5). Rostrum rounded. One pair of dorsolateral carinae between lamellar setae and bothridia slightly visible in dorsal view. Propodolateral apophyses developed, narrowly triangular. Two pairs of prodorsal tubercles present: *Ba* slightly visible; *Bp* distinct. Tubercles *D* and *L* absent. Rostral and lamellar setae similar in length (53–57), setiform, smooth; *ro* clearly thinner than *le*. Interlamellar (73–77) and bothridial (102–114) setae setifrom, with short attenuate tips, smooth. Exobothridial setae (24–28) setiform, thin, smooth.

Notogaster (Figs. 1–5). Oval. Exuviae present. Spinae adnatae absent. Dorsal notogastral setae inserted in 2 sub-parallel rows, p_1–p_3 setifrom, smooth, other setae thorn-like, dilated mediobasally, smooth. Setae p_1 (69–73) longer than c_1 (61–69), c_2 (41–49), *la*, *lm*, *lp*, h_1–h_3, p_2 (32–41), p_3 (28–32). All lyrifissures (*ia*, *im*, *ip*, *ih*, *ips*) and opisthonotal gland openings distinct.

Gnathosoma (Figs. 6–8). Subcapitulum longer than wide (73–77×57–61). Subcapitular setae (*h*, *m*, *a*) similar in length (16–20), setiform, barbed. Adoral setae (6–8) setifrom, thin, smooth. Palps

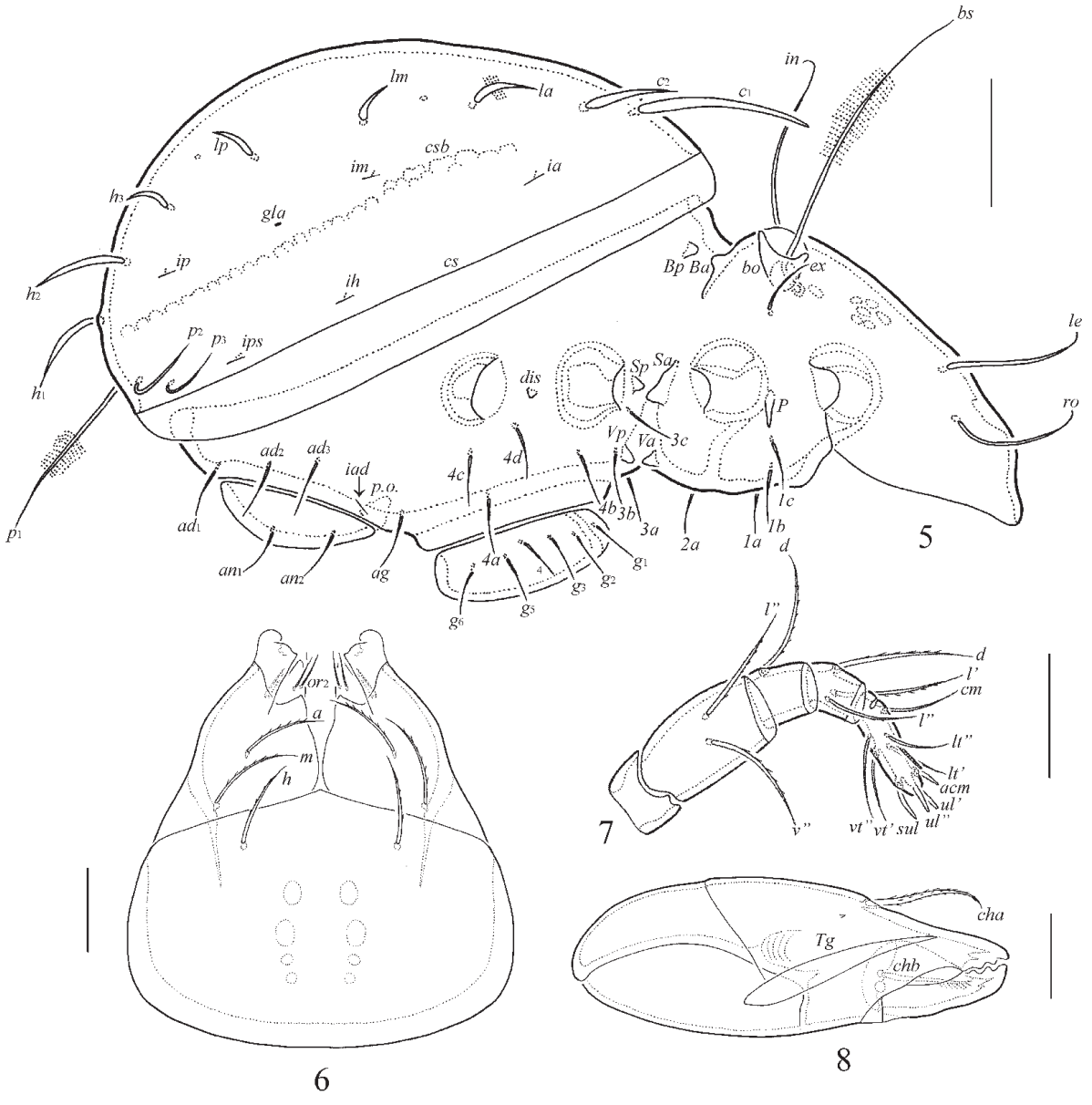
Figs. 3–4. *Belba cornuta* Wang et Norton, 1995: 3—ventral view (gnathosoma and legs not shown); 4—posterior view (left half). Scale bars 50 μm.

(49–53) with setation 0–2–1–3–9(+ω). Solenidion bacilliform, pressed to surface of palptarsi mediobasally. Postpalpal setae (4) spiniform. Chelicerae (73–77) with 2 setiform setae, *cha* (20–22) barbed, *chb* (14–16) ciliate unilaterally in mediodistal part. Trägårdh's organ of chelicerae elongate triangular.

Epimeral and lateral podosomal regions (Figs. 2, 3, 5). Parastigmatic tubercles well-developed: *Sa* elongate thorn-like, *Sp* smaller, triangular. Epimeral tubercles absent. Ventrosejugal tubercles present. Epimeral setal formula: 3–1–3–4. Epimeral setae (20–22) setiform, thin, smooth Discidia narrowly triangular.

Anogenital region (Figs. 3–5). Anogenital setae similar in length (20–22), setifrom, thin; genital and aggenital setae smooth, anal and adanal setae sparsely barbed. Adanal lyrifissures located diagonally to anal aperture. Ovipositor is typical for Damaeidae (Ermilov 2010): slightly elongated, broad (68×41), blades (32) little shorter than length of distal section (beyond middle fold; 36). Each of the three blades with four thorn-like setae, $\psi_1 \approx \tau_1$ (12) longer than $\psi_2 \approx \tau_a \approx \tau_b \approx \tau_c$ (10). Six coronal setae thorn-like (10).

Legs (Figs. 9–12). All legs shorter than body length (Table 1). Porose areas on all femora and



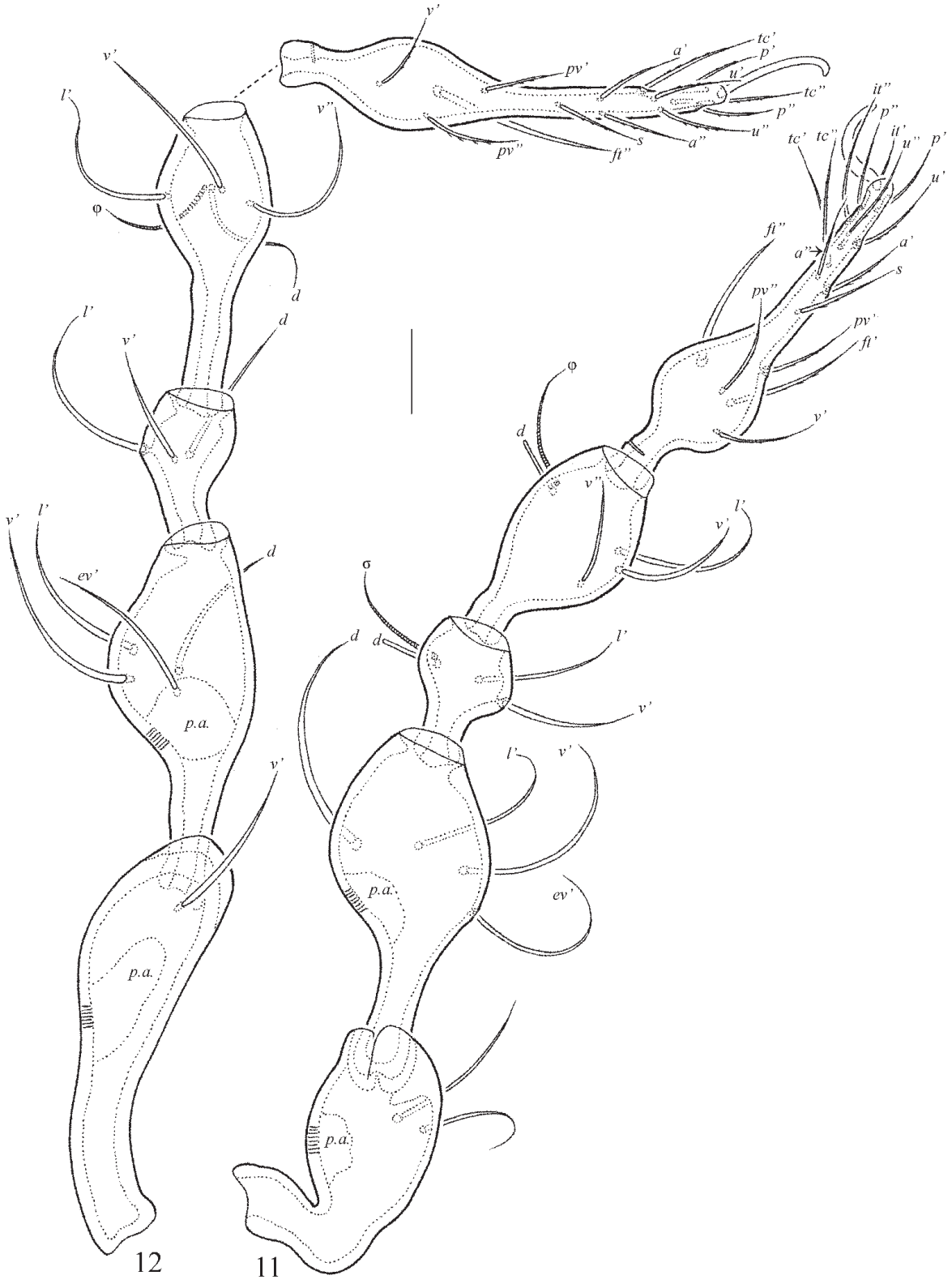
Figs. 5–8. *Belba cornuta* Wang et Norton, 1995: 5—lateral view (gnathosoma and legs not shown); 6—subcapitulum, ventral view; 7—palp, right, antiaxial view; 8—chelicera, left, paraxial view. Scale bars 50 μm (5), 15 μm (6–8).

trochanters III, IV distinct. Formulas of leg setation and solenidia: I (1–7–4–4–20) [1–2–2], II (1–6–4–5–17) [1–1–2], III (2–4–3–4–16) [1–1–0], IV (1–4–3–4–13) [0–1–0]; homologies of setae and solenidia indicated in Table 2. Setae *d* slightly longer than φ and σ on tibiae II–IV and genua I–III, respectively. Solenidion ω_1 on tarsi I and solenidia ω_1 and ω_2 on tarsi II bacilliform, other solenidia setiform. Famulus of tarsi I setiform, inserted close and posterolateral to solenidion ω_2.

Remarks. 1. Based on the supplementary description of *B. cornuta* from Taiwan and known literature data (Wang and Norton 1995), I propose the following diagnostic morphological traits for this species: body size 326–366×199–232; body surface without ornamentation and sculpturing, covered by filamentous cerotegument; propodolateral apophyses well-developed; prodorsal tubercles *Ba* and *Bp* present or indistinct; prodorsal setae setifrom, smooth, *bs*>*in*>*le*=*ro*>*ex*, *le* thicker than *ro*; exuviae present on notogaster; spinae adnatae absent; notogastral setae smooth, p_1–p_3 setifrom, smooth, other setae thorn-like, dilated mediobasally, p_1 longest; subcapitular setae of medium size, setiform, barbed; parastigmatic tubercles *Sa* elongate thorn-like, *Sp* smaller, triangular; epimeral tubercles absent; ventrosejugal tubercles present; epimeral setal formula: 3–1–3–4. Epimeral, genital

Figs. 9–10. *Belba cornuta* Wang et Norton, 1995: 9—leg I, without trochanter, right, antiaxial view; 10—leg II, without trochanter, right, antiaxial view (seta *d* broken on tibia). Scale bar 17 μm.

and aggenital setae setiform, thin, smooth; discidia narrowly triangular; anal and adanal setae sparsely barbed; all legs shorter than body length; formula of leg tarsi (I to IV) 20–17–16–13.



Figs. 11–12. *Belba cornuta* Wang et Norton, 1995: 11—leg III, right, paraxial view (setae *d* broken on tibia and genu); 12—leg IV, left, antiaxial view. Scale bar 17 μm.

2. The specimens of *B. cornuta* from Taiwan (data in this paper) are similar in general appearance to those from China according to the original description (Wang and Norton 1995). However, some differences are presented:

1) Prodorsal tubercles *Ba* and *Bp* are present in specimens from Taiwan (versus absent in the original description, Wang and Norton 1995).

2) One pair of dorsolateral carinae between lamellar setae and bothridia developed in specimens from Taiwan (this feature was not present in the original description, Wang and Norton 1995).

I believe these differences represent intraspecific variability. Hence, all listed additions to the original description (Wang and Norton 1995), as well as the supplementary description of *B. cornuta* should be considered in any future identifications of this species.

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Table 1

Leg mean lengths of one specimen *Belba cornuta* Wang et Norton, 1995

Leg	**Tr**	**Fe**	**Ge**	**Ti**	**Ta**	**All**	**Leg : body mean length**
I	12	94	41	49	86	282	≈0.79
II	12	77	36	45	77	247	≈0.69
III	49	61	32	45	77	264	≈0.74
IV	73	69	32	57	86	317	≈0.90

Table 2

Leg setation and solenidia of *Belba cornuta* Wang et Norton, 1995

Leg	**Tr**	**Fe**	**Ge**	**Ti**	**Ta**
I	*v′*	*d, (l), bv″, (v_1), v_2′*	*(l), v′, dσ*	*(l), (v), φ_1, φ_2*	*(ft), (tc), (it), (p), (u), (a), s, (pv), (pl), (v), ε, ω_1, ω_2*
II	*v′*	*d, (l), bv″, (v)*	*(l), v′, dσ*	*(l), (v), dφ*	*(ft), (tc), (it), (p), (u), (a), s, (pv), (v), ω_1, ω_2*
III	*l′, v′*	*d, l′, ev′, v′*	*l′, v′, dσ*	*l′, (v), dφ*	*(ft), (tc), (it), (p), (u), (a), s, (pv), v′*
IV	*v′*	*d, l′, ev′, v′*	*d, l′, v′*	*l′, (v), dφ*	*ft″, (tc), (p), (u), (a), s, (pv), v′*

Note: Roman letters refer to normal setae, Greek letters refer to solenidia (except ε=famulus); dφ and dσ—seta and solenidion coupled. Single prime (′) marks setae on the anterior and double prime (″)—setae on the posterior sides of a given leg segment. Parentheses refer to a pair of setae.