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New species and records of oribatid mites of the genus *Protoribates* (Acari, Oribatida, Haplozetidae) from China

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Abstract

Two new species of oribatid mites of the genus *Protoribates* (Oribatida, Haplozetidae) are described based on adult specimens from China. *Protoribates tibetensis* **sp. nov.** differs from all representatives of the genus *Protoribates* by larger body size, long, thick and barbed notogastral setae and monodactylous legs. *Protoribates sichuanensis* **sp. nov.** differs from *Protoribates magnus* (Aoki, 1982) by smaller body size, ventroanteriorly rounded femora II, shorter ad_1 and single porose area *A1*. Three known species of *Protoribates*, *P. crassisetiger nipponicus* Fujita, 1989, *P. geonjiensis* Choi, 1994, and *P. oblongus* (Ewing, 1909), are recorded in China for the first time. Two other known species, *Protoribates cattienensis* Ermilov & Anichkin, 2011 and *Protoribates dentatus* (Berlese, 1883), are recorded in mainland China for the first time. Supplementary morphological information is given for all the above known species. A key to the Chinese species of the genus *Protoribates* is given.

Key words: haplozetid mites, taxonomy, morphology, key, Palaearctic region, Oriental region

Introduction

The genus *Protoribates* was established by Berlese (1908) with *Oribates dentatus* Berlese, 1883 as type species. Till now, it comprises more than 80 representatives and has a cosmopolitan distribution except the Antarctic region (Subías 2004, online version 2020). Weigmann *et al.* (1993) redefined the genus based on the type specimens of *Protoribates dentatus* (Berlese, 1883). Later, Bayartogtokh (2010) and Walter & Latonas (2013) further summarized the diagnosis of the genus. Identification keys for the species of some countries or regions were provided by Balogh & Balogh (2002) (non-Holarctic), Weigmann (2006) (Germany and adjacent regions), Bayartogtokh (2010) (Mongolia), Walter & Latonas (2013) (North America), Corpuz-Raros (2014) (Philippines) and Ermilov & Starý (2017) (Vietnam).

At present, ten species of *Protoribates* were recorded in China (Wang *et al.* 2003; Chen *et al.* 2010; Ermilov & Liao 2017, 2018; Ermilov & Leong 2018). The first record of *Protoribates* in China was *Glaberoribates urbanlus* Tseng, 1984 in Taiwan (Tseng, 1982, 1984). Other early reports of the species of *Protoribates* in China were recorded in the genus *Xylobates* (Wen *et al.* 1984; Wen 1990; Yu *et al.* 1991; Chen *et al.* 1992; Wang & Wang 1994; Lu *et al.* 1996; Wang *et al.* 1996; Wang *et al.* 1997; Hu 2000; Li *et al.* 2000; Wang *et al.* 2000). *Protoribates agricola* (Nakamura & Aoki, 1989) recorded in Anhui and Beijing (Wang *et al.*, 1997; Li *et al.*, 2000) has been transferred to the genus *Transoribates* in Fujikawa *et al.* (1993). In recent years, Ermilov with Liao and Leong recorded three species: *Protoribates paracapucinus* (Mahunka, 1988) in Taiwan, *P. dentatus* (Berlese, 1883) in Macao and Taiwan and *P. cattienensis* Ermilov & Anichkin, 2011 in Taiwan (Ermilov & Liao 2017, 2018; Ermilov & Leong 2018).

During identifying specimens of *Protoribates* Berlese, 1908 (Haplozetidae) from the National Zoological Museum of China, Chinese Academy of Sciences, we found two new species, three newly recorded species in China and two newly recorded species in mainland China. The primary goal of the paper is to describe and illustrate the

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new species, and to give supplementary morphological information for the newly recorded species from China and mainland China. The additional goal of the paper is to present an identification key to the known species of *Protoribates* in China.

Material and methods

Observations, figures, measurements and descriptions were based on adult specimens mounted both in temporary cavity slides and permanent slides. Drawings were made with a camera lucida using a Leica transmission light microscope "Leica DM 2500".

Body length was measured in lateral (temporary cavity slides) or dorsal (permanent slides) view, from the tip of the rostrum to the posterior edge of the notogaster. Notogastral width refers to the maximum width of the notogaster in dorsal view (behind pteromorphs). 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.

Morphological terminology used in this paper 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.

All specimens are kept in alcohol or mounted on permanent slides, and deposited in IZAS —the National Zoological Museum of China, Institute of Zoology, Chinese Academy of Sciences, Beijing (Zhang 2018).

The following abbreviations are used: *lam* = lamella; *slam* = sublamella; *Al* = sublamellar porose area; *tu* = tutorium; *ro*, *le*, *in*, *bs*, *ex* = rostral, lamellar, interlamellar, bothridial and exobothridial setae, respectively; *D* = dorsophragmata; *c*, *la*, *lm*, *lp*, *h*, *p* = notogastral setae; *Aa*, *A1*, *A2*, *A3* = notogastral porose areas; *ia*, *im*, *ip*, *ih*, *ips* = notogastral lyrifissures; *gla* = opisthonotal gland opening; *h*, *m*, *a* = subcapitular 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; Pd I, Pd II = pedotecta I, II, respectively; *1a*, *1b*, *1c*, *2a*, *3a*, *3b*, *3c*, *4a*, *4b*, *4c* = epimeral setae; *dis* = discidium; *cus* = custodium; *cp* = circumpedal carina; *g*, *ag*, *an*, *ad* = genital, aggenital, anal and adanal setae, respectively; *iad* = adanal lyrifissure; *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*, *pl* = leg setae.

Genus *Protoribates* Berlese, 1908

Protoribates Berlese, 1908: 1; Weigmann *et al.*, 1993: 54; Bayartogtokh, 2010: 248; Walter & Latonas, 2013: 484.
Xylobates Jacot, 1929: 429; Weigmann *et al.*, 1993: 54 (synonymy).
Styloribates Jacot, 1934: 61; Subías, 2004: 206 (synonymy).
Alloribates Banks, 1947: 113. Marshall *et al.*, 1987: 266 (synonym of *Xylobates*).
Brasilobates Pérez-Íñigo & Baggio, 1980: 135; Subías, 2004: 206 (synonymy).
Glaberoribates Tseng, 1984: 62; Subías, 2004: 206 (synonymy).
Octodurozetes Mahunka, 1993: 227; Subías, 2004, online version 2015: 427 (synonymy).

Type species: *Oribates dentatus* Berlese, 1883

Diagnosis. Haplozetidae with pteromorphs movable; discidium present, custodium present or not; notogaster usually with four pairs of small porose areas, rarely three; ten pairs of notogastral setae usually short or minute, rarely long; bothridial setae with lanceolate head, sometimes setiform or with clubbed head; lamellae located dorsolaterally, narrow; sublamellae present; prolamellae rarely present; tutorium short, ridge-like; anterior notogastral margin present; five pairs of genital setae, rarely four; one pair of aggenital setae; two pairs of anal setae; three pairs of adanal setae; legs usually monodactylous or heterotridactylous, rarely bidactylous.

Remarks. The history of taxonomic study on the genus *Protoribates* is complex. Banks (1947) established the genus *Alloribates* with *Alloribates singularis* as type species. Then, Marshall *et al.* (1987) considered it as a synonym of *Xylobates* Jacot, 1929 without any remarks. Weigmann *et al.* (1993) redescribed the type species of the genus *Protoribates, P. dentatus* (Berlese, 1883) and considered *Xylobates* Jacot, 1929 as a junior synonym of *Protoribates*.

Jacot (1934) established the genus *Styloribates* with *Styloribates pectinatus* as type species, and then Balogh

(1961) regarded it as a synonym of *Scheloribates*. Woolley (1968) proposed a new combination *Xylobates pectinatus* (Jacot, 1934), regarding *Styloribates pectinatus* as a species of *Xylobates*. Lee & Pajak (1990) revoked *Styloribates* from the synonym of *Scheloribates* because of the presence of tutorium (tutorium absent in *Scheloribates*). Subías (2004) listed it as a junior synonym of the *Protoribates* and listed the type species *Styloribates pectinatus* as a synonym of *P. lophothrichus* (Berlese, 1904). According to the description and illustration of the type species *Styloribates pectinatus*, we think that it is similar to *P. dentatus* (Berlese, 1883), the type species of *Protoribates*, in having long adanal setae ad_1 and short ad_2, and femora II spur-like sharpened ventroanteriorly, which are diagnostic characters of *P. dentatus* and is different from *P. lophothrichus* (see Miko *et al.*, 1994). We think that it is reasonable to list *Styloribate*s as a junior synonym of *Protoribates*. *Styloribates pectinatus* Jacot, 1934 may be a synonym of *P. dentatus* (Berlese, 1883), but additional research is necessary.

Jacot (1936) established the genus *Propeschelobates* with *Oribata albida* (Ewing, 1908) as type species, and then Balogh (1961) regarded it as a synonym of *Scheloribates*. Lee & Pajak (1990) revoked the synonym from *Scheloribates* and considered it as a junior synonym of *Styloribates*. Subías (2004) listed it as a junior synonym of *Protoribates* and later in 2017, he listed it as a junior synonym of *Indoribates* (*Haplozetes*) Willmann, 1935 in his world catalogue of oribatid mites. Considering the presence of saccules rather than porose areas on notogaster in *Propeschelobates*, we disagree with the viewpoint that *Propeschelobates* is one of the synonyms of *Protoribates*.

Mahunka (1993) established the genus *Octodurozetes* with *Octodurozetes berndhauseri* as type species in having the structure of lamellae complex (prolamellae present) and the insertions of the lamellar setae (medial to lamellar ends) differing from *Xylobates*, but Subías (2004) listed it as a junior synonym of *Perxylobates* Hammer, 1972. Corpuz-Raros (2009) regarded it as a valid genus because of the presence of the anterior notogastral margin (anterior notogastral margin absent in *Perxylobates*). Subías (2004, online version 2015) listed *Octodurozetes* as a junior synonym of *Protoribates* in 2015. In fact, as Ermilov & Anichkin (2011b) stated, several species of *Protoribates*, such as *P. bayanicus* Bayartogtokh, 2000, *P. brevisetosus* (Fujita, 1989), *P. capucinus* Berlese, 1908, *P. cattienensis* Ermilov & Anichkin, 2011, *P. geonjiensis* Choi, 1994, *P. kumayaensis* Nakamura, Fukumori & Fujikawa, 2010, *P. nagaroensis* (Fujita, 1989) and *P. lankaensis* Ermilov, Khaustov & Joharchi 2019, have lamellar setae inserted medially to lamellar ends. Although Ermilov & Anichkin (2011b) considered that *Octodurozetes* can be distinguished from *Protoribates* only by the presence of prolamellae, several species described in *Protoribates* later, such as *P. heinrichi* Ermilov, Sandmann & Scheu, 2019, *P. lemensis* Ermilov & Tolstikov, 2015 and *P. prolamellatus* Ermilov, Sandmann & Scheu, 2019 also have prolamellae. Thus, we support the viewpoint that *Octodurozetes* is one of junior synonyms of *Protoribates*.

Kulijev (1978) established the genus *Triaungius* with *Scheloribates fallax* Kulijev, 1968 as type species. Subías (2004) regarded it as a subgenus *Protoribates* (*Triaungius*) in which the legs of species are heterotridactylous, and proposed two synonyms: *Brasilobates* Pérez-Íñigo & Baggio, 1980 = *Protoribates* (*Triaungius*) Kulijev, 1978 and *Glaberoribates* Tseng, 1984 = *Protoribates* (*Triaungius*) Kulijev, 1978. *Brasilobates* was established by Pérez-Íñigo & Baggio (1980) with *Brasilobates bipilis* as type speices. They stated that the genus is similar to *Xylobates*, but differs from the latter by heterotridactylous legs and nine pairs of notogastral setae, by which we think that this is rather an identification tool than a character to establish a genus. In fact, according to the description and illustration of the type species *Brasilobates bipilis*, we found it is very similar to *P. dentatus*, only differing from the latter in having nine pairs of notogastral setae (*vs.* ten pairs of notogastral setae), setae *le* and *in* smooth (*vs.* setae *le* and *in* barbed), adanal setae ad_1 smooth (*vs.* adanal setae ad_1 barbed). We tend to regard *B. bipilis* as a synonym of *P. dentatus* (Berlese, 1883), but additional research is necessary. *Glaberoribates* was established by Tseng (1984) with *Glaberoribates urbanlus* as type species, but the only difference we could find between *Glaberoribates* and *Protoribates* is the number of notogastral setae: seven to eight pairs in the former and ten pairs in the latter, by which we think is not enough to establish a genus. Therefore, we support the proposals for these two synonyms by Subías (2004). We also noticed that after 2014 (including 2014), in the world catalogue of oribatid mites, Subías corrected the spelling "*Triaungius*" as "*Triaunguis*", which may be because of the use of "*Triaunguis*" in Corpuz-Raros (2013). Although "*Triaunguis*" seems more idiomatic for expressing the 3-clawed generic diagnosis, the original spelling "*Triaungius*" in Kulijev (1978) should be reserved.

Weigmann *et al.* (1993) reviewed the Berlese's opinions of *Protoribates* (Berlese, 1908; Berlese, 1916) and Pérez-Iñigo's opinion of *Transoribates* (Pérez-Iñigo, 1992) and summarized that as believeing the genus *Protoribates* (*sensu* Berlese, 1916) was an invalid name, Pérez-Iñigo (1992) established a new genus, *Transoribates* with *Protoribates latus* Mihelčič, 1965 as type species. Walter & Latonas (2013) compared the diagnosis of *Transorib-*

ates latus with that of *Protoribates* Berlese, 1908 and concluded that except for the reduction in the number of genital setae and the clubbed sensillus, *T. latus* resembles *Protoribates*. We think the validity of *Transoribates* need additional research.

Checklist of known species of the genus *Protoribates* in China

Protoribates acutus **(Hammer, 1979)**

Xylobates acutus Hammer, 1979: 58, fig. 101; Chen, Li & Wen, 1992: 22.

Distribution. China (Anhui), Java.

Protoribates capucinus **Berlese, 1908**

Protoribates capucinus Berlese, 1908: 2; Willmann, 1931: 160, fig. 240; Sellnick, 1960: 68; Hammer, 1961: 108, fig. 103; Ayyildiz: 1988: 149, figs 5a, b; Pérez-Iñigo, 1974: 392, fig. 17; Bayartogtokh, 2010: 248–250, fig. 643.

Oribata monodactyla Haller, 1884: 221, Pl. 15, fig. 3; Subías, 2004, online version 2020: 392 (*species inquirenda*).

Protoribates monodactylus (Haller, 1884): Aoki, 1959: 134; Wang, Hu & Yin, 2000: 264.

Transoribates monodactylus (Haller, 1884): Fujikawa *et al.*, 1993: 73.

Xylobates capucinus angustior Jacot, 1937: 244; Norton & Kethley, 1989: 489 (synonymy).

Alloribates singularis Banks, 1947: 113. Norton & Kethley, 1989: 489 (synonymy).

Material examined. One female (in alcohol, CYN-18-156): China, Sichuan, Pengzhou, Xiaoyudong Town, 31°18′04.98″N, 103°73′44.09″E, 1131 m a.s.l., mosses, 13.VIII.2018; one female (in alcohol, CYN-18-165): China, Sichuan, Pengzhou, Longmenshan Town, Jiufeng Villa, 31°29′64.76″N, 103°85′28.13″E, 1280 m a.s.l., litter under *Metasequoia* sp., 15.VIII.2018, both the above collected by Yannan Chen. One female (in alcohol, LR-17-115): China, Tibet, Medog County, Beibeng Town, Jiangxin Village, 29°13′23.80″N, 95°07′45.18″E, 743 m a.s.l., litter under arbor, 12.VIII.2017; one female (in alcohol, LR-17-130): China, Tibet, Medog County, near Ximohe Bridge, 29°21′23.32″N, 95°20′26.86″E, 766 m a.s.l., litter under arbor, 15.VIII.2017, both the above collected by Rong Li. One female (on permanent slide, WY-15-036): China, Inner Mongolia, Alxa Zuo Banner, Bayanhot Town, Yingpan Mountain, 38°50′35.70″N, 105°41′06.82″E, 1577 m a.s.l., litter under arbor, 2.VIII.2015, collected by Yi Wei. One female (on permanent slide, ZLH-13-079): China, Guangdong, Taixia, Xiachuan Island, 21°37′01.43″N, 112°33′00.82″E, 83 m a.s.l., litter under shrub, 20.X.2013; five females (on permanent slides, ZLH-13-098): China, Guangdong, Taixia, Shangchuan Island, 21°35′26.14″N, 112°46′37.48″E, 166 m a.s.l., litter under grass, 25.X.2013, both the above collected by Lihao Zheng. Two females (on permanent slides, W-92-26): China, Beijing, Xiaolongmen, litter in forest, 24.VII.1992, collected by Huifu Wang.

Distribution. China (Beijing, Inner Mongolia, Guangdong, Sichuan, Tibet), Cosmopolitan.

Remarks. In Subías's updated catalogue, *Oribata monodactyla* Haller, 1884 was listed as a synonym of *Protoribates dentatus* (Berlese, 1883) firstly (Subías, 2004), and then was regarded as a synonym of *Protoribates capucinus* Berlese, 1908 (Subías, 2004, online version 2009), which was not considered to be certain by Subías.

Wang, Hu & Yin (2000) listed *Protoribates monodacylus* to be distributed in China based on the specimens collected from Beijing. After examining the specimens labeled as "*Protoribates monodactylus* (Haller)", collected by Prof. Huifu Wang in Beijing, Xiaolongmen, 24.VII.1992, which are the same specimens studied by Wang, Hu & Yin (2000), we found that the specimens fit to Hammer's (1961) description and illustration of *P. capucinus* Berlese.

Protoribates cattienensis **Ermilov & Anichkin, 2011 New record to Mainland China**

Protoribates cattienensis Ermilov & Anichkin, 2011b: 49–53, figs 4–5; Ermilov & Liao, 2018: 1019.

Distribution. China (Anhui, Sichuan, Taiwan), Vietnam.

Protoribates crassisetiger nipponicus **Fujita, 1989 New record to China**

Xylobates crassisetiger nipponicus Fujita, 1989: 17–19, fig. 1.

Protoribates (*Protoribates*) *crassisetiger nipponicus* (Fujita, 1989): Subías, 2004: 206.

Distribution. China (Anhui), Japan.

Protoribates dentatus **(Berlese, 1883) New record to Mainland China**

Oribates dentatus Berlese, 1883: 3.

Protoribates dentatus (Berlese, 1883): Berlese, 1908: 1; Weigmann *et al.*, 1993: 39–55, figs I–VIII; Seniczak *et al.*, 2018: 613–627, figs 1–12; Ermilov & Liao, 2018: 1019; Ermilov & Leong, 2018: 1769.

Peloribates vastus Mihelčič, 1956: 20–21, fig. 14.

Protoribates vastus (Mihelčič, 1956): Pérez-Iñigo, 1974: 397–398, fig. 24; Subías, 2004: 206 (synonymy).

Xylobates vastus (Mihelčič, 1956): Pérez-Iñigo, 1993: 209, fig. 76A.

Distribution. China (Guangxi, Sichuan, Macao, Taiwan), Holarctic, Oriental and Melanesia (I. Fiji).

Protoribates geonjiensis **(Choi, 1994) New record to China**

Xylobates geonjiensis Choi, 1994: 42–43, fig. 3.

Protoribates (*Protoribates*) *geonjiensis* (Choi,1994): Subías, 2004: 206.

Distribution. China (Hunan), Korea.

Protoribates lophothrichus **(Berlese, 1904)**

Oribates lophothrichus Berlese, 1904: 27, fig. 48.

Protoribates lophothrichus (Berlese, 1904): Sellnick, 1928: 15; Subías, 2014, online version 2020: 393.

Protoribates lophotrichus (Berlese, 1904): Willmann, 1931:160; Marshall *et al.*, 1987: 267; Miko *et al.*, 1994: 252–258, figs I–IV; Walter & Latonas, 2013: 492.

Xylobates lophotrichus (Berlese, 1904): Lu, Wang & Liao, 1996: 48; Wang, Hu & Yin, 2000: 261.

Xylobates lophothrichus (Berlese, 1904): Wang, Li & Zheng, 1997: 118; Li, Wang & Zheng, 2000: 13.

Xylobates prionota Woolley, 1968: 262–265, figs 1–5.

Xylobates prionotus Woolley, 1968: Marshall *et al.*, 1987: 268; Subías, 2004: 206 (synonymy).

Distribution. China (Beijing, Jilin, Anhui, Guangdong), Semicosmopolitan (Holarctic, Ethiopian, Oriental and Hawaii).

Remarks. Berlese (1904) proposed the new species in the name "*Oribates lophothrichus*", which Sellnick (1928) later moved it to the genus *Protoribates*. Later, Willmann (1931) misspelled the specific name as "*lophotrichus*". Marshall *et al.* (1987) considered it a reasonable emendation. After that, Miko *et al.* (1994) and Walter & Latonas (2013) adopted it. Subías (2004, online version 2020) use the original spelling "*lophothrichus*". Miko *et al.* (1994) considered that the species *P. lophotrichus* in Willmann (1931) is mostly probably *P. dentatus*.

Subías (2004) listed *Xylobates prionota* Woolley, 1968 as a synonym of *P. lophothrichus*, and then Walter & Latonas (2013) considered the synonymy correct after examining the type specimens of *X. prionota*.

Protoribates magnus **(Aoki, 1982)**

Xylobates magnus Aoki, 1982: 180–181, fig. 4. Wen, 1990: 123; Yu *et al.*, 1991: 81; Wang, Hu & Yin, 2000: 261.

Protoribates (*P.*) *magnus* Aoki, 1982: Subías, 2004: 206.

Protoribates (*Triaunguis*) *magnus* (Aoki, 1982): Subías, 2004, online version 2017: 436.

Distribution. China (Jilin, Jiangsu), Eastern Palearctic and India.

Protoribates oblongus **(Ewing, 1909) New record to China**

Xylobates oblonga Ewing, 1909a: 73–74, fig. 37.

Oribata longa Ewing, 1909b: 362–363, fig. 6; Norton & Kethley, 1989: 490, 493 (synonymy).

Xylobates longus (Ewing, 1909): Marshall *et al.* 1987: 267.

Xylobates longisetae Jacot, 1937: 244–245, figs 17–21; Marshall *et al.* 1987: 267; Norton & Kethley, 1989: 490, 493 (synonymy).

Hemileius oblongus (Ewing, 1909): Woolley, 1961: 4–6, figs 5–6.

Xylobates oblongus (Ewing, 1909): Norton & Kethley, 1989: 490, 493.

Protoribates oblongus (Ewing, 1909): Weigmann *et al.*, 1993: 39; Subías, 2004: 206.

Distribution. China (Tibet), Nearctic (except West) and Lesser Antilles.

Protoribates paracapucinus **(Mahunka, 1988)**

Xylobates paracapucinus Mahunka, 1988: 879–880, fig. 118–120.

Protoribates paracapucinus (Mahunka, 1988): Bayartogtokh & Akrami, 2000: figs 4A, B. Ermilov & Liao, 2017: 827.

Distribution. China (Taiwan), Tropical and subtropical region.

Protoribates sichuanensis **sp. nov.**

Distribution. China (Sichuan).

Protoribates tenuis **(Wen, Aoki & Wang, 1984)**

Xylobates tenuis Wen, Aoki & Wang, 1984: 302–303, fig. 11; Chen, Li & Wen, 1992: 20; Wang & Hu, 1992: 327; Wang & Wang, 1994: 53 (part); Wang, Lu & Wang, 1996: 61; Hu, 2000: 192.

Protoribates (*P.*) *tenuis* (Wen, Aoki & Wang, 1984): Subias, 2004: 206.

Distribution. China (Shanghai, Anhui, Zhejiang).

Remarks. Wang & Wang (1994) listed *X. tenuis* occurring in Anhui (Ningguo, Qingyang and Guangde). We examined the specimens on five permanent slides in IZAS labeled as "*Xylobates tenuis* Wen *et al.*" collected by Huifu Wang and Zongying Wang from Anhui (Ningguo and Qingyang) in 1988, which are part of the specimens examined in Wang & Wang (1994), and found that the specimens are not *X. tenuis* because of the presence of five pairs of genital setae and short lamellar setae (*vs.* four pairs of genital setae and long and barbed lamellar setae). The specimens were misidentified and therefore the species does not occur in Ningguo and Qingyang in Anhui.

Protoribates tibetensis **sp. nov.**

Distribution. China (Tibet).

Protoribates urbanlus **(Tseng, 1984)**

Glaberoribates urbanlus Tseng, 1984: 62–64. figs 180–181.

Protoribates (*Triaunguis*) *urbanlus* (Tseng, 1984): Subías, 2004: 206

Distribution. China (Taiwan).

Protoribates varisetiger **(Wen, Aoki & Wang, 1984)**

Xylobates varisetiger Wen, Aoki & Wang, 1984: 301–302, fig. 10; Wen, 1990: 123.

Protoribates (*P.*) *varisetiger* (Wen, Aoki & Wang, 1984): Subías, 2004: 206.

Distribution. China (Shanghai, Jilin).

Descriptions of new species

***Protoribates tibetensis* sp. nov.**

(Figs. 1–6)

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Diagnosis. Body size 520–700 × 310–460. Rostral, lamellar and interlamellar setae long, setiform, barbed, *le* inserted on lamellar ends. Bothridial setae with long stalk and short, unilaterally slightly dilated, apically pointed, barbed head. Notogastral setae setiform, setae *c* short, thin, smooth, others long, thick, barbed, blunt distally. Distance between porose areas *A1–A1* subequal to *A2–A2*. Epimeral setal formula: 3-1-3-3; setae *3c* longest. Circumpedal carinae of medium size, directed to region of acetabula III. Custodium present. Adanal setae ad_1 and ad_2 of medium size, thick, barbed. Legs monodactylous. Five pairs of genital setae. Femora II ventroanteriorly rounded.

Description. *Measurements.* Body length: 570 (holotype, male), 520–700 (15 paratypes: six females and nine males); notogaster width: 370 (holotype), 310–460 (15 paratypes). Females usually larger than males: 600–700 × 380–460 versus 520–625 ×310–385.

Integument. Body color brown. Body surface punctate. Lateral parts of prodorsum between sublamellae and acetabula I, II microgranulate.

Prodorsum (Figs 1A, B, 3A). Rostrum broadly rounded. Lamellae located dorsolaterally, half as long as prodorsum (measured in lateral view). Sublamellae about half as long as lamellae. Sublamellar porose areas oval (22–30 × 10–15), located very near to sublamellae. Rostral (75–92), lamellar (88–120) and interlamellar (108–158) setae setiform, barbed, *le* inserted on lamellar ends. Bothridial setae (105–145) with long stalk and short, unilaterally slightly dilated, apically pointed, barbed head. Exobothridial setae (30–45) thin, barbed. Dorsophragmata comparatively short, longitudinally elongated, directed posteromedially. Tutorium ridge-like.

Notogaster (Figs 1A, C, 3). Anterior notogastral margin convex medially. Pteromorphs with distinct hinges. Ten pairs of notogastral setae setiform, setae *c* (12–15) short, thin, smooth, others long (34–70), thick, barbed, blunt distally. Four pairs of rounded porose areas, *Aa* (10–15) larger than *A1*, *A2* and *A3* (4–8). Distance between *A1–A1* subequal to *A2–A2*. Seta *lp* inserted anteromedially to *A1*, seta h_3 inserted far anteriorly to *A2*. All lyrifissures and opisthonotal gland openings clearly visible, *ip* located posterolaterally to *A3*.

Gnathosoma (Fig. 6). Subcapitulum longer than wide (125–165 × 85–105). Subcapitular setae setiform, *h* longest (31–44), barbed, *a* (23–32) roughed, *m* shortest (15–22), thinnest. Palps (length 80–95) with setation 0-2-1-3-9(+ω). Postpalpal setae (6–8) spiniform. Chelicerae (length 120–165) setae barbed, *cha* (50–55) longer than *chb* (28–35). Trägårdh's organ long, tapered.

Epimeral and lateral podosomal regions (Figs 2, 3A). Epimeral setal formula: 3-1-3-3. Setae setiform, thin, *3c*, *1b* and *3b* barbed, *3c* (35–43) longer than *1b* and *3b* (28–38), others short (12–25), roughed. Pedotecta I and II lamina-like. Discidium triangular. Custodium present. Circumpedal carinae of medium size, directed to region of acetabula III.

Anogenital region (Figs 2, 3). Five pairs of genital (g_1, 17–25; g_2–g_5, 10–20), one pair of aggenital (14–20) setae, slightly barbed, two pairs of anal (25–44) and three pairs of adanal setae (ad_1, 67–88; ad_2, 56–80; ad_3, 26–35) setiform, barbed, ad_1 and ad_2 obviously longer than ad_3. Adanal setae ad_1 posterior, ad_2 lateral, ad_3 anterior to anal aperture. Adanal lyrifissures located close and parallel to anal plates.

Legs (Figs 4, 5). Monodactylous, claws thick, barbed dorsally. Tibiae I and II with ventrobasal tooth. Femora II ventroanteriorly rounded. Dorsoparaxial porose areas on femora I–IV and on trochanters III, IV well visible. Formulas of leg setation and solenidia: I (1-5-3-4-20) [1-2-2], II (1-5-3-4-15) [1-1-2], III (2-3-1-3-15) [1-1-0], IV (1-2-2-3-12) [0-1-0]; homology of setae and solenidia indicated in Table 1.

TABLE 1. Leg setation and solenidia of adult *Protoribates tibetensis* **sp. nov.** (same data for *Protoribates sichuanensis* **sp.nov.,** *Protoribates oblongus* (Ewing, 1909), *Protoribates dentatus* (Berlese, 1883))

Leg	Tr	Fe	Ge	Ti	Ta
I	*v'*	*d, (l), bv", v"*	*(l), v',* σ	*(l), (v),* φ_1, φ_2	*(ft), (tc), (it), (p), (u), (a), s, (pv), v', (pl), l"*, ε,* ω_1, ω_2
II	*v'*	*d, (l), bv", v"*	*(l), v',* σ	*(l), (v),* φ	*(ft), (tc), (it), (p), (u), (a), s, (pv),* ω_1, ω_2
III	*v', l'*	*d, l', ev'*	*l',* σ	*l', (v),* φ	*(ft), (tc), (it), (p), (u), (a), s, (pv)*
IV	*v'*	*d, ev'*	*d, l'*	*l', (v),* φ	*ft", (tc), (p), (u), (a), s, (pv)*

Roman letters refer to normal setae, Greek letters to solenidia (except *ε* = famulus). Single prime (') marks setae on the anterior and double prime (") setae on the posterior side of a given leg segment.

*— *l"* on tarsus IV absent in *Protoribates sichuanensis* **sp. nov.** and *Protoribates oblongus* (Ewing, 1909).

Material examined. Holotype (male, in alcohol, LR-17-115): China, Tibet, Medog County, Beibeng Town, Jiangxin Village, 29°13′23.80″N, 95°07′45.18″E, 743 m a.s.l., litter under arbor, 12.VIII.2017; nine paratypes (six males, three in alcohol and three on permanent slides; three females, one in alcohol and two on permanent slides, LR-17-115): same data as the holotype; four paratypes (two males, one in alcohol and one on permanent slide; two females, one in alcohol and one on permanent slide, LR-17-088): China, Tibet, Medog County, 108 Km milestone locality on Zamo Road, 29°29′28.07″N, 95°26′42.88″E, 904 m a.s.l., in mosses, 7.VIII.2017; one paratype (female on permanent on slide, LR-17-129): China, Tibet, Medog County, near Ximohe Bridge, 29°21′06.27″N, 95°20′27.17″E, 758 m a.s.l., litter under arbor, 15.VIII.2017; one paratype (male in alcohol, LR-17-130): same place as LR-17-129, 29°21′23.32″N, 95°20′26.86″E, 766 m a.s.l., litter under arbor, 15.VIII.2017. All specimens were collected by Rong Li.

Etymology. The species is named after the region, Tibet in China, from where the type specimens were collected.

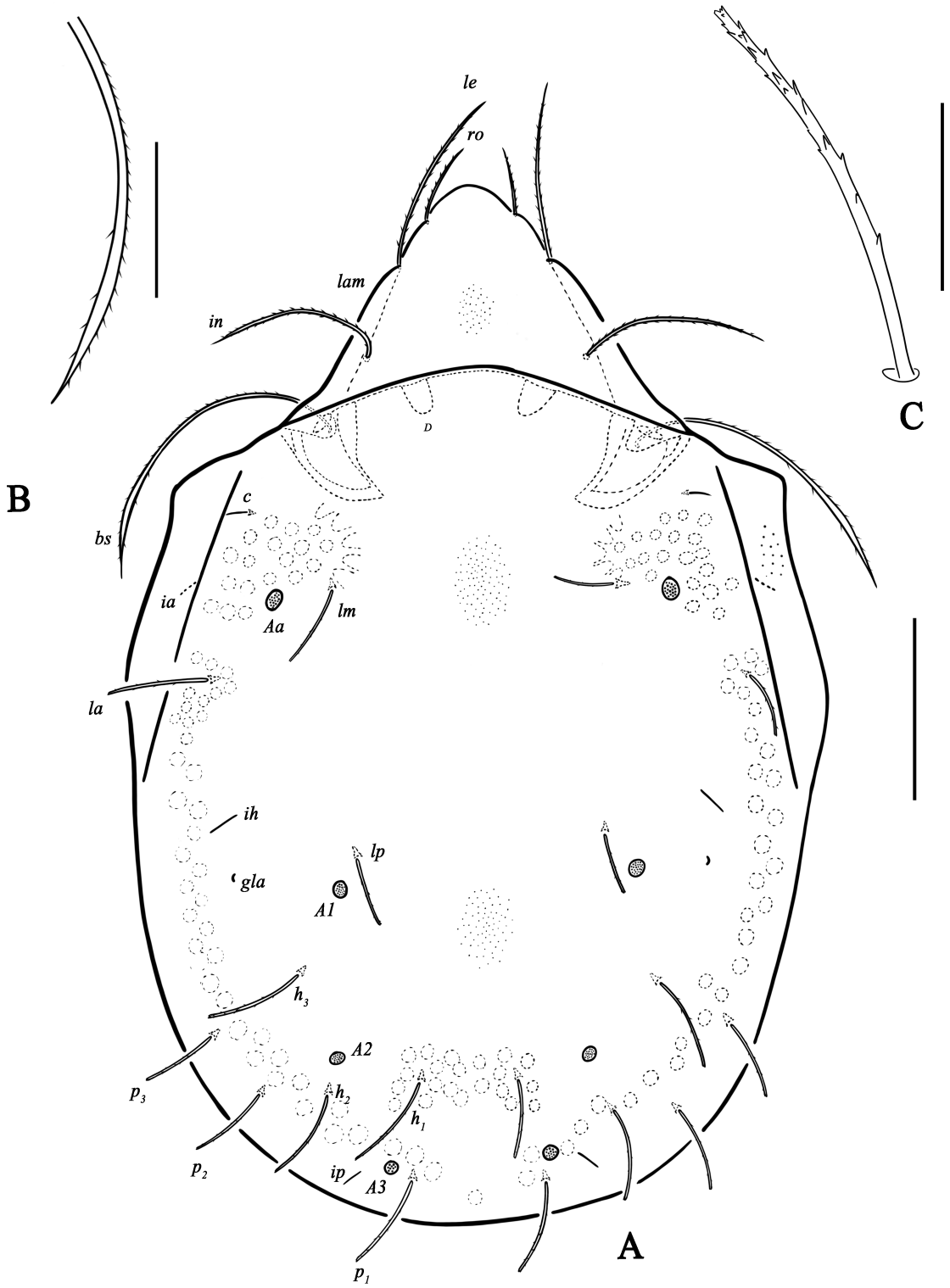

FIGURE 1. *Protoribates tibetensis* **sp. nov.**, adult. A. dorsal view; B. bothridial setae; C. notogastral setae except setae *c*. Scale bars: A=100 μm, B=50 μm, C=25 μm.

Remarks. By having the combination of larger body size, long, thick and barbed notogastral setae, long, thick, and barbed ad_1 and ad_2, custodium and monodactylous legs, *Protoribates tibetensis* **sp. nov.** differs from all representatives of the genus *Protoribates*. The presence of developed notogastral setae is unusual for *Protoribates*. There are only two species of *Protoribates* whose notogastral setae are moderately long, the others are minute or short. They are *P. mollicoma* (Hammer, 1973) from Pacific Islands and India, and *P. lemensis* Ermilov & Tolstikov, 2015 from Brazil, but the notogastral setae of both of above are smooth, not barbed, and custodium abstent.

Although the presence of long notogastral setae is unusual for the genus, the other characters such as porose areas on notogaster, the form of tutorium, leg chaetotaxy, and the number of genital setae are generally typical for *Protoribates*.

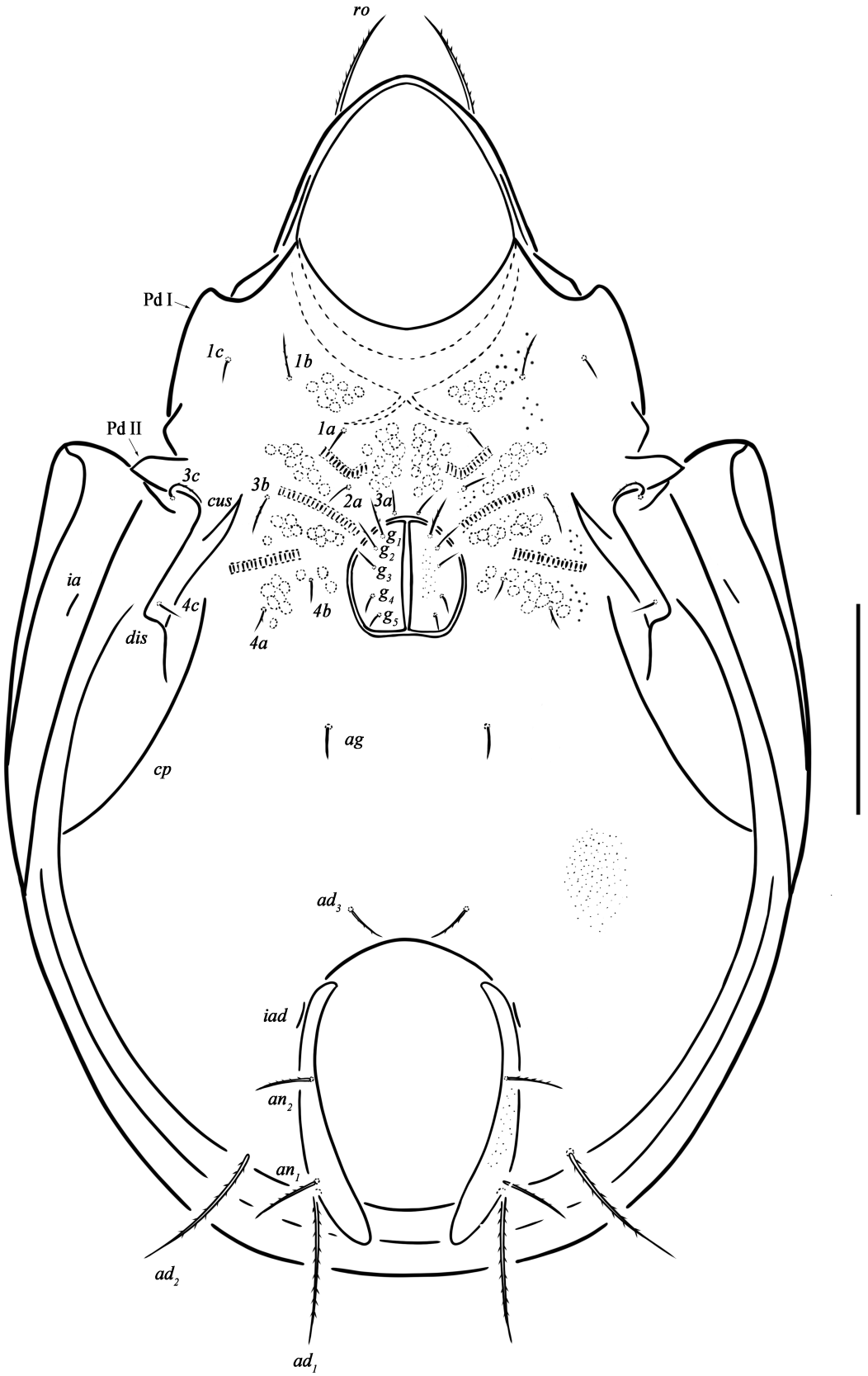

FIGURE 2. *Protoribates tibetensis* **sp. nov.**, adult. ventral view. Scale bar 100 μm.

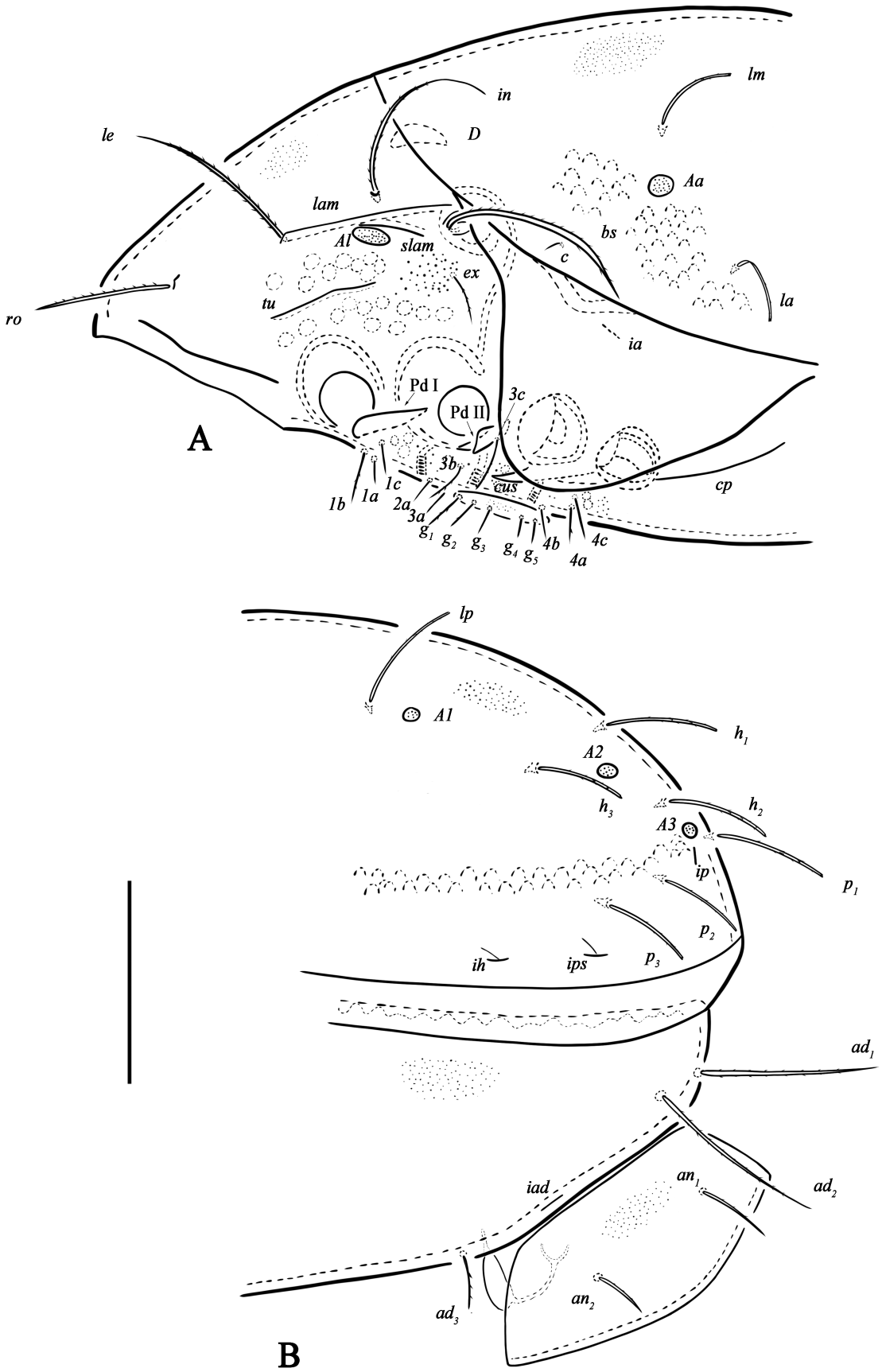

FIGURE 3 *Protoribates tibetensis* **sp. nov.**, adult. A. anterior part of body, lateral view; B. posterior part of body, lateral view. Scale bar 100 μm.

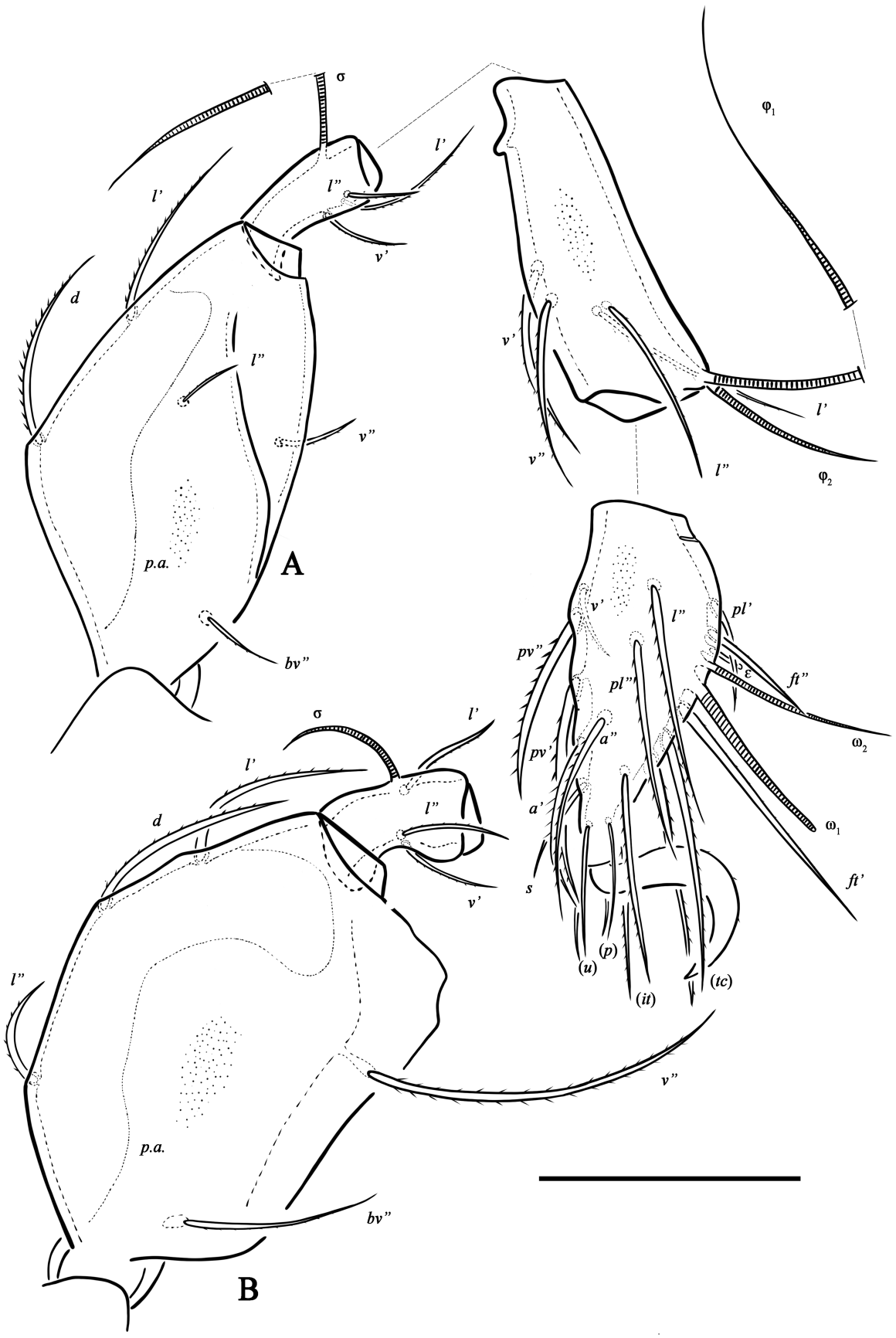

FIGURE 4. *Protoribates tibetensis* **sp. nov.**, adult. A. leg I, right, antiaxial view; B. genu, femur and part of trochanter of leg II, right, antiaxial view. Scale bar 50 μm.

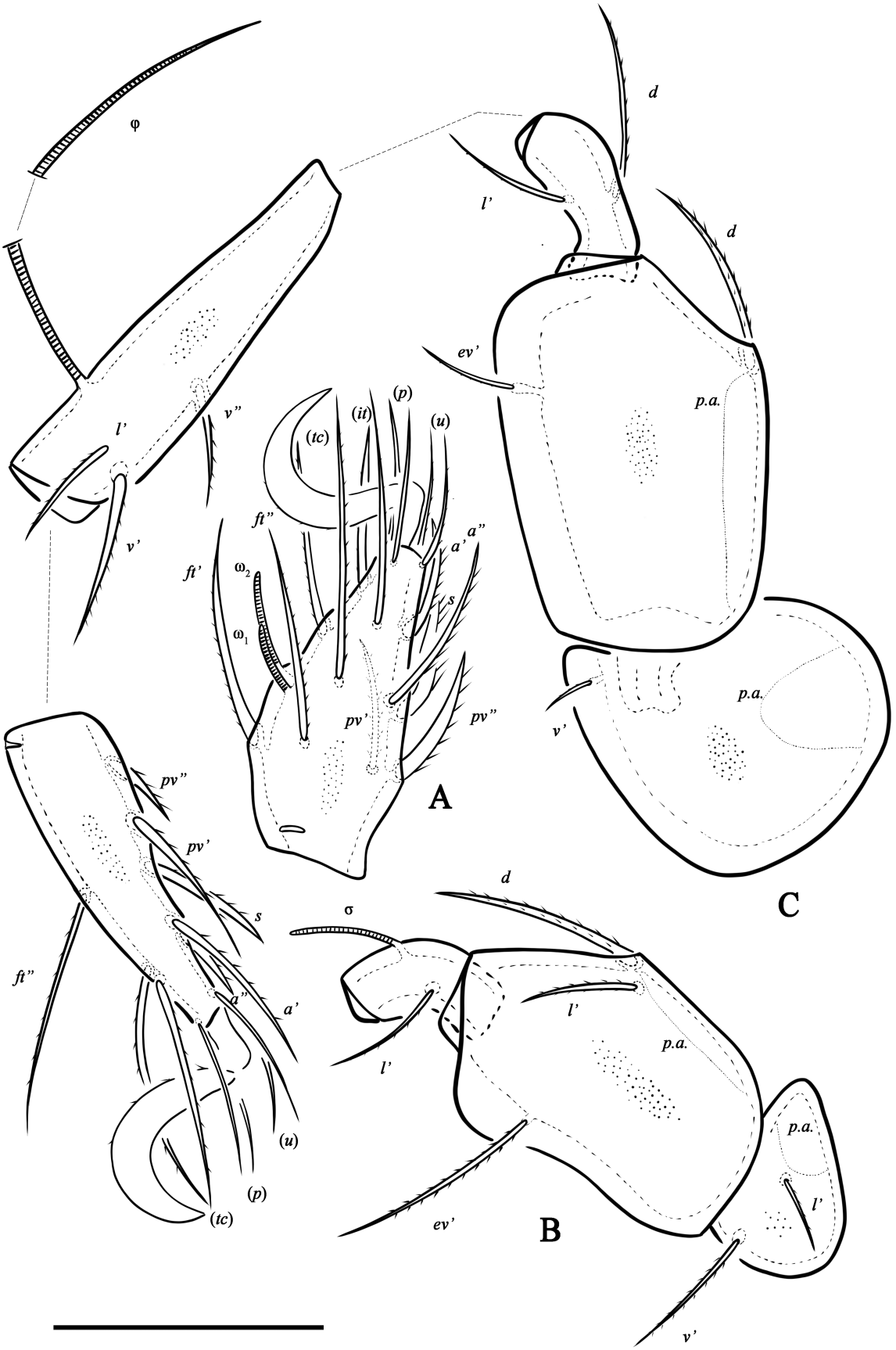

FIGURE 5. *Protoribates tibetensis* **sp. nov.**, adult. A. tarsus of leg II, right, antiaxial view; B. genu, femur and trochanter of leg III, right, antiaxial view; C. leg IV, right, antiaxial view. Scale bar 50 μm.

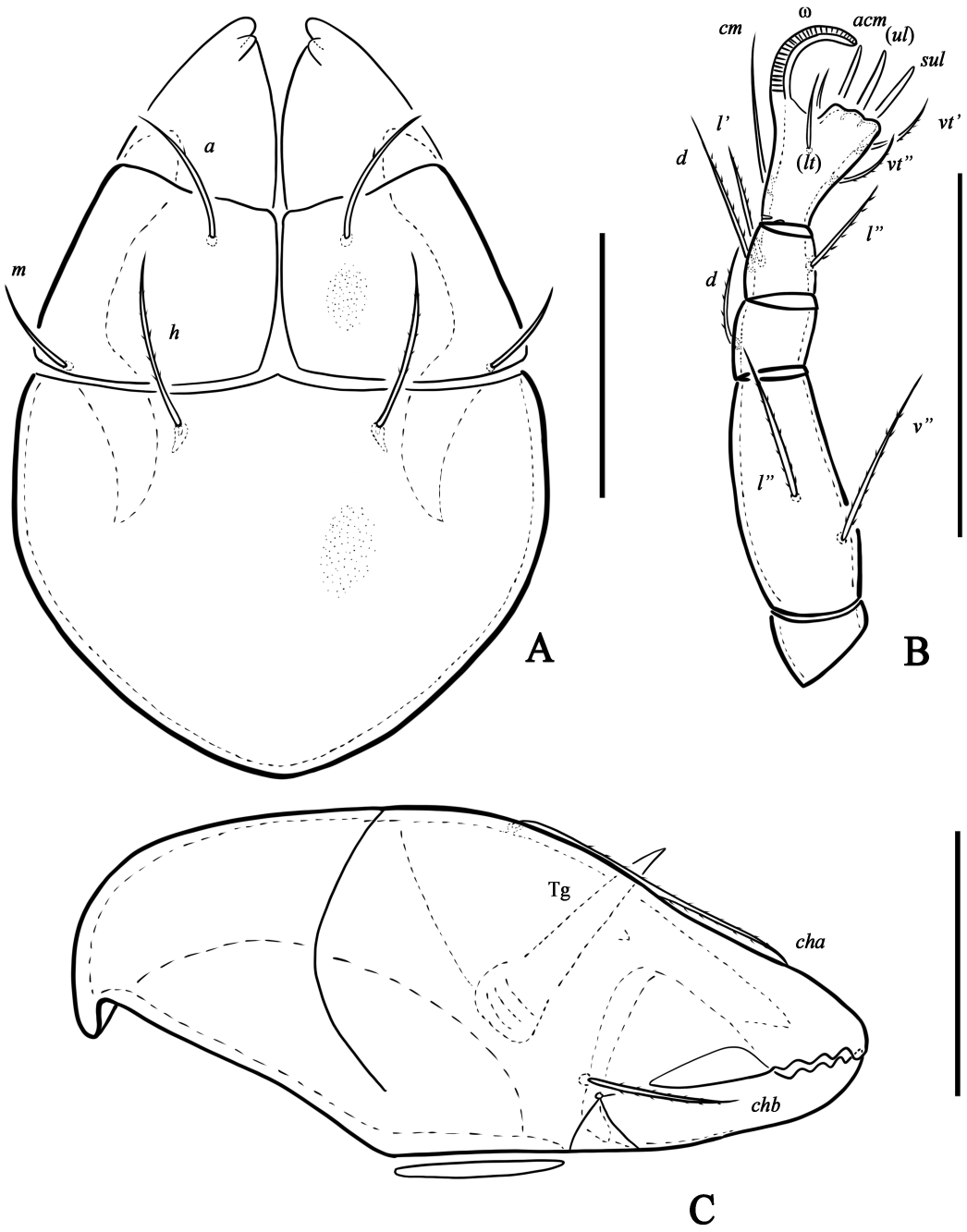

FIGURE 6. *Protoribates tibetensis* **sp. nov.**, adult. A. subcapitulum, ventral view; B. palp, right, antiaxial view; C. chelicera, right, antiaxial view. Scale bars 50 μm.

Protoribates sichuanensis **sp.nov.**

(Figs 7–12)

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Diagnose. Body size: 520–660 × 320–400. Rostrum rounded or slightly protruding. Rostral, lamellar and interlamellar setae long, setiform, barbed. Bothridial setae with long stalk and short, unilaterally dilated, apically pointed, barbed head. Notogastral setae minute. Four pairs of small rounded porose areas. Distance between porose areas *A1–A1* shorter than *A2–A2*. Epimeral setal formula: 3-1-3-2; setae *3c* and *1b* longest, barbed. Custodium present. Humeral porose areas *Ah* present. Adanal setae ad_1 and ad_2 of medium size. Five pairs of genital setae. Legs heterotridactylous. Femora II ventroanteriorly rounded.

Description. *Measurements*. Body length 520 (holotyle, male), 520–660 (six paratypes: four females and two males), width 320 (holotype), 320–400 (six paratypes). Females (585–630 × 365–400) always larger than males (520–530 × 320–325).

Integument. Body color brown. Body surface punctate. Lateral parts of prodorsum between sublamellae and acetabula I, II microgranulate.

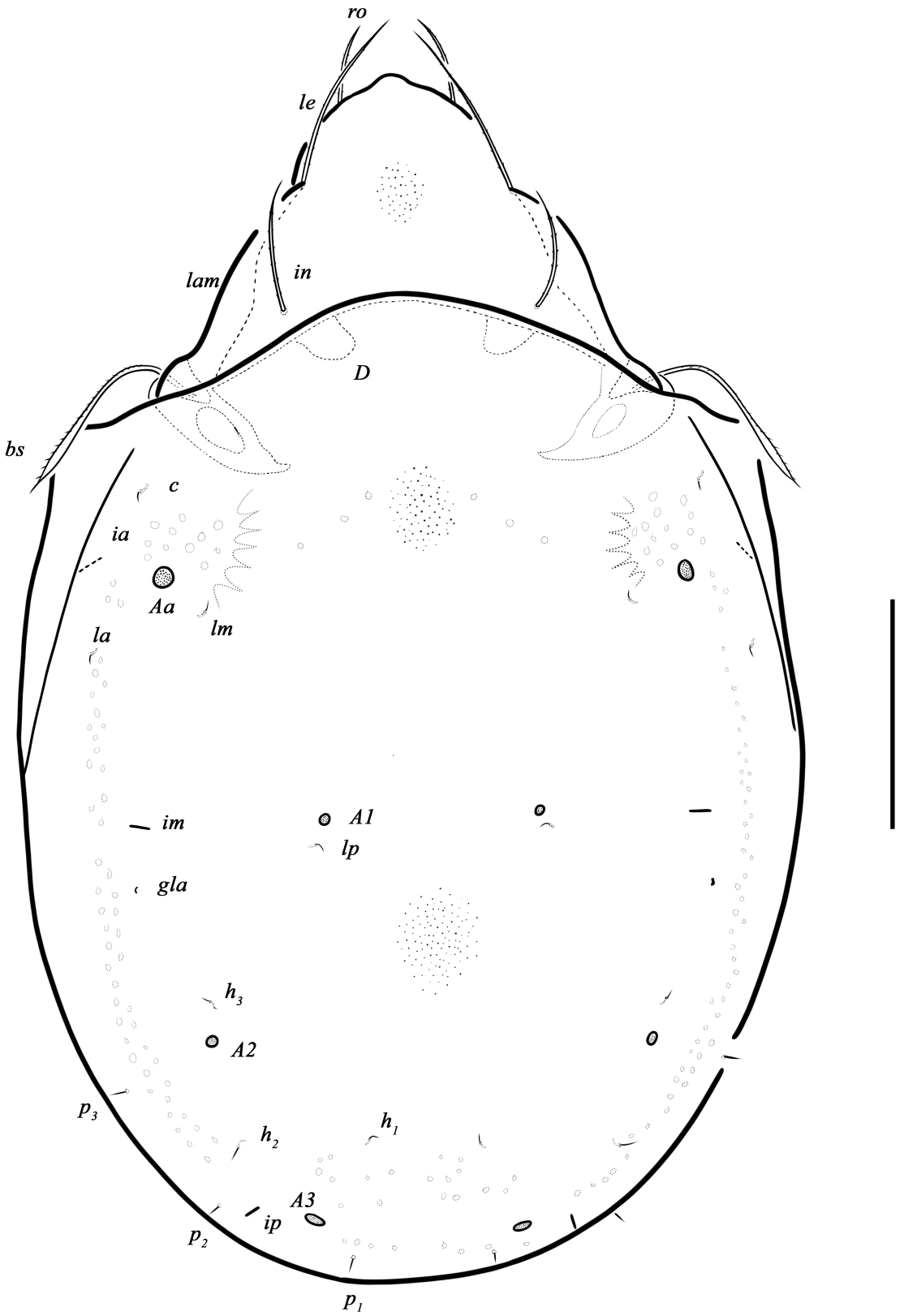

FIGURE 7. *Protoribates sichuanensis* **sp. nov.**, adult. dorsal view. Scale bar 100 μm.

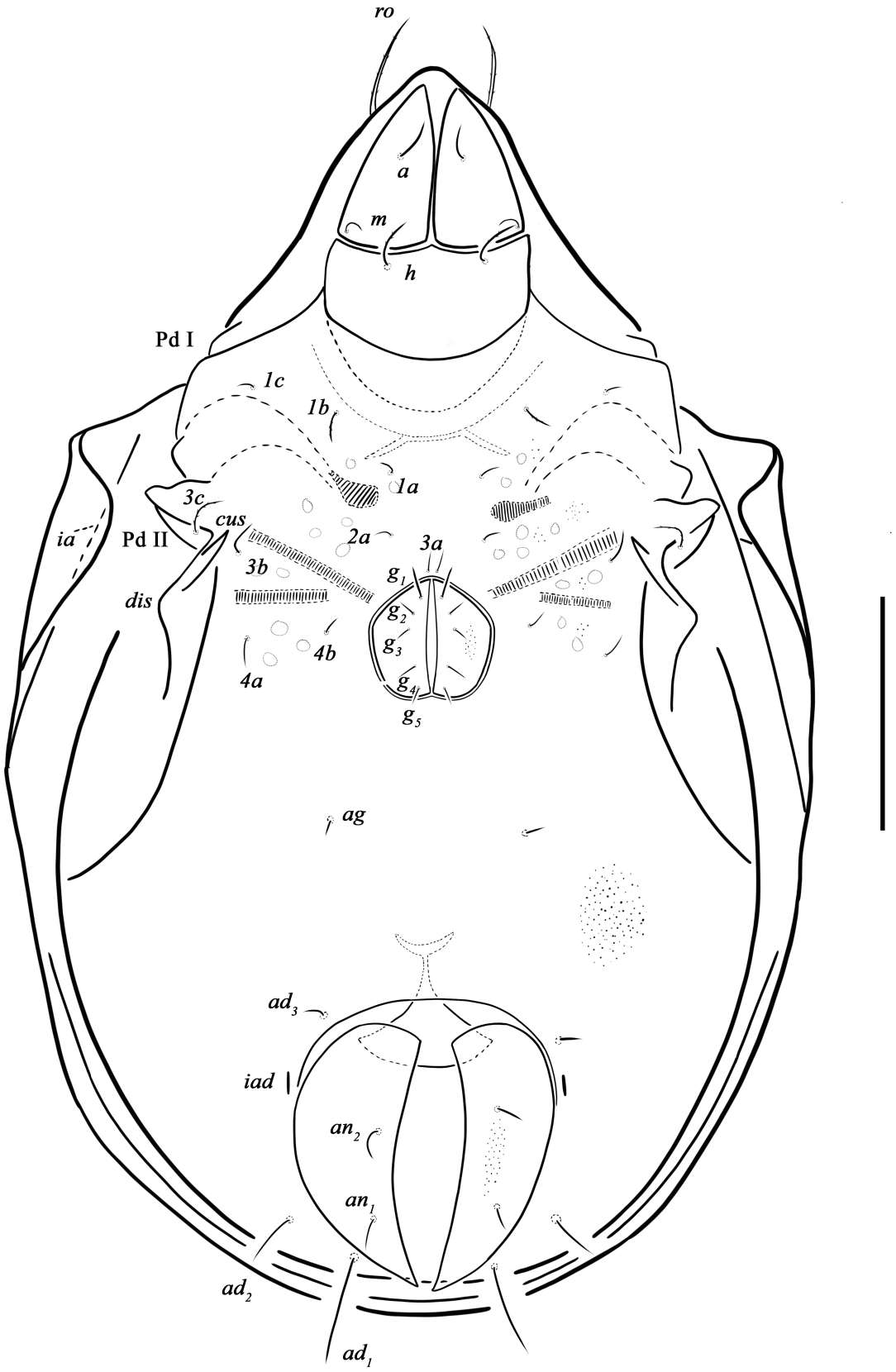

FIGURE 8. *Protoribates sichuanensis* **sp. nov.**, adult. ventral view. Scale bar 100 μm.

Prodorsum (Figs 7, 9A). Rostrum rounded or slightly protruding. Lamellae located dorsolaterally, half as long as prodorsum (measured in lateral view). Sublamellae about half as long as lamellae. Sublamellar porose areas (19–24 × 14–19) oval, located very near to sublamellae. Rostral (46–63), lamellar (75–111) and interlamellar (102–150)

setae setiform, barbed. Lamellar setae inserted on inside lamellar ends. Bothridial setae (114–127) with long stalk and short, unilaterally dilated, apically pointed, barbed head. Exobothridial setae minute. Dorsophragmata comparatively short, longitudinally elongated, directed posteromedially. Tutorium ridge-like.

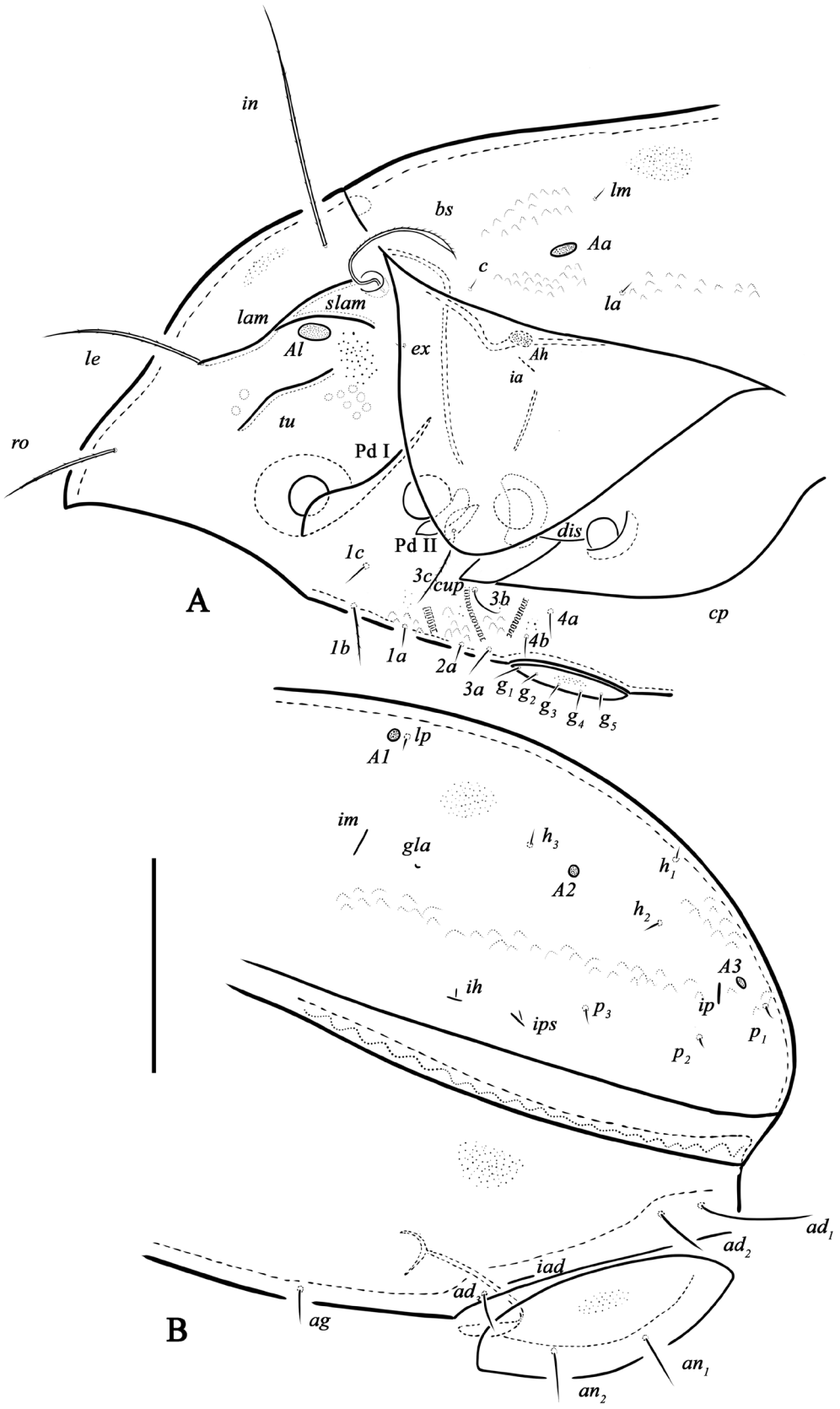

FIGURE 9. *Protoribates sichuanensis* **sp. nov.**, adult. A. anterior part of body, lateral view; B. posterior part of body, lateral view. Scale bar 100 μm.

Notogaster (Figs 7, 9, 12). Anterior notogastral margin convex medially. Pteromorphs with distinct hinges. Ten pairs of notogastral setae minute (5–6), thin, smooth. Four pairs of rounded porose areas, *Aa* (14–25) larger than *A1*, *A2* and *A3* (8–12); *A1* lost on one side of a specimen (CYN-18-142); *A2* lost on one side of a specimen, and *A3* on this side larger than that on other side (CYN-18-141-2). Distance between porose areas *A1–A1* shorter than *A2–A2* (1:2). Setae h_1 and h_2 almost in transverse line (h_1 slightly anterior). All lyrifissures and opisthonotal gland openings clearly visible.

Gnathosoma (Fig. 8). Generally, similar to *P. tibetensis* **sp. nov.** Subcapitulum longer than wide (137–150 × 85–92). Subcapitular setae (*a*, 19–21; *h*, 33–38; *m*, 16–18) setiform, *h* longest, barbed, *m* thinnest. Adoral setae (15–20) setiform, heavily barbed. Palps (length 87–90) with setation 0-2-1-3-9(+ω). Postpalpal setae (7) spiniform, smooth. Chelicerae (length 154–185) with two setiform, barbed setae (*cha*, 50–56; *chb*, 25–33). Trägårdh's organ of chelicerae elongate triangular.

Epimeral and lateral podosomal regions (Figs 8, 9A). Epimeral setal formula: 3-1-3-2. Epimeral setae setiform, thin, *3c* (30–40), *1b* (24–35) and *3b* (24–27) longer than others (13–17), *3c* and *1b* barbed, others smooth. Custodium present. Humeral porose areas *Ah* oval. Circumpedal carinae of medium size, directed to pedotecta II, but not reaching it.

Anogenital region (Figs 8, 9). Five pairs of genital (g_1, 19–24; g_2–g_5, 11–16), one pair of aggenital (12–19), two pairs of anal (22–32) and three pairs of adanal (ad_1, 33–76; ad_2, 27–48; ad_3, 16–24) setae setiform, thin, smooth, length of setae ad_1 within a wide range, always longer than ad_2 and ad_3. Adanal setae ad_1 in posterior, ad_2 in lateral, ad_3 in anterior positions. Adanal lyrifissures located close and parallel to anal aperture.

Legs (Figs 10, 11). Heterotridactylous, median claw thicker than laterals, barbed on dorsal side. Tibiae I, II with ventrobasal tooth. Femora II ventroanteriorly rounded. Femora I–IV and trochanters III, IV with distinctly developed dorsoparaxial porose area. Formulas of leg setation and solenidia: I (1-5-3-4-19) [1-2-2], II (1-5-3-4-15) [1-1-2], III (2-3-1-3-15) [1-1-0], IV (1-2-2-3-12) [0-1-0], setae number on tibiae I six on one specimen, one pair of setae on lateral added (CYN-18-141-3); homology of setae and solenidia indicated in Table 1.

Material examined. Holotype (male in alcohol, CYN-18-141-1): China, Sichuan, Pengzhou, Dabaoshan Town, Longcaogou, 31°22′67.57″N, 103°75′50.89″E, 1123 m a.s.l., litter under arbor, 11.VIII.2018; four paratypes (two males, one in alcohol and one on permanent slide; two females, one in alcohol and one on permanent slide, CYN-18-141); one paratype (female on permanent slide, CYN-18-142): same place as holotype, mosses, 11.VIII.2018; one paratype (female on permanent slide, CYN-18-181): China, Sichuan, Pengzhou, Baoshan Second Road, 31°26′32.33″N, 103°78′30.95″E, 1121 m a.s.l., litter under arbor, 17.VIII.2018. All specimens were collected by Yannan Chen.

Etymology. The species is named after the region, Sichuan in China, from where the type specimens were collected.

Remarks. *Protoribates sichuanensis* **sp. nov.** is morphologically similar to the species *Protoribates magnus* (Aoki, 1982) from the Eastern Palaearctic and India in having convex anterior notogastral margin, bothridial setae long, with unilaterally dilated, apically pointed, barbed head, long adanal setae ad_1 and ad_2, similar location of setae *h* and heterotridactylous legs. However, the new species differs from the latter by smaller body size (520–660 × 320–400 *vs*. 660–872 × 440–620); ventroanteriorly rounded femora II (*vs*. ventroanteriorly pointed femora II); adanal setae ad_1 less than 1 × the distance between ad_1–ad_1 (adanal setae ad_1 1.3–1.6 × the distance between ad_1–ad_1); single porose area *A1* (*vs*. *A1* occasionally divided into two closely situated pores on both sides or on one side).

Protoribates sichuanensis **sp. nov.** is also morphologically similar to *P. gruezoi* Corpuz-Raros, 2014 from Philippines; *P. seminudus* (Hammer, 1971) from Australian and Oriental (northeast India (frequent) and Philippines); *P. shaldybinae* Ermilov & Starý, 2017 from Vietnam; and *P. punctatus* (Grobler, 1991) from Ethiopic and northeast India, in having long ad_1 and heterotridactylous legs. But it differs from *P. gruezoi* by body surface punctate (*vs*. body surface granulate); lamellar setae inserted on lamellar ends (*vs*. lamellar setae inserted on the prodorsal surface, close to the lamellar ends); h_1 and h_2 almost in transverse line (h_1 slightly anterior) (*vs*. h_2 aligned with h_1, h_3). It differs from *P. seminudus* by convex anterior notogastral margin (*vs*. straight anterior notogastral margin); h_1 and h_2 almost in transverse line (h_1 slightly anterior) (*vs*. h_2 aligned with h_1, h_3); no line between the tips of the lamellar (a line not a real translamellae between the tips of the lamellae). It differs from *P. shaldybinae* by adanal setae ad_1 and ad_2 smooth (*vs*. adanal setae ad_1 and ad_2 barbed); pedotecta II not dentate (*vs*. pedotecta II dentate); without dorsal teeth on tarsi I and II (*vs*. with dorsal teeth on tarsi I and II). After comparing the descriptions and illustrations of *P. seminudus* and *P. punctatus*, we did not find any differences between them, and also by the fact that both are distributed in northeast India. *Protoribates punctatus* may be a synonym of *P. seminudus*, but additional research is necessary.

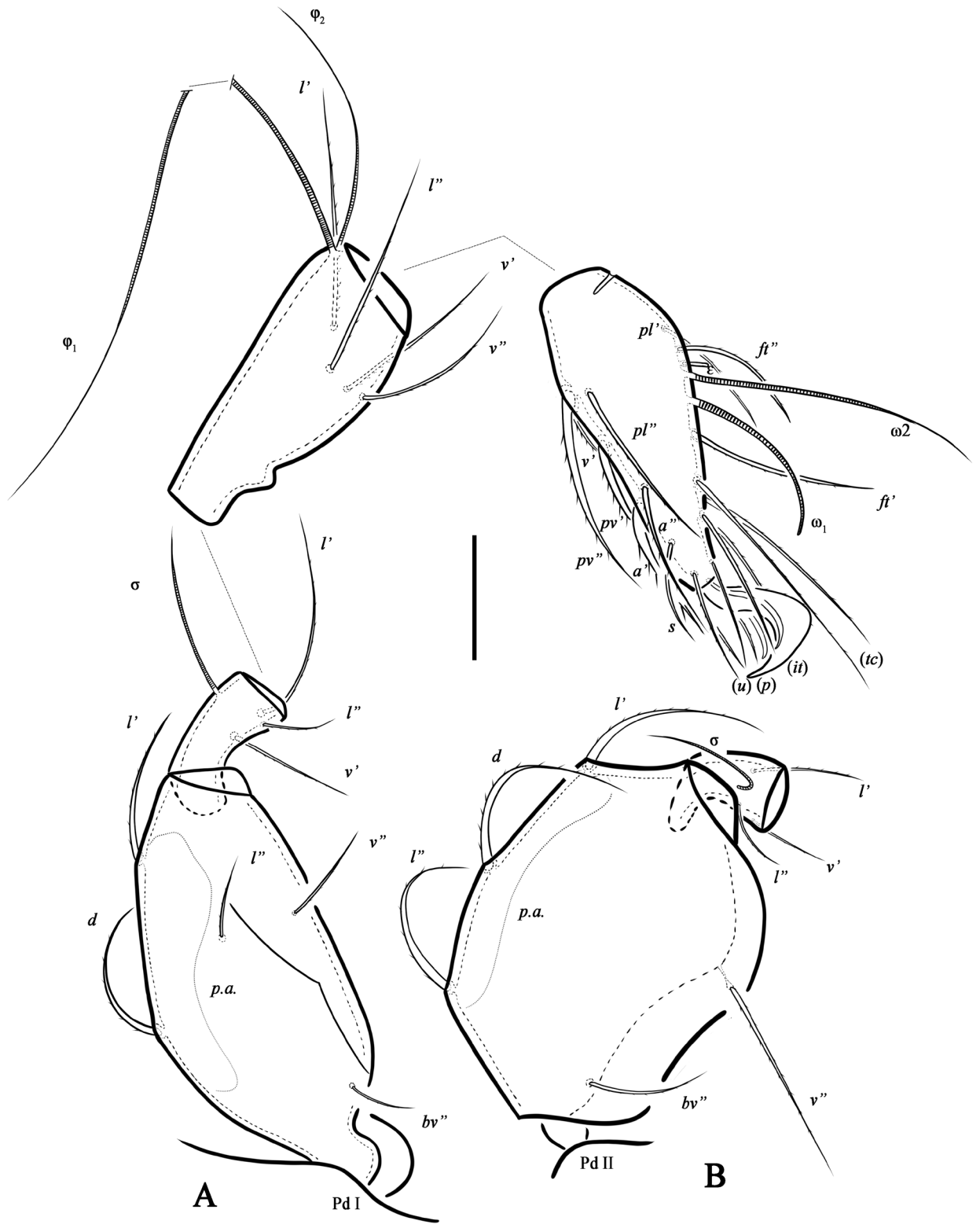

FIGURE 10. *Protoribates sichuanensis* **sp. nov.**, adult. A. leg I, right, antiaxial view; B. genu, femur and part of trochanter of leg II, right, antiaxial view. Scale bar 30 μm.

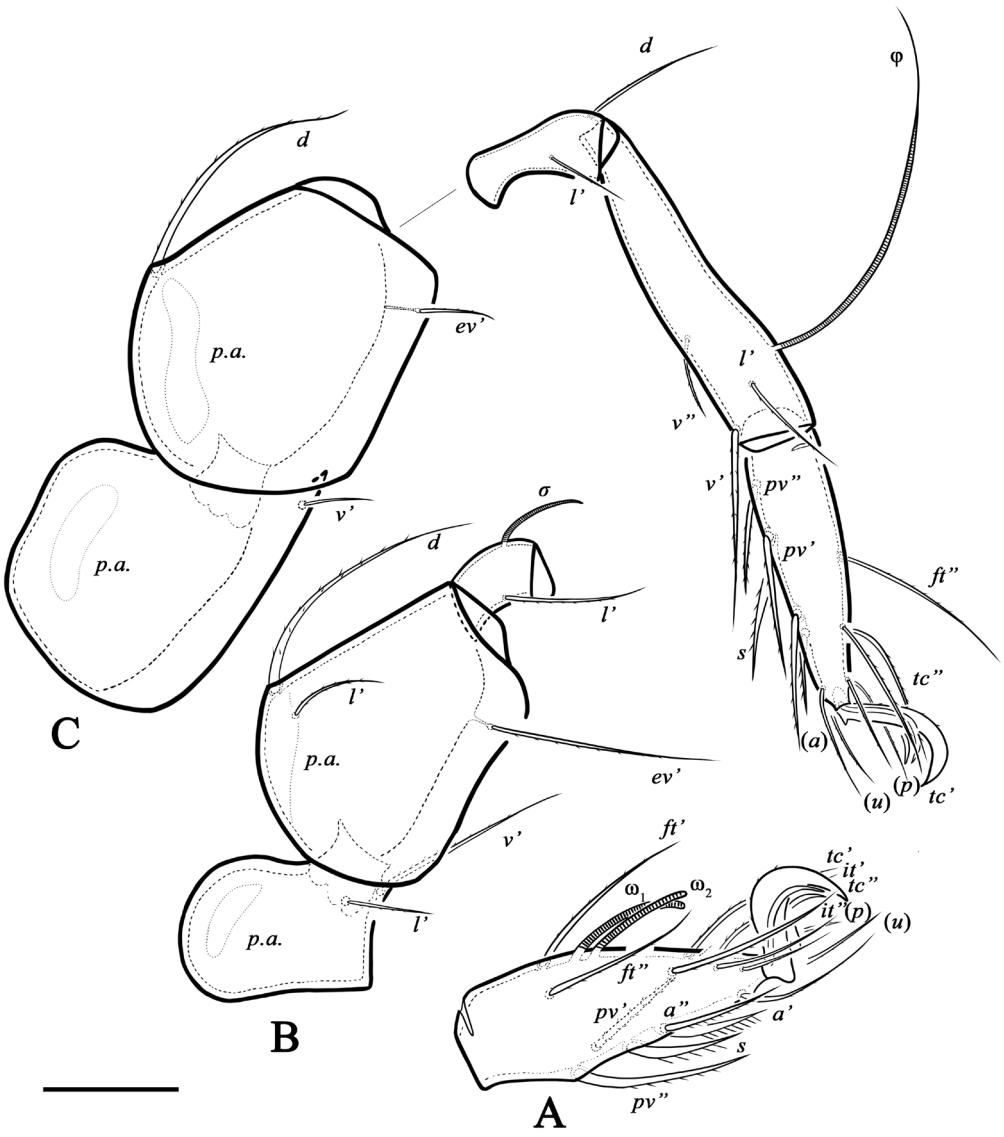

FIGURE 11. *Protoribates sichuanensis* **sp. nov.**, adult. A. tarsus of leg II, right, antiaxial view; B. genu, femur and trochanter of leg III, left, antiaxial view; C. leg IV, left, antiaxial view. Scale bar 30 μm.

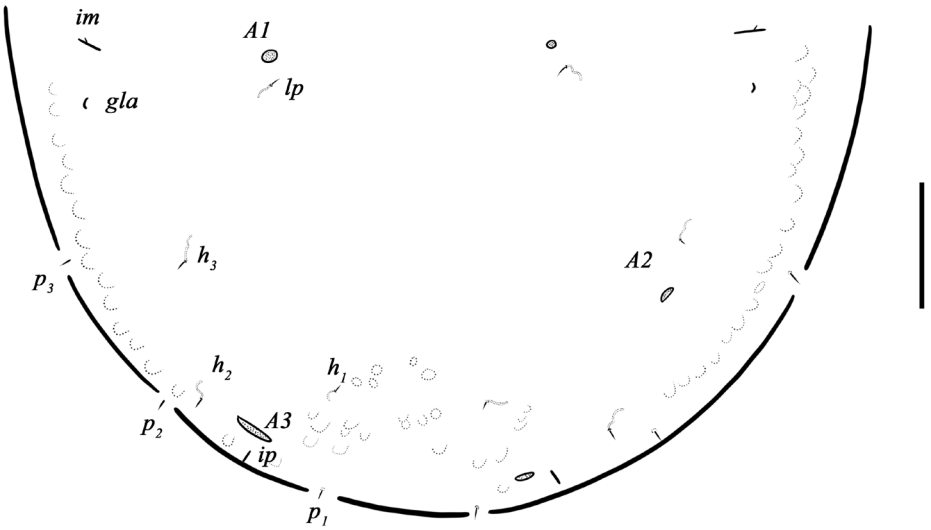

FIGURE 12. *Protoribates sichuanensis* **sp. nov.**, adult. dorsal view (*A2* lost on left side, *A3* on left side large, CYN-18-141-2, male). Scale bar 50 μm.

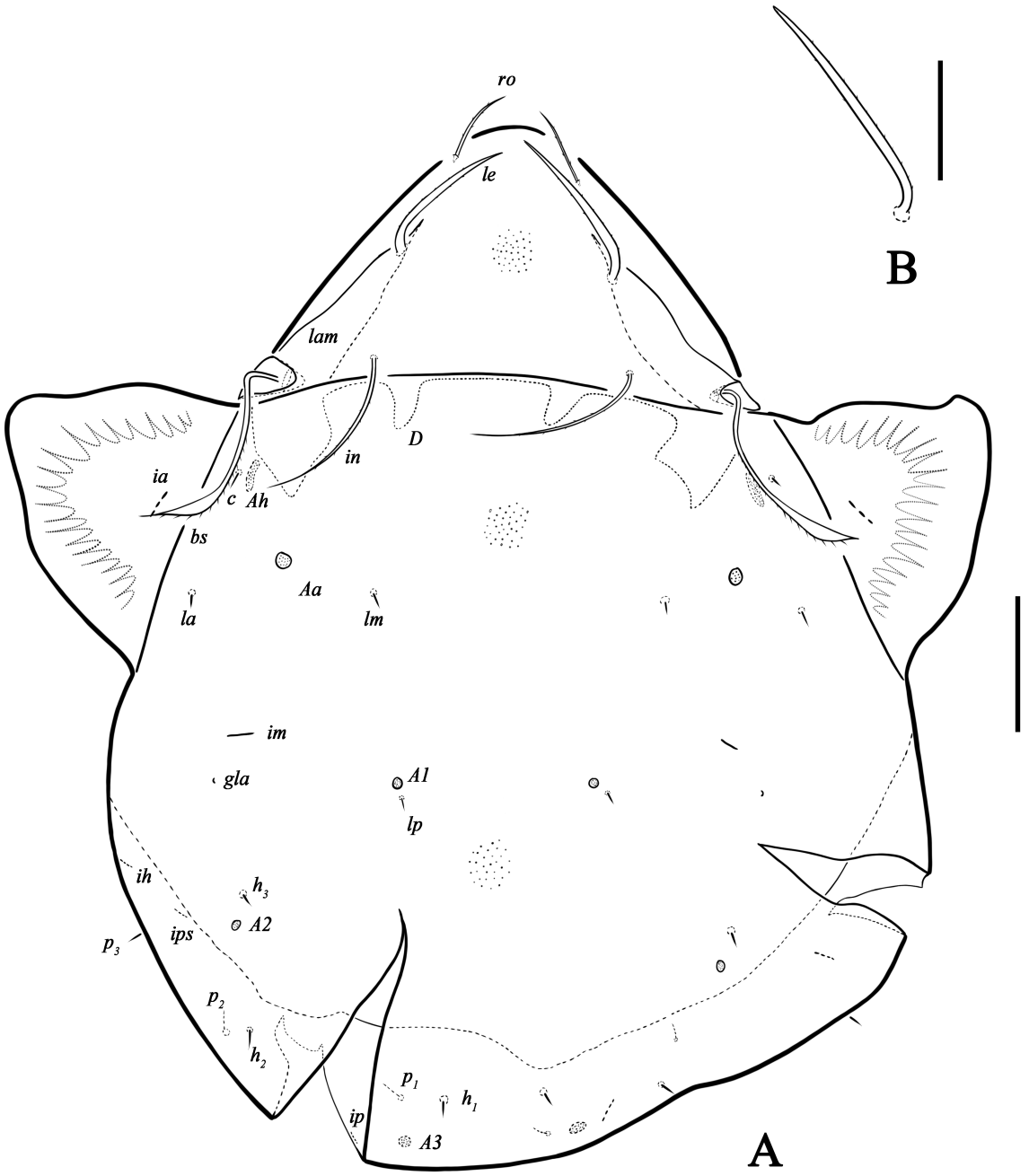

FIGURE 13. *Protoribates crassisetiger nipponicus* Fujita, 1989, adult. A. dorsal view. B. lamellar setae. Scale bars: A=50 μm, B=35 μm.

New records to China

Protoribates crassisetiger nipponicus (Fujita, 1989)

(Figs 13–14)

Xylobates crassisetiger nipponicus Fujita, 1989: 17–19, fig. 1.
Protoribates (Protoribates) crassisetiger nipponicus (Fujita, 1989): Subías, 2004: 206.

Supplementary description. Body length 400–480, width 340–390. Body color brown. Body surface punctate.
Prodorsum.

Rostrum broadly rounded. Lamellae located dorsolaterally, half as long as prodorsum. Rostral (48–52) and

interlamellar (87–92) setae setiform, barbed. Lamellar setae (71-84), setiform, thickened and barbed, inserted on lamellar ends. Bothridial setae (95–100) with long stalk and short, unilaterally dilated, pointed apically, barbed head. Dorsophragmata comparatively short, longitudinally elongated, directed posteromedially.

Notogaster. Anterior notogastral margin slightly convex medially. Pteromorphs with distinct hinges. Ten pairs of notogastral setae minute (8), thin, smooth. Four pairs of rounded porose areas, *Aa* larger (8–10) than *A1*, *A2* and *A3* (5–8). Distance between porose areas *A1–A1* shorter than *A2–A2* (1:2). All lyrifissures and opisthonotal gland openings clearly visible.

Gnathosoma. Subcapitulum longer than wide (100–117 × 90–92). Subcapitular setae (*a*, *h*) similar in length (27–28), setiform, *a* slightly thicker than *h*; setae *m* slightly shorter (21), thinnest.

Epimeral and lateral podosomal regions. Epimeral setal formula: 3-1-3-3. Epimeral setae setiform, thin, smooth, *1b*, *3b* and *3c* (20–24) longer than others (8). Humeral porose areas *Ah* elongate oval. Circumpedal carinae of medium size, directed to pedotecta II, but not reaching it.

Anogenital region. Five pairs of genital (g_1, 9–13; g_2–g_5, 8–10), one pair of aggenital (11–16), two pairs of anal (16–25) and three pairs of adanal (ad_1, 35–44; ad_2, 21–25; ad_3, 11–16) setae setiform, thin, smooth, ad_1 and ad_2 longer than ad_3. Adanal setae ad_1 in posterior, ad_2 in lateral, ad_3 in anterior positions. Adanal lyrifissures located close and parallel to anal aperture.

Legs. Monodactylous.

Material examined. One female (on permanent slide, T0309): China, Anhui, Fengyang County, on rice. I.1996; one female (on permanent slide, T0695): same place as T0309. XII.1996. Both specimens were collected by Qingtian Li.

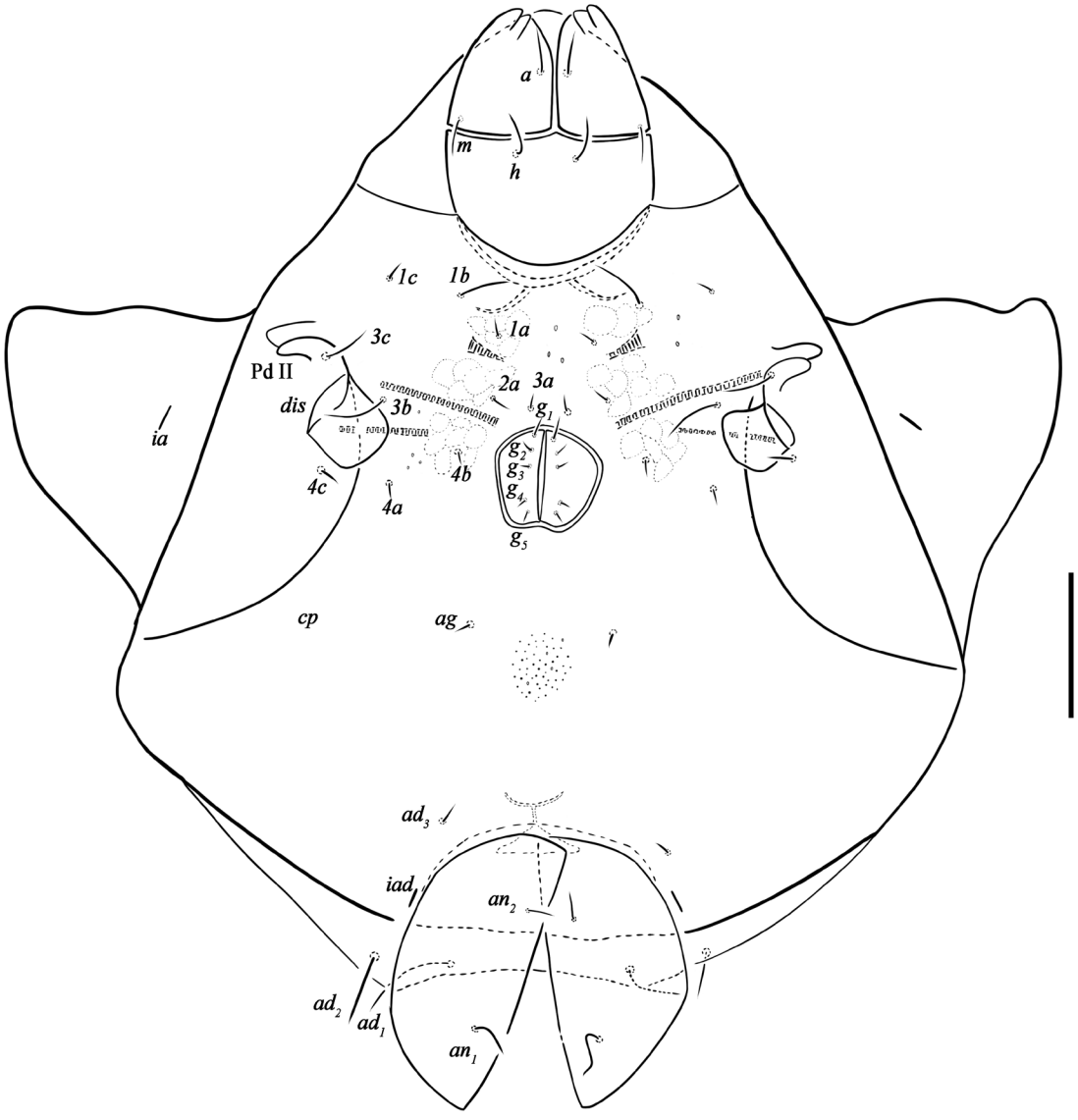

FIGURE 14. *Protoribates crassisetiger nipponicus* (Fujita, 1989), adult. ventral view. Scale bar 50 μm.

Distribution. China (Anhui), Japan.

Remarks. The main diagnostic character of the subspecies is the thickened lamellar setae. In having this character, it is similar to *P. heinrichi* Ermilov, Sandmann & Scheu, 2019 from Indonesia, *P. kumayaensis* Nakamura, Fukumori & Fujikawa, 2010 and *P. tohokuensis* Fujikawa, 2003 from Japan, and *P. heterodactylus* Ermilov & Anichkin, 2011 from Vietnam. It differs from *P. heinrichi* in having thin rostral setae (*vs.* thickened rostral setae) and bothridial setae with unilaterally dilated head (*vs.* bothridial setae setiform). It differs from *P. kumayaensis* in having the lamellar setae inserted on the lamellar ends (*vs.* inserted medially to the lamellar ends) and thin interlamellar setae (*vs.* thickened interlamellar setae). It differs from *P. tohokuensis* in having smooth anal and adanal setae (*vs.* barbed anal and adanal setae) and custodium absent (*vs.* custodium present). It differs from *P. heterodactylus* in having monodactylus legs (*vs.* bidactylous legs), thin setae *3c* and *4c* (*vs.* thickened setae *3c* and *4c*) and bothridial setae with unilaterally dilated head (*vs.* bothridial setae setiform).

The conditions of the specimens examined in this study are not good, broken, but the characters of the subspecies are clearly to be diagnosed.

Protoribates geonjiensis (Choi, 1994)

(Figs 15–16)

Xylobates geonjiensis Choi, 1994: 42–43, fig. 3.
Protoribates (*Protoribates*) *geonjiensis* (Choi,1994): Subías, 2004: 206.

Supplementary description. Body length 400–420, width 190–200. Body color brown. Body surface punctate.

Prodorsum. Rostrum slightly truncate. Lamellae located dorsolaterally, longer than half of prodorsum. Rostral setae (25–28) setiform, thin, smooth. Lamellar setae minute (7), setiform, thin, smooth, inserted medially to lamellar ends. Interlamellar setae (30–32) slightly thicker and longer than rostral setae, setiform, barbed. Bothridial setae (75–87) with long stalk and short, unilaterally dilated, apically pointed, barbed head. Dorsophragmata comparatively long, longitudinally elongated, directed posteromedially.

Notogaster. Anterior notogastral margin convex medially, fine. Pteromorphs with distinct hinges. Ten pairs of notogastral setae short (10–16), thin, smooth. Three pairs of rounded porose areas, *Aa* larger (7–8) than *A1* and *A2* (4–5). Areae porosae *A3* absent. Distance between porose areas *A1–A1* subequal to *A2–A2*. All lyrifissures and opisthonotal gland openings clearly visible.

Gnathosoma. Subcapitulum longer than wide (100–121 × 65–75). Subcapitular setae (*a*, *h*) similar in length (17–19), setiform, *a* thicker than *h*; setae *m* (8) short, thinnest.

Epimeral and lateral podosomal regions. Epimeral setal formula: 3-1-3-2. Epimeral setae setiform, thin, smooth, *1b* (18–20) longer than others (8–10) (*3c* and *3b* we can't measure precisely). Discidium triangular. Circumpedal carinae of medium size, directed to pedotecta II, but not reaching it.

Anogenital region. Five pairs of genital (g_1, 10–12; g_2–g_5, 5–8), one pair of aggenital (8–11), two pairs of anal (11–15) and three pairs of adanal (11–15) setae setiform, thin, smooth. Adanal setae ad_1 in posterior, ad_2 in lateral, ad_3 in anterior positions. Adanal lyrifissures located close and parallel to anal aperture.

Legs. Monodactylous.

Material examined. Two females (on permanent slides, W-88-1): China, Hunan, Changsha, Yuelu Mountain, soils under secondary evergreen broad-leaved forest, 10.IX.1988, collected by Huifu Wang.

Distribution. China (Hunan), Korea.

Remarks. The main diagnostic characters of the species are the extremely short lamellar setae and its insertion medially to the lamellar ends. In having these characters, it is very similar to *P. cattienensis* Ermilov & Anichkin, 2011. The species differs from the latter by the bothridial setae with unilaterally dilated head (*vs.* bothridial setae setiform or with slightly unilaterally dilated head; see figs 15 and 23).

The specimens we examined differ from the original description (Choi, 1994) in the number of porose areas on notogaster. The original description states that there are four pairs of porose areas, whereas only three pairs of porose areas can be seen in our examined specimens. Apart from that, there are no other differences between the characters of the specimens we examined with the original description.

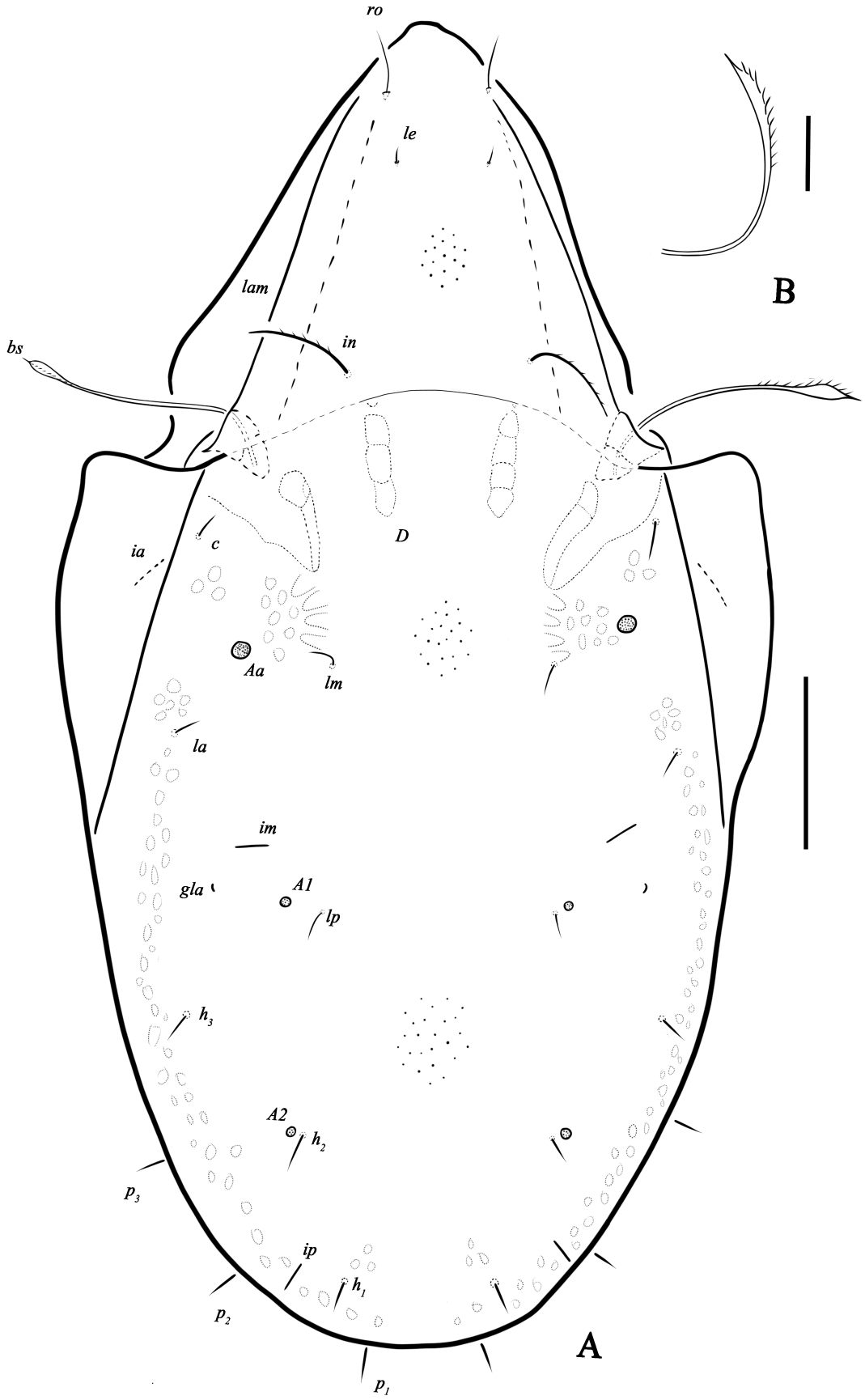

FIGURE 15. *Protoribates geonjiensis* Choi, 1994, adult. A. dorsal view; B. bothridial setae. Scale bars: A=50 μm, B=25 μm.

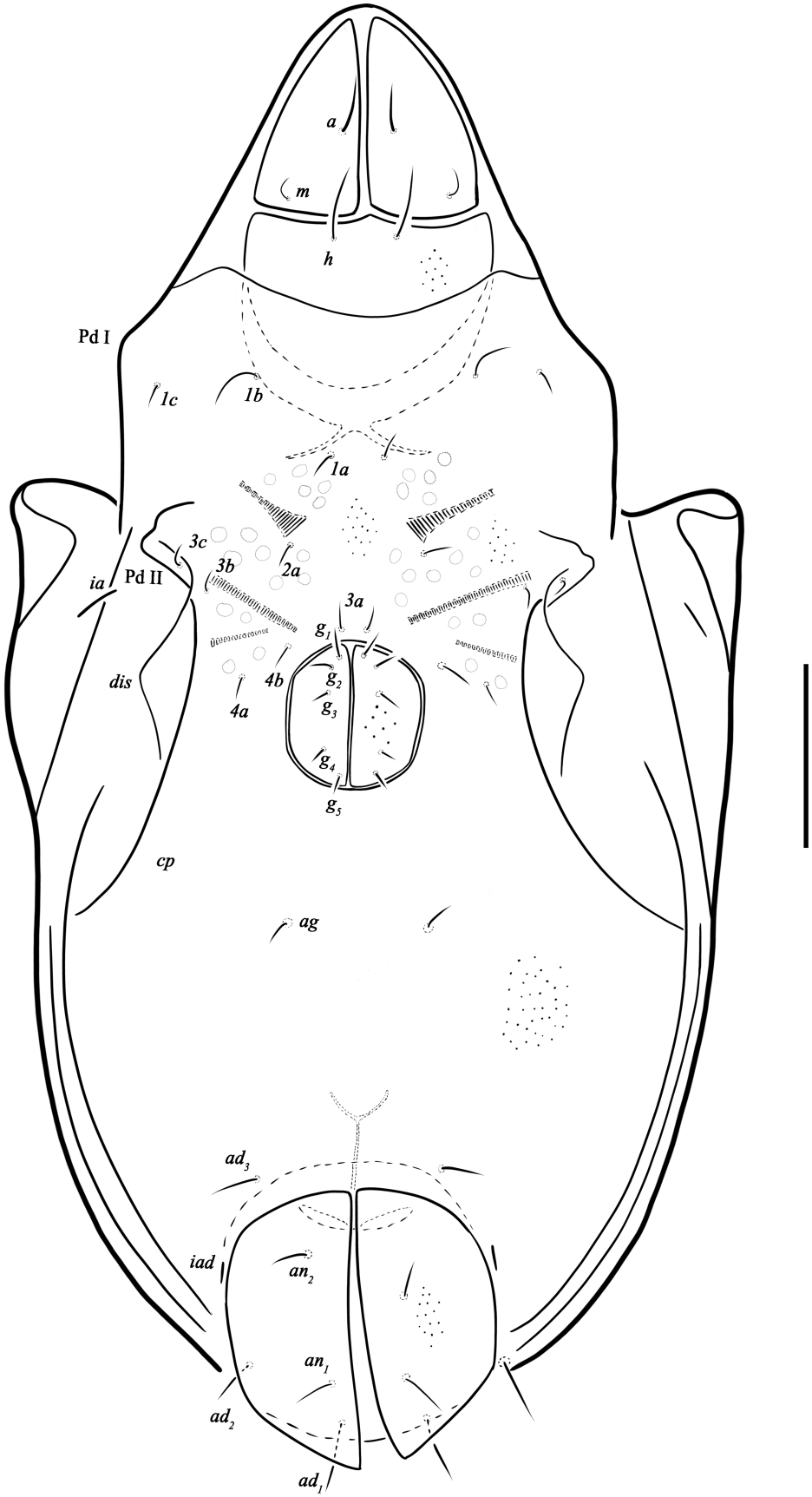

FIGURE 16. *Protoribates geonjiensis* Choi, 1994, adult. ventral view. Scale bar 50 μm.

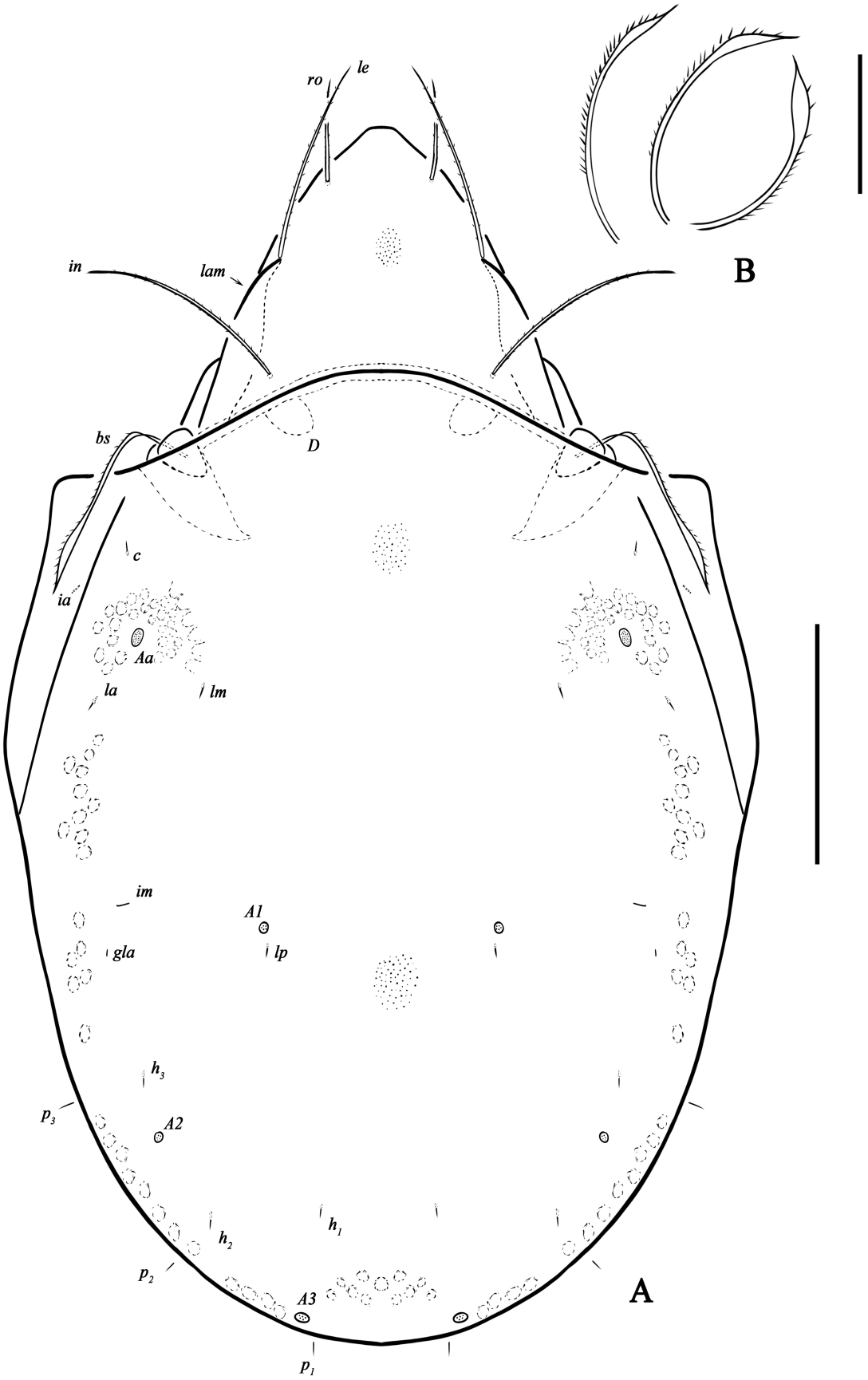

FIGURE 17. *Protoribates oblongus* (Ewing, 1909), adult. A. dorsal view; B. bothridial setae. Scale bars: A=100 μm, B=50 μm.

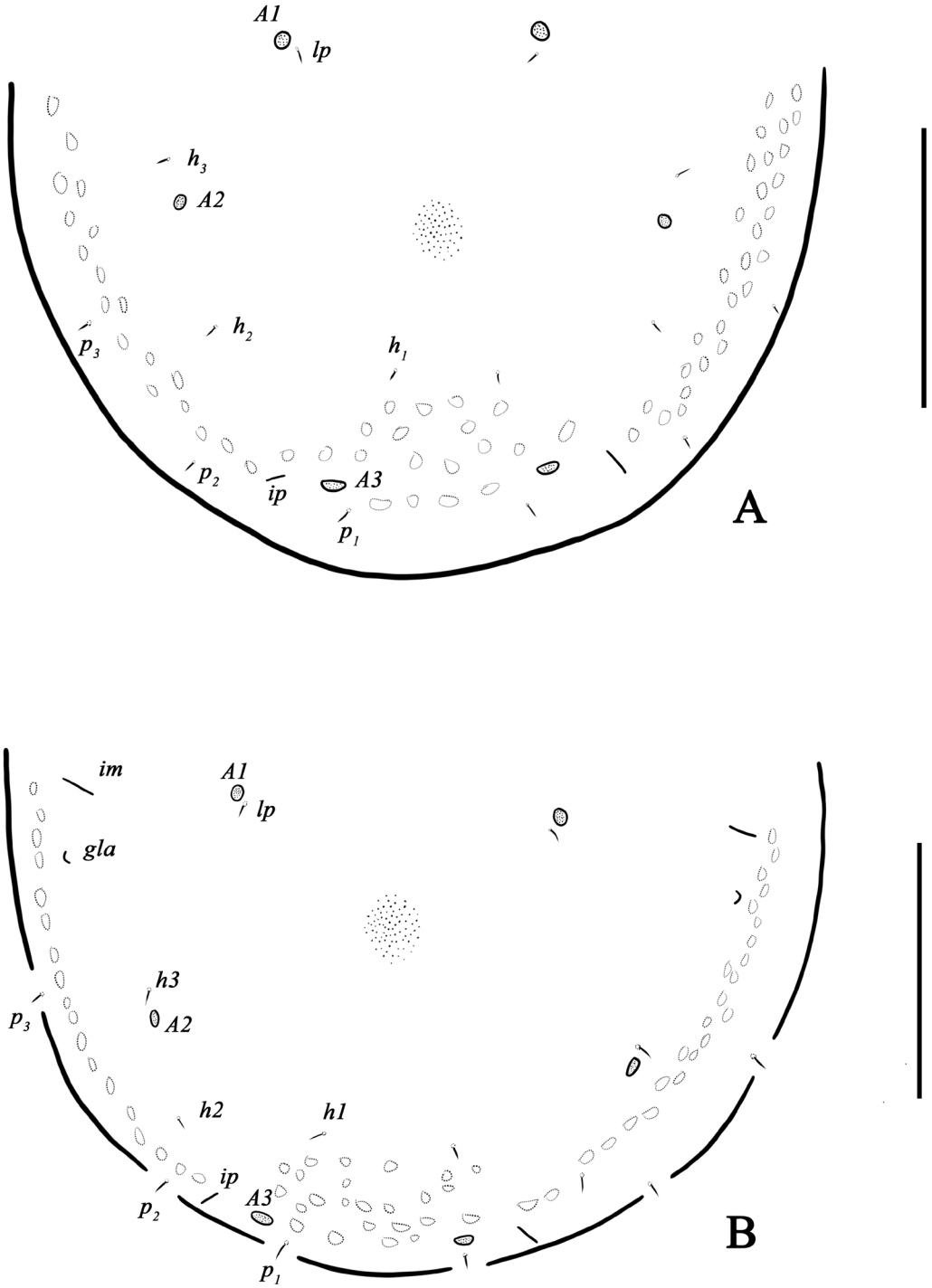

FIGURE 18. *Protoribates oblongus* (Ewing, 1909), adult, showing variations among individuals. A. dorsal view (setae h_2 anterior to h_1, setae h_3 away from *A2*); B. dorsal view (h_3 close to *A2*, setae h_1 anterior to h_2). Scale bars 100 μm

***Protoribates oblongus* (Ewing, 1909)**
(Figs 17–22)

Xylobates oblonga Ewing, 1909a: 73–74, fig. 37.
Oribata longa Ewing, 1909b: 362–363, fig. 6; Norton & Kethley, 1989: 490, 493 (synonymy).
Xylobates longus (Ewing, 1909): Marshall *et al.* 1987: 267.
Xylobates longisetae Jacot, 1937: 244–245, figs 17–21; Marshall *et al.* 1987: 267; Norton & Kethley, 1989: 490, 493 (synonymy).

Hemileius oblongus (Ewing, 1909): Woolley, 1961: 4–6, figs 5–6.
Xylobates oblongus (Ewing, 1909): Norton & Kethley, 1989: 490, 493.
Protoribates oblongus (Ewing, 1909): Weigmann *et al.*, 1993: 39; Subías, 2004: 206.

Supplementary description. Body length 385–560, width 185–325. Females larger than males: 500–560 × 300–325 versus 385–450 ×185–250. Body color brown. Body surface punctate. Lateral parts of prodorsum between sublamellae and acetabula I, II microgranulate.

Prodorsum (Figs 17, 20A). Rostrum truncate at tip. Lamellae located dorsolaterally, half as long as prodorsum (measured in lateral view). Sublamellae about half as long as lamellae. Sublamellar porose areas oval (13–20 × 8–12), located very near to sublamellae. Rostral (40–50), lamellar (70–95) and interlamellar (80–116) setae setiform, barbed, *le* inserted on inside lamellar ends. Bothridial setae (88–115) with long stalk and short, unilaterally dilated, apically pointed, barbed head, the number of barbs on head of bothridial setae different (3–12) (fig 17B). Exobothridial setae (8–10) thin, smooth. Dorsophragmata comparatively short, longitudinally elongated, directed posteromedially. Tutorium ridge-like.

Notogaster (Figs 17A, 18, 20). Anterior notogastral margin convex medially. Pteromorphs with distinct hinges. Ten pairs of notogastral setae minute (4–6), thin, smooth. Four pairs of rounded porose areas, *Aa* (10–16) larger than *A1*, *A2* and *A3* (6–13), *A1* occasionally divided into two closely situated pores on one side of one specimen. Distance between *A1–A1* shorter than *A2–A2* (0.42–0.65). Setae h_1 and h_2 almost in transverse line, sometimes h_1 anterior (Figs 17A, 18B), sometimes h_2 anterior (Fig. 18A). Distance between h_3 and *A2* varied, sometimes h_3 away from *A2* (Figs 17A, 18A), sometimes h_3 close to *A2* (Fig. 18B). All lyrifissures and opisthonotal gland openings clearly visible, *ip* located posterolaterally to *A3*.

Gnathosoma (Fig. 19B). Subcapitulum longer than wide (110–140 × 70–95). Subcapitular setae setiform, *h* longest (24–40), barbed, *a* (16–22) roughed, *m* shortest (10–21), thinnest. Adoral setae (14–17) setiform, heavily barbed. Palps (length 70–88) with setation 0-2-1-3-9(+ω). Postpalpal setae (6–8) spiniform. Chelicerae (length 120–145) with two barbed setae, *cha* (41–49) longer than *chb* (20–25). Trägårdh's organ long, tapered.

Epimeral and lateral podosomal regions (Figs 19, 20A). Epimeral setal formula: 3-1-3-2. Setae setiform, thin, smooth, except *3c* (25–38), barbed, usually longer than *3b* (20–38) and *1b* (20–30) and others (10–16), *3b* longer than *3c* occasionally. Humeral porose areas *Ah* oval. Pedotecta I and II lamina-like. Discidium triangular. Custodium absent. Circumpedal carinae long, directed to region of acetabula II, but not reaching it.

Anogenital region (Figs 19, 20). Five pairs of genital (g_1, 10–17; g_2–g_5, 8–13), one pair of aggenital (*ag*, 8–16), two pairs of anal (18–25) and three pairs of adanal (ad_1, 35–50; ad_2, 20-40; ad_3, 10–18) setae setiform, thin, smooth. Adanal setae ad_1 and ad_2 of medium size, longer than ad_3 and anal setae an_1 and an_2. Adanal setae ad_1 posterior, ad_2 posterolateral, ad_3 anterior to anal aperture. Adanal lyrifissures located close and parallel to anal plates.

Legs (Figs 21, 22). Monodactylous; claws thick, barbed dorsally. Tibiae I and II with ventrobasal tooth. Femora II ventroanteriorly rounded. Dorsoparaxial porose areas on femora I–IV and on trochanters III, IV well visible. Formulas of leg setation and solenidia: I (1-5-3-4-19) [1-2-2], II (1-5-3-4-15) [1-1-2], III (2-3-1-3-15) [1-1-0], IV (1-2-2-3-12) [0-1-0]; homology of setae and solenidia indicated in Table 1.

Material examined. Three specimens (two males, one in alcohol and one on permanent slide, one female in alcohol, LR-17-032): China, Tibet, Bomi County, Yigong Village, 41 Km milestone locality on Provincial Road 305, 30°16′02.38″N, 94°46′46.34″E, 2216 m a.s.l., litter under *Pinus* sp., 31.VII.2017; three specimens (two females, one in alcohol and one on permanent slide, one male on permanent slide, LR-17-051): China, Tibet, Bomi County, Yigong Village, 32 Km milestone locality on Provincial Road 305, 30°14′23.62″N, 94°51′30.00″E, 2236 m a.s.l., litter, 2.VIII.2017; two specimens (males in alcohol, LR-17-058): China, Tibet, Nyingchi County, Pailong Town, Polonggou, 30°01′37.58″N, 95°00′51.20″E, 2018 m a.s.l., litter under arbor, 3.VIII.2017; three specimens (females on permanent slides, LR-17-111): China, Tibet, Medog County, Beibeng Town, Jiangxin Village, 29°13′08.48″N, 95°07′53.90″E, 893 m a.s.l., litter under *Alpinia* sp., 12.VIII.2017; eight specimens (five males, four in alcohol and one on permanent slide; three females in alcohol, LR-17-115): same place as LR-17-111, 29°13′23.80″N, 95°07′45.18″E, 743 m a.s.l., litter under arbor, 12.VIII.2017; two specimens (females, one in alcohol and one on permanent slide, LR-17-129): China, Tibet, Medog County, near Ximohe Bridge, 29°21′06.27″N, 95°20′27.17″E, 758 m a.s.l., litter under arbor, 15.VIII.2017; three specimens (two females and one male in alcohol, LR-17-130): same place as LR-17-129, 29°21′23.32″N, 95°20′26.86″E, 766 m a.s.l., litter under arbor, 15.VIII.2017; one specimen (male in alcohol, LR-17-132): same place as LR-17-129, 29°21′28.14″N, 95°20′28.62″E, 769 m a.s.l., litter

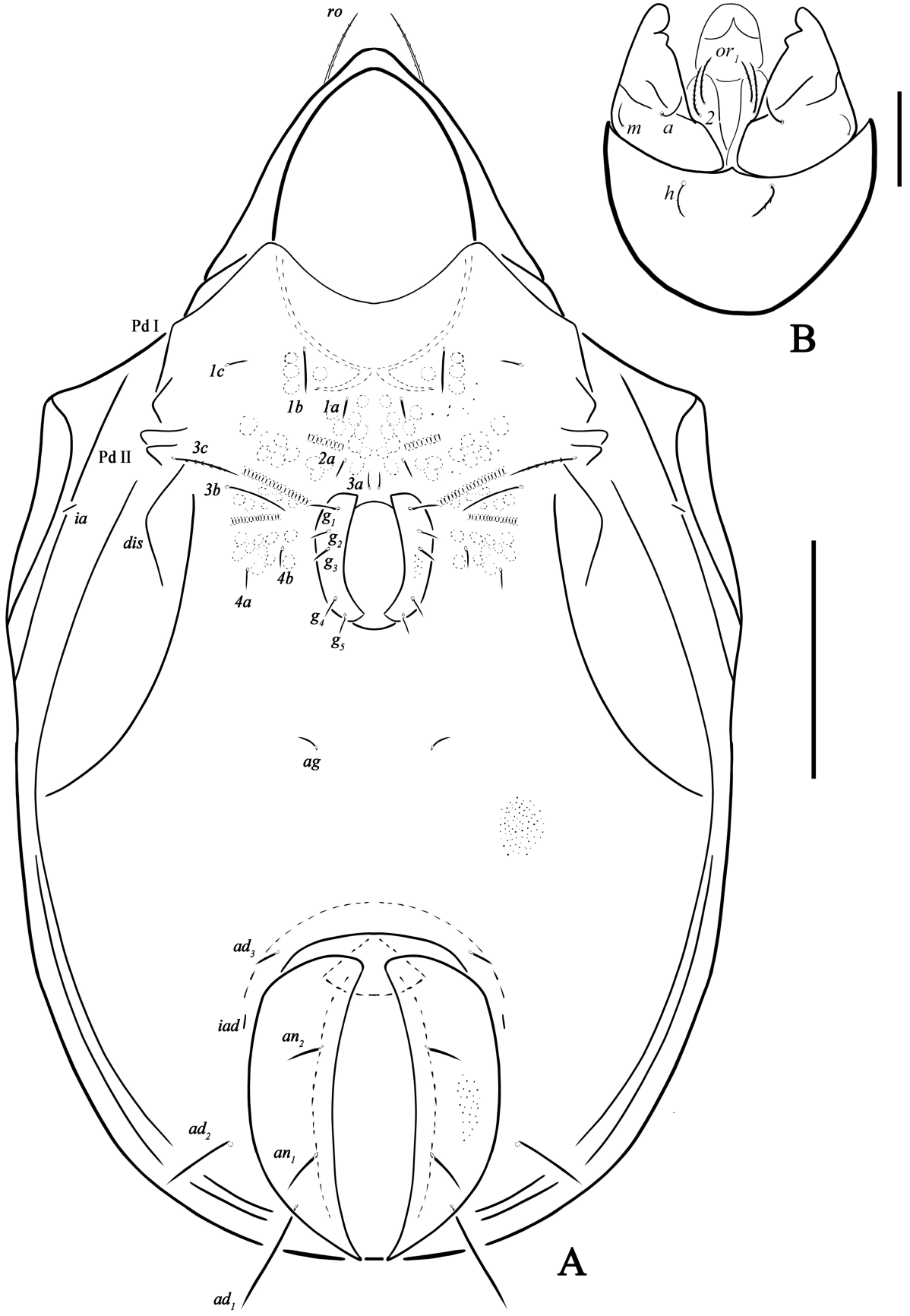

FIGURE 19. *Protoribates oblongus* (Ewing, 1909), adult. A. ventral view; B. subcapitulum, ventral view. Scale bars: A=100 μm, B=30 μm.

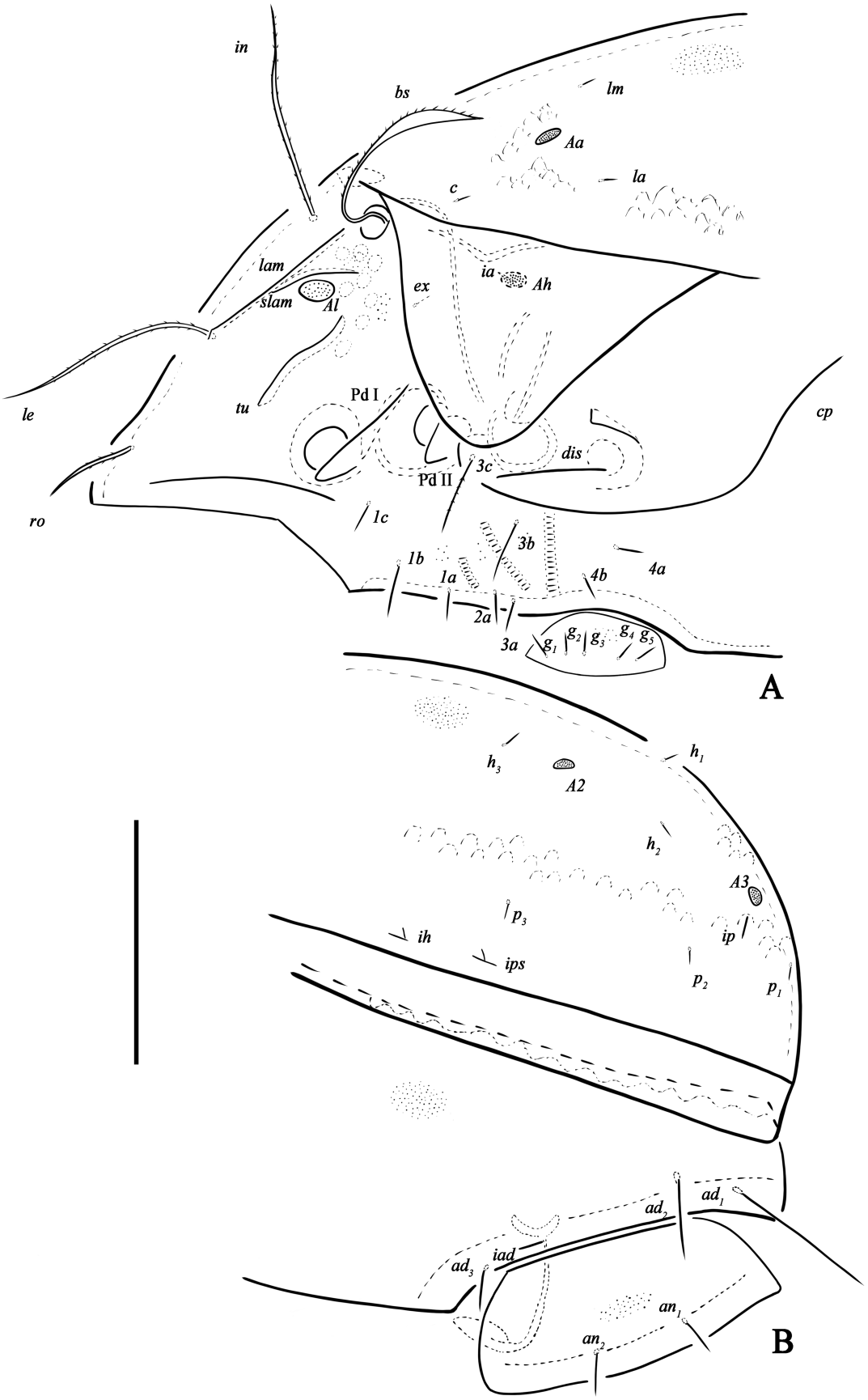

FIGURE 20. *Protoribates oblongus* (Ewing, 1909), adult. A. anterior part of body, lateral view; B. posterior part of body, lateral view. Scale bar 100 μm.

FIGURE 21. *Protoribates oblongus* (Ewing, 1909), adult. A. leg I, right, antiaxial view; B. genu, femur of leg II, right, antiaxial view. Scale bar 30 μm.

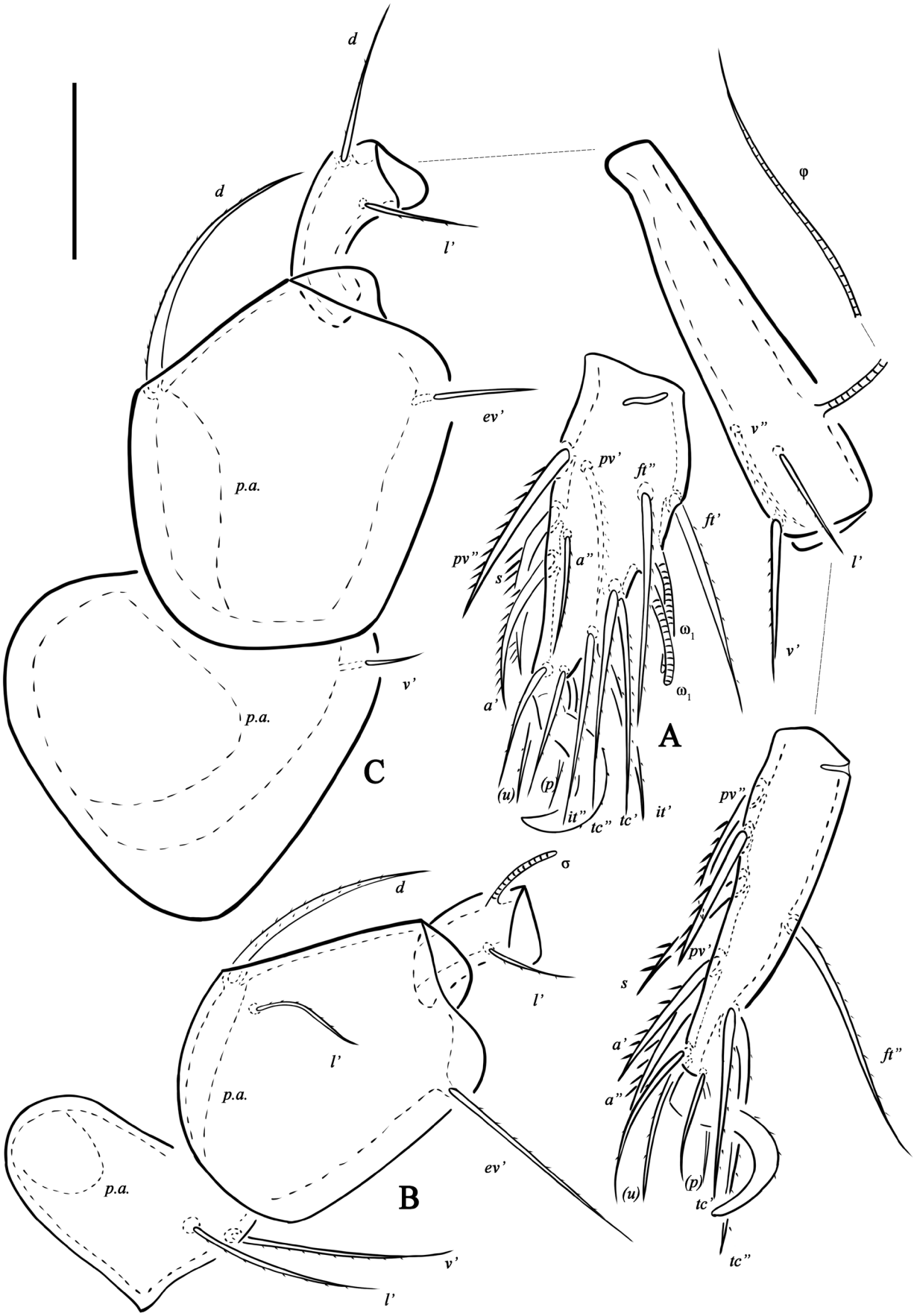

FIGURE 22. *Protoribates oblongus* (Ewing, 1909), adult. A. tarsus of leg II, right, antiaxial view; B. genu, femur and trochanter of leg III, left, antiaxial view; C. leg IV, left, antiaxial view. Scale bar 30 μm.

under *Musa* sp., 15.VIII.2017; three specimens (two males and one female in alcohol, LR-17-133): same place as LR-17-129, 29°21′33.41″N, 95°20′33.25″E, 782 m a.s.l., litter under arbor, 15.VIII.2017; six specimens (four females, three in alcohol and one on permanent slide; two males, one in alcohol and one on permanent slide, LR-17-145): China, Tibet, Bomi County, Kada Village, 29°55′01.16″N, 95°37′37.36″E, 2707 m a.s.l., litter under shrub, 17.VIII.2017; four specimens (three females, two in alcohol, one on permanent slide; one male in alcohol, LR-17-146): same place as LR-17-145, mosses, 17.VIII.2017. All specimens were collected by Rong Li.

Distribution. China (Tibet), Nearctic and Lesser Antilles.

Remarks. Woolley (1961) redescribed the species as *Hemileius oblongus* (Ewing, 1909) probably based on Ewing's description and illustration since he did not examine the actual specimens in most instances. Norton & Kethley (1989) examined the type specimens and considered that *Xylobates longus* (Ewing, 1909) and *X. longisetae* Jacot, 1937 are junior synonyms of *X. oblongus* Ewing, 1909. In that paper, they stated that the density of the barbs of bothridial setae varied and the body size ranged from 465 to 550 μm. They examined approximately 20 American specimens of *oblongus* and all of them were female.

According to the descriptions and illustrations of *oblongus*, *longus* and *longisetae* (Woolley, 1961, Ewing, 1909a, b, Jacot, 1937), the specimens we examined are similar to *P. oblongus* by long, smooth adanal setae, long and barbed rostral, lamellar and interlamellar setae, same position of porose areas and setae on notogaster, ventro-anteriorly rounded femora II and bothridial setae with long, barbed unilaterally stalk and short, apically pointed, unilaterally dilated, barbed head, and the number of barbs on bothridial setal head varied from three to 12 (even in one specimen, with differences on both sides: three and six), coincident with the description in Norton & Kethley (1989). The body size of the specimens we examined ranges from 385–560, and females larger than males: 500–560 versus 385–450, also within the size range given by Norton & Kethley (1989). Based on the above, we consider our specimens to be conspecific with *Protoribates oblongus*, found in Asia for the first time.

Protoribates oblongus is morphologically similar to *P. hakonensis* Aoki, 1994 from Japan, Bulgaria and Vietnam; *P. iracemae* Pérez-Íñigo & Baggio, 1994 from Brazil and Ecuador; *P. osunensis* Badejo, Woas & Beck, 2003 from Nigeria; and *P. rioensis* Badejo, Woas & Beck, 2003 from Brazil in having long prodorsal setae, long adanal setae ad_1 and ad_2, and monodactylous legs. However, it differs from *P. hakonensis* by setae h_3 closer to *A2* than to opisthonotal gland openings *gla* (*vs.* h_3 closer to opisthonotal gland openings *gla* than to *A2*); setae h_2 posterior to the level of *A2* (*vs.* setae h_2 close to *A2*); adanal setae ad_1 always longer than ad_2 (*vs.* adanal setae ad_1 almost equal to ad_2); setae *ro* and *le* barbed (*vs.* setae *ro* and *le* smooth). It differs from *P. iracemae* by setae *lm* anterior to the level of *la* (*vs.* setae *lm* posterior to the level of *la*); setae *ro*, *le* and *in* barbed (*vs.* setae *ro*, *le* and *in* smooth); bothridial setae with barbed stalk and head (*vs.* bothridial setae with barbed head only); ten pairs of notogastral setae present (*vs.* ten pairs of notogastral setae reduced to alveolus). It differs from *P. osunensis* by adanal setae ad_1 and ad_2 smooth (*vs.* adanal setae ad_1 and ad_2 barbed); anterior notogastral margin convex medially (*vs.* anterior notogastral margin straight). It differs from *P. rioensis* by adanal setae ad_1 and ad_2 smooth (*vs.* adanal setae ad_1 and ad_2 barbed); rostrum truncate (*vs.* rostrum emarginate).

The species is also morphologically similar to *P. diani* (Mahunka, 1986) from Kenya; *P. ecuadoriensis* Ermilov, Bayartogtokh, Sandmann, Marian & Maraun, 2013 from Ecuador; *P. paraecuadoriensis* Ermilov & Friedrich, 2016 from Peru; *P. taira* Fujikawa, 2006 from Japan; *P. triangularis* (Hammer, 1971) from Pacific Islands and India; and *P. yezoensis* (Fujikawa, 1983) from Japan in the position of porose areas and setae on notogaster and monodactylous legs. However, it differs from all of the latter in having adanal setae ad_1 and ad_2 obviously longer than anal setae (*vs.* adanal seate ad_1 and ad_2 similar to anal setae in length).

New records to mainland China

Protoribates cattienensis Ermilov & Anichkin, 2011

(Figs 23–24)

Protoribates cattienensis Ermilov & Anichkin, 2011b: 49–53, figs 4–5; Ermilov & Liao, 2018: 1019.

Supplementary description. Body length 390–460, width 170–225. Body color brown. Body surface punctate. *Prodorsum*. Rostrum slightly truncate. Lamellae located dorsolaterally, slightly longer than half of prodorsum.

Rostral setae (18–20) setiform, thin, smooth. Lamellar setae short (8–10), setiform, thin, smooth, inserted medially to lamellar ends. Interlamellar setae slightly thicker and longer than rostral setae (28–32), setiform, barbed. Bothridial setae (90–95) long, setiform, or with slightly unilaterally dilated, apically pointed, barbed head. Dorsophragmata comparatively long, longitudinally elongated, directed posteromedially.

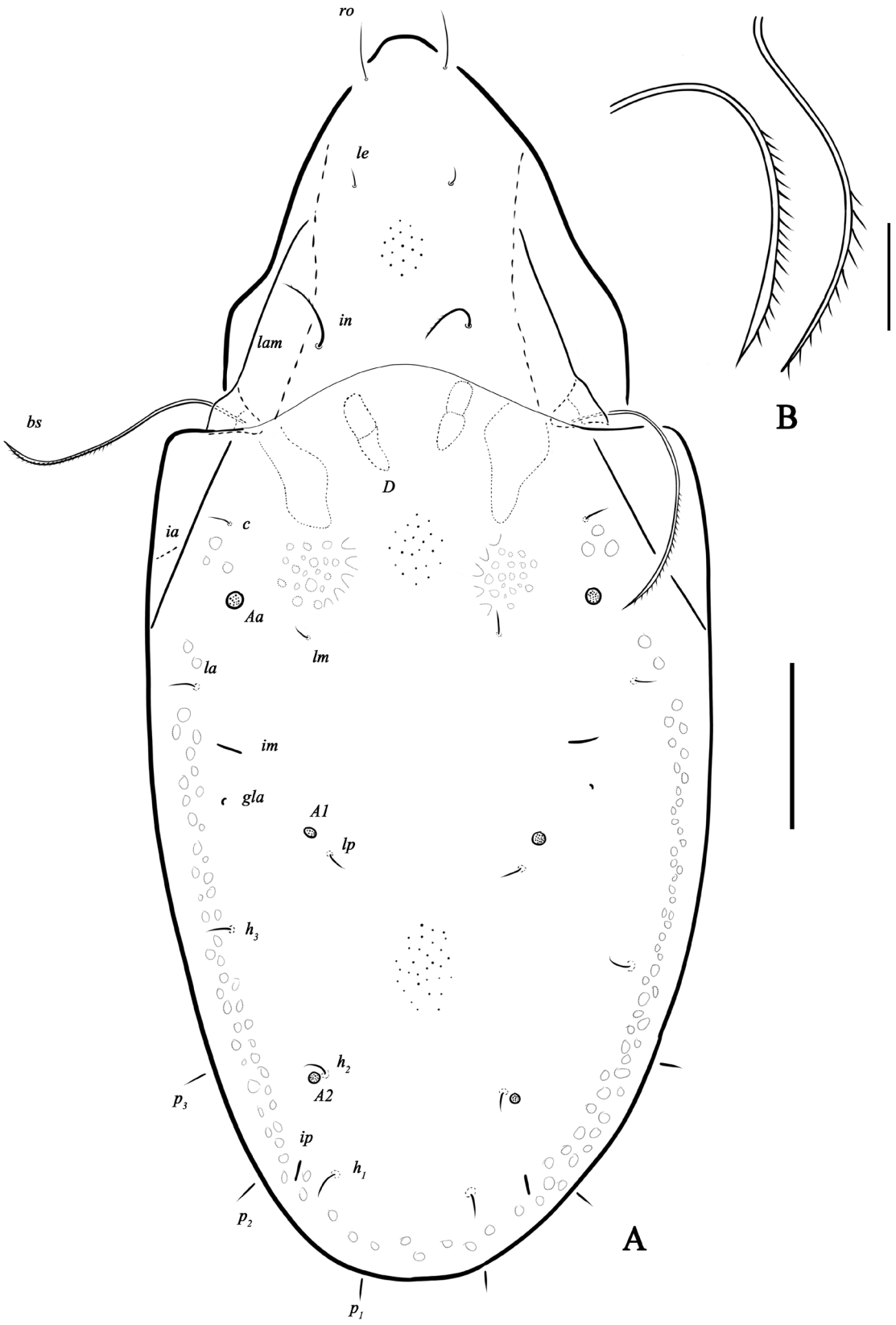

FIGURE 23. *Protoribates cattienensis* Ermilov & Anichkin, 2011, adult. A. dorsal view; B. bothridial setae. Scale bars: A=50 μm, B=25 μm.

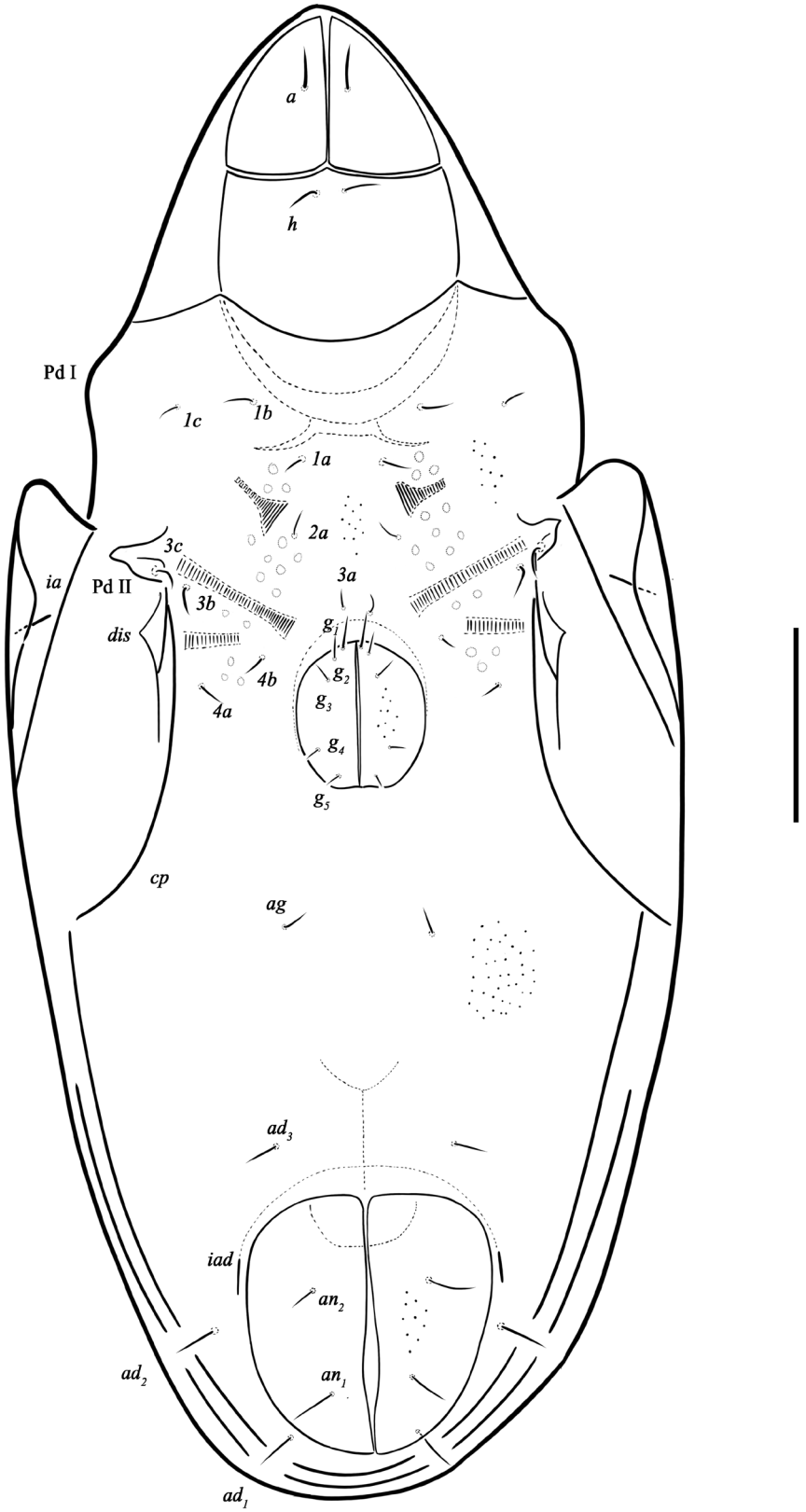

FIGURE 24. *Protoribates cattienensis* Ermilov & Anichkin, 2011, adult. A. ventral view. Scale bar 50 μm.

Notogaster. Anterior notogastral margin convex medially, fine. Pteromorphs with distinct hinges. Ten pairs of notogastral setae short (8–16), thin, smooth. Three pairs of rounded porose areas, *Aa* larger (8–9) than *A1* and *A2* (4–6), porose areas *A3* absent. Distance between porose areas *A1–A1* subequal to *A2–A2*. Lyrifissures and opisthonotal gland openings clearly visible.

Gnathosoma. Subcapitulum longer than wide (95–111 × 62–71). Subcapitular setae (*a,* 13–16; *h*, 8–10; *m*, 13), setiform, *h* barbed; *m* thinnest.

Epimeral and lateral podosomal regions. Epimeral setal formula: 3-1-3-2(3?). Epimeral setae short (6–10), setiform, thin, smooth (setae *4c* not clear to see). Circumpedal carinae of medium size, directed to pedotecta II, but not reaching it.

Anogenital region. Five pairs of genital (g_1, 13–16; g_2–g_5, 6–8), one pair of aggenital (6), two pairs of anal (8–13) and three pairs of adanal (ad_1, ad_2, 14–18; ad_3, 8–13) setae setiform, thin, smooth. Adanal setae ad_1 in posterior, ad_2 in lateral, ad_3 in anterior positions. Adanal lyrifissures located close and parallel to anal aperture.

Legs. Monodactylous.

Material examined. Seven females (on permanent slides, Anhui-91-5, Anhui-91-6): China, Anhui, Ningguo, litter, 1991, collected by Zongying Wang. Three females (one in alcohol and two on permanent slide, CYN-18-165): China, Sichuan, Pengzhou, Longmenshan Town, Jiufeng Villa, 31°29′64.76″N, 103°85′28.13″E, 1280 m a.s.l., litter under *Metasequoia* sp., 15.VIII.2018, collected by Yannan Chen.

Distribution. China (Anhui, Sichuan, Taiwan), Vietnam.

Remarks. The main diagnostic characters of the species are the extremely short lamellar setae and its insertion medially to the lamellar ends. In having these characters, it is very similar to *P. geonjiensis* Choi, 1994. The species differs from the latter by the bothridial setae setiform (specimens in Sichuan) or with slightly narrow lanceolate distal part (specimens in Anhui) (*vs.* bothridial setae with evident unilaterally dilated head).

The specimens we examined differs from the original description (Ermilov & Anichkin, 2011b) in the larger and wider body size (390–460 × 170–225 *vs.* 315–348 × 140–166), longer bothridial setae (90–95 *vs.* 57–65) and notogastral setae (8–16 *vs*. 6–8). The bothridial setae we examined shows two forms, one setiform, the other with slightly narrow lanceolate distal part. The other characters are the same. We don't think these differences warrant considering them as different species.

P. cattienensis Ermilov & Anichkin, 2011 and *P. geonjiensis* Choi, 1994 are similar to the species of the genus *Perxylobates* Hammer, 1972 in the comparatively narrow body size, lamellar setae *le* inserted medially to lamellar ends and comparatively long dorsophragmata. They differ from the latter by the presence of the anterior notogastral margin (absent in the species of *Perxylobates*), but the margin is fine. We think the species *Protoribates cattienensis* Ermilov & Anichkin, 2011 and *Protoribates geonjiensis* Choi, 1994 may belong to the genus *Perxylobates* Hammer, 1972, but additional research is necessary.

Protoribates dentatus (Berlese, 1883)

(Figs 25–26)

Oribates dentatus Berlese, 1883: 3.
Protoribates dentatus (Berlese, 1883): Berlese, 1908: 1; Weigmann *et al.*, 1993: 39–55, figs I–VIII; Seniczak *et al.*, 2018: 613–627, figs 1–12; Ermilov & Liao, 2018: 1019; Ermilov & Leong, 2018: 1769.
Peloribates vastus Mihelčič, 1956: 20–21, fig. 14.
Protoribates vastus (Mihelčič, 1956): Pérez-Iñigo, 1974: 397–398, fig. 24; Subías, 2004: 206 (synonymy).
Xylobates vastus (Mihelčič, 1956): Pérez-Iñigo, 1993: 209, fig. 76A.

Supplementary description. Body length 480–650, width 275–382. Body color brown. Body surface punctate. Lateral parts of prodorsum between sublamellae and acetabula I, II microgranulate.

Prodorsum. Rostrum broadly rounded. Lamellae located dorsolaterally, half as long as prodorsum (measured in lateral view). Sublamellae about half as long as lamellae. Sublamellar porose areas (30 × 16) oval, located very near to sublamellae. Rostral (52–55), lamellar (92) and interlamellar (100–113) setae setiform, barbed. Lamellar setae inserted on lamellar ends. Bothridial setae (120–130) with long stalk and short, slightly unilaterally dilated, apically pointed, barbed head. Exobothridial setae (25) thin, barbed. Dorsophragmata comparatively short, longitudinally elongated, directed posteromedially. Tutorium ridge-like.

Notogaster. Anterior notogastral margin convex medially. Pteromorphs with distinct hinges. Ten pairs of notogastral setae minute (5–8), thin, smooth. Four pairs of rounded porose areas, similar in size, *Aa* (13–16) relatively larger than *A1*, *A2* and *A3* (9–15), *A2* occasionally divided into two closely situated pores on one side (CYN-18-156). Distance between porose areas *A1–A1* subequal to *A2–A2*. Setae *lp* inserted anteromedially to *A1*. All lyrifissures and opisthonotal gland openings clearly visible.

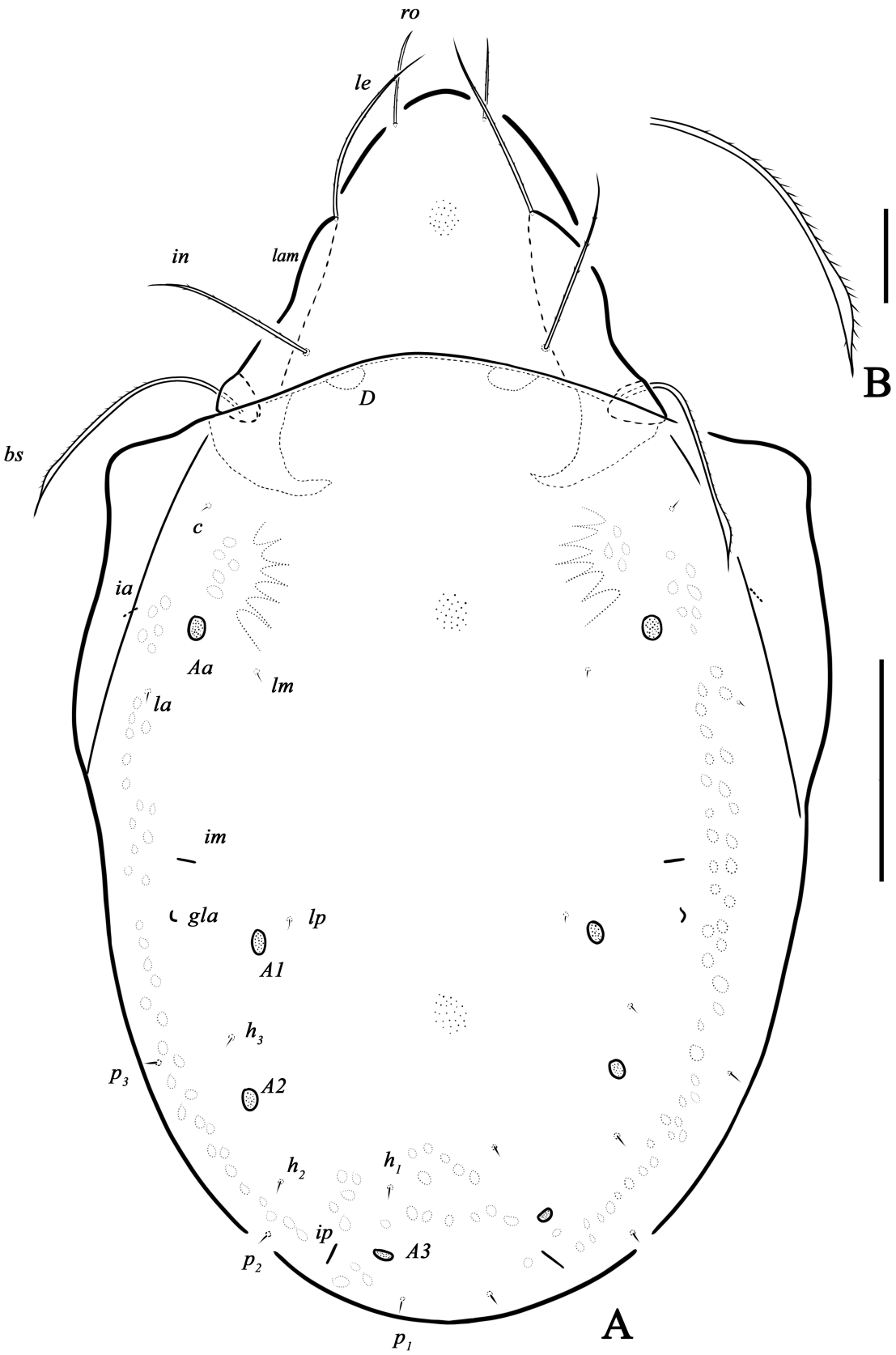

FIGURE 25. *Protoribates dentatus* (Berlese, 1883), adult. A. dorsal view; B. bothridial setae. Scale bars: A=100 μm, B=30 μm.

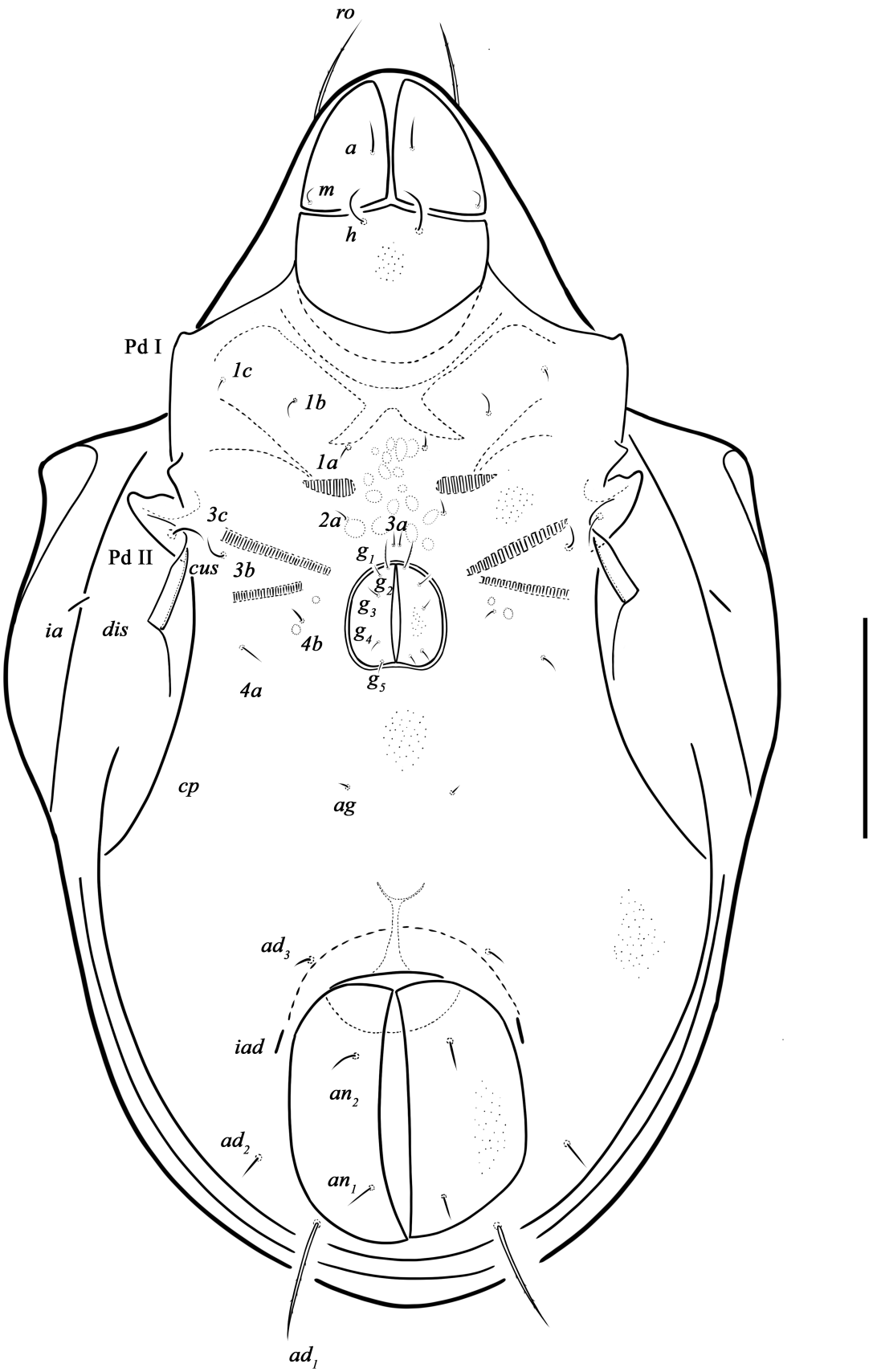

FIGURE 26. *Protoribates dentatus* (Berlese, 1883), adult. A. ventral view. Scale bar 100 μm.

Gnathosoma. Subcapitulum longer than wide (130–137 × 87–92). Subcapitular setae (*a*, 19–20; *h*, 27–37; *m*, 12) setiform, *m* thinnest.

Epimeral and lateral podosomal regions. Epimeral setal formula: 3-1-3-2. Epimeral setae setiform, thin, *1b*, *3b* and *3c* (25–37) longer than others (10–19). Circumpedal carinae of medium size, directed to pedotecta II, but not reaching it.

Anogenital region. One pair of genital setae long (g_1, 28), barbed. Four pairs of genital (g_2–g_5, 8–11), one pair of aggenital (12–17), two pairs of anal (16–25) and two pairs of adanal (ad_2, 20–24; ad_3, 17–18) setae setiform, thin, smooth, adanal setae ad_1 (51–62) longer than ad_2 and ad_3, barbed. Adanal setae ad_1 in posterior, ad_2 in lateral, ad_3 in anterior positions. Adanal lyrifissures located close and parallel to anal aperture.

Legs. Monodactylous or heterotridactylous, median claw thicker than laterals, barbed on dorsal side. Femora II spur-like sharpened ventroanteriorly. Femora I–IV and trochanters III, IV with distinctly developed dorsoparaxial porose area. Tibiae I, II with ventrobasal tooth. Formulas of leg setation and solenidia: I (1-5-3-4-20) [1-2-2], II (1-5-3-4-15) [1-1-2], III (2-3-1-3-15) [1-1-0], IV (1-2-2-3-12) [0-1-0]; homology of setae and solenidia indicated in Table 1.

Material examined. Two females (one in alcohol and one on permanent slide, CYN-18-140): China, Sichuan, Pengzhou, Dabaoshan Town, Longcaogou, 31°22′67.57″N, 103°75′50.89″E, 1123 m a.s.l., litter under *Ginkgo biloba* L., 11.VIII.2018; one male (in alcohol, CYN-18-141): same place as CYN-18-140, litter under arbor, 11.VIII.2018; one male (on permanent slide, CYN-18-149): China, Sichuan, Pengzhou, Xiaoyudong Town, 31°18′88.17″N, 103°75′40.75″E, 956 m a.s.l., litter, 12.VIII.2018; one male (on permanent slide, CYN-18-150): same place as CYN-18-149, litter, 12.VIII.2018; three specimens (two males in alcohol; one female on permanent slide, CYN-18-156): same place as CYN-18-149, 31°18′04.98″N, 103°73′44.09″E, 1131 m a.s.l., mosses, 13.VIII.2018. All specimens above were collected by Yannan Chen. One female (on permanent slide, LK-14-008): China, Guangxi, Nanning, Liangfengjiang National Forest Park, Bodhi Villa, 22°43′31.50″N, 108°17′02.76″E, 70 m a.s.l., litter, 16.IV.2014; one male (on permanent slide, LK-14-009): same place as LK-14-008, 22°43′29.71″N, 108°17′06.03″E, 57 m a.s.l., litter under bamboo forest, 16.IV.2014. Both the above were collected by Kang Li.

Distribution. China (Guangxi, Sichuan, Macao, Taiwan), Holarctic, Oriental and Melanesia (Fiji I.).

Remarks. Weigmann *et al.* (1993) redescribed the species in detail according to the specimens in Berlese's collection and from Slovakia. In that paper, they stated that the claws varied: leg I is usually monodactylous, others heterotridactylous, but mono-, bi- or tridactylous occurs occasionally on all legs. Seniczak *et al.* (2018) described and illustrated the morphological ontogeny of the species according to the specimens from Greece and showed that the number of claws of adults varies on all leg tarsi, and the most common formula is 1-3-3-3.

We examined ten specimens in China, the claw formula of eight of them is 1-1-1-1 (five males and three females from Sichuan); one is 1-3-3-3 (female from Guangxi); one is 3-3-3-3 (male from Guangxi). The number of claws varies.

After examining the specimens, we did't see the epimeral setae *4c*, which is present in the specimens of Weigmann *et al.* (1993) and Seniczak *et al.* (2018) described.

Key to the Chinese species of the genus *Protoribates*

1. Adanal setae ad_1 barbed, ad_2 smooth; ad_1 longer and thicker than ad_2 2
- Both adanal setae ad_1 and ad_2 smooth or barbed; ad_1 not longer and thicker than ad_2 3
2. Bothridial setae setiform; distance between notogastral porose areas *A1–A1* shorter than *A2–A2*; notogastral setae *lp* inserted posteriorly or posteromedially to *A1*; body size: 505 × 285 . . . . . *P. varisetiger* (Wen, Aoki & Wang, 1984)
- Bothridial setae with slightly unilaterally dilated head; distance between notogastral porose areas *A1–A1* subequal to *A2–A2*; notogastral setae *lp* inserted anteromedially to *A1*; body size: 470–650 × 275–382 . . . . . *P. dentatus* (Berlese, 1883)
3. Lamellar setae *le* distinctly thicker than rostral setae *ro* and interlamellar setae *in*, like tusk (see fig. 13); body size: 469–509 × 302–375 . . . . . *P. crassisetiger nipponicus* Fujita, 1989
- Lamellar setae *le* similar to or slightly narrower than rostral setae *ro* and interlamellar setae *in* in thickness 4
4. Legs monodactylous 5
- Legs heterotridacylous 10
5. Notogastral setae long (more than 30 μm) and barbed (except setae *c*, short and smooth) (see fig. 1); body size: 520–700 × 310–460 . . . . . *P. tibetensis* **sp. nov.**
- Notogastral setae short or minute (less than 20 μm), smooth 6
6. Lamellar setae *le* shorter than or similar to notogastral setae; anterior notogastral margin fine 7

- Lamellar setae *le* longer than notogastral setae; anterior notogastral margin distinct 8
7. Bothridial setae seriform or with slightly unilaterally dilated head (see fig. 23); body size: 315–460 × 144–225 . . . . . *P. cattienensis* Ermilov & Anichkin, 2011
- Bothridial setae with unilaterally dilated head (see fig. 15); body size: 400–430 × 184–200 . . . . . *P. geonjiensis* Choi, 1994
8. Bothridial setae setiform; adanal setae ad_1 and ad_2 barbed; custodium present; body size: 525–565 × 300–330 . . . . . *P. lophothrichus* (Berlese, 1904)
- Bothridial setae with unilaterally dilated, barbed head; adanal setae ad_1 and ad_2 smooth; custodium absent 9
9. Adanal setae ad_1 and ad_2 distinctly longer than anal setae; lamellar setae *le* barbed, longer than their mutual distance, inserted on lamellar ends; dorsophragmata comparatively short; body size: 385–560 × 185–325 . . . . . *P. oblongus* (Ewing, 1909)
- Adanal setae ad_1 and ad_2 similar to anal setae in length; lamellar setae *le* smooth, short, usually not more than half of their mutual distance, inserted medially to lamellar ends; dorsophragmata comparatively long; body size: 320–440 × 238–266 . . . . . *P. capucinus* Berlese, 1908*
10. Adanal setae ad_1 and ad_2 distinctly longer than anal setae 11
- Adanal setae ad_1 and ad_2 similar to anal setae in length 12
11. Adanal setae ad_1 1.3–1.6 × their mutual distance; femora II ventroanteriorly pointed; notogastral porose areas *A1* occasionally divided into two pores on both sides or on one side; body size: 660–872 × 440–620 . . . . . *P. magnus* (Aoki, 1982)
- Adanal setae ad_1 less than 1.0 × their mutual distance; femora II ventroanteriorly rounded; notogastral porose areas *A1* not divided; body size: 520–660 × 320–400 . . . . . *P. sichuanensis* **sp. nov.**
12. Genital setae four pairs; body size: 390–425 × 180–185 . . . . . *P. tenuis* (Wen, Aoki & Wang, 1984)
- Genital setae five pairs 13
13. Notogastral setae eight pairs; interlamellar setae *in* and lamellar setae *le* longer than bothridial setae; distance between notogastral porose areas *A1–A1* subequal to *A2–A2* . . . . . *P. urbanlus* (Tseng, 1984)
- Notogastral setae ten pairs; interlamellar setae *in* and lamellar setae *le* shorter than bothridial setae; distance between notogastral porose areas *A1–A1* shorter than *A2–A2*; body length: 680 . . . . . *P. acutus* (Hammer, 1979)

*Note. As Ermilov & Starý (2017) stated, the species *P. capucinus* and *P. paracapucinus* are morphologically very similar and the differences between them are not visible. Thus, we didn't include the latter in the key.

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