



Taxonomic contribution to the knowledge of the genus *Indoribates* and *Lauritzenia* (Acari, Oribatida, Haplozetidae), with description of a new species from China

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Abstract

Oribatid species from China of the genus *Indoribates* and *Lauritzenia* are studied, with description of a new species *Indoribates* (*Indoribates*) *subiasi* **sp. nov.** based on adult materials collected from China. *Indoribates* (*I.*) *japonicus* (Aoki, 1988), *I.* (*Haplozetes*) *vindobonensis curtipilis* (Kunst, 1977), and *Lauritzenia* (*Incabates*) *nuda* (Hammer, 1961), are recorded in China for the first time. A new combination is proposed: *Lauritzenia* (*Incabates*) *nobilis* (Golosova, 1984) **comb. nov.** (from the genus *Cosmobates* Balogh, 1959). Two new synonyms are proposed: *Indoribates* (*Haplozetes*) *vindobonensis curtipilis* (= *Haplozetes ulykpani* Bayartogtokh & Aoki, 1998 **syn. nov.**) and *Indoribates* (*Indoribates*) *Jacot*, 1929 (= *Indoribates* (*Bihaplozetes*) *Subías*, 2020 **syn. nov.**). A key to the known species of *Indoribates* and *Lauritzenia* from China is also provided.

Key words: oribatid mites; morphology; taxonomy; key; Oriental and Palearctic regions

Introduction

The genus *Indoribates* (Oribatida, Haplozetidae) was established by Jacot (1929) with *Protoribates punctulatus* Sellnick, 1925 as type species from Indonesia. The generic diagnosis of *Indoribates* and its related genera or subgenera, *Haplozetes* Willmann, 1935, *Lauritzenia* Hammer, 1958 and *Incabates* Hammer, 1961, remains controversial. The main point of contention is if the number of claws and genital setae can be used to distinguish genera. Subías (2020) and Subías and Shtanchaeva (2023) regarded the species with five pairs of genital setae as belonging to *Indoribates*, the species with four pairs as belonging to *Lauritzenia*, and differentiated some subgenera based on the number of claws. Subías (2020) and Subías and Shtanchaeva (2023) considered *Haplozetes* a subgenus of *Indoribates* and *Incabates* a subgenus of *Lauritzenia*. However, some acarologists (e.g. Bayartogtokh 2000, 2010; Weigmann 2006, 2010) believe that *Haplozetes* is an independent genus, including the species with five or four pairs of genital setae and the species with different number of claws. Furthermore, Weigmann (2006, 2010) regarded *Lauritzenia* and *Incabates* as synonyms of *Haplozetes*. Also, some acarologists (e.g. Choi & Kim 2002; Lee 1993) considered *Incabates* an independent genus. The classification of *Indoribates* and its related genera or subgenera is quite complex, necessitating further research. In this paper, we follow Subías's opinion and consider all taxonomic nuances below based on his classification (Subías 2020, 2022; Subías & Shtanchaeva 2023).

According to Subías (2022, updated 2024), the genus comprises five subgenera, 35 species, and one subspecies, with a cosmopolitan distribution except the Antarctic region. Generic diagnoses of *Indoribates* were provided by Jacot (1929), Hammer (1979, as *Sundazetes*), Mahunka (1977—as *Nixozetes*, 1997—as *Bolkiah*), while Subías and Shtanchaeva (2023) provided a key to the subgenera and Safeer and Ramani (2021) a key to thirteen species of *Indoribates* (*Indoribates*).

Before the present study, three species of *Indoribates* were recorded in China: *I. minutus* (Tseng, 1984) in Taiwan, *I. multisetus* (Wen & Zhao, 1994) and *I. crassisetiger* (Fukuyama & Aoki, 2000) in Yunnan. In this paper, we (1) describe a new species found in China, (2) provide a checklist of the known species of *Indoribates* and *Lauritzenia* in China, considering the similarity of *Indoribates* and *Lauritzenia*, and report one species and one subspecies of *Indoribates*, and one species of *Lauritzenia* (*Incabates*) for the first time in China, (3) propose a new combination and two new synonyms, and (4) provide a key to known species of *Indoribates* and *Lauritzenia* from China.

Materials and methods

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

Observations, figures, measurements and descriptions were based on adult specimens mounted on temporary cavity slides and permanent slides. Drawings were made with a camera lucida using a transmission light microscope “Leica DM 3000”.

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.

The morphological terminology used in this paper follows that of Grandjean (1936), Ermilov *et al.* (2019), Ermilov and Starý (2020). Also, see Norton (1977) for leg setal nomenclature, and Norton and Behan-Pelletier (2009) for an overview.

The following abbreviations are used:

Prodorsum: *lam* = lamella; *slam* = sublamella; *Al* = sublamellar porose area; *tu* = tatorium; *ro*, *le*, *in*, *bs*, *ex* = rostral, lamellar, interlamellar, bothridial, and exobothridial setae, respectively; *Ad* = dorsosejugal porose area; *D* = dorsophragma; *P* = pleurophragma.

Notogaster: *c*, *la*, *lm*, *lp*, *h*, *p* = setae; *Sa*, *S1*, *S2*, *S3* = saccules; *ia*, *im*, *ip*, *ih*, *ips* = lyrifissures; *gla* = opisthonotal gland opening.

Gnathosoma: *a*, *m*, *h* = subcapitular setae; *or* = adoral seta; *d*, *l*, *cm*, *acm*, *ul*, *su*, *lt*, *vt*, *inf*, *sup* = palp setae; ω = palp solenidion; *cha*, *chb* = cheliceral setae; *Tg* = Trägårdh’s organ.

Epimeral and lateral podosomal regions: *1a*, *1b*, *1c*, *2a*, *3a*, *3b*, *3c*, *4a*, *4b*, *4c* = epimeral setae; *Pd I*, *Pd II* = pedotecta I and II, respectively; *dis* = discidium; *cir* = circumpedal carina.

Anogenital region: *g*, *ag*, *an*, *ad* = genital, aggenital, anal, and adanal setae, respectively; *iad* = adanal lyrifissure; *p.o.* = preanal organ.

Legs: *Tr*, *Fe*, *Ge*, *Ti*, *Ta* = trochanter, femur, genu, tibia, and tarsus, respectively; *p.a.* = porose area; ω , σ , ϕ = solenidia; ε = famulus; *d*, *l*, *v*, *ev*, *bv*, *ft*, *tc*, *it*, *p*, *u*, *a*, *s*, *pv*, *pl* = setae.

Collectors: Catalogue numbers of specimens are prefixed with the collectors’ pseudonyms as follows: XSJ = Shu-Jing Xu, ZLH = Li-Hao Zheng, CJ = Jun Chen, LK = Kang Li, CXF = Shu-Jing Xu and Cheng Fan, LR = Rong Li. The collectors will not be listed below, if the catalogue numbers of specimens are prefixed as above.

Taxonomy

Family Haplozetidae Grandjean, 1936

Genus *Indoribates* Jacot, 1929: 429

Nixozetes Mahunka, 1977: 268

Sundazetes Hammer, 1979: 61; Mahunka 1987: 812 (synonym of *Nixozetes*); Balogh & Balogh 1992: 135 (synonymy).

Bolkiah Mahunka, 1997: 692; Ermilov *et al.* 2019: 471 (synonymy).

Type species. *Protoribates punctulatus* Sellnick, 1925

General remarks

According to Subías's system (Subías 2020, 2022; Subías & Shtanchaeva 2023), the main difference between the genera *Indoribates* and *Lauritzenia* is the number of genital setae. *Indoribates* has five pairs of genital setae, while *Lauritzenia* has four pairs (e.g., Balogh & Balogh 1992; Hammer 1958, 1979; Jacot 1929; Mahunka 1977, 1997; Subías 2020; Subías & Shtanchaeva 2023).

Subías (2020) and Subías and Shtanchaeva (2023) stated that the genus *Indoribates* comprises five subgenera, including the nominate subgenus *Indoribates* and subgenus *Bihaplozetes* Subías, 2020. Species of the subgenus *Indoribates* have monodactylous legs, while *Bihaplozetes* is characterized by bidactylous legs (Subías 2020; Subías & Shtanchaeva 2023). The new species we describe in this paper have monodactylous legs I and bidactylous legs II to IV. The leg characteristics of the new species lie between those of the subgenus *Indoribates* and *Bihaplozetes*. Therefore, we suggest augmenting the diagnosis of the subgenus *Indoribates* to include the species with monodactylous or bidactylous legs, in order to avoid identification confusion. And we propose that *Bihaplozetes* is a junior synonym of the subgenus *Indoribates*: *Indoribates* (*Indoribates*) Jacot, 1929 (= *Indoribates* (*Bihaplozetes*) Subías, 2020 **syn. nov.**).

According to Subías's system (Subías 2020, 2022; Subías & Shtanchaeva 2023), the genus *Lauritzenia* comprises four subgenera, including the nominate subgenus *Lauritzenia* and subgenus *Incabates*. The most important difference between them is that the legs are monodactylous in the nominate subgenus, and heterotridactylous in *Incabates* (Balogh & Balogh 1992; Subías 2020; Subías & Shtanchaeva 2023). However, in the catalogue of Subías (2022, updated 2024), some species do not conform to these characteristics. For ease of identification, we propose revising the classification of certain species.

Indoribates (*Indoribates*) *carneus* (Tseng, 1984), listed in the catalogue of Subías (2022, updated 2024), has four pairs of genital setae according to the original illustration. Additionally, the species has monodactylous legs, as per the diagnosis of *Lauritzenia* described by Tseng (1984). Therefore, the species should be placed in *Lauritzenia* (*Lauritzenia*).

Indoribates (*Indoribates*) *nobilis* (Golosoova, 1984) listed in the catalogue of Subías (2022, updated 2024), has four pairs of genital setae. Thus, it should be removed from the genus *Indoribates*. Golosoova (1984) did not describe the legs of the species, but it was originally described in the genus *Cosmobates* Balogh, 1959, in which the species has heterotridactylous legs. Therefore, it is inferred that the legs of species *nobilis* are also heterotridactylous, and the species should be placed in *Lauritzenia* (*Incabates*). Thus, a new combination is proposed: *Lauritzenia* (*Incabates*) *nobilis* (Golosoova, 1984) **comb. nov.**

Indoribates (*Haplozetes*) *albidus* (Ewing, 1908), listed in the catalogue of Subías (2022, updated 2024), was once placed in the genus *Scheloribates* Berlese, 1908 by examining the syntype (Marshall *et al.* 1987). However, Subías (2004) placed it in the genus *Protoribates* Berlese, 1908 without any comments, and later, he placed it in *Indoribates*. Here, we agree with the view of Marshall *et al.* (1987) and the species should not be placed in the family Haplozetidae.

Lauritzenia (*Lauritzenia*) *cuticulata* (Tseng, 1984), listed in the catalogue of Subías (2022, updated 2024), was originally placed in the genus *Muliercula* Coetzer, 1968, in which the pteromorphs of the species lack hinges. Tseng (1984) also stated that this species is similar to the other species, *Muliercula chiayiensis* Tseng, 1984, described in the same genus and paper, whose pteromorphs also lack hinges. Therefore, it is inferred that the pteromorphs of the species *cuticulata* lack hinges, and it should not be placed in *Indoribates* (*Haplozetes*). Meanwhile, due to the absence of the type specimens (Ermilov & Liao 2017), it may be better to keep it in the genus *Muliercula*.

Indoribates (*Indoribates*) *subiasi* sp. nov.

(Figs 1, 2)

Type material

Holotype: male (in 100% alcohol, XSJ-19-032): China, Hunan, Yongshun County, Xiaoxi Village, Xiaoxi National Nature Reserve, 28°47'56"N, 110°16'17"E, ca. 580 m a.s.l., litter under the arbor, 27.IV.2019.

Paratypes: seven females and fourteen males, in alcohol, same data as the holotype.

Other (non-type) material

Five specimens (three females and two males in alcohol, XSJ-19-027): same locality as the holotype, 28°47'56"N, 110°15'47"E, ca. 560 m a.s.l., litter under pine trees, 27.IV.2019; two males (in alcohol, XSJ-19-028): same locality as the holotype, N28°47'52"N, 110°15'58"E, ca. 630 m a.s.l., litter under the bush, 27.IV.2019; one male (in alcohol, XSJ-19-030): same locality as the holotype, 28°47'54"N, 110°16'10"E, ca. 650 m a.s.l., litter under the bush, 27.IV.2019; five specimens (four females and one male in alcohol, XSJ-19-009): China, Hunan, Zhangjiajie, Wulingyuan District, Wenfeng Village, 29°20'07"N, 110°35'29"E, ca. 430 m a.s.l., litter under pine trees by the river, 24.IV.2019; one female (in alcohol, XSJ-19-011): same locality as the above, 29°19'51"N, 110°36'E, ca. 410 m a.s.l., litter under small broad-leaved trees, 24.IV.2019; one male (in alcohol, XSJ-19-012): same locality as the above, 29°19'33"N, 110°36'15"E, ca. 460 m a.s.l., litter in the grass under small broad-leaved trees, 24.IV.2019; one female (in alcohol, XSJ-19-035): China, Hubei, Xuan'en County, Changtanhe Town, Lianghekou Village, 29°59'13"N, 109°43'51"E, ca. 1140 m a.s.l., litter under the coniferous and broad-leaved trees near the road, 30.IV.2019; one female (on permanent slide, ZLH-13-084): China, Guangdong, Taishan, Xiachuan Island, Guanyin Mountain, 21°38'23"N, 112°35'42"E, ca. 100 m a.s.l., litter under the arbor, 21.X.2013; two specimens (one female and one male in alcohol, CJ-14-101): China, Jiangxi, Lushan, Sandiequan, 29°33'35"N, 116°00'40"E, ca. 990 m a.s.l., mosses on stone, 6.VIII.2014; two specimens (one female and one male in alcohol, ZLH-20-177): China, Henan, Shangcheng county, Suxianshi Town, Xihe Village, Dabie Mountain Nature Reserve, West River Scenic Area, Huatuo Valley, 31°43'28"N, 115°32'24"E, ca. 470 m a.s.l., litter under coniferous forest, 17.VII.2020; one female (in alcohol, ZLH-20-182): same locality as the above, ca. 500 m a.s.l., litter under broad-leaved forest, 17.VII.2020; thirty five specimens (sixteen females and nineteen males in alcohol, ZLH-21-089): China, Anhui, Lu'an, Huoshan County, Taiyang Village, Baimajian, 31°7'51"N, 116°9'51"E, ca. 700 m a.s.l., litter under coniferous and broad-leaved trees, 12.VIII.2021.

Diagnosis

Body length: 490–640. Rostrum round. Rostral, lamellar and interlamellar setae long, setiform, barbed; *ro* shortest; *in* longest. Bothridial seta long, setiform, barbed. Tutorium long, with tooth distally. Ten pairs of notogastral setae setiform, thin, smooth, *c* medium-sized, others short. Four pairs of saccules with slightly elongated channels. Five pairs of genital setae. Three pairs of aggenital setae. Leg I monodactylous, legs II to IV heterodactylous.

Description

Measurements. Body length: 530 (holotype), 490–640 (paratypes); notogaster width: 320 (holotype), 320–440 (paratypes). No differences between males and females in body size.

Integument. Body color light brown to brown. Cuticle densely microfoveolate (visible under high magnification). Lateral side of body with microgranulate cerotegument.

Prodorsum (Fig. 1A, C). Rostrum rounded. Lamella about one-half length of prodorsum. Sublamella short. Sublamellar porose area oval or slightly rounded (7–10 × 8–13), located near to sublamella. Tutorium long, with tooth distally. Rostral (60–70) and lamellar (92–100) setae, setiform, barbed; interlamellar seta (110–120) setiform, slightly barbed; insertion of *ro* mostly close to the tooth of tutorium, occasionally far from it on one side; *le* inserted at end of lamella. Bothridial seta (130–165) setiform, unilaterally barbed. Exobothridial seta (25–35) setiform, thin, barbed. Dorsosejugal porose area elongate oval.

Notogaster (Fig. 1A, C). Anterior notogastral margin convex medially. Ten pairs of setae setiform, smooth, *c* (80–98) distinctly longer than others (25–50). Four pairs of saccules with slightly elongated channels. Opisthonotal gland opening and all lyrifissures distinct.

Gnathosoma (Fig. 2E–G). Subcapitulum size: 112–125 × 95–98. Subcapitular setae (*a*: 20–25; *m*: 30–40; *h*: 25–38) setiform, slightly barbed. Both adoral setae (12–15) setiform, densely barbed. Palp (85–90) with typical setation 0-2-1-3-9(+∞). Postpalpal setae (5–6) spiniform, smooth. Chelicera (132–135) with two setiform, barbed setae (*cha*: 30–48; *chb*: 28–30).

Epimeral and lateral podosomal regions (Fig. 1B, C). Epimeral setal formula: 3-1-3-3. All epimeral setae setiform, thin, roughened or slightly barbed, *1b* (28–30), *3b* (25–35) and *3c* (28–40) longer than others (12–25). Discidium rectangular in lateral view. Circumpedial carina distinct, directed to pedotectum II.

Anogenital region (Fig. 1B, C). Five pairs of genital setae (12–20), three pairs of aggenital setae (12–18), two pairs (occasionally three setae on one plate) of anal setae (20–28), and three pairs of adanal seta (20–30) setiform, smooth. Adanal lyrifissure close and parallel to anal plate.

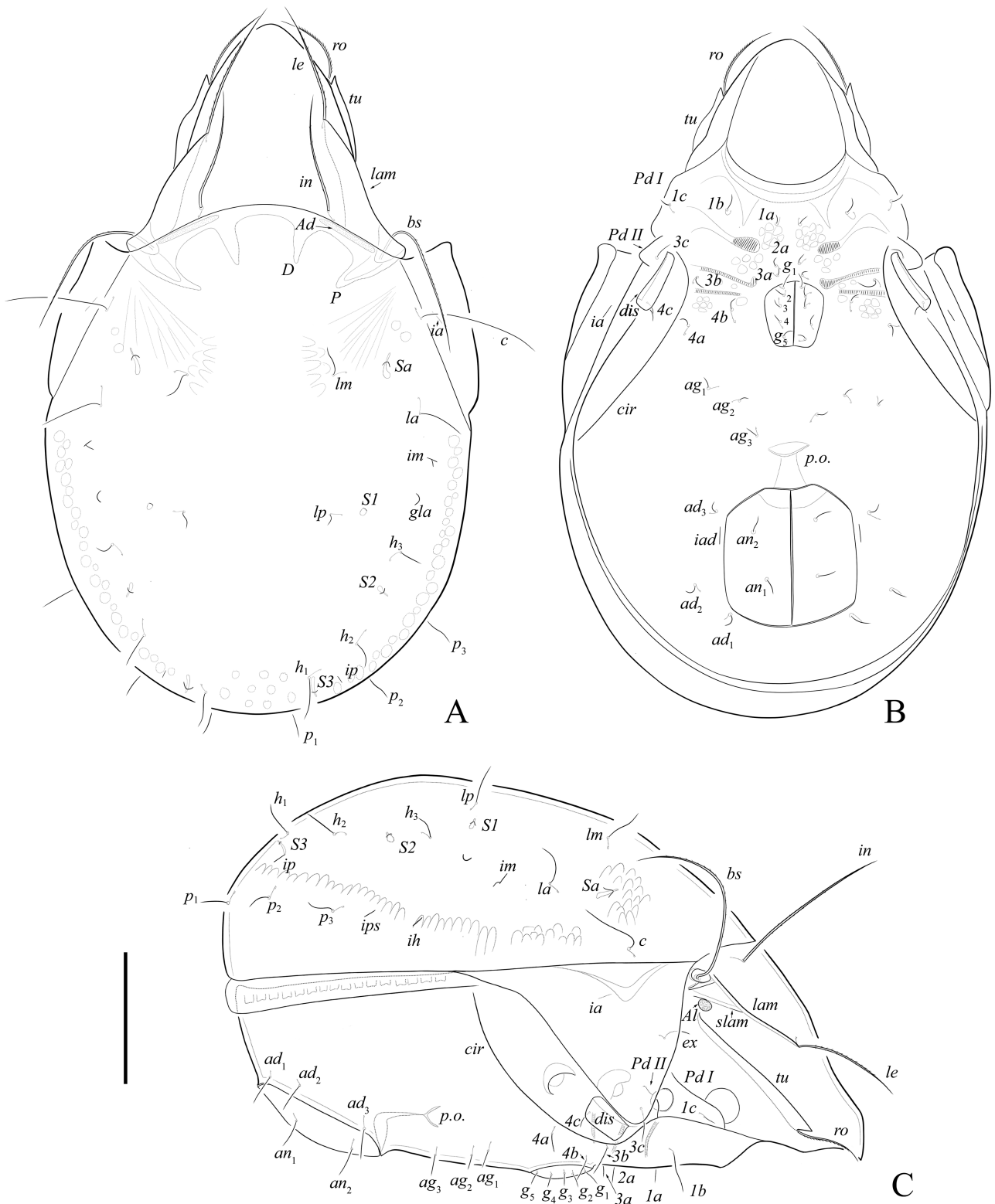


FIGURE 1. *Indoribates (Indoribates) subiasi* sp. nov., adult. A. dorsal view (legs not shown); B. ventral view (legs and gnathosoma not shown); C. lateral view (gnathosoma and legs not shown). Scale bar: 100 μ m.

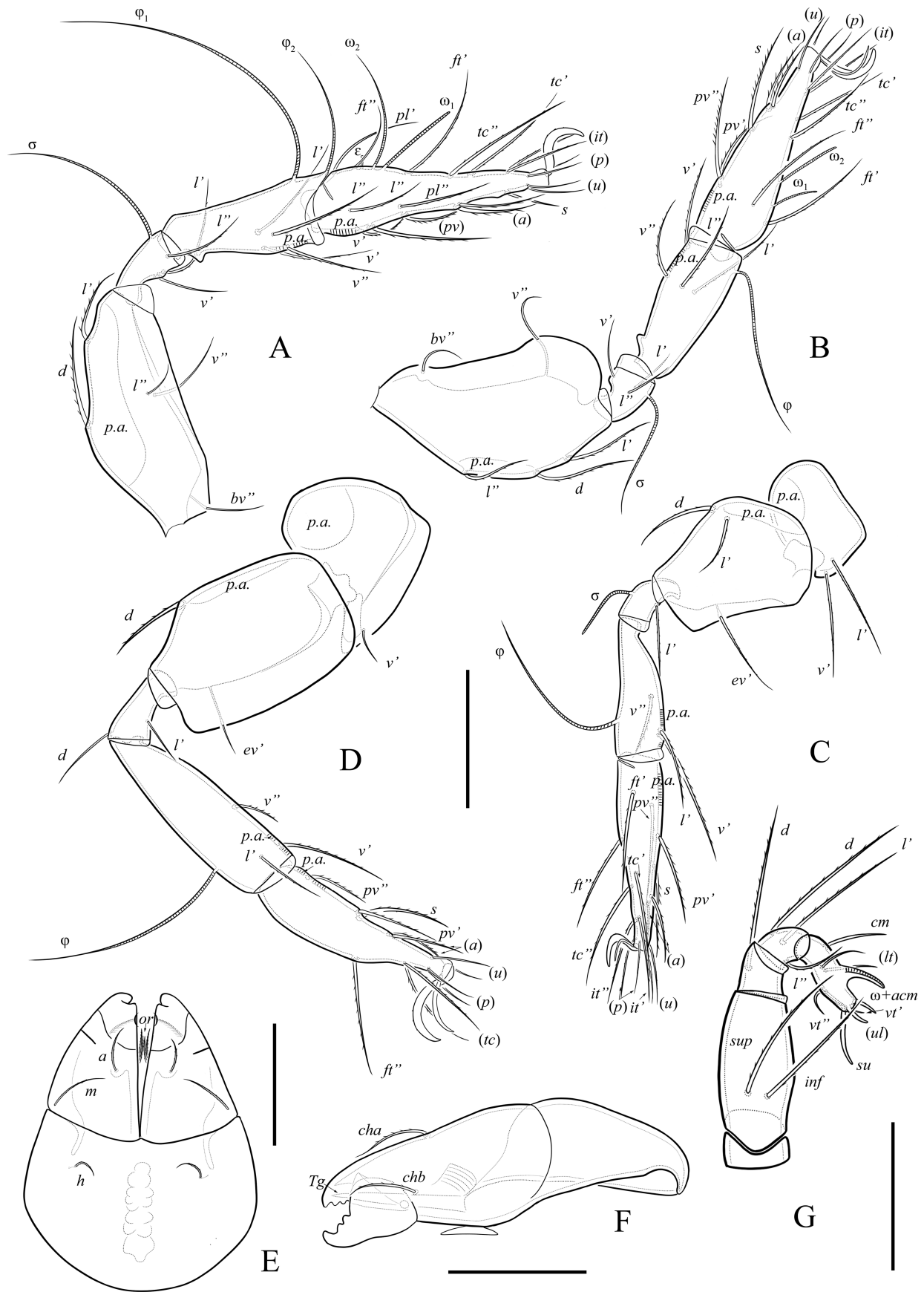


FIGURE 2. *Indoribates (Indoribates) subiasi* sp. nov., adult. A. leg I, trochanter omitted, right, antiaxial view; B. leg II, trochanter omitted, left, antiaxial view; C. leg III, right, antiaxial view; D. leg IV, right, antiaxial view; E. subcapitulum, ventral view; F. chelicera, left, antiaxial view; G. palp, right, antiaxial view. Scale bars: 100 µm (A–D), 50 µm (E, F), 30 µm (G).

Legs (Fig. 2A–D). Leg I monodactylous, legs II to IV bidactylous, one claw slightly barbed on dorsal side, thicker than the other one. Dorsoparaxial porose area on femora I–IV and on trochanters III, IV, and ventrodistal porose area on tibiae I–IV and proximoventral porose area on tarsi I–IV poorly 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 *Indoribates (Indoribates) subiasi* sp. nov.

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

Note: Roman letters refer to normal setae, and Greek letters to solenidia (except ε = famulus). A single quotation mark (') designates setae on the anterior side and a double quotation mark (") setae on the posterior side of a given leg segment. Parentheses refer to a pair of setae.

Etymology

The specific name “*subiasi*” is in honor of Luis S. Subías for his contribution to the study of oribatid mites.

Distribution

This species is known from Anhui, Guangdong, Henan, Hubei, Hunan and Jiangxi provinces in the central and southern part of China.

Remarks

The new species is distinguished from all representatives of the subgenus *Indoribates* by the presence of monodactylous leg I and heterobidactylous legs II to IV. Only one species, *Indoribates (Indoribates) bayartogtokhi* (Ermilov, Sandmann & Scheu, 2019), owns bidactylous legs. The new species differs from *I. (I.) bayartogtokhi* by having monodactylous leg I (versus bidactylous leg I); three pairs of aggenital setae (versus one pair); setiform bothridial seta (versus spindle-form bothridial seta); interlamellar seta longer than rostral setae (versus interlamellar seta shorter than rostral setae).

By having three pairs of aggenital setae, setiform bothridial seta and medium-sized notogastral setae, the new species is morphologically similar to *Indoribates (Indoribates) bicarinatus* Ermilov & Anichkin, 2014. However, the new species differs from the latter by having heterobidactylous legs II to IV (versus monodactylous leg II to IV); lacking longitudinal ridges on anal plates (versus have longitudinal ridges on anal plates); notogastral setae *c* longer than rostral setae (versus notogastral setae *c* similar to or shorter than rostral setae).

Checklist of known species of *Indoribates* in China

Indoribates (I.) crassisetiger (Fukuyama & Aoki, 2000)

Nixozetes crassisetiger Fukuyama & Aoki, 2000: 23, figs 1–17.

Indoribates (I.) crassisetiger (Fukuyama & Aoki, 2000): Subías 2004: 208.

Distribution. China (Yunnan).

Indoribates (I.) japonicus (Aoki, 1988). New record to China

Sundazetes japonicus Aoki, 1988: 15, figs 4–8.

Nixozetes japonicus (Aoki, 1988): Fujikawa *et al.* 1993: 67.

Indoribates (I.) japonicus (Aoki, 1988): Subías 2004: 208.

Material examined. One male (on permanent slide, LK-14-024): China, Guangxi, Beihai, Weizhou Island, Shiluo Village, 21°02'N, 109°05'38"E, ca. 30 m a.s.l., litter under the bushes, 20.IV.2014; ten specimens (two females and three males in alcohol, five females on permanent slides, LK-14-039): China, Guangxi, Beihai, Weizhou Island, 21°00'40"N, 109°05'55"E, ca. 20 m a.s.l., litter under the bushes; one female (on permanent slide, LK-14-061): China, Guangdong, Zhanjiang, Naozhou Island, Dailang Village, 20°56'40"N, 110°36'12"E, ca. 20 m a.s.l., 27.IV.2014.

Distribution. China (Guangdong, Guangxi), Japan.

***Indoribates (I.) minutus* (Tseng, 1984)**

Lauritzenia minuta Tseng, 1984: 58, figs 172–173.

Indoribates (Haplozetes) minutus (Tseng, 1984): Subías 2004: 208; Shtanchaeva *et al.* 2014: 76, figs 1–15.

Indoribates (Indoribates) minutus (Tseng, 1984): Subías 2004, updated 2021: 400.

Material examined. Four specimens (three females and one male on permanent slides, ZLH-13-106): China, Guangdong, Yangjiang, Hailing Island, Niutang Mountain, 21°34'34"N, 111°49'08"E, ca. 30 m a.s.l., litter under bamboo forest and arbor, 28.X.2013; three specimens (two females and one male on permanent slides, ZLH-13-107): same locality as the above, 21°34'33"N, 111°49'08"E, ca. 20 m a.s.l., litter under bamboo forest, 28.X.2013; four specimens (two males in alcohol, two females on permanent slides, LK-14-041): China, Guangdong, Lianjiang, Gaoqiao Town, 21°36'06"N, 109°44'55"E, ca. 0 m a.s.l., litter under *Eucalyptus* sp., 23.IV.2014; three specimens (two females and one male on permanent slides, LK-14-049): China, Guangdong, Lianjiang, Gaoqiao Town, Deyao Village (Mangrove Reserve), 21°32'48"N, 109°46'15"E, 4 m a.s.l., litter under arbor, 25.IV.2014; three males (on permanent slides, LK-14-058): China, Guangdong, Zhanjiang, Naozhou Island, Huangzhai Village, 20°56'33"N, 110°35'28"E, 3 m a.s.l., litter in the grass under pine trees, 27.IV.2014; one male (on permanent slide, LK-14-031): China, Guangxi, Beihai, Xieyang Island, 20°54'52"N, 109°12'28"E, ca. 80 m a.s.l., litter in the grass under the arbor, 21.IV.2014; fourteen specimens (one female and three males in alcohol, eight females and two males on permanent slides, LK-14-035): China, Guangxi, Beihai, Weizhou Island, 21°03'26"N, 109°06'09"E, 7 m a.s.l., litter in the grass under the arbor, 22.IV.2014; four males (on permanent slides, LK-14-037): same locality as "LK-14-035", 21°03'30"N, 109°06'04"E, ca. 0 m a.s.l., litter under the bushes, 22.IV.2014; four males (on permanent slides, LK-14-045): China, Guangxi, Beihai, Hepu County, Xinxu Village (Mangrove Reserve), 21°29'58"N, 109°45'43"E, ca. 20 m a.s.l., litter under the arbor, 24.IV.2014.

Distribution. China (Guangdong, Guangxi, Taiwan), Brazil.

Remarks. Due to possessing five pairs of genital setae, the species should be placed in *Indoribates* rather than *Lauritzenia*. Previously, it was placed in *Indoribates (Haplozetes)* (Shtanchaeva *et al.* 2014; Subías 2004). Later, Subías (2004, updated 2021) placed it in *Indoribates (Indoribates)*. We support this opinion based on its monodactylous legs.

***Indoribates (I.) subiasi* sp. nov.**

Distribution. China (Anhui, Guangdong, Henan, Hubei, Hunan, Jiangxi).

***Indoribates (Haplozetes) vindobonensis curtipilis* (Kunst, 1977). New record to China**

Haplozetes vindobonensis curtipilis Kunst, 1977: 185, figs 1–2.

Indoribates (Haplozetes) vindobonensis curtipilis (Kunst, 1977): Subías 2004: 208.

Haplozetes ulykpani Bayartogtokh & Aoki, 1998: 123, figs 5–7; Bayartogtokh 2000: 19, figs 29–40. **syn. nov.**

Material examined. Two specimens (one female and one male on permanent slides, CXF-17-167): China, Inner Mongolia, Alxa Zuoqi, Bayanhot Town, near the Helan Mountain South Temple, 38°40'58"N, 105°46'46"E, ca. 1850 m a.s.l., litter under the bush, 27.VIII.2017; seventeen specimens (eleven females and six males on permanent

slides, CXF-17-128): China, Gansu, Baiyin, Jingtai County, Shoulu Mountain National Forest Park, 37°08'15"N, 103°44'43"E, ca. 2610 m a.s.l., litter under *Picea crassifolia*, 20.VIII.2017; three specimens (one female and two males on permanent slides, CXF-17-130): same locality as "CXF-17-128", 37°08'16"N, 103°44'46"E, ca. 2620 m a.s.l., litter in the grass, 20.VIII.2017; twelve specimens (seven females and five males, in alcohol, LR-17-023): China, Tibet, Bayi District, G318 National Highway, 29°48'55"N, 94°44'32"E, ca. 3140 m a.s.l., litter under bamboo forest, 30.VII.2017; six specimens (four female and two males in alcohol, LR-17-026): same locality as "LR-17-023", 29°48'53"N, 94°44'32"E, ca. 3140 m a.s.l., litter under *Populus* sp., 30.VII.2017; one female (on permanent slide, LR-17-153): China, Tibet, Bayi District, near 4145 km milestone locality on China National Highway 318, 29°50'17"N, 94°44'43"E, ca. 3080 m a.s.l., litter under bamboo forest, 18.VIII.2017.

Distribution. China (Gansu, Inner Mongolia, Tibet), Czech, Slovakia, Mongolia.

Remarks. This species is very similar to *Indoribates (Haplozetes) vindobonensis* (Willmann, 1935). The main difference between them is the length of interlamellar setae. From the dorsal view, the interlamellar setae of *I. (H.) vindobonensis* extend beyond the lamellar end, appearing longer than lamellar setae. The interlamellar setae of *I. (H.) vindobonensis curtispilis* do not extend beyond the lamellar end, the interlamellar setae appearing similar to lamellar setae in length.

Indoribates (Haplozetes) ulykpani (Bayartogtokh & Aoki, 1998) was described by Bayartogtokh & Aoki (1998) as a new species; however, we propose that it should be a synonym of *I. (H.) vindobonensis curtispilis*. The conclusion is based on a comparative morphological analysis of the two species, which reveals that the main difference is that the interlamellar setae of *I. (H.) ulykpani* do not extend beyond the lamellar end, making them appear shorter than lamellar setae and interlamellar setae of *I. (H.) vindobonensis curtispilis*. However, from the lateral view, the interlamellar setae of *I. (H.) ulykpani* are similar to lamellar setae (Bayartogtokh 2000). After examining the specimens of *I. (H.) vindobonensis curtispilis* in IZAS, we found that the interlamellar setae are often perpendicular to the prodorsum. When the prodorsum is strongly tilted downward, the interlamellar setae appear similar in length to the lamellar setae from the dorsal view, and the rostral setae appear posterior to the lamellar setae. However, if the prodorsum is not tilted downward, the interlamellar setae appear shorter than lamellar setae, and the rostral setae appear anterior to the lamellar setae.

Thus, in the illustration of *I. (H.) vindobonensis curtispilis*, the prodorsum is tilted downward, resulting the interlamellar setae similar in length to lamellar setae, like *I. (H.) ulykpani*. Bayartogtokh and Aoki (1998) also stated that *I. (H.) ulykpani* differs from *I. (H.) vindobonensis* by having relatively long rostral setae, with the bothridium only partially covered posteriorly by the anterior margin of notogaster, and with lamellae positioned more medially. However, in both *I. (H.) vindobonensis curtispilis* and *I. (H.) ulykpani*, the rostral setae are similar to or slightly shorter than the lamellar setae, and in both, the bothridia are only partially covered posteriorly by the anterior margin of notogaster. Regarding the position of lamellae, we think this may be due to the illustration in dorsal view, which includes the pedotectum I, causing the lamellae to appear medially, and this character was not definitely described in the description. Therefore, we subjectively consider *Haplozetes ulykpani* to be a junior synonym of *Indoribates (Haplozetes) vindobonensis curtispilis* (Kunst, 1977): *Indoribates (Haplozetes) vindobonensis curtispilis* (Kunst, 1977) (= *Haplozetes ulykpani* Bayartogtokh & Aoki, 1998 **syn. nov.**)

There are some variations among the specimens we examined. Most specimens have five pairs of genital setae, one pair of aggenital setae; bothridial setae are typically clavate, with their ends often being blunt. However, occasionally five genital setae on one side and four setae on the other side, a specimen with two pairs of aggenital setae, and sometimes the ends of bothridial setae are somewhat pointed, even in one specimen.

***Indoribates (Neindoribates) multisetus* (Wen & Zhao, 1994)**

Sundazetes multisetus Wen & Zhao, 1994: 75, figs 13–19.

Indoribates (I.) multisetus (Wen & Zhao, 1994): Subías 2004: 208; Liu *et al.* 2010: 108.

Indoribates (Neindoribates) multisetus (Wen & Zhao, 1994): Subías 2020: 5; Subías 2004, updated 2020: 398.

Material examined. Holotype, on permanent slide, 92-1791, China, Yunnan, Xishuangbanna, 20.V.1992, collected by Xia Zhao. Paratype, two specimens, 92-1791, same data as the holotype. These type specimens are deposited in IZAS.

Distribution. China (Guizhou, Yunnan).

Remarks. The species is distinguished from others in *Indoribates* by the presence of neotrichy in the epimeral regions. The typical epimeral setal formula in *Indoribates* is 3-1-3-3; however, in *I. multisetus*, it is 3-1-5-6 (5).

Checklist of known species of *Lauritzenia* in China

Lauritzenia (Lauritzenia) carnea Tseng, 1984

Lauritzenia carnea Tseng, 1984: 60, figs 174–175.

Indoribates (Haplozetes) carneus (Tseng, 1984): Subías 2004: 208.

Indoribates (I.) carneus (Tseng, 1984): Subías 2004, updated 2021: 400.

Distribution. China (Taiwan).

Remarks. As mentioned above, according to the original illustration, the species has four pairs of genital setae. Consequently, it should be placed in *Lauritzenia*. Subías (2004, 2022) listed the species in the genus *Indoribates*, possibly due to the original description, in which Tseng (1984) stated there are five pairs of genital setae, but four pairs in the illustration. Considering the error in the original description, such as the claim that the species has one pair of anal setae, which is inconsistent with the diagnosis of haplozetid species and the illustration of the species. Therefore, we refer to the original illustration to identify the species.

Lauritzenia is feminine, and the adjectival specific epithet must also be feminine; hence *carneus* is revised to *carnea*.

Lauritzenia (Lauritzenia) loongchiensis (Tseng, 1984)

Haplozetes loongchiensis Tseng, 1984: 64, figs 182–183.

Lauritzenia (Lauritzenia) loongchiensis (Tseng, 1984): Subías 2004: 208.

Distribution. China (Taiwan).

Lauritzenia (Incabates) major (Aoki, 1970)

Incabates major Aoki, 1970: 599, figs 37–41; Wen 1990: 122; Aoki 1991: 78; Liu *et al.* 2010: 108.

Lauritzenia (Incabates) major (Aoki, 1970): Subías 2004: 209.

Distribution. China (Guizhou, Jilin, Taiwan), Japan, Vietnam.

Lauritzenia (Incabates) nuda (Hammer, 1961). New record to China

Incabates nudus Hammer, 1961: 108, fig. 104; Corpuz-Raros 1980: 175, fig 3A–E.

Lauritzenia (Incabates) nuda (Hammer, 1961): Subías 2004: 209.

Material examined. One female (in alcohol, LK-14-027): China, Guangxi, Beihai, Xieyang Island, 20°55'02"N, 109°12'18"E, ca. 30 m a.s.l., litter under the bush, 21.IV.2014.

Distribution. China (Guangxi), Philippines, India, Peru.

Remarks. The specimen we examined differs from the type specimens in that the interlamellar seta is a little shorter than lamellar seta rather than being the same length. Other characteristics remain consistent. The specimen we examined differs from those described by Corpuz-Raros (1980) in that the body is more elongated and interlamellar seta appearing shorter in dorsal view. Other characteristics remain consistent.

Hammer (1971) once stated that three species she described, *Incabates nudus* Hammer, 1961, *Incabates angustus* Hammer, 1967 and *Incabates medius* Hammer, 1971 are very similar, and differing only in a few characteristics. The differences between them are that: (1) *Inc. nudus* is wider than *Inc. medius*, and *Inc. medius* is wider than *Inc.*

angustus; (2) the anterior notogastral margin of *Inc. medius* and *Inc. angustus* is more convex than that of *Inc. nudus*; (3) in *Inc. medius*, h_3 and p_3 are located on a transverse line; in *Inc. angustus*, p_3 is located much farther anterior to h_3 ; in *Inc. nudus*, p_3 is located posterior to h_3 . These differences are very small.

Due to their similarity, Subías (2004) regarded *Inc. medius* as a synonym of *Inc. angustus*. Later, Subías (2004, updated 2018) moved *Inc. angustus* (= *Inc. medius*) to the genus *Scheloribates*, possibly due to the immovable pteromorphs described by Hammer (1967). However, although Hammer (1967) stated the pteromorphs of *Inc. angustus* are immovable, she also stated there is a distinct longitudinal line in the area of pteromorphs. Combined with the illustrations, we refer to that the pteromorphs of *Inc. angustus* and *Inc. medius* may be movable. Thus, we think *Inc. angustus* and *Inc. medius* may be synonyms of *L. (Inc.) nuda*, but additional research is necessary.

Key to known species of *Indoribates* and *Lauritzenia* in China

1	Five pairs of genital setae	2 (<i>Indoribates</i>)
-	Four pairs of genital setae	7 (<i>Lauritzenia</i>)
2	Leg I monodactylous, legs II to IV bidactylous; three pairs of aggenital setae	<i>Indoribates (Indoribates) subiasi</i> sp. nov.
-	All legs monodactylous or heterotridactylous; one pair of aggenital setae	3
3	Legs heterotridactylous	<i>Indoribates (Haplozetes) vindobonensis curtispilis</i> (Kunst, 1977)
-	Legs monodactylous	4
4	Neotrichy present in the epimeral regions; notogastral setae barbed	5
-	Neotrichy absent in the epimeral regions; notogastral setae smooth	6
5	Neotrichy present on epimere III and IV, five pairs of setae on epimere III and five or six pairs of setae on epimere IV	<i>Indoribates (Neoindoribates) multisetus</i> (Wen & Zhao, 1994)
-	Neotrichy only present on epimere IV, four pairs of setae on epimere IV	<i>Indoribates (Indoribates) crassistiger</i> (Fukuyama & Aoki, 2000)
6	Bothridial seta setiform; notogastral setae longer than anal setae; anal and adanal setae densely barbed from middle towards tips	<i>Indoribates (Indoribates) japonicus</i> (Aoki, 1988)
-	Bothridial seta lanceolate; notogastral setae shorter than anal setae; anal and adanal setae slightly barbed	<i>Indoribates (Indoribates) minutus</i> (Tseng, 1984)
7	Legs monodactylous	8
-	Legs heterotridactylous	9
8	Bothridial seta lanceolate	<i>Lauritzenia (Lauritzenia) carnea</i> Tseng, 1984
-	Bothridial seta clavate	<i>Lauritzenia (Lauritzenia) loongchiensis</i> (Tseng, 1984)
9	Notogastral setae represented by alveoli except p_1 ; rostral, lamellar, interlamellar and head of bothridial seta barbed	<i>Lauritzenia (Incabates) nuda</i> (Hammer, 1961)
-	Notogastral setae present; rostral, lamellar, interlamellar and head of bothridial seta smooth	<i>Lauritzenia (Incabates) major</i> (Aoki, 1970)

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