NEW SPECIES OF *GYMNODAMPIA* (ACARI: ORIBATIDA: AMEROIDEA) FROM CHINA.

BY JUN CHEN [1], VALERIE M. BEHAN-PELLETIER [2]
HUI-FU WANG [1], & ROY A. NORTON [3]

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MITES, ORIBATIDA, *GYMNODAMPIA*, NEW SPECIES, CHINA

SUMMARY: Five new species of *Gymnodampia* Jacot from China are proposed and described on the basis of adults: *Gymnodampia acuta* n. sp., *G. qinlingensis* n. sp., *G. sichuanensis* n. sp., *G. tegularum* n. sp. and *G. yaoi* n. sp. A key to the 16 species and subspecies of *Gymnodampia* known worldwide is presented, and their distribution is discussed.

ACARIENS, ORIBATIDES, GYMNODAMPIA, NOUVELLES ESPÈCES, CHINE

RÉSUMÉ : Cinq nouvelles espèces chinoises de *Gymnodampia* Jacot sont proposées et décrites sur les adultes: *Gymnodampia acuta* n. sp., *G. qinlingensis* n. sp., *G. sichuanensis* n. sp., *G. tegularum* n. sp. and *G. yaoi* n. sp. Une clé des 16 espèces et sous espèces de *Gymnodampia* est fournie et la distribution de ce genre à répartition mondaiale est discutée.

The oribatid mite genus *Gymnodampia* Jacot, 1937 is Holarctic in distribution, with species found in East Asia and eastern North America, and is among the more species-rich genera in deciduous forest litter in Eastern Asia. Recently (CHEN *et al.*, 2004), we revised this genus, described new species from eastern North America, placed the genera *Cristamerus* Hammer, 1977 and *Defectamerus* Aoki, 1984 in junior synonymy with *Gymnodampia*, and discussed its placement in the Brachypylina. Although immatures of *Gymnodampia* are apheredermous, whereas known ameroid immatures are eupheredermous, we cannot find convincing apomorphic traits linking this genus to any known family of apheredermous Brachypylina. Thus, we retain *Gymnodampia* in the Ameroidea, and place it in Ameridae based on adult similarities. The purpose of this paper is to describe five new species of *Gymnodampia* from China, to provide a key to all known *Gymnodampia* species, and to briefly analyse their distribution.

MATERIAL & METHODS

Measurements and descriptions are based on specimens mounted in temporary cavity slides and on permanent slides, as well as published descriptions. Terminology used in this paper follows GRANDJEAN (see TRAVÉ & VACHON, 1975 for references) and CHEN *et al.* (2004). All examined specimens were adults; details of their number and provenance are given below. The following conventions of measurement

1. Institute of Zoology, Chinese Academy of Sciences, Beijing 100080, P. R. China.
2. Systematic Entomology, Agriculture and Agri-Food Canada, K. W. Neatby Building, 960 Carling Ave., Ottawa, Ontario K1A 0C6, Canada. Corresponding author; email: behanpv@agr. gc. ca,
3. State University of New York, College of Environmental Science and Forestry, Syracuse, NY 13210, USA

and description are used: *total length*: measured from tip of rostrum to posterior edge of notogaster; *length of notogaster*: measured from anterior margin to posterior edge of notogaster; *width of notogaster*: refers to maximum notogastral width; *distance between setae of prodorsum and notogaster*: measured as mutual distance between central point of insertion of setal pairs, or (for different setae) as mutual distance between central point of insertion of setae on same side; a*bbreviations for setae of prodorsum*: *ro*: rostral seta; *le*: lamellar seta; *in*: interlamellar seta; *ss*: sensillus; *ex*: exobothridial seta; *leg and palp setal formulae*: famulus is included in tarsal setal count on leg I and solenidial counts are in parentheses. The unideficience nomenclature for notogastral setae is used herein as outlined by NORTON in BALOGH & BALOGH (1988).

Abbreviations for Collections: CNC: Canadian National Collection of Insects and Arachnids, Agriculture and Agri-Food Canada, Ottawa, Canada; IZCAS: Institute of Zoology, Chinese Academy of Sciences, Beijing, China; RAN: personal collections of R. A. NORTON, Syracuse, New York, USA.

Measurements are given as mean, and range in parentheses.

Specimens for scanning electron microscopy were cleaned by soaking in Terg-A-Zyme®solution for 3-6h, followed by brief (1-2s) submersion in an ultrasonic bath. Specimens were then critical-point dried, mounted on Al stubs with double-sided sticky tape, and gold-coated in a Hummer sputter apparatus.

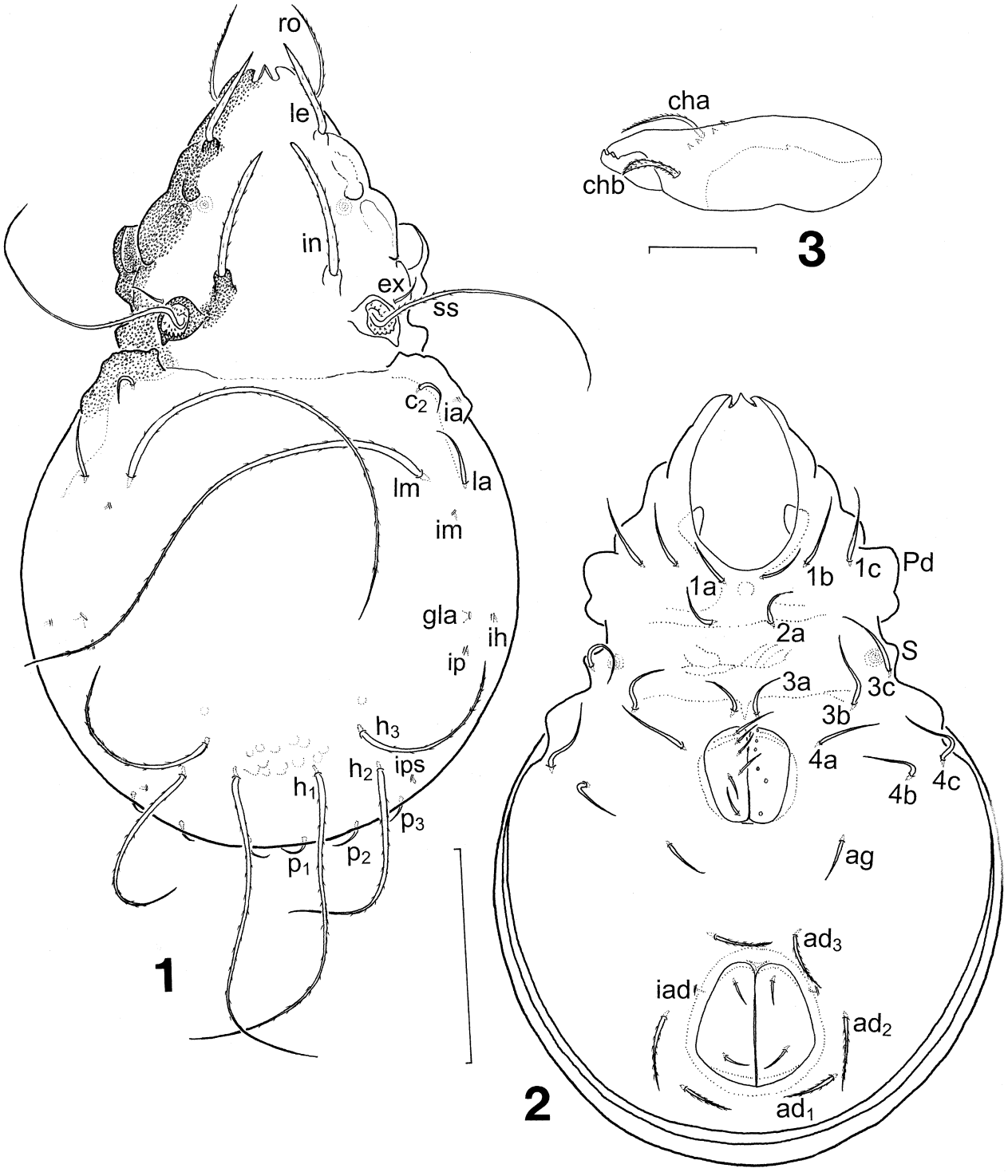
Gymnodampia Jacot, 1937

Gymnodampia Jacot, 1937,
Am. Midl. Nat. 18: 242; CHEN *et al*., 2004:
Cristamerus Hammer, 1977,
Biol. Skr. 21(4): 22; CHEN *et al*., 2004:
Defectamerus Aoki, 1984,
Zool. Sci., 1: 135; CHEN *et al*., 2004:

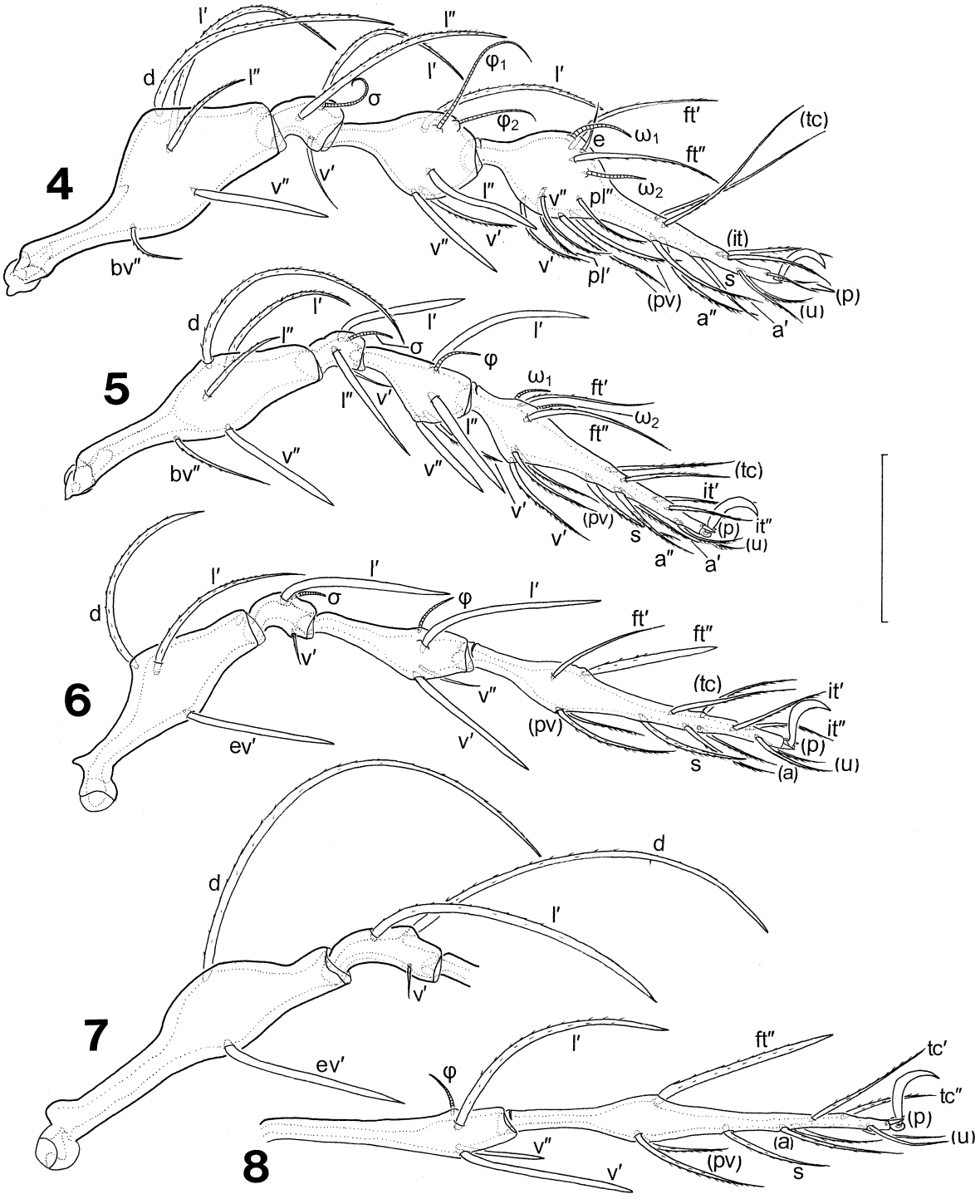
Diagnosis. Rostrum with 2 incisions (FIGS. 9, 21); setae *le* and *in* setiform, arising from round tubercles (FIGS. 22, 29, 34); enantiophysis *A* present, small; deep pit present lateral to enantiophysis *A* (Figs. 12, 29, 34); bothridium bowl like, protruding to form bothridial enantiophysis with humeral tubercle of notogaster (FIGS. 10, 32); lateral apophysis present (FIG. 10); dorsosejugal region extensively depressed; anterior margin of notogaster fused to prodorsum without scissure or suture (FIG. 22), indicated only by sharp change in contour; humeral region of notogaster with strong crest, ending in anteromedial tubercle (FIGS. 10, 20); notogaster with 8-10 pairs of setae, setae *lm*, *lp*, and *h* series conspicuously longer than others; pedotectum I present, typical pedotectum II absent, but with triangular tubercle *S* posterior to acetabulum II (FIG. 17); tubercle *S* with deep, circular pit present ventrally (FIG. 17, white arrowhead); epimeral setae long, setation: 3-1-3-3; sejugal constriction distinct;1 pair of aggenital setae, 6 pairs of genital setae (FIG. 31), 2 pairs of anal setae and 3 pairs of adanal setae present; setae ad_3 preanal and ad_1 postanal; lyrifissure *iad* between setae ad_2 and ad_3, parallel to lateral margin of anal plate (FIG. 2); tracheal system normal; ovipositor normally developed without coronal setae; genital papilla *Va* conical, larger than *Vm* and *Vp*; subcapitulum diarthric (FIGS. 17, 25, 33); rutellum pantelobasic, small axillary saccule present at base of palp; chelicera chelate-dentate with 2 setae, *cha* slender, with barbs, *chb* thick, expanded distally, with dense barbs (FIGS. 3, 19); palp setation 0-2-1-3-8(1), with solenidion recumbent (FIGS. 18, 25); all legs monodactyl, setal formulae (trochanter to tarsus): leg I 1-5-3(1)-4(2)-20(2); leg II 1-5-3(1)-4(1)-16(2); leg III 2-3-2(1)-3(1)-15; leg IV 1-2/3-3-3(1)-12; proral setae of tarsi II to IV small, spine-like (FIG. 14); femora I and II with proximal retrotecta (FIGS. 10, 12, 32, 34), III and IV with proximal spur; femora I to IV and trochanters III and IV with porose areas; solenidion ω_2 separated from ω_1 on tarsus I, positioned distally, famulus *e* spine like (FIG. 4).

Gymnodampia acuta n. sp.
(FIGS. 1-12)

Material examined: Holotype: adult female (in alcohol, Wu-43), CHINA: Fujian Province: Wuyi Mt. (26. 4° N, 116. 4° N), Guadun, 3 Aug., 1983, HUI-FU WANG and XIAO-MEI ZHANG, litter (IZCAS); Paratypes: 3 adults (in alcohol), with same data as holotype; 7 adults (6 in alcohol, 1 mounted on



FIGS. 1-3: *Gymnodampia acuta* n. sp., adult ♀, 1, dorsal aspect; 2, ventral aspect (gnathosoma removed); 3, chelicera, abaxial view. Scale bars: 1-2 = 200μm, 3 = 50μm.



FIGS. 4-8: *Gymnodampia acuta* n. sp., adult ♀ legs I to IV, abaxial aspect, 4, leg I; 5, leg II; 6, leg III; 7, leg IV (femur and genu); 8, leg IV (tibia and tarsus). Scale bar = 100μm.

slide, W-89-21), Wuyi Mt., Sangang (27. 7° N, 117. 6° E), 28 Apr., 1989, Hui-Fu Wang and Yun-Qi Cui, litter under bamboo forest; 6 adults (in alcohol, Wu-49), Wuyi Mt., Sangang, 4 Aug., 1983, Hui-Fu Wang and Xiao-Mei Zhang, litter; 1 adult (in alcohol, W-89-25), Wuyi Mt., Sangang, 28 Apr., 1989, Hui-Fu Wang and Yun-Qi Cui, litter; 2 adults (mounted on slides, W-89-29), Wuyi Mt., Guadun, 28 Apr., 1989, Hui-Fu Wang and Yun-Qi Cui, litter and soil under *Cunninghamia sp*. ; 1 adult (mounted on slide, W-89-31), Wuyi Mt., Guadun, 30 Apr., 1989, Hui-Fu Wang and Yun-Qi Cui, litter under bamboo forest; 1 adult (mounted on slide, Wu-16), Wuyi Mt., 30 July, 1983, Hui-Fu Wang and Xiao-Mei Zhang, litter. Paratypes deposited in CNC, IZCAS and RAN.

Etymology. This specific epithet "acuta" is from the Latin for "pointed" and refers to the acute, triangular rostrum of this species.

Diagnosis. Adult. Total length 632-778μm; rostrum acute, triangular between incisions; apophysis *Aa* rounded; bothridium with angular tubercle, with marginal incisions posteriorly; pedotectum I weakly developed, rounded distally and on outside margin; notogastral setae 9 pairs, setae *lm* and *h*-series longer than other notogastral setae, h_1 and h_2 inserted almost at same level, distance between h_2 longer than that between h_3.

Adult Measurements. Female (n=3): total length 734μm (688-778μm), notogastral length 432μm (421-446μm), notogastral width 497μm (478-518μm). Male (n=3): total length 670μm (632-729μm), notogastral length 400μm (365-446μm), notogastral width 440μm (397-470μm).

Integument. Integument smooth, except granular on projecting tubercles and crests. Cerotegument reticulate.

Prodorsum. Rostrum between incisions acute, triangular, depth of rostral incisions only evident in ventral aspect, as part of rostrum dorsally overlying base of incisions (Figs. 1, 2, 9). Seta *ro* long, tapered, *ro*, *le* and *in* barbed, *ro* length 92μm (88-96μm), distance between *ro* 94μm (84-104μm), *le* length 111μm (104-120μm), distance between *le* 103μm (92-112μm), *in* length 132μm (128-136μm), distance between *in* 91μm (84-104μm). Apophysis *Aa* rounded. Bothridium with angular tubercle posteriorly; with marginal incisions posteriorly (Figs. 1, 11). Sensillus attenuate, basal half slightly barbed, almost smooth distally, *ss* length 346μm (320-388μm), *ex* length 45μm (40-48μm).

Notogaster. Nine pairs of notogastral setae, seta *lp* absent (Fig. 1). Setae c_2 and *la* short (ca. 60μm), *lm* and h_1, h_2 and h_3 flagellate and slightly barbed, *lm* length 504μm (446-543μm), h_1 length 348μm (324-365μm), h_2 length 227μm (194-243μm), h_3 length 192μm (170-211μm), distance between h_2 160μm (144-172μm), distance between h_3 133μm (124-148μm); h_1 and h_2 inserted almost at same level (Fig. 1); setae of *p*-series short (ca. 40μm).

Venter. Pedotectum I weakly developed, outside margin and anterior edge rounded (Fig. 2). Tubercle *S* large, rounded distally. Adanal setae barbed, short (ca. 40μm).

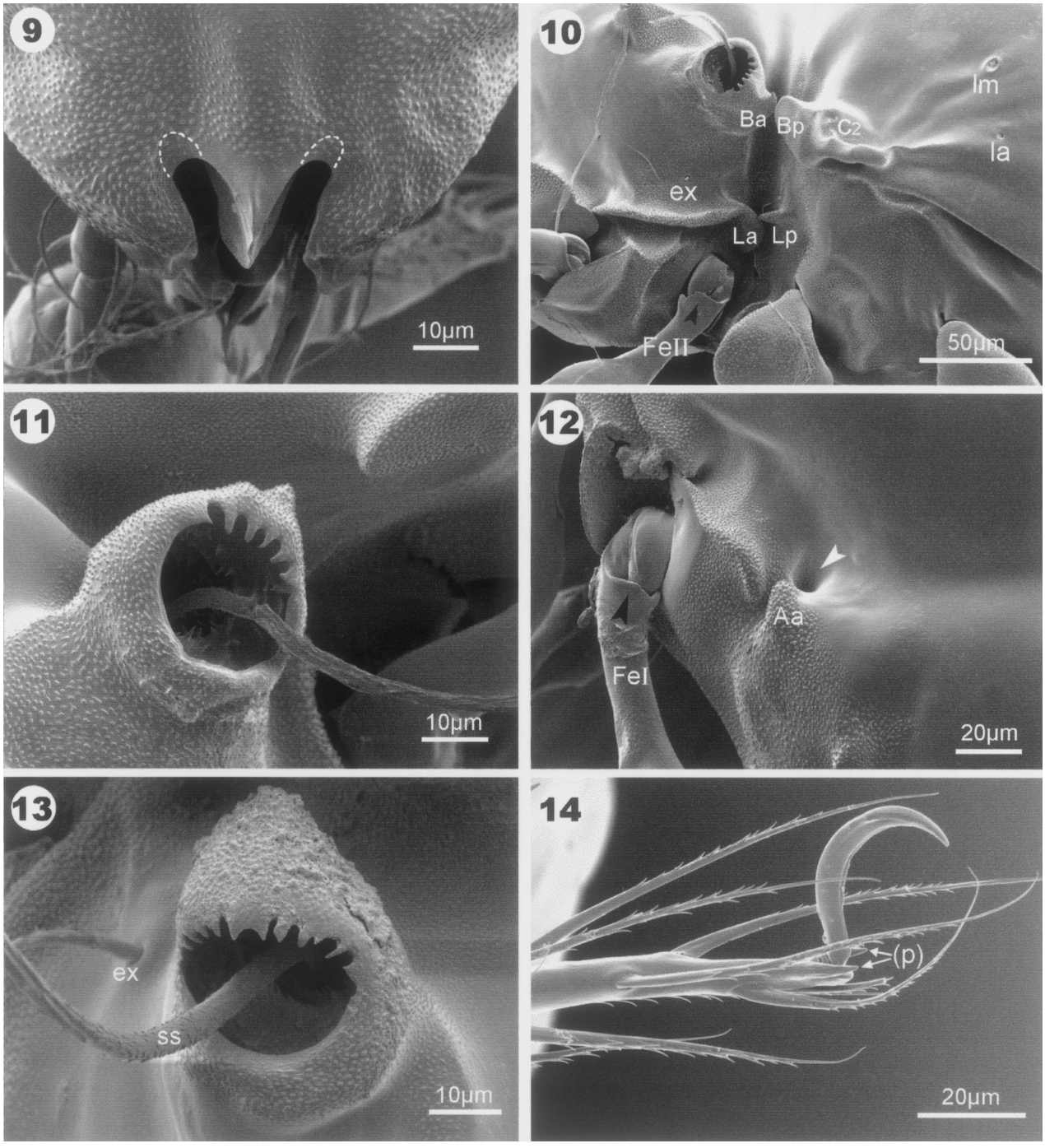
Gnathosoma. Normal for genus.

Legs. Setae *v*″ of femora I-II, *ev*′ of femora III-IV, *l*″ and *v*″ of tibiae I-II, *l*′ and *v*′ of tibia III strong, almost straight and smooth (Figs. 4-8). Setae *d* and *l*′ of femur I about 0. 9 times length of segment, (*l*) of genu I about 3 times length of segment, (*tc*) longest setae on tarsus I, nearly 0. 6 times length of segment; *d* of femur IV about 1. 5 times length of segment, *d* and *l*′ of genu IV about 4 and 3 times of length of segment, respectively. Genual solenidia σI curved, about 1. 3 times length of segment, σII almost equal to length of segment, σIII shorter than segment; tibial solenidia φ_1I almost equal to length of segment and φ_2I about 0. 5 times length of segment, respectively, φII about 0. 5 times length of segment, φIII and φIV about 0. 3 and 0. 2 times length of segment, respectively; tarsal solenidia ω_1I, ω_2I, ω_1II and ω_2II clearly shorter than respective segment.

Immatures. Unknown.

Distribution. Known only from Wuyi Mountain, Fujian Province, China.

Remarks. This species is similar to *G. soonkii* (Choi *et* Aoki, 1985), *G. jacoti* Chen *et al*., 2004, *G. tegularum* n.sp., and *G. fusca* (Fujikawa, 2002) in having 9 pairs of notogastral setae. It differs from them by: the acute triangular rostrum between the incisions and pedotectum I more weakly developed, distal margin rounded and not projecting when viewed dorsoventrally. There are clear differences in notogastral setation between this species and *G. soonkii* and



Figs. 9-12: *Gymnodampia acuta* n. sp., scanning electron micrographs of adult, 9, dorsal aspect of rostrum, base of rostral incisions overlaid by rostrum indicated by dashed white lines; 10, dorsolateral aspect of podosoma, proximal retrotectum of femur II indicated by black arrowhead; 11, anterodorsal aspect of bothridium; 12, dorsal aspect of enantiophysis *A* and femur I, pit lateral to enantiophysis *A* indicated by white arrowhead, proximal retrotectum of femur I indicated by black arrowhead.

Figs. 13-14: *Gymnodampia qinlingensis* n. sp., scanning electron micrographs of adult, 13, dorsal aspect of bothridium; 14, lateral aspect of tarsus IV, with spiniform setae (*p*) indicated.

G. fusca: in *G. acuta*, *lm* is inserted slightly anterior to *la*, h_1 and h_2 are inserted almost at same level, and distance between h_2 is longer than that between h_3; in *G. soonkii* and *G. fusca*, *lm* is inserted slightly posterior to *la*, h_1 is positioned posterior to h_2, and distance between h_2 is shorter than that between h_3.

Gymnodampia qinlingensis n. sp.
(FIGS. 13-19)

Material examined: Holotype: adult female (in alcohol, To-155), CHINA: Shaanxi Province: Qinling Mt., Foping County (33. 5° N, 107. 9° E), Loubangou, 1605M, 16 Nov., 1995 (IZCAS); Paratypes: 4 adults (in alcohol), with same data as holotype; 13 adults (10 in alcohol, 3 mounted on slide, To-164), Foping County, Huodiba, 1675M, 18 Nov., 1995; 2 adults (in alcohol, To-160), Foping County, Daoliushui, 1605M, 17 Nov., 1995; 3 adults (mounted on slides, To-161), Foping County, Sanguanmiao, 1600M, 17 Nov., 1995. All collected by ZHI-GAO ZENG. Paratypes deposited in CNC, IZCAS and RAN.

Etymology. This new species is named for its type locality, Qinling Mt., China.

Diagnosis. Total length 689-802μm; rostrum tongue-shaped between incisions; apophysis *Aa* rounded; bothridium with angular tubercle, with marginal incisions posteriorly; 10 pairs of notogastral setae, relatively short, thick, seta *lm* inserted posterior to *la*, *lp* inserted posterior to opening of opisthosomal gland.

Adult Measurements. Female (n=4): total length 772 μm (737-802μm), notogastral length 482μm (446-527μm), notogastral width 512μm (478-535μm). Male (n=2): total length 716μm (689-737μm), notogastral length 429μm (413-437μm), notogastral width 437μm (429-440μm).

Integument. Integument smooth, except granular on projecting tubercles and crests. Cerotegument reticulate.

Prodorsum. Rostrum tongue-shaped between incisions (FIG. 15). Seta *ro* smooth, length 91μm (76-104μm), distance between *ro* 89μm (84-96μm); *le* and *in* clearly barbed, *le* length 106μm (100-108μm), distance between *le* 85μm (76-92μm), *in* length 115μm (92-120μm), distance between *in* 76μm (72-80μm). Apophysis *Aa* large, rounded. Bothridium with angular tubercle posteriorly; with marginal incisions posteriorly (FIG. 13). Sensillus attenuate, slightly barbed in basal half, *ss* length 243μm (212-264μm), *ex* length 48μm (40-56μm).

Notogaster. 10 pairs of notogastral setae (FIG. 15). Setae c_2 and *la* relatively short (ca. 86μm); setae *lm, lp*, h_1, h_2 and h_3 long, barbed, *lm* length 212μm (204-224μm), *lp* length 170μm (152-184μm), h_1 length 185μm (168-200μm), h_2 length 118μm (104-128μm), h_3 length 150μm (132-160μm), distance between *lm* and *lp* 113μm (108-116μm), distance between *lp* and h_3 115μm (104-132μm). *lm* inserted posterior to *la*; *lp* inserted posterior to opening of opisthosomal gland (FIG. 15); setae of *p*-series short (ca. 40μm).

Venter. Pedotectum I well developed, triangular. Tubercle *S* large, distally rounded. Adanal setae barbed, short (ca. 35μm).

Gnathosoma. Normal for genus.

Legs. Dorsal and lateral setae of femora, genua and tibiae of all legs thick, except *v′* of genua I and II relatively slender. Setae *d* and *l′* of femur I about 0. 6 times length of segment, (*l*) of genu I about 1. 3 times length of segment; *d* of femur IV about 0. 6 times length of segment, *d* and *l′* of genu IV about 1. 6 times length of segment. Genual solenidion σII 0. 8 times length of segment; tibial solenidia φ_1I same length, and φ_2I about 0. 6 times length of segment, respectively.

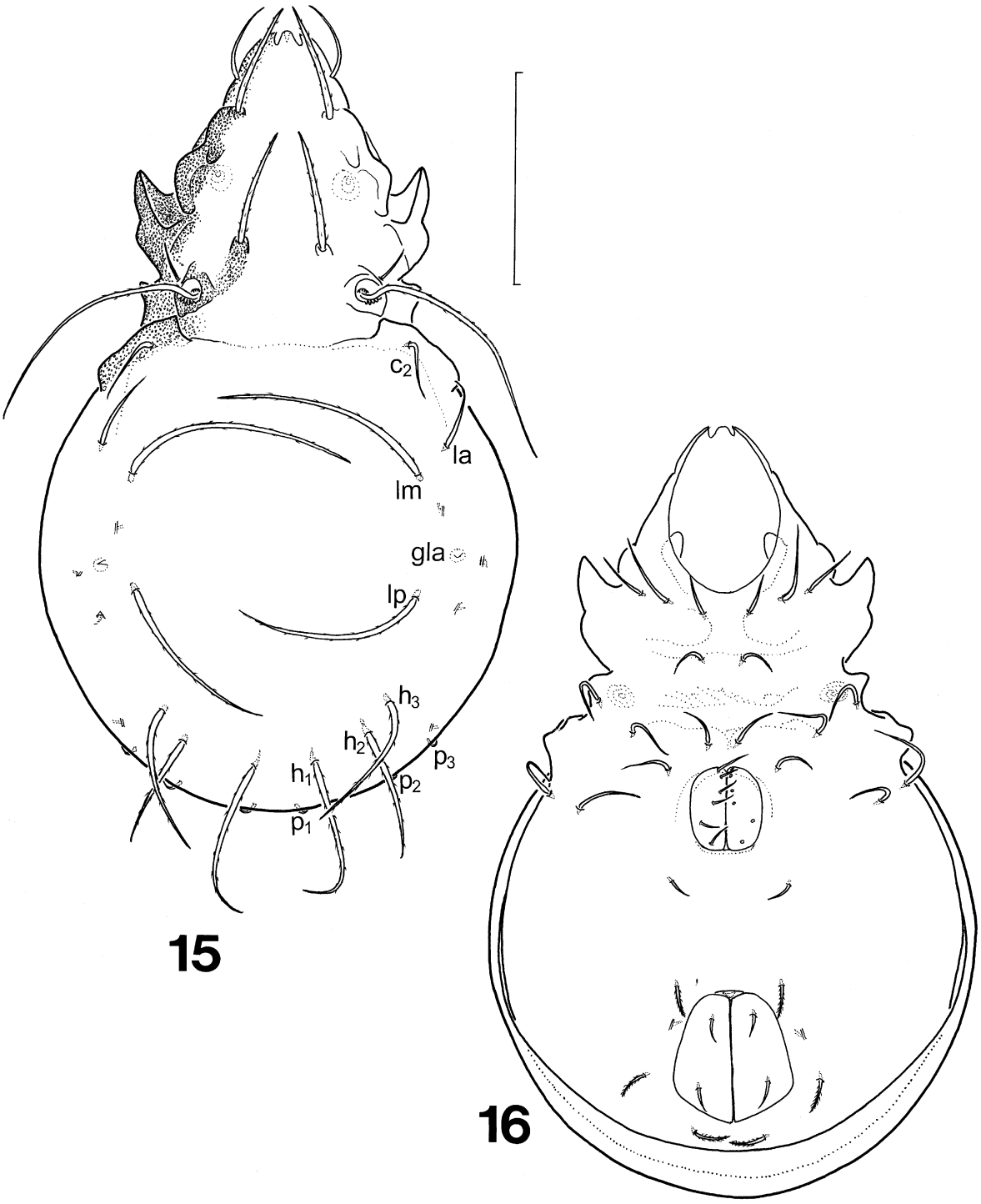
Immatures. Unknown.

Distribution. Known only from the type locality (Qinling Mountains), Shaanxi Province, China.

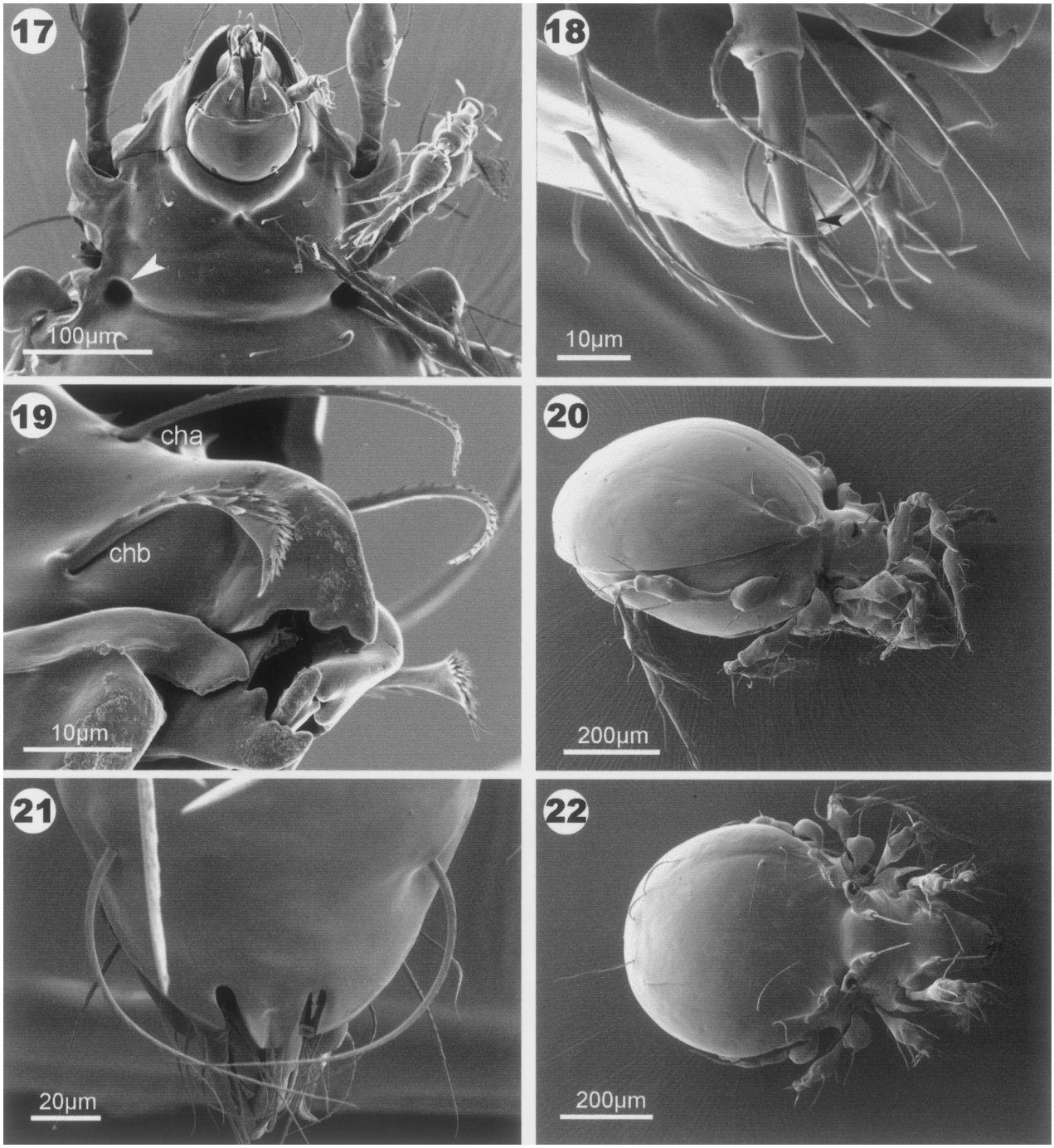
Remarks. *Gymnodampia* species having 10 pairs of notogastral setae include this new species, and five known species: *G. lindquisti* Chen *et al.,* 2004, *G. setata* Jacot 1937, *G. spinosa* (Hammer, 1977), *G. sungohi* (Choi, 1994) and *G. yunnanensis* (Aoki & Yamamoto, 2000). These species are similar, but they can be distinguished using the key to species (see below).

Gymnodampia sichuanensis n. sp.
(FIGS. 20-25, 29-31)

Material examined: Holotype: adult female (in alcohol, W-90-25), CHINA: Sichuan Province:

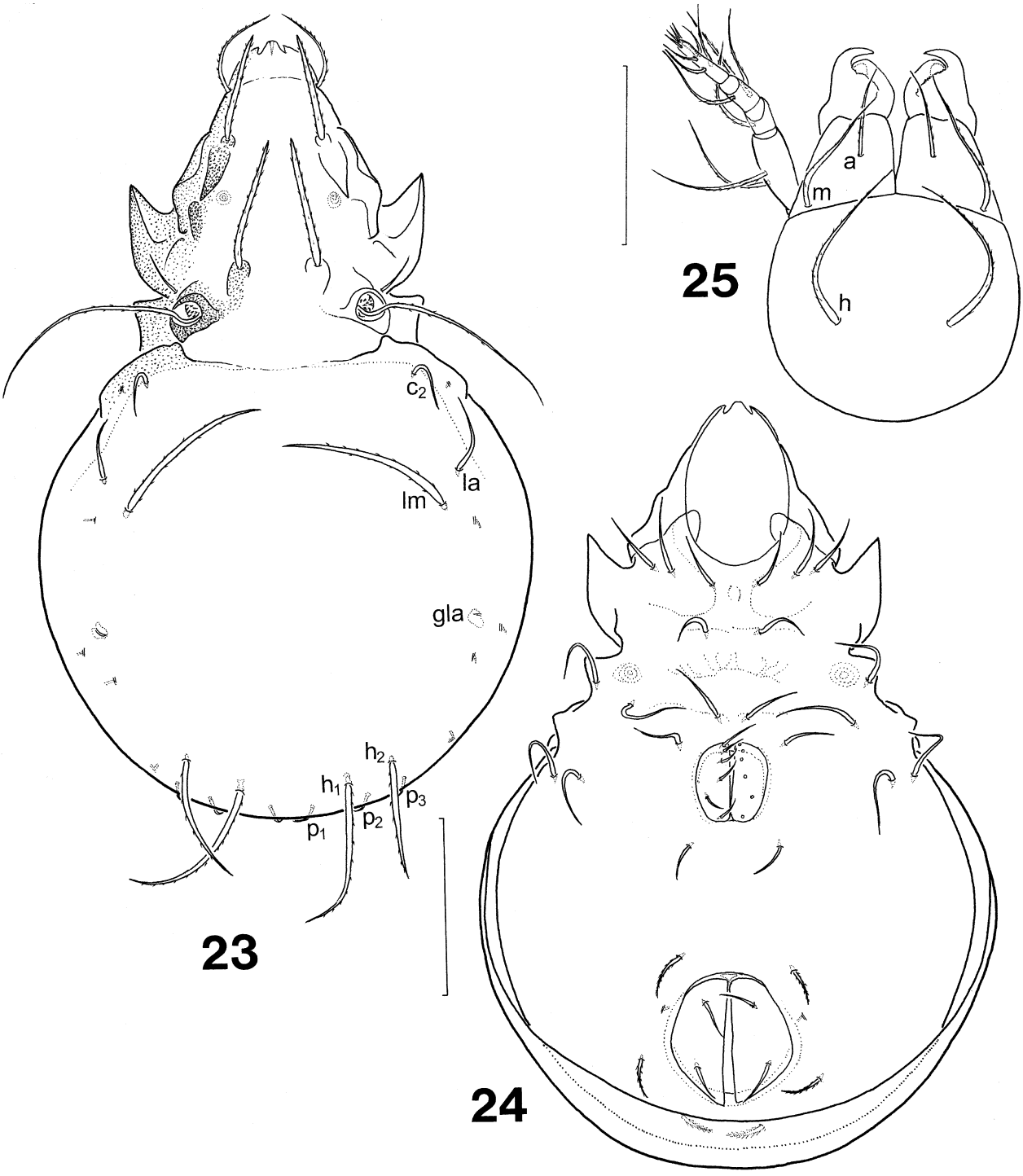


FIGS. 15-16: *Gymnodampia qinlingensis* n. sp., adult ♀, 15, dorsal aspect; 16, ventral aspect (gnathosoma removed). Scale bars = 200μm



Figs. 17-19, *Gymnodampia qinlingensis* n. sp., scanning electron micrographs of adult,17, ventral aspect of gnathosoma and epimeral region, pit of tubercle S indicated by white arrowhead; 18, lateral aspect of palptarsus, solenidion indicated by black arrowhead; 19, lateral aspect of chelicera and distal part of rutellum.

Figs. 20-22. *Gymnodampia sichuanensis* n. sp., scanning electron micrographs of adult, 20, lateral aspect; 21, dorsal aspect of rostral region; 22, dorsal aspect.



FIGS. 23-25: *Gymnodampia sichuanensis* n. sp., adult ♀, 23, dorsal aspect; 24, ventral aspect; 25, ventral aspect of subcapitulum. Scale bars: 23-24=200μm, 25=100μm.

Songpan County (32. 6° N, 103. 6° E), Zhalitai, 3000M, 2 July, 1990 (IZCAS). Paratypes: 13 adults (10 in alcohol, 3 mounted on slides), with same data as holotype; 8 adults (6 in alcohol, 2 mounted on slides, W-90-28), Songpan County, Huanglongsi, 3000M, 3 July, 1990; 1 adult (in alcohol, W-90-19), Nanping County, Jiuzhaigou (33. 2° N, 103. 9° E), 5 July, 1990. All collected by Fu-Sheng Huang. Paratypes deposited in CNC, IZCAS and RAN.

Etymology. This specific epithet refers to the known distribution of this species in Sichuan Province, China.

Diagnosis. Total length 851-907μm; rostrum tongue-shaped between incisions; apophysis *Aa* sharply triangular; bothridium with angular tubercle on lateroposterior margin, inner margin without incisions posteriorly; 8 pairs of notogastral setae present, *lm* positioned posterior to *la*.

Adult Measurements. Female (n=4): total length 863μm (851-882μm), notogastral length 530μm (510-551μm), notogastral width 558μm (543-575μm). Male (n=2): total length 891μm (875-907μm), notogastral length 506μm (486-527μm), notogastral width 559μm (535-583μm).

Integument. Integument smooth, except granular on projecting tubercles and crests. Cerotegument reticulate.

Prodorsum. Rostrum tongue-shaped between incisions, tip blunt, with distinct depression (Figs. 21, 23). Setae *ro* thin, slender, clearly barbed, length 116μm (108-132μm), distance between *ro* 92μm (87-104μm); *le* slightly barbed, length 120μm, distance between *le* 99μm (96-104μm), *in* clearly barbed, length 148μm (136-160μm), distance between *in* 80μm (72-87μm). Apophysis *Aa* sharply triangular (Figs. 23, 29). Bothridium with angular tubercle posteriorly; without marginal incisions posteriorly (Fig. 30). Sensillus attenuate, weakly barbed, *ss* length 261μm (200-292μm), *ex* length 65μm (60-72μm).

Notogaster. 8 pairs of notogastral setae, setae *lp* and h_3 absent (Figs. 22, 23). Setae c_2 and *la* relatively short (ca. 86 and 110μm, respectively), setae *lm,* h_1 and h_2 relatively long, tapered, with few barbs, *lm* length 189μm (180-200μm), h_1 length 192μm (184-200μm), h_2 length 150μm (144-160μm); *lm* positioned posterior to *la*; setae of *p*-series very short (ca. 42μm).

Venter. Pedotectum I well developed, triangular in dorsoventral aspect. Tubercle *S* large, rounded distally. Adanal setae barbed.

Gnathosoma. Normal for genus.

Legs. Dorsal and lateral setae of femora, genua and tibiae of all legs thick, except *v′* of genua I and II relatively slender, proximal spur of femora III and IV small. Setae *d* and *l′* of femur I about 0. 5 times length of segment, (*tc*) nearly 0. 9 times length of segment; *d* and *l′* of genu IV about 1.5 times length of segment. Genual solenidion σI slightly longer than segment, tibial solenidia φII about 0. 4 times length of segment, φIII 0. 5 times length of segment.

Immatures. Unknown.

Distribution. Known only from Sichuan Province, China.

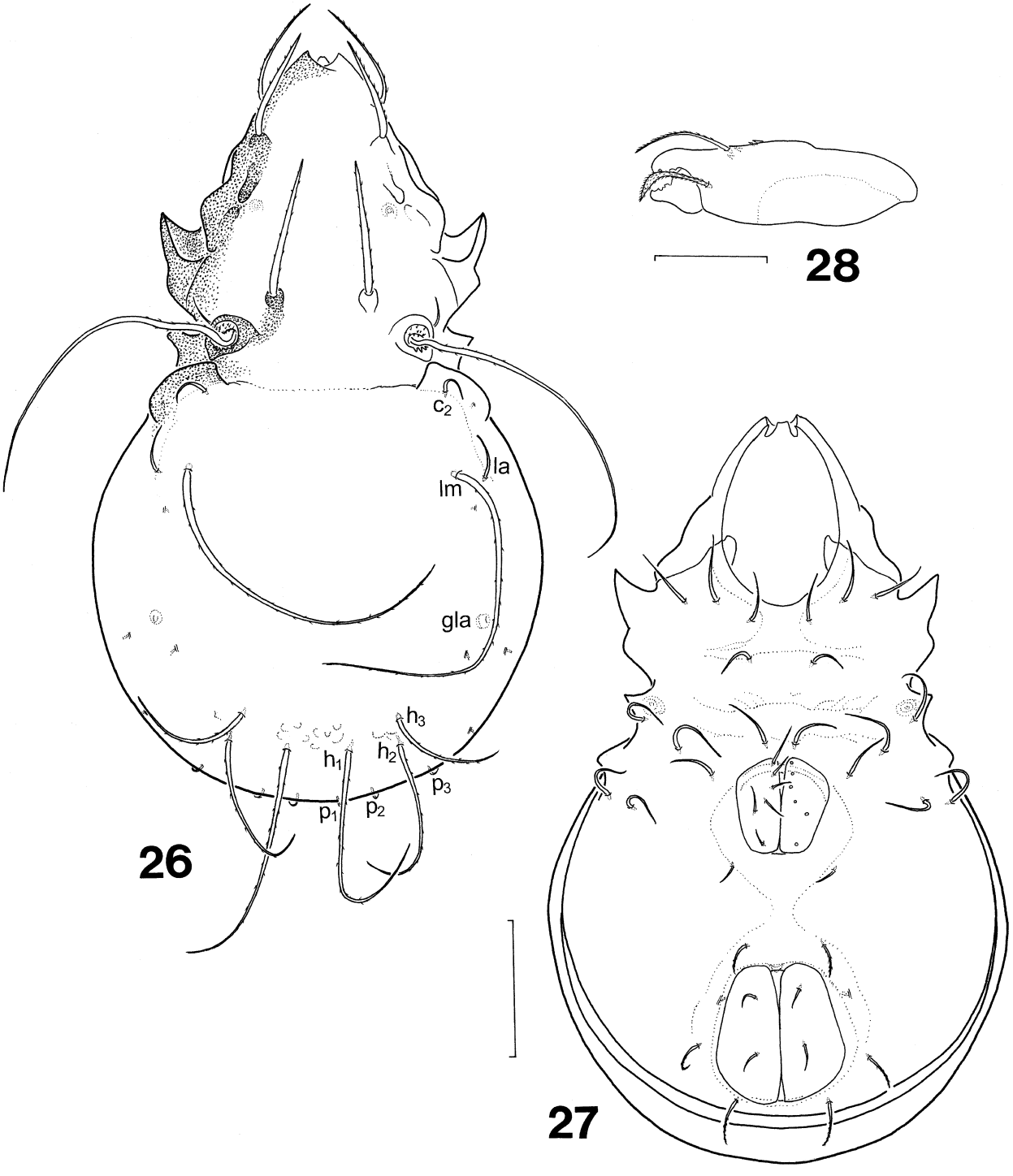
Remarks. This species can be distinguished from others having 8 pairs of notogastral setae including *G. crassisetiger* (Aoki, 1984), with 3 subspecies (Aoki, 1984; Aoki, 1991, Choi & Aoki, 1985), and *G. yaoi* n. sp. by: larger body size; apophysis *Aa* shaped like a sharp triangular tubercle; and bothridium without marginal incisions posteriorly.

Gymnodampia tegularum n. sp.
(Figs. 26 -28)

Material examined: Holotype: adult male (in alcohol), CHINA: Guizhou Province: Xishui County (28. 3 ° N, 106. 2° E), Daleipo, 750M, 29 Sept., 2000, Yan Zhang (IZCAS). Paratypes: 2 adult males (in alcohol), with same data as holotype. Paratypes deposited in CNC and IZCAS.

Etymology. The specific epithet "tegularum" is from the Latin for 'roof tiles' and refers to the overlapping of the medial region of the rostrum by the dorsal part of the rostrum lateral to incisions.

Diagnosis. Total length 502-543μm; rostrum medially short, tongue-shaped between incisions; dorsal part of rostrum lateral to incisions extending medially over incisions and overlapping basally, so that incisions only visible in ventral aspect; apophysis *Aa* small, rounded; bothridium with angular tubercle on lateroposterior margin, with marginal incisions posteriorly; 9 pairs of notogastral setae, *la* and *lm* inserted almost at same level, distance between h_2 slightly longer than that between h_3, h_1 and h_2 inserted almost at same level.



FIGS. 26-28: *Gymnodampia tegularum* n. sp., adult ♂, 26, dorsal aspect; 27, ventral aspect; 28, chelicera, abaxial view. Scale bars: 26-27 = 100μm, 28 = 50μm.

Adult Measurements. Male (n=3): total length 518μm (502-543μm), notogastral length 284μm (275-292μm), notogastral width 305μm (292-324μm).

Integument. Integument smooth, except granular on projecting tubercles and crests. Cerotegument reticulate.

Prodorsum. Rostrum medially short, tongue-shaped between incisions; dorsal part of rostrum lateral to incisions extending medially over incisions and overlapping basally, so that rostral incisions only visible in ventral aspect (FIG. 26, 27). Seta *ro* thin, slender, slightly barbed, length 83μm (72-92μm), distance between *ro* 79μm (72-84μm). Setae *le* and *in* slightly barbed, *le* length 84μm (80-88μm), distance between *le* 79μm (72-88μm), *in* length 100μm, distance between *in* 65μm (64-68μm). Apophysis *Aa* small, rounded. Bothridium with angular tubercle on lateroposterior margin; with marginal incisions posteriorly (FIG. 26). Sensillus attenuate, barbed slightly at base, *ss* length 255μm (228-276μm), *ex* length 32μm (24-36μm).

Notogaster. 9 pairs of notogastral setae, setae *lp* absent (FIG. 26). Setae c_2 and *la* short (ca. 34μm); setae *lm*, h_1, h_2 and h_3 long, barbed, *lm* length 240μm, h_1 length 202μm (192-212μm), h_2 length 136μm, h_3 length101μm (84-120μm), distance between h_1 47μm (44-48μm), distance between h_2 119μm (116-120μm), distance between h_3 109μm (108-112μm); *la* and *lm* inserted almost at same level, h_1 and h_2 almost inserted at same level (FIG. 26); setae of *p*-series short (ca. 40μm).

Venter. Pedotectum I well developed, triangular in dorsoventral aspect. Tubercle *S* large, distal end acute. Adanal setae slightly barbed, short (ca. 50μm).

Gnathosoma. Normal for genus.

Legs. Shapes and lengths of segments and setae of legs similar to those of *G. acuta*. Setae (*l*) of genu I about 3. 7 times length of segment, (*tc*) of tarsus I nearly 0. 6 times length of segment. Genual solenidion σI about 1. 7 times length of segment, tibial solenidia σ_1I 1. 6 times and φ_2I almost equal to length of segment, respectively, φII about 0. 6 times length of segment, σIII about 0. 4 times length of segment.

Immatures: Unknown.

Distribution. Only known from the type locality in Xishui County, Guizhou Province, China.

Remarks. The unique character states of the rostrum such that the dorsal part of rostrum lateral to incisions extends medially over incisions and overlaps basally, so that incisions are only visible in ventral aspect, can easily distinguish *G. tegularum* from other *Gymnodampia* species having nine pairs of notogastral setae.

Gymnodampia yaoi n. sp.
(FIGS. 32-37)

Material examined: Holotype: adult female (in alcohol, Yao-3), CHINA: Sichuan Province: Qingcheng Mt. (30. 9° N, 103. 5° E), 28 Mar., 1986, WEN-BING YAO (IZCAS). Paratypes: 13 adults (12 in alcohol, 1 mounted on slide), with same data as holotype; Paratypes deposited in IZCAS, CNC and RAN.

Etymology. This new species is named in honor of Prof. WEN-BING YAO, who donated his collection of oribatid mites to IZCAS.

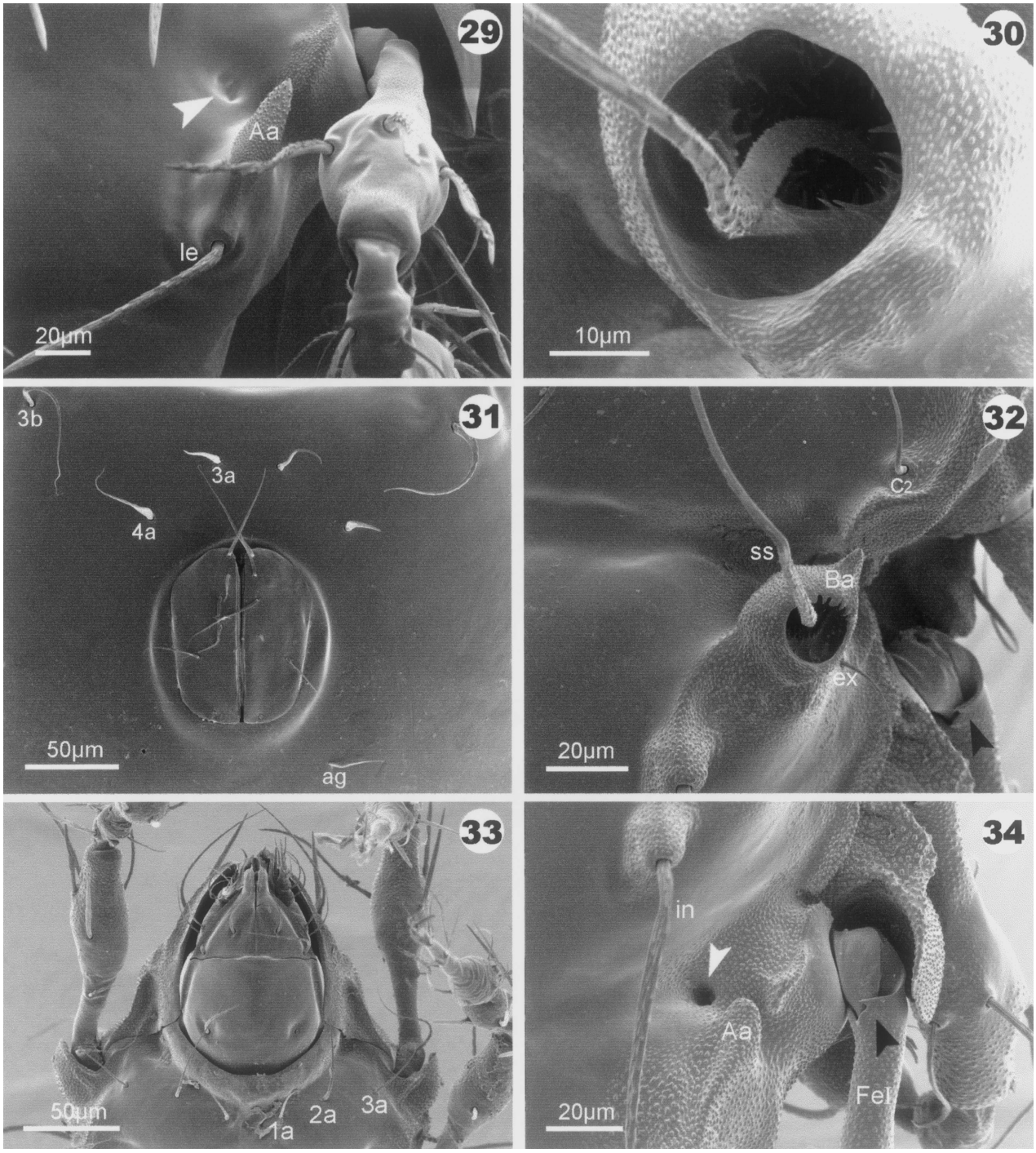
Diagnosis. Total length 512-608μm; rostrum somewhat triangular between incisions, tip slightly truncate; apophysis *Aa* small, rounded; bothridium with angular tubercle, with marginal incisions posteriorly; 8 pairs of notogastral setae, *lm* very long, subequal to length of notogaster, h_1 clearly longer than h_2; *lm* inserted anterior to *la*.

Adult Measurements. Female (n=4): total length 526μm (512-543μm), notogastral length 311μm (292-324μm), notogastral width 338μm (324-350μm). Male (n=2): total length 567μm (527-608μm), notogastral length 344μm (324-365μm), notogastral width 373μm (340-405μm).

Integument. Integument smooth, except granular on projecting tubercles and crests. Cerotegument reticulate.

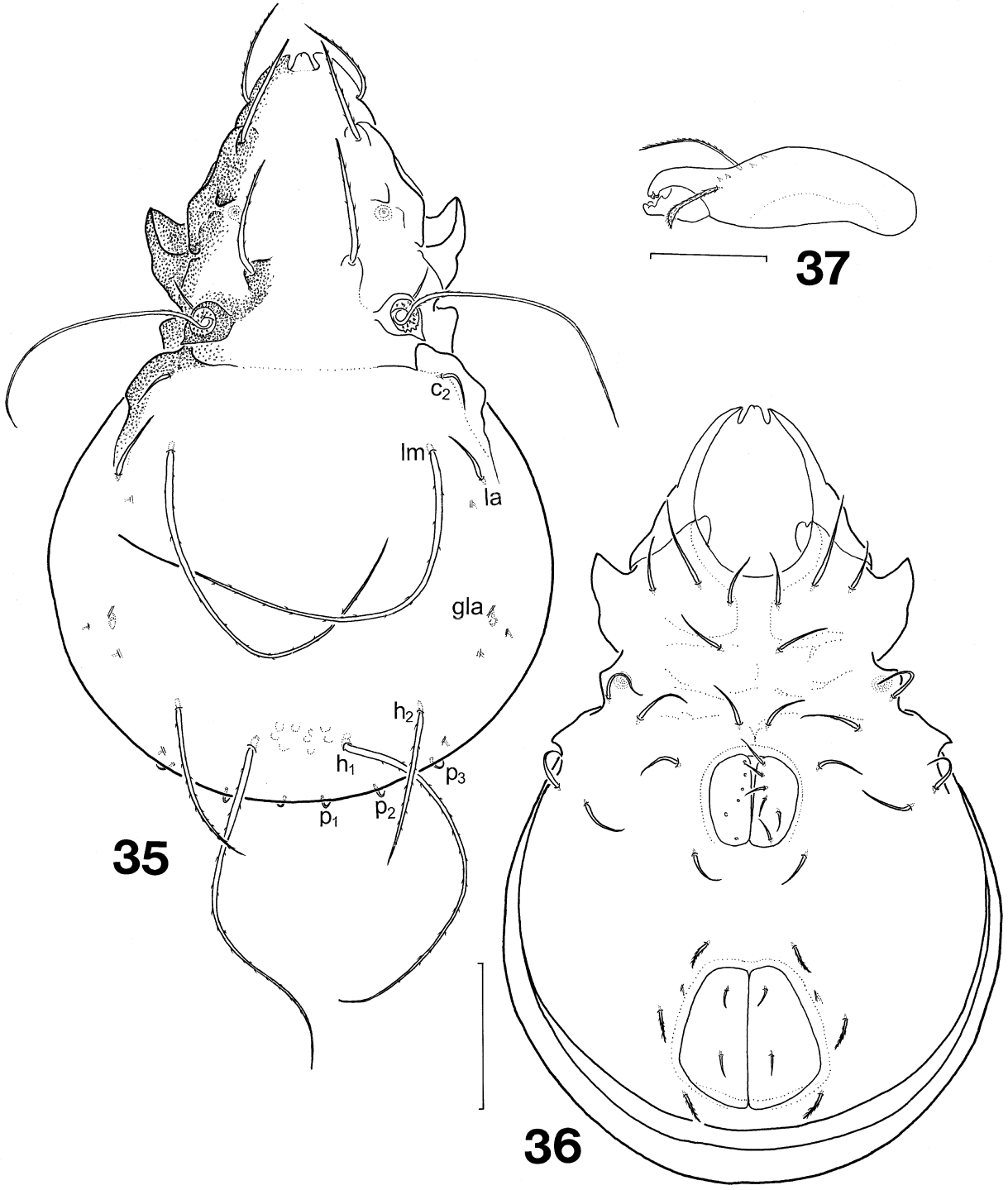
Prodorsum. Rostrum between rostral incisions somewhat triangular, tip slightly truncated (FIG. 35). Setae *ro*, *le* and *in* clearly barbed, *ro* length 80μm (52-92μm), distance between *ro* 79μm (64-88μm), *le* length 85μm (80-96μm), distance between *le* 75μm (72-80μm), *in* length 96μm (92-100μm), distance between *in* 66μm (60-72μm). Apophysis *Aa* small, rounded. Bothridium with angular tubercle posteriorly, with marginal incisions posteriorly (FIG. 32). Sensillus attenuate, slightly barbed at base, *ss* length 214μm (164-252μm), *ex* length 29μm (24-32μm).

Notogaster. 8 pairs of notogastral setae, setae *lp* and h_3 absent (FIG. 35). Setae c_2 and *la* short



FIGS. 29-31. *Gymnodampia sichuanensis* n. sp., scanning electron micrographs of adult, 29, dorsal aspect of enantiophysis *A*, pit lateral to enantiophysis indicated by white arrowhead; 30, anterodorsal aspect of bothridium; 31, ventral aspect of genital region.

FIGS. 32-34. *Gymnodampia yaoi* n. sp., Scanning electron micrographs of adult, 32, dorsal aspect of bothridium; 33, ventral aspect of subcapitulum; 34, dorsal aspect of enantiophysis *A* and femur I, pit lateral to enantiophysis *A* indicated by white arrowhead, proximal retrotectum of femur I indicated by black arrowhead.



FIGS. 35-37: *Gymnodampia yaoi* n. sp., adult ♂, 35, dorsal aspect; 36, ventral aspect; 37 chelicera, abaxial view. Scale bars: 35-36 = 100μm, 37 = 50μm.

(ca. 40μm); setae *lm, h_1*, and h_2 long, barbed, *lm* length 294μm (264-324μm), h_1 length 216μm (172-260μm), h_2 length 160μm (120-200μm); *lm* inserted anterior to *la*; setae of *p*-series relatively long (ca. 80μm).

Venter. Pedotectum I well developed, triangular. Tubercle *S* small, rounded distally. Adanal setae barbed, short (ca. 30μm).

Gnathosoma. Normal for genus.

Legs. Shapes and lengths of segments and setae of legs similar to those of *G. acuta*. Setae *l′* of femur I about 0. 6 times length of segment, *d* of femur IV nearly same length as segment. Genual solenidion σI straight, about same length as segment; tibial solenidion σ_2I about 0. 8 times length of segment.

Immatures: Unknown.

Distribution. Known only from the type locality in Sichuan Province, China.

Remarks. As seta *lm* is subequal to the length of the notogaster, *G. yaoi* is very similar to *G. crassisetiger australis* (Aoki, 1991) and *G. crassisetiger coreana* (Choi & Aoki, 1985), but can be distinguished as follows: in *G. yaoi*, notogastral seta *lm* is inserted anterior to *la*, and the distance between *lm* and h_2 is almost 3. 0-3. 5 times that between h_2 and h_1; whereas in the latter two taxa, notogastral seta *lm* is inserted posterior to or at same level as seta *la*, and the distance between *lm* and h_2 is almost 4. 5-7. 5 times that between h_2 and h_1.

Key to adults of world species and subspecies of the genus *Gymnodampia*

1. 10 pairs of notogastral setae (both *lp* and h_3 present). 2
— 9 or 8 pairs of notogastral setae (*lp* absent, h_3 present or absent) 7

2. Rostrum without incision; seta *la* inserted on or just adjacent to humeral crest and positioned closer to seta c_2 than to seta *lm*, distance between *lm* and *la* about 1. 5 times that between c_2 and *la* (Pakistan) . . . . . *G. spinosa* (Hammer, 1977)
— Rostrum with pair of incisions; seta *la* inserted posterior to humeral crest and positioned closer to seta *lm* than to seta c_2, distance between *lm* and *la* shorter than that between c_2 and *la*. 3

3 Femur IV with 3 setae; notogastral setae h_1 and h_3 almost at same level, h_2 positioned posterior to this level. . . . . (N. America) *G. lindquisti* Chen *et al.,* 2004
— Femur IV with 2 setae; notogastral setae h_1 most posterior seta and h_3 most anterior seta of *h*-series 4

4. Lateroposterior margin of bothridium slightly protruding, not forming angular tubercle 5
— Lateroposterior margin of bothridium clearly protruding, forming angular tubercle 6

5. Bothridium without marginal incisions posteriorly; seta *lp* inserted near opening of opisthosomal gland . . . . . (N. America) *G. setata* (Berlese, 1916)
— Bothridium with marginal incisions posteriorly; seta *lp* inserted well posterior to opening of opisthosomal gland. . . . . (Korea) *G. sungohi* (Choi, 1994)

6. Incisions of rostrum shallow; bothridium without marginal incisions posteriorly; seta *lp* inserted near opening of opisthosomal gland . . . . . (China) *G. yunnanensis* (Aoki & Yamamoto, 2000)
— Incision of rostrum deep; bothridium with marginal incisions posteriorly; seta *lp* inserted well posterior to opening of opisthosomal gland. . . . . (China) *G. qinlingensis* n. sp.

7. 9 pairs of notogastral setae (*lp* absent) 8
— 8 pairs of notogastral setae (*lp* and h_3 absent) 12

8. Rostrum short, tongue-shaped between incisions, dorsal part of rostrum lateral to incisions extending medially over incisions and overlapping basally, so that incisions only visible in ventral aspect . . . . . (China) *G. tegularum* n. sp.
— Region between rostral incisions large, incisions clearly evident dorsally, dorsolateral part of rostrum extending medially at most slightly over incisions, never overlapping basally 9

9. Rostrum acute triangular between incisions, dorsal part of rostrum lateral to incisions extending medially; h_1 and h_2 inserted almost at same level, distance between h_2 longer than that between h_3; pedotectum I weakly developed, distally rounded in dorsoventral view . . . . . (China) *G. acuta* n. sp.
— Rostrum wide, tongue like or trapezoid-shaped between incisions, dorsal part of rostrum lateral to incisions not extending medially; distance between h_2 clearly shorter than that between h_3; pedotectum I well developed, triangular in dorsoventral view 10

10. Bothridium without marginal incisions posteriorly; h_3 inserted well posterior of opisthosomal gland opening, distance between h_3 and h_2 0. 5-0. 9 times that between h_2 and h_1 . . . . . (N. America) *G. jacoti* Chen *et al.,* 2004
— Bothridium with marginal incisions posteriorly; h_3 inserted just posterior to opisthosomal gland opening, distance between h_3 and h_2 1. 2-1. 8 times that between h_2 and h_1 11

11. Notogastral seta h_2 attenuate, almost same length as h_3, 0. 65-0. 8 times length of h_1; setae *d* and *l′* of genu IV very long, *d* 2. 1-2. 5 times length of segment, *l′* 3. 1-4. 0 times length of segment . . . . . (Korea) *G. soonkii* (Choi *et* Aoki, 1985)

— Notogastral seta h_2 isodiametric along most of length, tapered distally, 0. 4-0. 6 times length of h_3, 0. 3-0. 4 times length of h_1; setae *d* and *l′* of genu IV long, *d* nearly 2. 5-2. 8 times length of segment, *l′* nearly 1. 3-1. 8 times length of segment ..... (Japan) *G. fusca* (Fujikawa, 2002)

12. Body relatively large (851-907 μm); apophysis *Aa* sharply triangular; bothridium without marginal incisions posteriorly ..... (China) *G. sichuanensis* n. sp.
— Body size medium (510-700μm); apophysis *Aa* rounded; bothridium with marginal incisions posteriorly 13

13. Notogastral seta *lm* clearly inserted anterior to seta *la*, distance between *lm* and h_2 almost 3. 0-3. 5 times that between h_2 and h_1 ..... (China) *G. yaoi* n. sp.
— Notogastral seta *lm* inserted posterior to or at same level as seta *la*, distance between *lm* and h_2 almost 4. 6-7. 5 times that between h_2 and h_1 14

14. Notogastral setae *lm* much shorter than length of notogaster . (Japan) *G. crassisetiger crassisetiger* (Aoki, 1984)
— Notogastral setae *lm* longer than or subequal to length of notogaster 15

15. Seta *lm* inserted almost at same level as setae *la*, distance between *lm* and h_2 almost 4. 6-5. 0 times that between h_2 and h_1..... (Taiwan) *G. crassisetiger australis* (Aoki, 1991)
— Seta *lm* inserted posterior to *la*, distance between *lm* and h_2 almost 5. 5-7. 3 times that between h_2 and h_1 .... (Korea, China) *G. crassisetiger coreana* (Choi *et* Aoki, 1985)

Distribution

Gymnodampia seems restricted to eastern temperate regions of North America and Asia. This distribution is similar to that of Mixed Mesophytic forests and may be a relict of Tertiary vicariance events. *Gymnodampia* is primarily Asian with all but 3 of the 16 known species and subspecies being found there. Species with 8 pairs of notogastral setae are only known from the eastern part of Asia (Japan, Korea, Eastern China (Jilin, Fujian, Jiangxi, Anhui, Guangxi, Taiwan)), while species with 9 or 10 pairs of notogastral setae occur in both Eastern North America and Eastern Asia. The large proportion of species known from one or a few locations suggests a high degree of endemism, so probably many more species remain to be described.

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