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Redefinition of *Acanthosoma* and taxonomic corrections to its included species (Hemiptera: Heteroptera: Acanthosomatidae)

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Abstract

The genus level diagnostic characters of *Acanthosoma* Curtis, 1824, *Anaxandra* Stål, 1876, and *Sastragala* Amyot & Serville, 1843 (Hemiptera: Heteroptera: Acanthosomatidae) are discussed. The synonymy of *Acanthosoma* and *Anaxandra* proposed by Kumar (1974) is supported. *Acanthosoma* and *Sastragala* are redefined and recognized as valid genera. The identities of various species of *Acanthosoma* are clarified based on their type materials, their diagnostic characters are discussed and several misidentifications in previous works are corrected. The following new or reinstated combinations and new subjective synonymies are proposed: *Acanthosoma haemorrhoidale haemorrhoidale* (Linnaeus, 1758) = *Acanthosoma proximum* Dallas, 1851, syn. nov. = *Acanthosoma difficile* Dallas, 1851, syn. nov. = *Acanthosoma dubium* Dallas, 1851, syn. nov.; *Acanthosoma firmatum* (Walker, 1868), comb. nov. (transferred from *Sastragala*) = *Acanthosoma giganteum* Matsumura, 1913, syn. nov.; *Acanthosoma murreanum* (Distant, 1900), comb. nov. (transferred from *Sastragala*) = *Acanthosoma acutangulata* Liu, 1979, syn. nov. = *Sastragala neoelongata* Ahmad & Moizuddin, 1990, syn. nov.; *Acanthosoma rufispinum* (Distant, 1887), comb. nov. (transferred from *Sastragala*) = *Sastragala minuta* Ahmad & Moizuddin, 1990, syn. nov.; *Acanthosoma tauriforme* (Distant, 1887) = *Anaxandra longispina* Liu, 1987, syn. nov.; *Acanthosoma hampsoni* (Distant, 1900), comb. nov. (transferred from *Sastragala*); *Acanthosoma labiduroides* Jakovlev, 1880 = *Acanthosoma coralliferum* Horváth, 1889, syn. nov. = *Acanthosoma zanthoxylum* Hsiao & Liu, 1977, syn. nov.; *Acanthosoma forfex* Dallas, 1851 = *Acanthosoma distinctum* Dallas, 1851, syn. nov.; *Acanthosoma rufescens* Dallas, 1851, comb. restit. = *Acanthosoma elongatum* Dallas, 1851, syn. nov. = *Anaxandra hamata* Reuter, 1881, syn. nov.; *Acanthosoma nigricorne* Walker, 1868 = *Acanthosoma nigrospina* Hsiao & Liu, 1977, syn. nov.; *Acanthosoma alaticorne* Walker, 1868, comb. restit. = *Anaxandra laticollis* Hsiao & Liu, 1977, syn. nov. New combinations resulting from synonymization of *Anaxandra* with *Acanthosoma*: *Acanthosoma sichuanense* (Liu, 1980), comb. nov., *A. montanum* (Liu, 1987), comb. nov. Species transferred to *Sastragala* Amyot & Serville, 1843: *Sastragala nigrolineata* (Stål, 1876), comb. nov.; *S. sigillata* (Stål, 1876), comb. nov.; *S. versicolor* Distant, 1910, comb. restit.; *S. yunnana* (Hsiao & Liu, 1977), comb. nov.; to *Elasmostethus* Fieber, 1860: *Elasmostethus singhalensis* (Distant, 1902), comb. nov. Lectotypes are designated for the following species: *Acanthosoma*: *A. difficile*, *A. distinctum*, *A. dubium*, *A. elongatum*, *A. forfex*, *A. proximum*; *Anaxandra*: *A. hamata*, *A. nigrocornuta* Reuter, 1881, *A. tauriformis*; *Sastragala*: *S. murreeana*, *S. rufispina*. A neotype is designated for *Anaxandra montana*. New country records: *Acanthosoma alaticorne* and *A. rufispinum*: Nepal; *A. forfex*: Burma (Myanmar); *A. labiduroides*: Burma (Myanmar) and Vietnam; *A. montanum*: Laos and Vietnam; *A. murreeanum*: India, Thailand; *A.*

nigricorne: Nepal, Burma (Myanmar) and Vietnam; *A. rufescens*: Pakistan, Nepal, Taiwan, Burma (Myanmar), Thailand, Laos and Vietnam.

Key words: Heteroptera, Acanthosomatidae, taxonomy, new combination, new synonymy, lectotype designation, South Asia, East Asia, Australia

Introduction

Acanthosomatidae (Hemiptera: Heteroptera: Pentatomoidea) comprises about 285 described species worldwide. The generic classification of the family was revised by Kumar (1974), who recognized 47 genera in 3 subfamilies. Subsequent authors (Rolston & Kumar 1975, Ahmad & Moizuddin 1990, Fischer 1996, Froeschner 1997, Faúndez 2014, Faúndez *et al.* 2014, Tsai & Rédei 2015) described new genera, synonymized other genera, removed genera from the family, or resurrected genera from synonymy; as a result the number of currently recognized genera is 56 (Kment 2006, Faúndez *et al.* 2014a, b, Tsai & Rédei 2015). Except of the fauna of the Asian part of Russia which was thoroughly elucidated by Kerzhner (1972), Kanyukova (1988) and Vinokurov & Kanyukova (1995), the East Palaearctic and Oriental fauna of Acanthosomatidae is badly in need of revision.

The present paper addresses species level synonymy problems in the genera *Acanthosoma* Curtis, 1824 and *Anaxandra* Stål, 1876. Both genera are distributed in East Asia, with one species of *Acanthosoma* having Transpalaearctic distribution, and one species reported from Australia (Cassis & Gross 2002). Kumar (1974) recognized *Anaxandra* as a junior subjective synonym of *Acanthosoma* but this decision was not followed by most subsequent authors (Hsiao & Liu 1977, Ahmad & Moizuddin 1985, 1990, Liu 1987, Liu & Wang 2004, Göllner-Scheiding 2006, Han & Liu 2010, Aukema *et al.* 2013). Prior to this study *Acanthosoma* contained about 28, *Anaxandra* about 17 species, and there was considerable disagreement among authors about the generic assignment of some of the included species.

During the present study we reexamined specimens of all but one (*A. taurina* Kirkaldy, 1910) of the species currently placed into *Acanthosoma* and *Anaxandra*, including types of most species which were of problematic identity. In this contribution we discuss the status and relationships of these two genera; redefine *Acanthosoma*; transfer several species into and remove other species from *Acanthosoma*; clarify the identities of several problematic species; designate lectotypes; and propose new combinations, new synonymies and various other taxonomic corrections.

Material and methods

External structures and genitalia were examined using stereoscopic microscopes (Olympus SZX12, Zeiss Discovery.V8). Drawings were made by using a camera lucida. Measurements were taken using a micrometer eyepiece. Male genitalia were dissected after careful heating in hypertonic KOH solution. Digital photographs were taken with a Nikon D90 camera equipped with an AF-S Micro Nikkor 60mm f/2.8G ED lens. Morphological terminology mostly follows Tsai *et al.* (2011).

Label data of type specimens are presented in verbatimly, lines are separated by backslash (\), the two sides of the label by double backslash (\\), texts in non-Latin scripts are transliterated or translated and provided between < >. Abbreviations: Ch = text in Chinese script; hw = handwritten, handwriting; pr = printed. Type depositories and localities verified by us are marked with exclamatory point (!); the symbol '>' placed between two depositories indicates specimen transfer by means of donation or exchange.

Abbreviations for depositories:

BMNH	Natural History Museum, London, United Kingdom;
HNHM	Hungarian Natural History Museum, Budapest, Hungary;
IZAS	Institute of Zoology, Chinese Academy of Sciences, Beijing, China;
LSUK	Linnaean Society, London, United Kingdom;
MNHN	Muséum National d'Histoire Naturelle, Paris, France;

MMBC	Moravian Museum, Brno, Czech Republic;
NCHU	Department of Entomology, National Chung Hsing University, Taichung, Taiwan;
NHMUK	Natural History Museum, University of Karachi, Karachi, Pakistan;
NHRS	Naturhistoriska Riksmuseet, Stockholm, Sweden;
NKUM	Institute of Entomology, Nankai University, Tianjin, China;
NMNS	National Museum of Nature and Science, Taichung, Taiwan;
NMPC	National Museum, Prague, Czech Republic;
NSMT	National Museum of Nature and Science, Tsukuba, Japan;
NTU	Department of Entomology, National Taiwan University, Taipei, Taiwan;
RMNH	Naturalis Biodiversity Center (formerly Rijksmuseum van Natuurlijke Historie), Leiden, The Netherlands;
SEHU	Entomological Institute, Hokkaido University, Sapporo, Japan;
SKNJ	Shin-ichi Kudo Collection, Naruto University of Education, Naruto, Japan;
TMNH	Tianjin Museum of Natural History, Tianjin, China;
USNM	United States National Museum of Natural History, Washington, D.C., USA;
ZJPC	Zdeněk Jindra Personal Collection, Prague, Czech Republic;
ZMAS	Zoological Institute, Russian Academy of Sciences, St. Petersburg, Russia.

Taxonomy

Genus *Acanthosoma* Curtis, 1824

Acanthosoma Curtis, 1824a: [legend to plate 20]. Type species by subsequent designation (Curtis 1824b: [legend to plate 28]): *Cimex haemorrhoidalis* Linnaeus, 1758.

Anaxandra Stål, 1876: 110. Type species by subsequent designation (Distant 1902: 321): *Acanthosoma rufescens* Dallas, 1851. Synonymized by Kumar (1974: 53). **Confirmed subjective synonym.**

Acanthosoma (selected references): Stål 1871: 638 (in key), Stål 1876: 110 (in key), Lethierry & Severin 1893: 252 (catalogue), Distant 1902: 314 (in key), 315 (redescription, fauna of British India, Ceylon and Burma), Kirkaldy 1909: 171 (catalogue), Stichel 1962a: 769 (catalogue, Palaearctic), Stichel 1962b: 250 (catalogue, Palaearctic), Lee 1971: 213 (in key), 214 (fauna of Korea), Hsiao & Liu 1977: 160 (in key), 175 (fauna of China), Kanyukova 1988: 912 (in key, fauna of Far East of USSR), Ahmad & Moizuddin 1990: 270 (redescription, fauna of Pakistan and North India), Vinokurov & Kanyukova 1995: 191 (in key, fauna of Sibiria), Göllner-Scheiding 2006: 166 (catalogue, Palaearctic), Yamamoto & Hayashi 2012: 502 (fauna of Japan), Aukema *et al.* 2013: 430 (catalogue, Palaearctic).

Anaxandra: Atkinson 1889: 30 (redescription, fauna of Inda), Lethierry & Severin 1893: 255 (catalogue), Distant 1902: 314 (in key), 321 (redescription, fauna of British India, Ceylon and Burma), Bergroth 1908: 193 (catalogue), Kirkaldy 1909: 174 (catalogue), Tang 1935: 360 (catalogue, China), Stichel 1962a: 770 (catalogue, Palaearctic), Stichel 1962b: 251 (catalogue, Palaearctic), Lee 1971: 221 (fauna of Korea), Kumar 1974: 53 (synonymy with *Acanthosoma*), Hsiao & Liu 1977: 159 (in key), 169 (fauna of China), Liu 1987: 152 (in key), Ahmad & Moizuddin 1990: 270 (in key), 293 (diagnostic characters), Kudo & Nakahira 1993: 121 (behaviour), Lin & Zhang 1993: 134 (in key), Tallamy & Schaefer 1997: 101 (behaviour), Liu & Wang 2004: 140 (in key), Kment 2006: 22 (taxonomic history), Göllner-Scheiding 2006: 169 (catalogue, Palaearctic), Han & Liu 2010: 157 (in key), Yamamoto & Hayashi 2012: 505 (taxonomic status), Hanelová & Vilímová 2013: 434 (behaviour), Aukema *et al.* 2013: 430 (catalogue, Palaearctic).

Revised diagnosis. Medium-sized or rather large acanthosomatids (body length: 12–20 mm) frequently with variously produced humeri. Most of the diagnostic characters of the genus are homoplastic: proepisternum produced anteriorly below eye; mesosternal carina elongate, reaching to or more or less surpassing anterior margin of prosternum (Figs 139–147); metathoracic scent gland ostiole associated with a long and slightly curved peritreme; posterolateral angles of abdominal segments III–VI produced into short denticles in both sexes, those of segment VII obtuse or rounded in male (cf. Figs 10–11, 34, 47, 76, 91, 109, 126); posterior margin of ventrite VII of female shallowly concave laterally, deeply emarginate medially around valvifers VIII; ventrites VI and VII each with a pair of Pendergrast's organs. The following characters are probably autapomorphies: genital capsule provided with a pair of lateral projections of various shape; phallus elongate, first pair of conjunctival processes (cp-I) invariably lacking, a single second pair (cp-II) invariably present, well developed, elongate, partly sclerotized, third pair (cp-III) fused along midline into a single ventral process, but reduced or completely lacking

in several species (homologies of the conjunctival processes after Tsai *et al.* (2011)); tubular theca; sinistral asymmetry of thecal conjunctiva; whip-like aedeagus with usually 2 coils, enclosing a strongly sclerotized, single endophallic duct; abdominal segment X of male with dorsoapical protrusion.

Diversity and distribution. *Acanthosoma*, as redefined by us, contains members of the narrowly understood *Acanthosoma* and *Anaxandra* (see Discussion). Prior to this study these two genera contained about 45 species. As a result of various synonymies proposed and removal of many species into other genera we recognize 23 species in this paper (these are listed in the Summary); a number of undescribed species is before us.

The speciation center of the genus is East Asia. Most species inhabit the Himalayas, China Proper, Korea, and Japan; some species extend to marginal areas of East Siberia, Far East Territory of Russia and Indochina; *A. haemorrhoidale* (Linnaeus, 1758) is of Transpalaearctic distribution; *A. hampsoni* (Distant, 1900), comb. nov., is restricted to southern India; we have seen specimens representing an undescribed species from the Philippines. Cassis & Gross (2002) indicated the presence of unspecified *Acanthosoma* spp. in Indonesia (Java), Papua New Guinea (Bismarck Archipelago) and Palau; apparently all of these records pertain to species belonging to *Sastragala*.

Notes. Kumar (1974) recognized *Anaxandra* as a junior subjective synonym of *Acanthosoma* but this decision was not followed by most authors (cf. Göllner-Scheiding 2006). We agree with Kumar's (1974) opinion and we treat the included species accordingly. The status and validity of these genera are treated in the Discussion.

Kumar (1974) recognized *Sastragala* Amyot & Serville, 1843 also as a junior synonym of *Acanthosoma*. We disagree with Kumar (1974) and recognize *Sastragala* as a valid genus (see Discussion). Apparently very few subsequent workers followed Kumar's (1974) synonymy; the only authors of whom we are aware are Cassis & Gross (2002), who transferred the Australian *Sastragala versicolor* Distant, 1910 to *Acanthosoma* as a consequence of the synonymy of the two genera. Based on reexamination of the holotype (a female deposited in BMNH) we are convinced that *S. versicolor* is a typical member of *Sastragala*, therefore the original combination is hereby reinstated.

Acanthosoma schrenki listed by Reuter (1908: 544) is unavailable; it is conspecific with *A. axillaris* Jakovlev, 1889, now a junior subjective synonym of *A. spinicolle* Jakovlev, 1880 (Reuter 1908). "*Acanthosoma brevirostris* Stål, 1873" listed by Miller (1956: 58) apparently pertains to *Acanthomia brevirostris* Stål, 1873, now a junior synonym of *Clavigralla scutellaris* (Westwood, 1842) (Coreidae). *Acanthosoma bidentata* and *A. yunnanensis* were listed by Liu (1992: 131, 132, respectively) without diagnosis or description; both of these names are unavailable, their identities are unknown, and they are omitted from the present work.

Specific epithets combined with *Acanthosoma* are not declined uniformly in the literature. The genus name is derived from Greek and ends in *-soma* therefore it takes the gender of the Greek noun *σῶμα* (= body) which is neuter (IZCN (1999), Art. 30.1.2).

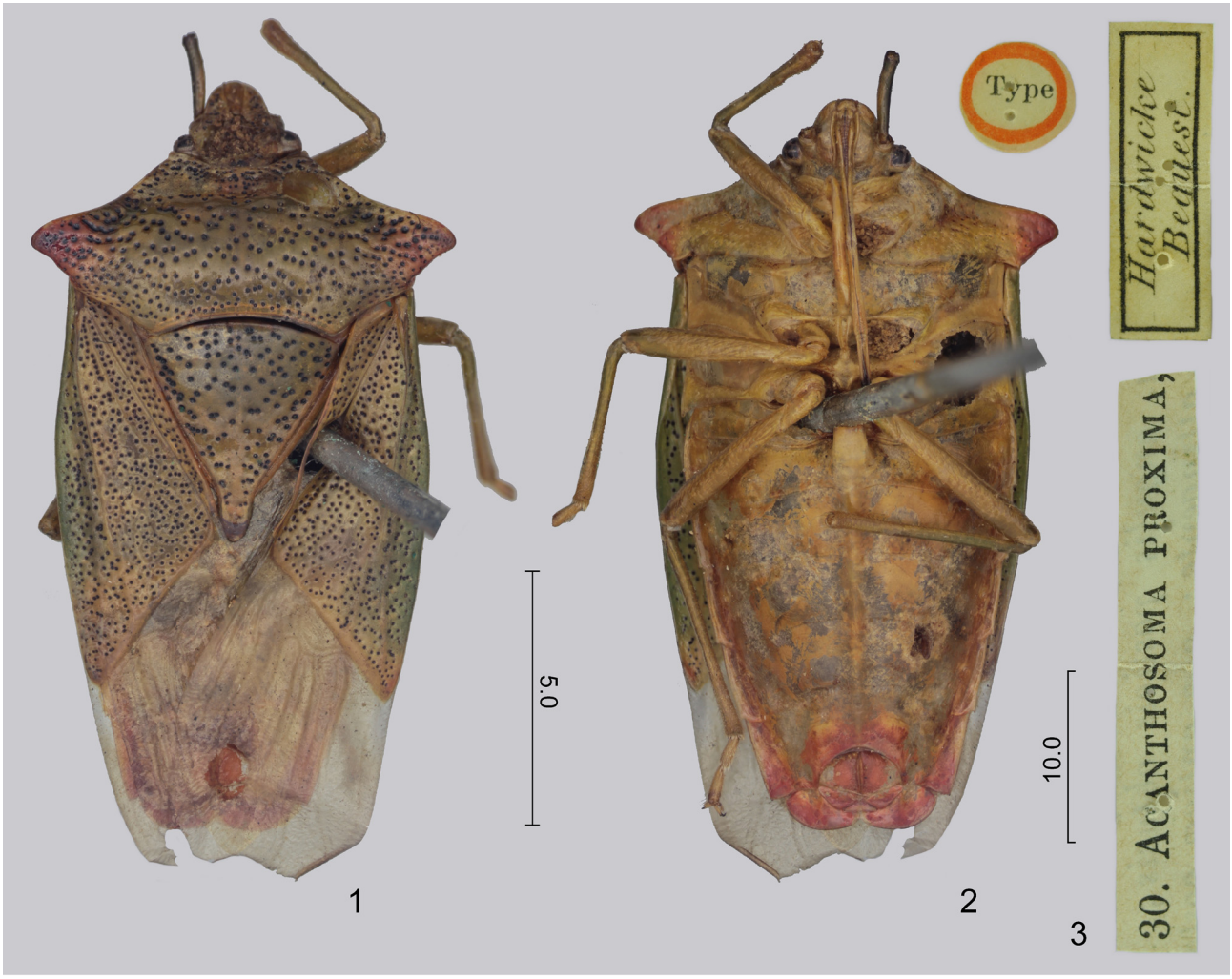
Acanthosoma haemorrhoidale (Linnaeus, 1758)

Figs 1–12, 157, 167–168

Cimex haemorrhoidalis Linnaeus, 1758: 444. Lectotype (Kumar 1974: 54): ♂, Europe; LSUK.
Acanthosoma proximum Dallas, 1851: 303. Syntype(s): unknown locality; BMNH! **New subjective synonym.**
Acanthosoma difficile Dallas, 1851: 304. Syntype(s): ♂, unknown locality; BMNH! **New subjective synonym.**
Acanthosoma dubium Dallas, 1851: 304. Syntype(s): ♂, unknown locality; BMNH! **New subjective synonym.**
Note. A complete list of synonyms was presented by Göllner-Scheiding (2006).

Acanthosoma haemorrhoidale (selected references): Kumar 1974: 54 (lectotype designation), Kanyukova 1988: 913 (in key, figures, distribution, host plant), Vinokurov & Kanyukova 1995: 192 (in key, figures, distribution, host plants), Göllner-Scheiding 2006: 167 (catalogue, distribution), Aukema *et al.* 2013: 430 (catalogue, distribution).
Acanthosoma proximum: Herrich-Schäffer 1853: 4 (listed), Distant 1902: 315 (redescription, distribution).
Acanthosoma proxima: Walker 1867: 398 (listed), Stål 1876: 113 (listed), Distant 1879: 1 (listed), 7 (record, type material), Atkinson 1889: 22 (English translation of original description, record, distribution), Lethierry & Severin 1893: 254 (catalogue, distribution), Kirkaldy 1909: 172 (catalogue, distribution).
Acanthosoma difficile: Herrich-Schäffer 1853: 3 (listed).
Acanthosoma difficilis: Walker 1867: 399 (listed), Stål 1876: 113 (listed), Atkinson 1889: 23 (reproduction of original description), Lethierry & Severin 1893: 253 (catalogue), Kirkaldy 1909: 171 (catalogue).
Acanthosoma dubium: Herrich-Schäffer 1853: 3 (listed).

Acanthosoma dubia: Walker 1867: 399 (listed), Stål 1876: 113 (listed), Atkinson 1889: 23 (reproduction of original description), Lethierry & Severin 1893: 253 (catalogue), Kirkaldy 1909: 171 (catalogue).



FIGURES 1–3. Lectotype of *Acanthosoma proximum* Dallas, 1851 and its labels. Fig. 1, dorsal view; Fig. 2, ventral view; Fig. 3, labels. © BMNH. Scales in mm.

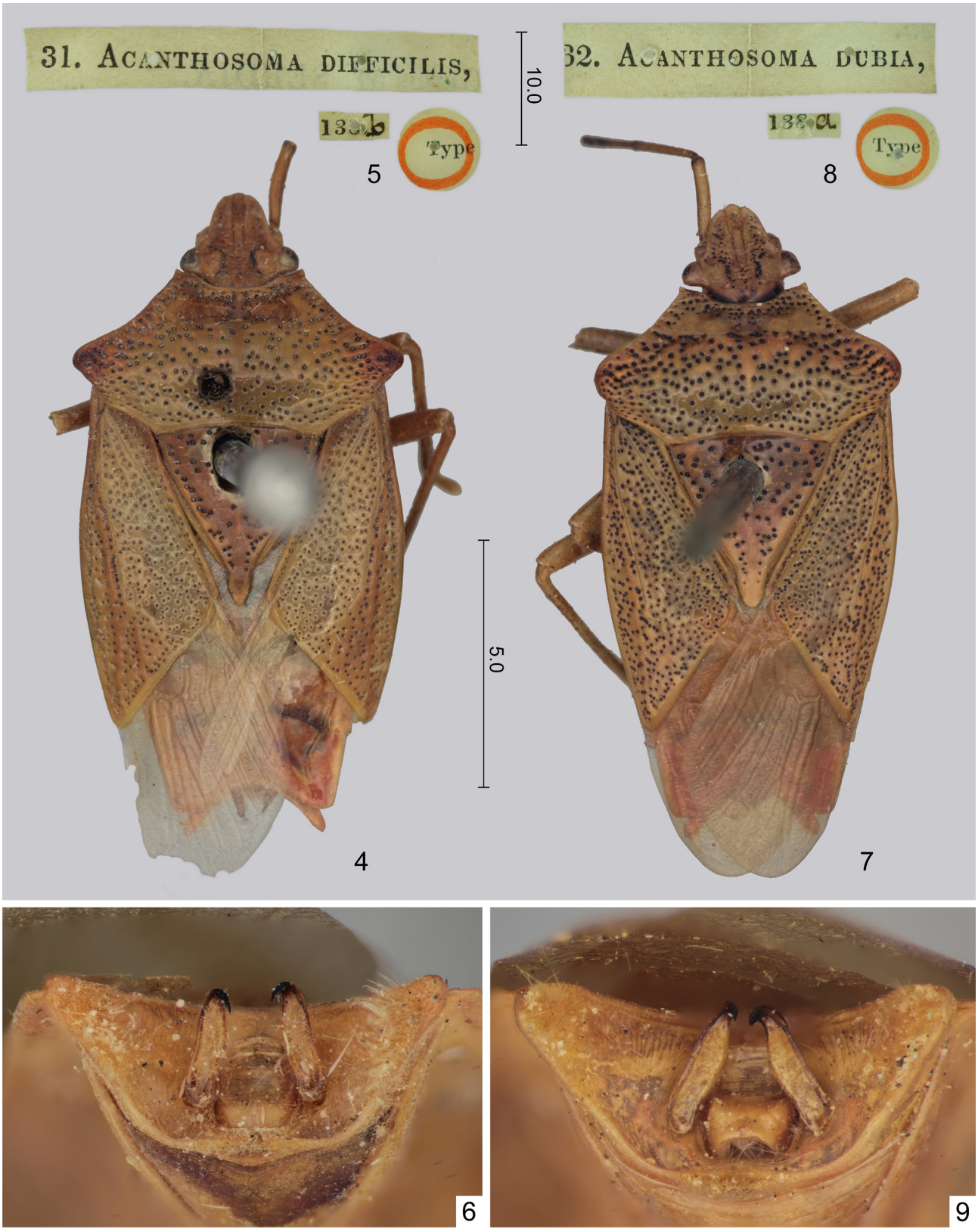
Type material examined

Acanthosoma proximum. **Lectotype** (present designation): ♀, "Type" [pr circle with red border], "Hardwicke \ Bequest." [pr, with black frame], "30. ACANTHOSOMA PROXIMA," [pr, cut from p. 398 of Walker (1867)]; pinned, right antenna, segments II–IV of left antenna, right fore and left hind tarsi, left fore and mid legs, tarsal segment II of right mid leg lacking, damaged by Dermestidae; deposited in BMNH (Figs 1–3).

Acanthosoma difficile. **Lectotype** (present designation): ♂, "Type" [pr circle with red border], "138 [pr] b [hw]", "31. ACANTHOSOMA DIFFICILIS," [pr, cut from p. 399 of Walker (1867)]; pinned, left antenna, segments II–IV of right antenna, both fore legs, left hind leg, left mid leg distad of femur and tarsal segment II of right mid leg lacking; deposited in BMNH (Figs 4–6).

Acanthosoma dubium. **Lectotype** (present designation): ♂, "Type" [pr circle with red border], "138 [pr] a [hw]", "32. ACANTHOSOMA DUBIA," [pr, cut from p. 399 of Walker (1867)]; pinned, right antenna, segments III–IV of left antenna, right hind leg, left fore and right mid leg distad of femur, left hind tarsus, segment II of tarsi of right fore and left mid legs lacking; deposited in BMNH (Figs 7–9).

Diagnosis. The type species of *Acanthosoma*, *A. haemorrhoidale*, the well-known hawthorn shield bug, was redescribed and illustrated by several authors. It can most reliably be recognized based on the characters of the external genitalia of the male: genital capsule with short and broad lateral projections invariably without pigmented teeth; paramere elongate, apically hooked. Diagnostic characters of the male (Figs 6, 9–11, 167–168) and female (Fig. 12) are figured.



FIGURES 4–9. Lectotypes of *Acanthosoma* species and their labels. Fig. 4, *A. difficile* Dallas, 1851, dorsal view; Fig. 5, same, labels; Fig. 6, same, apex of abdomen, posterior view; Fig. 7, *A. dubium* Dallas, 1851, dorsal view; Fig. 8, same, labels; Fig. 9, same, apex of abdomen, posterior view. © BMNH. Scales in mm; Figs 6 and 9 not to scale.

Notes. *Acanthosoma proximum* was described based on specimen(s) from unknown locality (Dallas 1851). A single female syntype deposited in BMNH was reexamined and it is designated as the lectotype of *A. proximum*. No difference could be found between the lectotype and females of *A. haemorrhoidale* therefore the above subjective synonymy is proposed.

The type material of *Acanthosoma difficile* and *A. dubium* was reexamined and lectotypes are designated for both species. Although their humeri are markedly different, the male genitalia of the lectotypes of both species leave no doubt that both of them represent *A. haemorrhoidale*. Regarding the shape of the humeri both individuals fit well within the range of variability of *A. haemorrhoidale*; as a conclusion the above synomymies are proposed.

Acanthosoma haemorrhoidale is widely distributed all over the Palaearctic Region and show considerable morphological variability over its area of distribution. The humeri of individuals from East Asia are usually more strongly produced than those of the European population and they are usually recognized as subspecies (*A. h. angulatum* Jakovlev, 1880, *A. h. ouchii* Ishihara, 1950). *Acanthosoma proximum*, *A. difficile* and *A. dubium* all represent the nominotypical subspecies of *A. haemorrhoidale.*

The record of the nominotypical subspecies of *A. haemorrhoidale* from southwestern China (Sichuan) by Hsiao & Liu (1977: 177) is based on misidentification and it pertains to *A. emeiense* Liu, 1980. The specimen illustrated by Hsiao & Liu (1977: plate 29, fig. 407) was later designated as holotype of *A. emeiense* (cf. Liu 1980: 242, fig. 16).

Acanthosoma proximum was subsequently recorded by Distant (1879), Atkinson (1889), Ahmad *et al.* (1979) and Ahmad & Moizuddin (1990) from localities which are now in Northern Pakistan; Schaefer & Ahmad (1987) cited host plant records based on Ahmad *et al.* (1979). *Acanthosoma haemorrhoidale*, the senior synonym of *A. proximum*, has not been recorded from Pakistan so far and occurrence of this species in the country is unlikely. We could not find any specimen in the BMNH which could represent specimens referred to by Distant (1879) and Atkinson (1889) and we consider these records as erroneous. The diagnostic characters, particularly the female terminalia described and figured by Ahmad & Moizuddin (1990) strongly differ from those of *A. haemorrhoidale* (Fig. 12) therefore we consider the records of Ahmad *et al.* (1979) and Ahmad & Moizuddin (1990) erroneous too. Judging from their illustrations of the peritreme and female terminalia they probably pertain to *A. spinicolle* Jakovlev, 1880, a species widely distributed in Central Asia (cf. Göllner-Scheiding 2006).

Distribution. *Acanthosoma haemorrhoidale* is a species of Transpalaearctic distribution (Göllner-Scheiding 2006). Records from northern Pakistan (Distant 1879, Atkinson 1889, Ahmad *et al.* 1979, Ahmad & Moizuddin 1990, all as *A. proximum*) and southwestern China (Hsiao & Liu 1977) are erroneous.

Acanthosoma firmatum (Walker, 1868), new combination

Figs 13–28

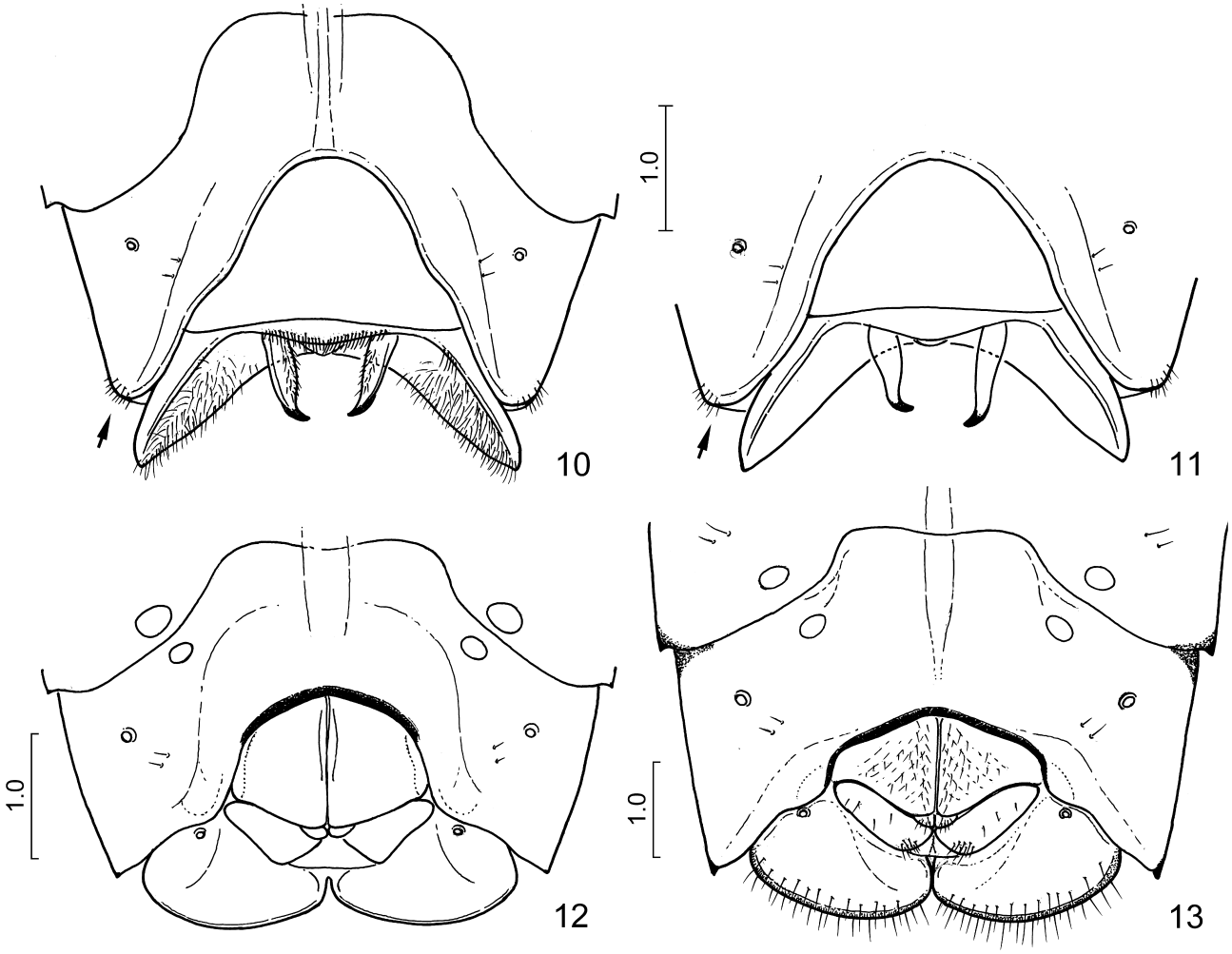
Cuspicona firmata Walker, 1868: 569. Holotype: China; BMNH!
Acanthosoma giganteum Matsumura, 1913: 128. Holotype: ♀, Japan: Honshu, Kyoto; SEHU! **New subjective synonym.**

Cuspicona firmata: Lethierry & Severin 1893: 196 (as of doubtful identity, catalogue, distribution).
Sastragala firmata: Distant 1900: 228, 233 (generic placement), Kirkaldy 1909: 173 (catalogue, distribution), Hoffmann 1932: 10 (listed), Hoffmann 1935: 102 (catalogue), Tang 1935: 359 (catalogue, distribution), Stichel 1962a: 771 (catalogue, distribution), Stichel 1962b: 251 (catalogue, distribution), Hua 2000: 167 (listed, distribution), Göllner-Scheiding 2006: 180 (catalogue, distribution).
Acanthosoma giganteum (selected references): Esaki 1915: 96 (listed, in key), 97 (redescription, figures, distribution, phenology), Mitshuhashi 1915: 523 (listed, distribution), Esaki 1916a: 204 (listed), Matsumura 1930: 19, 120 (reproduction of original description and illustration), Miyamoto & Yasunaga 1989: 188 (listed, distribution), Tomokuni 1993: 242 (diagnostic characters, photos, distribution), Lee & Kwon 1994: 78 (listed), Kwon *et al.* 1996: 116 (listed), Hayashi & Kishi 1998: 23 (record, distribution), Ishikawa 2001: 11 (records, distribution, host plant), Kwon *et al.* 2001: 370 (catalogue, distribution), Hayashi & Kishi 2002: 12 (record), Hayashi & Ozaki 2004: 247 (listed, records), Kobayashi & Tachikawa 2004: 274 (listed), Yamamoto *et al.* 2009: 33 (host plant), Yamamoto & Hayashi 2012: 505 (diagnosis, photos of adults and larva, generic placement, distribution, records), Tomokuni 2014: 367 (record, photo, host plant).
Anaxandra gigantea (selected references): Esaki 1931: 115 (record), Esaki 1932: 1591 (redescription, figures, distribution), Doi 1933: 92 (record), Hirayama 1937: 178 (diagnosis, photo, record, distribution), Tazawa 1938: 256 (record, distribution), Ishihara 1947: 69 (diagnosis, distribution, host plant), Esaki 1952: 205 (redescription, figures, distribution, host plant), Takeuchi 1955: 47 (diagnosis, photo, distribution), Miyamoto 1962: 81 (redescription, photo, habitat, distribution), Stichel 1962a: 770 (catalogue, distribution), Stichel 1962b: 251 (catalogue, distribution), Lee 1971: 213 (in

key), 221 (redescription, photo, records, distribution), 502 (catalogue, distribution), Kawasawa & Kawamura 1975: 237 (listed, figure, host plants), Hiura 1977: 106 (listed, distribution, figure), Suzuki 1978: 28 (record), Hiura 1980: 331 (records, distribution, host plants, habitat), Tomokuni 1981: 105 (listed), Watanabe 1982: 415 (records, habitat, distribution), Hayashi 1987: 569 (record, photo, behaviour, host plant), Schaefer & Ahmad 1987: 24 (host plant), Göllner-Scheiding 2006: 169 (catalogue, distribution), Zhao & Liu 2012: 130 (redescription, distribution), Hanelová & Vilímová 2013: 445 (behaviour), Zheng & Lin 2013: 94 (redescription, photo, distribution).

Anaxandra giganteum (selected references): Esaki 1926: 201 (generic placement, records), Matsumura 1931: 1175 (redescription, habitus, distribution), Hoffmann 1935: 150 (cataloge, distribution), Onoda & Onoda 1938: 91 (redescription, habitus), Hsiao & Liu 1977: 171 (in key, redescription, figure, photo, distribution), Tomokuni 1979: 107 (listed, distribution), Zhang *et al.* 1980: 32 (record, host plant, phenology), Zhang & Lin 1981: 141 (record, distribution), Liu 1987: 152 (in key), Zhang & Sie 1988: 70 (records, distribution), Xiong & Liu 1993: 201 (record, distribution), Hua 2000: 166 (listed, distribution, host plants), Liu *et al.* 2002: 291 (listed).

Acanthosoma gigantea: Lee & Kwon 1991: 57 (listed, distribution).

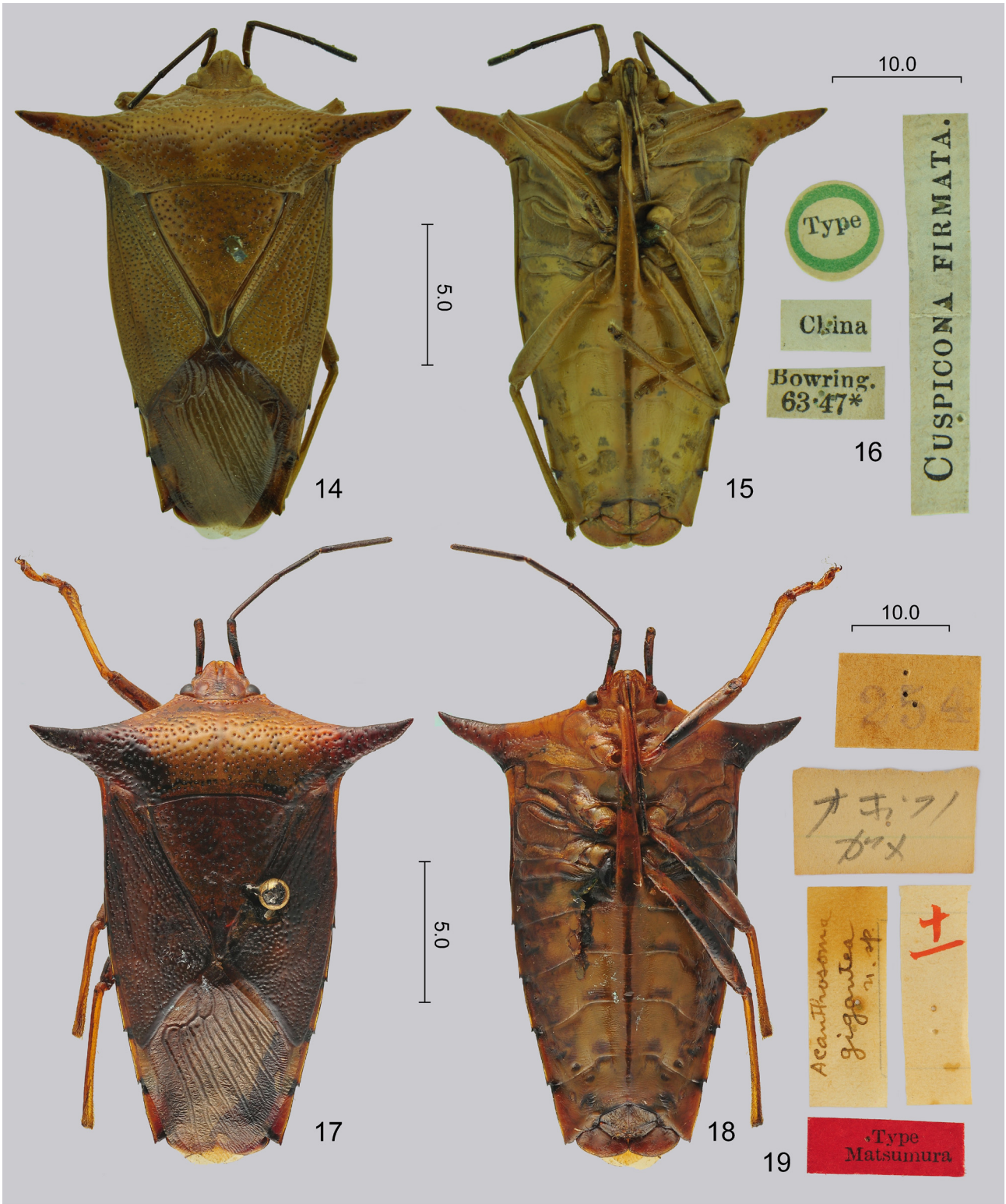


FIGURES 10–13. Diagnostic characters of *Acanthosoma* species. Fig. 10, *A. haemorrhoidale*, apex of abdomen of male, ventral view (Denmark: Copenhagen); Fig. 11, same (Czech Republic: Prague); Fig. 12, same, apex of abdomen of female, ventral view; Fig. 13, *A. firmatum*, apex of abdomen of female, ventral view. Scales in mm.

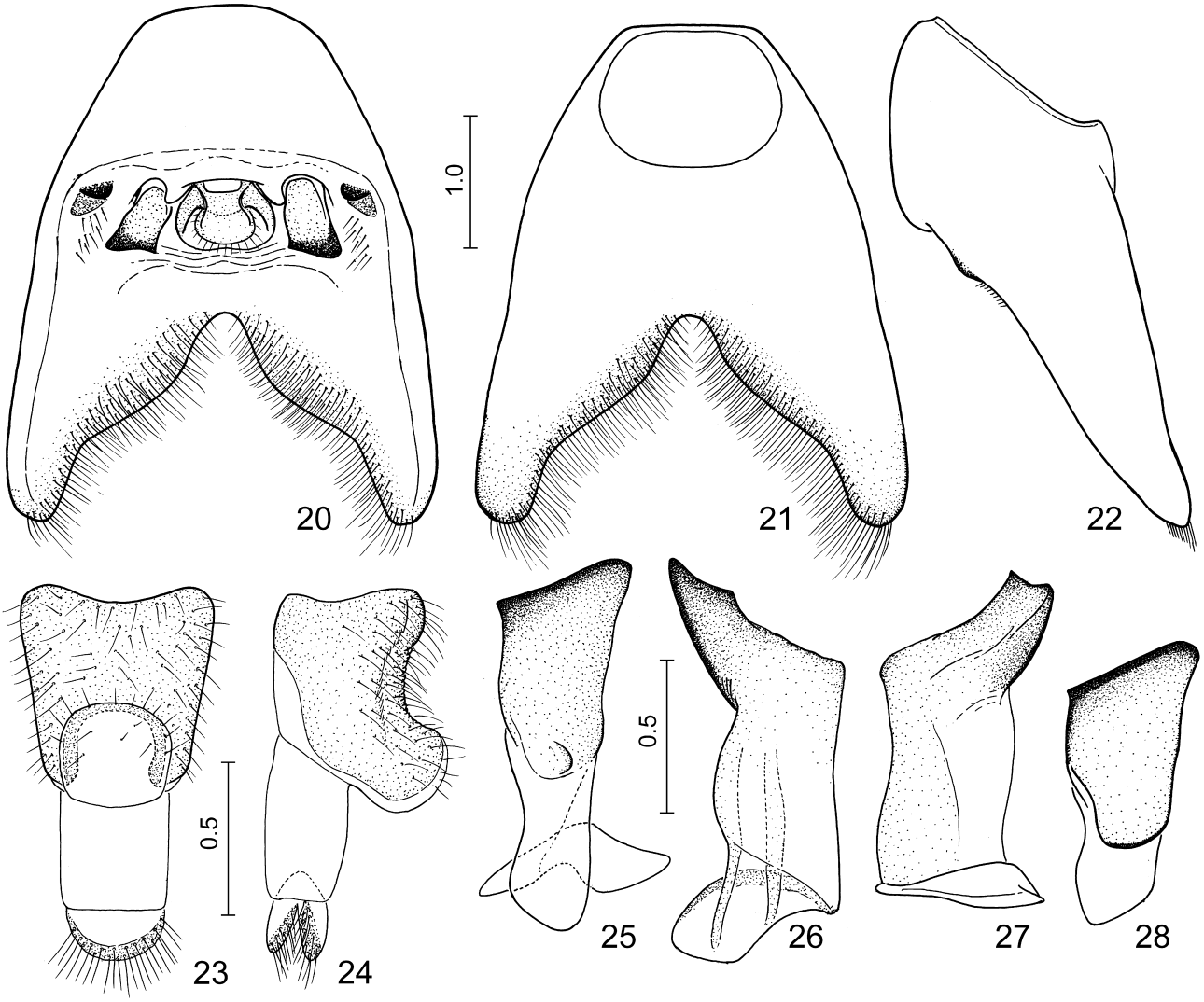
Type material examined

Cuspicona firmata. **Holotype**: ♀, "Type" [pr circle with green border], "Bowring. \ 63·47*" [pr], "China" [pr], "CUSPICONA FIRMATA." [pr, cut from p. 569 of Walker (1868)]; pinned, segments III–IV of both antennae, tibia and tarsus of right fore leg, tarsal segment II of right hind and all left legs lacking; deposited in BMNH (Figs 14–16).

Acanthosoma giganteum. **Holotype**: ♀, "254" [pr], "Acanthosoma \ gigantea \ n. sp." [Matsumura's hw], "<11> [Ch]" [hw in red], "Type \ Matsumura" [red, pr rectangle], "<oho-tsuno-kame> [in Japanese script, = 'big-bodied acanthosomatid bug']" [Matsumura's hw with pencil]; deposited in SEHU (Figs 17–19).



FIGURES 14–19. Holotypes of Acanthosomatidae species and their labels. Fig. 14, *Sastragala firmata* Walker, 1868, dorsal view; Fig. 15, same, ventral view; Fig. 16, same, labels; Fig. 17, *Acanthosoma giganteum* Matsumura, 1913, dorsal view; Fig. 18, same, ventral view; Fig. 19, same, labels. © BMNH (14–16), SEHU (17–19). Scales in mm.



FIGURES 20–28. Diagnostic characters of *Acanthosoma firmatum*, male. 20, genital capsule, ventral view; 21, same, dorsal view; 22, same, lateral view; 23, proctiger, dorsal view; 24, same, lateral view; 25–28, right paramere, four different views. Scales in mm.

Additional specimens examined. JAPAN. Honshu: Yamaguchi Prefecture, Utsunomiya, Mine, 8.ix.1986, leg S. Takahashi (1 ♂ 1 ♀ SEHU), Kanagawa Prefecture, Ogino, 4.iv.1992, leg. H. Takizawa (1 ♀ SEHU), Yamagata Prefecture, Azumayama, near Namekawa Mine, 19.vii.1986, leg. K. Haga (1 ♀ SEHU), Gifu Prefecture, Shirotori, 22.vii.1985, leg. M. Tomokuni (2 ♀♀ NSMT), Gunma Prefecture, Hujioka, Kamihino, 31.vii.2008, leg. E. Hara (1 ♀ SKNJ), Shibukawa, 1.viii.2008, leg. E. Hara (1 ♀ SKNJ); Kawayu-Mura, Monzen, 28.vii.2009, leg. E. Hara (1 ♀ SKNJ); **Kyushu**: Miyazaki Prefecture, Kirishima, Takachiho, 11.vi.1975, leg T. Shiba (1 ♀ SEHU), Fukuoka, Iwate, 5.viii.1953, leg. T. Oku (1 ♀ SEHU); **Shikoku**: Ehime Prefecture, Kumakougen-chou, Wakayama, vii.2010, leg. S. Yano (1 ♂ 9 ♀♀ SKNJ).—**CHINA. Yunnan**: Tengchong, Mangbang Township, Dahaoping–Laoluokeng, 2240 m, 23.v.2009, leg M. Li (1 ♂ NKUM); **Tibet**: Mêdog, Beibengxiang, 1000 m, 9.ix.1974, leg. F.S. Huang (1 ♂ IZAS), Zayü, Ciba, 10.vii.1973, collector unknown (1 ♀ NKUM).—**TAIWAN. Nantou County**: Meifeng, 15–16.ii.1990, leg. C.S. Lin, UV light trap, NMNS ENT 516-38 (1 ♀ NMNS), Meifeng, 30.viii.1992, leg. J.L. Sung (1 ♀ NTU), Howangshan, 10.ix.2000, leg. C.C. Lo, NMNS ENT 4463-258 (1 ♂ NMNS), same data, NMNS ENT 4463-182 (1 ♀ NMNS); **Taichung County**: Guquan, 15.xi.1992, leg. R.C. Wang (1 ♀ NTU), unknown locality, 4.vi.2000, leg. Y.C. Huang (1 ♂ NCHU).

Diagnosis. A large-bodied species with long, horizontally or more or less anterolaterally directed humeral processes. Diagnostic characters: posterolateral angle of pronotum provided with a small, triangular process directed posteriad and extending over base of corium; Pendergrast's organs of ventrites VI and VII small (diameter

less than 0.5 mm), rather broadly separated (Fig. 13). The male genitalia (Figs 20–22, 25–28) and female terminalia (Fig. 13) are diagnostic. Small specimens (particularly males) of this species might look very similar to *A. murreeanum* (see below) but genitalia of both sexes are very different.

Description of male and female terminalia. *Male.* Genital capsule (Figs 20–22) with a pair of robust lateral projections directed posteriad, obtusely rounded apically, widely separated by a broad median incision; dorsal rim and its infolding densely pilose; ventral rim broadly excavate, of rather rectangular outline, its infolding provided with a pair of small, heavily sclerotized and pigmented denticles laterad of paramere sockets. Paramere as in Figs 25–28. Segment X with a somewhat recurved dorsoapical protuberance (Figs 23–24).

Female. Posterior margin of ventrite VII with a deep, nearly pentagonal incision margined with black, surrounding valvifers VIII; posterior margin of valvifer VIII distinctly concave; laterotergites IX obliquely directed and adjacent along meson; posterior margin of laterotergites VIII broadly arcuate, posteriorly far surpassing posterolateral angles of abdominal segment VII (Fig. 13).

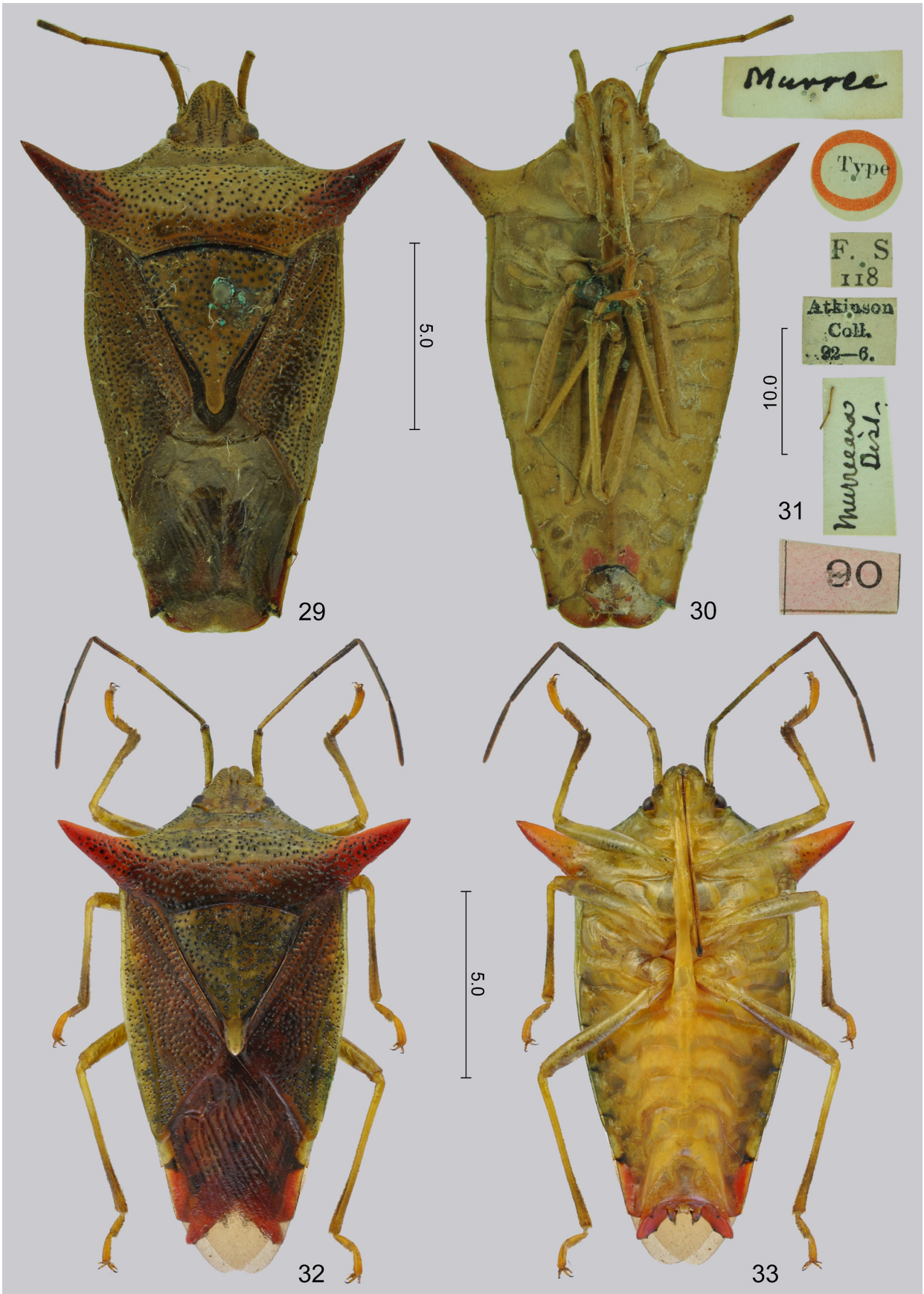
Intraspecific variability. The humeral processes of the pronotum are somewhat variable. They are usually obliquely truncate at their posterior margin apically in specimens from China and Japan, whilst they are not truncate, directed straight laterad in specimens from Taiwan.

Notes. *Acanthosoma firmatum* was described as *Cuspicona firmata* based on a holotype from China (Walker 1867). It was subsequently transferred to *Sastragala* by Distant (1900). No subsequent author provided original information on the species; it was merely listed in taxonomic catalogues and checklist (Kirkaldy 1909, Hoffmann 1932, Hoffmann 1935, Tang 1935, Stichel 1962a, 1962b, Hua 2000, Göllner-Scheiding 2006). The species redescribed and figured by Hsiao & Liu (1977: 175) under the name *S. firmata* is a misidentification; reexamination of the specimen figured by the authors (Hsiao & Liu 1977: plate 28 fig. 402) confirmed that it pertains to another species which will be treated in another publication. The redescription and drawing provided by Zhang & Sie (1992: 251) apparently pertain to the same species.

Acanthosoma giganteum was described from Japan (Matsumura 1913); subsequent authors variously used the specific epithet in combination with the generic names *Acanthosoma* and *Anaxandra*. It was redescribed and illustrated by a number of Japanese (e.g. Hirayama 1937, Esaki 1932, 1952, Takeuchi 1955, Miyamoto 1962, Hiura 1977, Tomokuni 1993) and Korean (Lee 1971) authors. It was recorded from China (Esaki 1926) and Taiwan (Esaki 1932); these records are in need of revision as we have seen specimens identified by T. Esaki as *A. giganteum* pertaining to *A. murreeanum*. Although we were not able to find the specimen photographed by Hsiao & Liu (1977) their identification is apparently correct. The photographs provided by Tsai & Yang (2005: 100, figs 14a–c) for *A. giganteum* (as *A. gigateum*, inadvertent error) pertain to *A. asahinai* Ishihara, 1943.

Reexamination of the holotypes of both *Cuspicona firmata* and *Acanthosoma giganteum* left no doubt that the two specimens are conspecific, therefore the above new subjective synonymy is proposed. Although *C. firmata* was greatly omitted by subsequent authors whilst *Acanthosoma giganteum* / *Anaxandra gigantea* is relatively frequently cited in the literature, our opinion is that following the Principle of Priority best serves stability in this case.

Distribution. *Acanthosoma firmatum* is distributed in Japan, Korea, China, and Taiwan. Several authors recorded it from various regions of China under different names. The record of *Sastragala firmata* by Hsiao & Liu (1977) and probably all subsequent records are misidentifications. Records under the name *Acanthosoma giganteum* / *Anaxandra gigantea* are apparently partly correct, but we have seen misidentified specimens in collections and therefore we believe that most records from China are in need of verification. Unfortunately the species seems to be rare in China, only a few voucher specimens could be examined. Only old (Esaki 1926) or doubtful (Hua 2000) reports exist from Vietnam and Laos, these are also in need of confirmation.—**JAPAN. Honshu**!; **Kyushu**!; **Shikoku**!—**KOREA. Central**; **South** (Kwon *et al.* 2001).—**CHINA. Yunnan**!; **Tibet**!; **Hubei**? (Hua 2000, as *giganteum*); **Hunan**? (Hua 2000); **Jiangxi**? (Liu *et al.* 2002, as *giganteum*); **Sichuan**? (Esaki 1926 ["Szechwan"], Xiong & Liu 1993, both as *giganteum*); **Guizhou**? (Zhang & Liu 2012: 130, as *gigantea*); **Guangxi**? (Hsiao & Liu 1977, as *giganteum*); **Guangdong**? (Hua 2000).—**TAIWAN**!—**VIETNAM**? (Hua 2000).—**LAOS**? (Esaki 1926, Hoffmann 1935, both as *giganteum*).



FIGURES 29–33. ***Acanthosoma murreeanum.*** 29, Lectotype of *Sastragala murreeana* Distant, 1900, dorsal view; 30, same, ventral view; 31, same, labels; 32, male from China (Yunnan: Nanjian), dorsal view; 33, same, ventral view. © BMNH (29–31). Scales in mm.

Acanthosoma murreeanum (Distant, 1900), new combination

Figs 29–43, 159

Sastragala murreeana Distant, 1900: 228. Syntypes: N. India [now Pakistan: Punjab]: Murree; BMNH!

Sastragala edessoides (non Distant, 1900): Hsiao & Liu (1977: 174). Misidentification.

Acanthosoma acutangulata Liu, 1979: 58, 59. Holotype: ♂, China: Hubei, Shennungchia [= Shennongjia]; TMNH? (not found). **New subjective synonym.**

Sastragala neoelongata: Ahmad *et al.* (1979: 8, 12, 46), Ahmad & Moizuddin (1985: 66). Unavailable name.

Sastragala neoelongata Ahmad & Moizuddin, 1990: 287, 291. Holotype: ♂, Pakistan: Punjab, Murree; NHMUK. **New subjective synonym.**

Sastragala hampsoni (non Distant, 1900): Ahmad *et al.* (1979: 8, 11), Ahmad & Moizuddin (1990: 287, 288). Misidentification.

Sastragala murreeana: Distant 1902: 320 (redescription, distribution), Bergroth 1908: 193 (catalogue, distribution), Kirkaldy 1909: 173 (catalogue, distribution).

Sastragala edessoides (misidentification): Li 1985: 117 (redescription, host plants, record), Liu 1987: 153 (in key, records, distribution), Zhou *et al.* 1992: 79 (record), Li 1995: 69 (redescription, habitus, host plants, phenology, distribution), Mai 2001: 224 (redescription, photo, distribution), Liu & Wang 2005: 274 (record, distribution), Xue & Bu 2006: 227 (redescription, distribution), Wang *et al.* 2007: 59 (record, host plant).

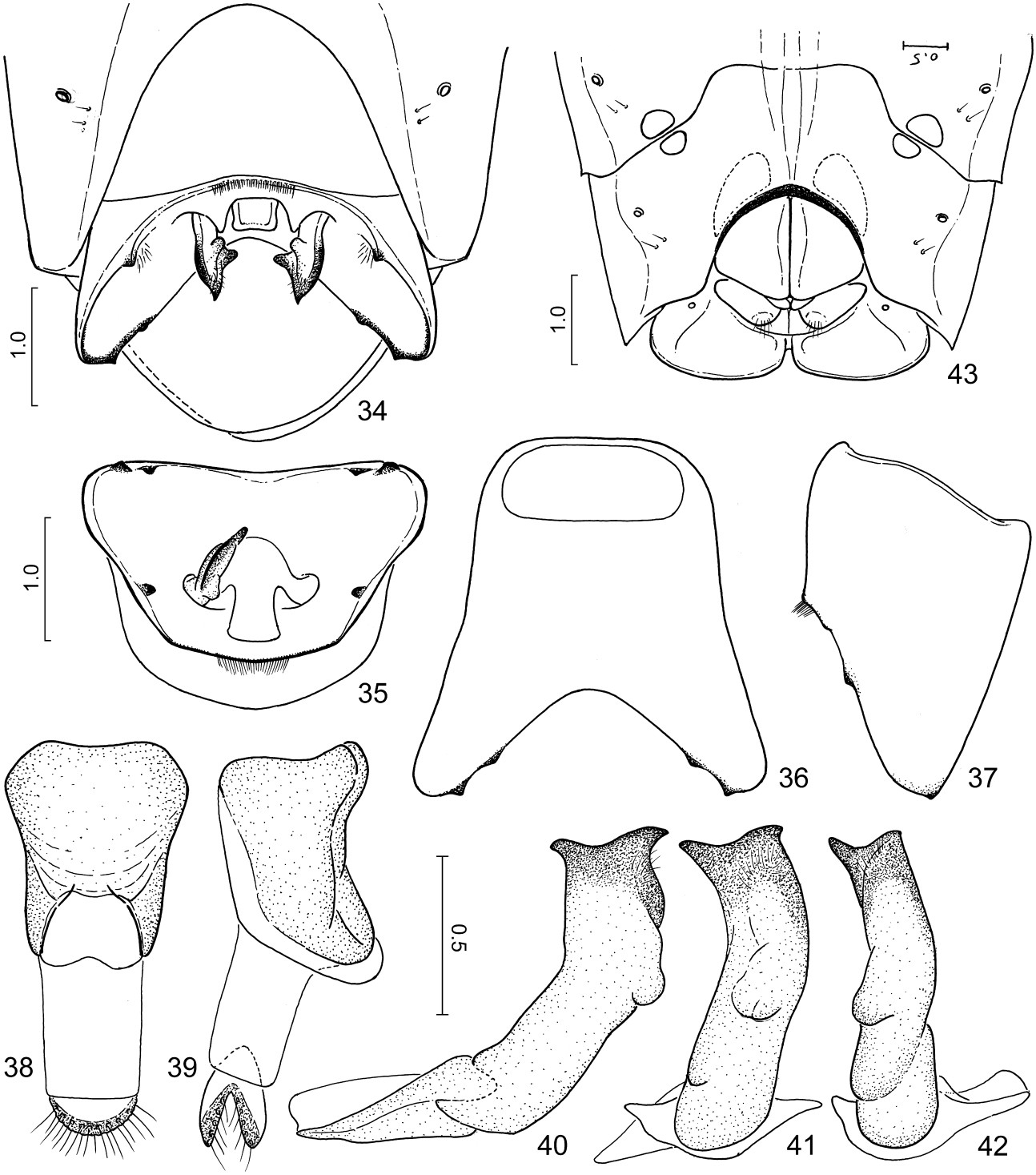
Acanthosoma acutangulata: Liu 1992: 132 (records), Liu 1987: 154 (in key, host plant, records, distribution, as *acutangulatta* [inadvertent error]), Lei & Zhou 1998: 42 (listed, distribution), Hua 2000: 166 (listed, host plants, distribution), Göllner-Scheiding 2006: 166 (catalogue, distribution), Cui *et al.* 2007: 203 (type material).

Type material examined

***Sastragala murreeana*. Lectotype** (present designation): ♀, "Type" [pr circle with red border], "Murree" [hw], "F. S \ 118" [pr], "Atkinson \ coll. \ 92–6." [pr], "90" [pink, pr], "murreeana \ Dist." [Distant's hw]; pinned, segments III–IV of left and segments II–IV of right antennae and some tarsal segments missing; deposited in BMNH (Figs 29–31). **Paralectotype**: ♀, Murree, leg. F. Stoliczka, coll. W.L. Distant, B.M. 1911-383 (BMNH).

Additional specimens examined. PAKISTAN. Punjab: Murree, 11.vii.1974, leg. I. Ahmad (1 ♀ USNM), "Kashmir" [might pertain to India or China], leg. F.J. Mitchell, B.M. 1923-605 (1 ♀ BMNH).—**INDIA. Himachal Pradesh**: "Simla" [= Shimla], 5.ix.1918, leg. Brunell (1 ♂ USNM).—**CHINA. Hebei**: Shijiazhuang, Taihang Mts., Jingxing, Xinzhuang, 1000 m, 13–20.vii.2003, leg. P. Zahradnik (1$ ZJPC); **Beijing**: Mt. Xiang, 500 m, 26.ix.1961, leg. S.Y. Wang (1 ♀ IZAS); **Gansu**: Cheng County, Mt. Jifeng, 1900 m, 16.ix.1990, unknown collector (1 ♂ IZAS); **Shaanxi**: "Chensi Cent." [= C Shaanxi], "Weitzeping" [= Xi'an], 20.viii.[19]16, coll. Licent (1 ♀ NKUM), "Hwashan" [= Huashan], 9.vi.[19]36, unknown collector (3 ♂♂ 1 ♀ IZAS), same locality, 10.vi.[19]36, unknown collector (4 ♂♂ 1 ♀♀ IZAS); **Shanxi**: "Chansi S" [= S Shanxi], "Tch'aoyintchen" [= Yongji, Zhaoyizhen], 26.vii.[19]16, coll. Licent (1 ♀ NKUM), "Tai yuan fou" [= Taiyuan], 4.x.[19]14, coll. Licent (1 ♀ NKUM), Yuncheng, Mt. Li National Nature Reserve, 1200 m, 24–26.vii.2012, leg. F. Yuan (1 ♂ IZAS); **Hubei**: Shennongjia, 22.vi.1977, leg. L.Y. Zheng (1 ♀ NKUM), same locality, leg. H.G. Zou (1 ♀ NKUM); **Sichuan**: Maoxian, Fengyi, 1500 m, 28.vii.1963, leg. S.L. Liu (1 ♀ TMNH > NKUM), Jinchuan, Chengguan, 2000–2300 m, 10.ix.1963, leg. S.L. Liu (1 ♀ TMNH > NKUM), Chengkou, 16.viii.1980, from lacquer tree (*Toxicodendron* sp.), leg. C.S. Fu (1 ♀ IZAS), Xiyang, 18.vi.1981, from same plant, leg. Z.C. Peng (1 ♀ IZAS), Luding, Moxi, 650 m, 20.vi.1983, leg. S.Y. Wang (1 ♂ IZAS), same locality, 1500 m, 20.vi.1983, leg. X.Z. Zhang (1 ♂ NKUM), same locality and altitude, 14.ix.1982, leg. S.Y. Wang (1 ♂ NKUM), Luding, Moxi, Hailuo Valley, 1420 m, 14.ix.1982, leg. S.Y. Wang (1 ♀ IZAS), "Lifan, Weizhou" [now Wenchuan County], 17.vii.1939, unknown collector (1 adult without abdomen, IZAS), between "Yachow" [= Ya'an] & "Tatsienlu" [= Kangding], 22–8000 ft., 10–13.vii.[19]30, leg. D.C. Graham (1 ♀ USNM); **Chongqing**: Nanchuan, Mt. Jinfo, 1500–1600 m, 30.viii.2000, leg. C.R. Li (1 ♂ NKUM); **Yunnan**: Lijiang, Mt. Xiang, 5.viii.1979, collector unknown (1 ♀ NKUM), Lanping, 2300 m, 21.vii.1984, leg. S.Y. Wang (1 ♀ IZAS), Nanjian County, Wuliang Mts., Sheyaoqing, Mt. Lingbao, 2400 m, 5.xi.2001, collector unknown (3 ♂♂ 1 ♀ NKUM), Nanjian County, Wuliang Mts., Sheyaoqing, Nanjian County, 2200 m, 6.xi.2001, at light, collector unknown (1 ♂ 2 ♀♀ NKUM), same locality, 2400 m, 7.xi.2001, leg. W.B. Zhu (3 ♂♂ 3 ♀♀ NKUM), Kunming, Wenquan, 8.iv.1986, leg. X.R. Yang (1 ♂ NKUM), Yunlong, Mt. Zhiben, 2430 m, 20.vi.1981, leg. S.Y. Wang (1 ♂ IZAS), "Tali" [= Dali], unknown date and collector, det. as "taurina K." by G. Horváth, det. as "gigantea Mats." by T. Esaki (1 ♂ HNHM), "Tali" [= Dali], unknown date and collector (1 ♀ USNM), "Yunnan-Fou" [= Kunming]: "San-nen-Kai" (3 ♂♂ 1 ♀ RMNH), "China merid." [= south China], det. as

"taurina K." by G. Horváth, det. as "gigantea Mats." by T. Esaki (1 ♀ HNHM); **Guizhou**: "Anshunfu" [= Anshun], Gan Chouen Fou, 1912, leg. P.Cavalerie (1 ♀ MNHN > IZAS); **Tibet**: Moupin, 23.vii.1939, leg. S.N. Hsia (1 ♀ IZAS), Zayü County, Shangzayü, 28.48°N 97.43°E, 1900 m, 22–23.viii.2005, leg. Z.S. Song (1 ♂ IZAS).—**THAILAND. Chiang Mai Prov.:** "China" [in error], "Chiengmai" [= Chiang Mai], 28.xi.1928, leg. D.C. Graham (1 ♂ USNM).—**LAOS**? "Annam, Laos", date and collector unknown (1 ♀ HNHM).



FIGURES 34–43. Male and female genitalia of *Acanthosoma murreeanum.* Fig. 34, apex of abdomen of male, ventral view; Fig. 35, genital capsule, posterior view; Fig. 36, same, dorsal view; Fig. 37, same, lateral view; Fig. 38, proctiger, dorsal view; Fig. 39, same, lateral view; Figs 40–42, right paramere, three different views; Fig. 43, apex of abdomen of female, ventral view. Scales in mm.

Diagnosis. A relatively small species of *Acanthosoma* (body length: 13.5–16 mm) with long, anterolaterally directed, apically sharp humeral processes. Pendergast's organ of ventrites VI and VII subequal in size and narrowly separated (Fig. 43). The male genitalia (Figs 34–37, 40–42) and female terminalia (Fig. 43) are diagnostic. Small specimens (particularly males) of *A. firmatum* (see above) might look similar to this species but genitalia of both sexes are very different.

Description of male and female terminalia. *Male.* Genital capsule (Figs 34–37) with a pair of short, broadly rounded lateral projections not reaching apex of membrane in rest; dorsal rim with a deep, V-shaped incision, lateral projections with 2+2 pigmented denticles subapically; ventral rim with a broad, rounded incision, with 1+1 pigmented denticles laterally. Paramere as in Figs 40–42. Segment X with a dorsoapical protusion (Figs 38–39).

Female. Posterior margin of ventrite VII with a deep, parabolic median incision surrounding valvifers VIII, margined with black, with a pair of large red submedian patches submarginally; laterotergites IX obliquely directed and broadly separated along meson (Fig. 43); posterior margins of laterotergites VIII rather weakly arcuate.

Notes. *Sastragala murreeana* was described from Murree, North India (now Pakistan) based on an unspecified number of syntypes deposited in coll. Atkinson and coll. Distant (now both deposited in BMNH). Two female syntypes were found in BMNH and one of them (Figs 29–30) is designated here as lectotype. The species is hereby transferred into *Acanthosoma* based on arguments presented in the Discussion.

Based on specimens from Murree (the type locality of *A. murreeanum*) Ahmad & Moizuddin (1990) described a new species, *Sastragala neoelongata*. Their text and illustrations, particularly those of the male genitalia leave no doubt that this species is conspecific with *A. murreeanum* and therefore the subjective synonymy of the two names is proposed. The records of *Sastragala murreeana* by the same authors (Ahmad *et al.* 1979, Ahmad & Moizuddin 1985, 1986, 1990, Schaefer & Ahmad 1987) represent *A. rufispinum* (see below under the latter species).

The redescription of *Sastragala hampsoni* provided by Ahmad & Moizuddin (1990) pertains to the same biological species; their fig. 25 (as *S. neoelongata*) shows the genital capsule from posteroventral whilst their fig. 26 (as *S. hampsoni*) from posterior view. *Sastragala hampsoni* belongs to *Acanthosoma* and it is discussed below.

The redescription, photo and drawing of *Sastragala edessoides* provided by Hsiao & Liu (1977) undoubtedly pertain to *A. murreeanum*. These authors listed the species from six localities in China; voucher specimens from four of them were found in NKUM currently housing T.Y. Hsiao's collection. Probably all subsequent Chinese authors misidentified the species in the same way.

Acanthosoma acutangulata was described from Hubei Province of China. The author (Liu 1979) indicated that the type material was deposited in TMNH but it was not found there during the present study (S.L. Hao, *pers. comm.*), neither it is deposited in NKUM or IZAS. The species, however, can readily be recognized based on the original description and illustrations, and we have examined several non-types from China including two specimens collected in the same locality and on the same date as the type material of *A. acutangulata*. Based on this material we have no doubt that this species is also conspecific with *A. murreeanum* therefore the subjective synonymy of the two names is proposed.

Distribution. So far only recorded from Pakistan and temperate and Oriental parts of China. The specimen recorded by us from Shimla, Himachal Pradesh, represents the first verified record from India, and we record it for the first time from Thailand. An old specimen from "Kashmir" was examined during the present study; it might have been collected in areas currently administered either by Pakistan, India, or China. Another old specimen bearing the label "Annam, Laos" might have been collected either in the present Laos or Vietnam.—**PAKISTAN. Punjab**!—**INDIA. Himachal Pradesh**!—**CHINA. Hebei**!; **Beijing**!; **Gansu**!; **Shaanxi**!; **Shanxi**!; **Hubei**!; **Sichuan**!; **Chongqing**!; **Guizhou**!; **Yunnan**!; **Guizhou**!; **Tibet**!—**THAILAND. Chiang Mai Prov.**!—**LAOS**? "Annam, Laos"!

Acanthosoma rufispinum (Distant, 1887), new combination

Figs 44–56, 160

Sastragala rufispina Distant, 1887: 352. Syntype(s): North India; BMNH!

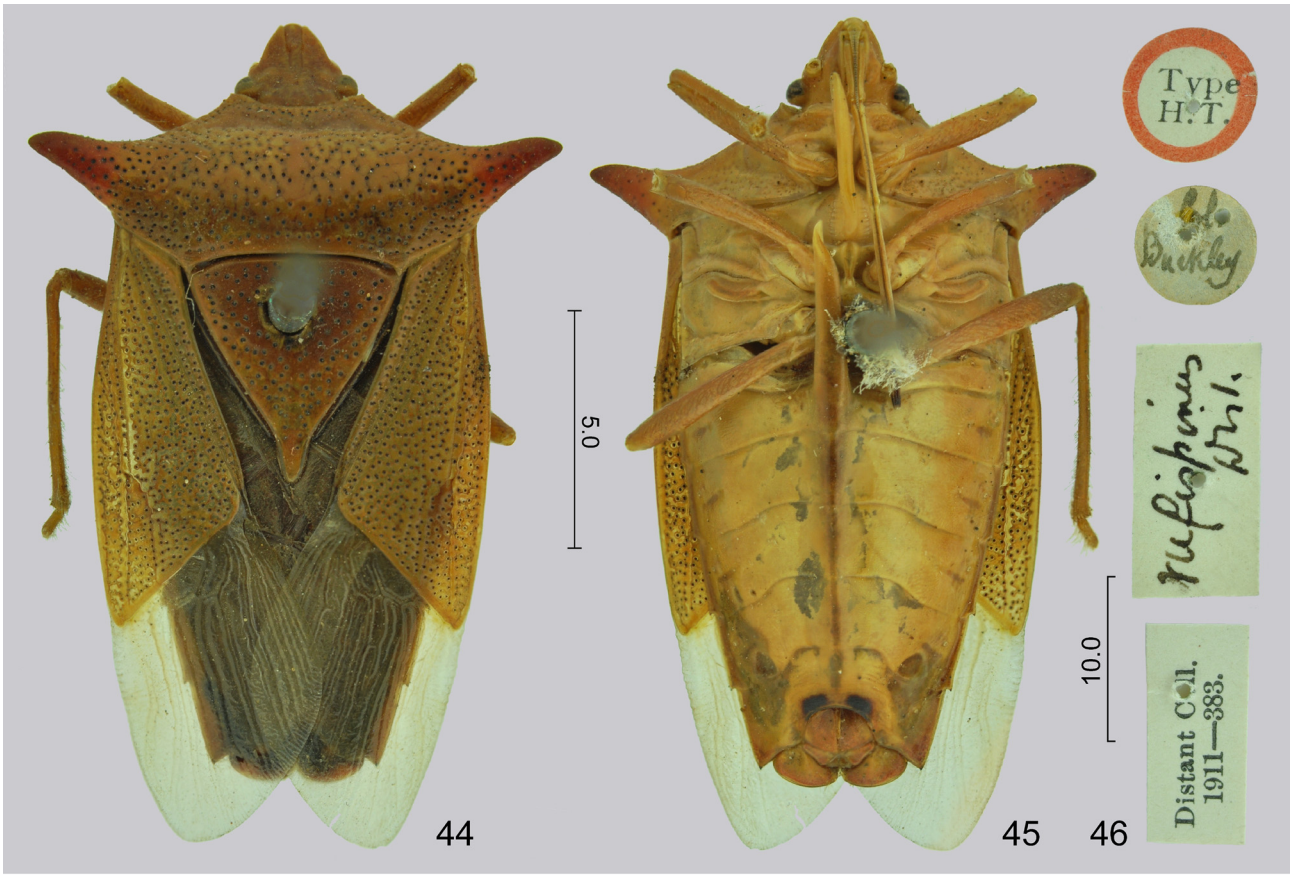
Sastragala minuta: Ahmad *et al.* (1979: 8, 12), Schaefer & Ahmad (1987: 24). Unavailable name.

Sastragala minuta Ahmad & Moizuddin, 1990: 287, 290. Holotype: ♂, Pakistan: Punjab, Murree; NHMUK. **New subjective synonym.**

Sastragala murreeana (non Distant, 1900): Ahmad & Moizuddin (1990: 289). Misidentification.

Sastragala rufispina: Atkinson 1889: 29 (reproduction of original description, distribution), Lethierry & Severin 1893: 254 (catalogue, distribution), Distant 1902: 319 (redescription, distribution), Kirkaldy 1909: 173 (catalogue, distribution), Distant 1918: 148 (diagnostic characters, distribution, record), Ahmad & Moizuddin 1990: 287 (in key, distribution).

Sastragala murreeana (misidentification): Ahmad *et al.* 1979: 8 (listed), 12 (record, host plant), Ahmad & Moizuddin 1985: 66 (anatomy, figures), Ahmad & Moizuddin 1986: 169 (figures, host plant, immatures), Schaefer & Ahmad 1987: 23 (host plant), Ahmad & Moizuddin 1990: 287 (in key, distribution), 289 (redescription, figures, record, host plant).

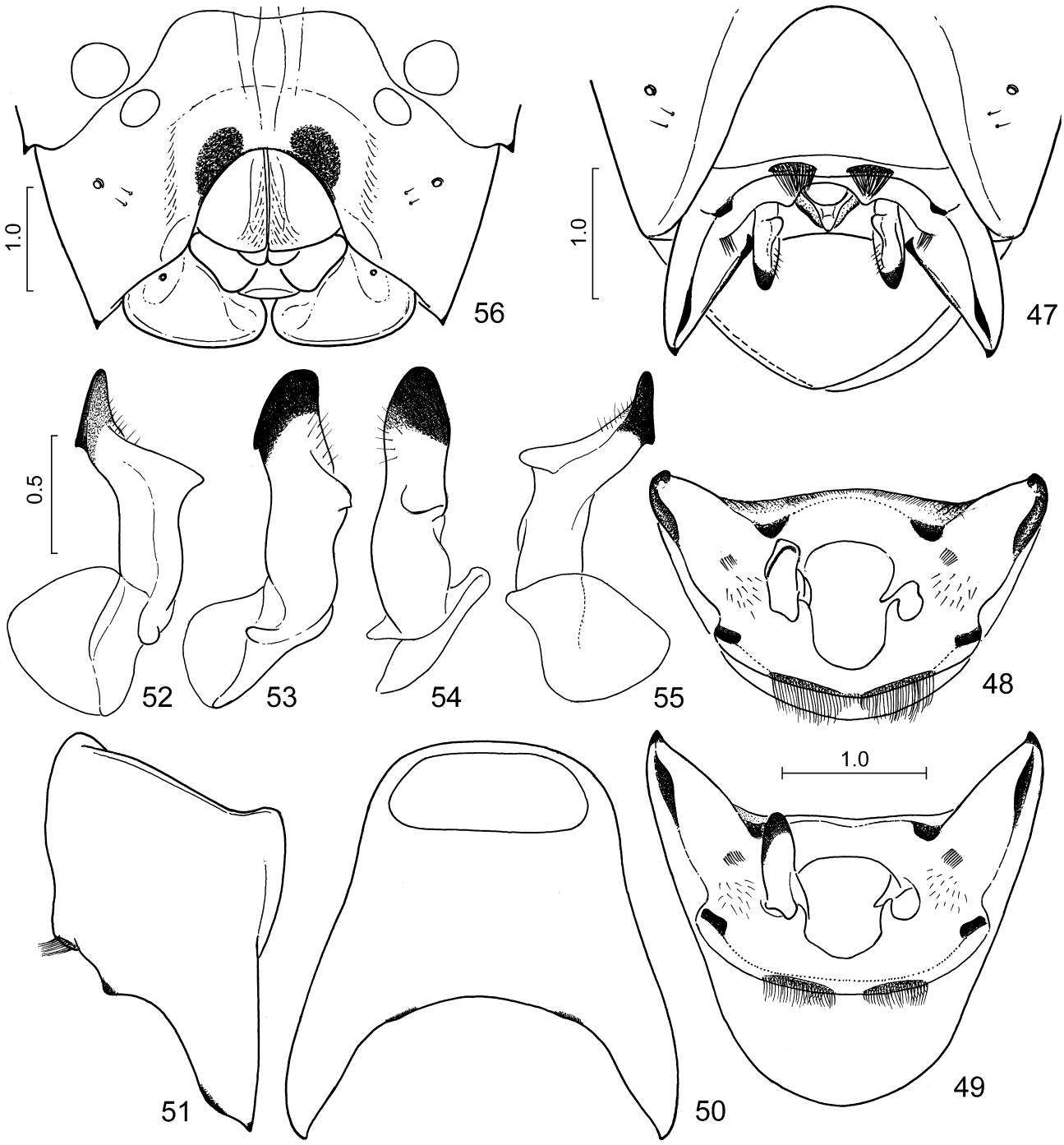


FIGURES 44–46. Lectotype of *Sastragala rufispina* Distant, 1887 and its labels. Fig. 44, dorsal view; Fig. 45, ventral view; Fig. 46, labels. © BMNH. Scales in mm.

Type material examined. *Sastragala rufispina*. Lectotype (present designation): ♀, "Type \ H.T." [pr circle with red border], "Col. \ Buckley" [gray circle, hw], "Distant coll. \ 1911-383" [pr], "rufispinus \ Dist." [Distant's hw]; pinned, both antennae, tibiae and tarsi of left fore, both mid, and right hind leg, tarsus of right fore leg, tarsal segment II of left hind leg lacking; deposited in BMNH (Figs 44–46).

Additional specimens examined. PAKISTAN. Punjab: Murree, leg. F. Stoliczka, F.S. 118 (1 ♀ BMNH); same locality and collector, coll. Atkinson, B.M. 92-6 (1 ♂ BMNH); same locality and collector, coll. W.L. Distant, B.M. 1911-383 (1 ♀ BMNH); **Azad Kashmir**: Tararkhel [= Tarar Khel], from grass, 4.viii.1965, leg. S.M. Khan (1 ♂ BMNH).—**INDIA. Himachal Pradesh**: Kulu [= Kullu], 5000 ft., leg. C. Rost (1 ♀ HNHM), Dalhousie, 21.vi.1961, leg. P.W. Oman (1 ♂ USNM); **Uttarakhand**: Mussoorie [= Masūrī], United Prov. Forest Dept., Dehra Dun, A.W. Imms, B.M. 1915-228 (1 ♂ BMNH); Mussoorie, Inoti, United Prov. Forest Dept., Dehra Dun, 16.x.1910, A.W. Imms, B.M. 1915-228 (1 ♀ BMNH); Dehra Dun, leg. Ollenbach, Pusa coll. (1 ♂ BMNH); Almora Dist., Chaubattia, 6000–7000 ft., leg. S.R. Archer, B.M. 1920-175 (1 ♀ BMNH); Naini Tal [= Nainital], 7800 ft., 4.ii.1934, leg. J.A. Graham, B.M. 1934-147 (2 ♂♂ BMNH), Garhwal, Saklana Tehri, Uniyal Gaon, Jai K. Uniyal, 5500 ft., 22.v.1946, on leaves of *Alnus nitida*, coll. J.C. Lutz (11 ♂♂ 9♀♀ USNM).—**NEPAL.** Jiri, 1900 m, 17–19.v.1962, leg. G. Ebert (1 ♂ NMPC), Janakpur, Malipu-Dolakha, 1000–1700 m, 9.viii.1983, unknown collector (1 ♀ SEHU), Godavari, Napal Valley, 17.vi.1968, leg. T. Kumata (1 ♀ SEHU).

Diagnosis. Recognized by its distinctly anterolaterally produced and apically rather obtuse humeri (Figs 44–45) and particularly its male genitalia (Figs 47–55). Pendergrast's organ of ventrite VI larger than that of ventrite VII, rounded (Fig. 56).



FIGURES 47–56. Diagnostic characters of *Acanthosoma rufispinum*. Fig. 47, apex of abdomen of male, ventral view; Fig. 48, genital capsule, posterior view; Fig. 49, same, posteroventral view; Fig. 50, same, dorsal view; Fig. 51, same, lateral view; Fig. 52–55, right paramere, four different views; Fig. 56, apex of abdomen of female, ventral view. Scales in mm.

Description of male and female terminalia. *Male.* Genital capsule (Figs 47–51) with a pair of short, broadly rounded lateral projections almost reaching apex of membrane in rest; dorsal rim with a broad, deep, U-shaped incision; apex of lateral projection with a pigmented denticle, dorsal infolding protruding basally, with a pair of pigmented ridges; ventral rim with a broad, rounded medial incision, with a pair of pigmented denticles laterally, and a pair of somewhat elongate, pigmented protuberances subapically. Paramere as in Figs 52–55. Segment X with a dorsoapical protusion (cf. Fig. 47).

Female (Fig. 56). Posterior margin of ventrite VII with a deep, parabolic median incision surrounding valvifers VIII, margined with black, with a pair of black submedian patches submarginally; laterotergites IX obliquely directed and broadly separated along meson; posterior margin of laterotergites VIII shallowly arcuate.

Notes. *Sastragala rufispina* was described from North India based on an unspecified number of individuals (syntypes) (Distant 1887). A single female syntype was found in BMNH (Figs 29–30) and it is designated as lectotype; several additional specimens of both sexes were examined from various localities of northern India and Nepal. The species is hereby transferred to *Acanthosoma* based on arguments presented in the Discussion.

Based on several specimens from Murree of Punjab Province, Pakistan, Ahmad & Moizuddin (1990) provided a detailed redescription of a species identified by them as *Sastragala murreeana* Distant, 1900. Their text and illustrations, particularly those of the genitalia of the male leave no doubt that they misidentified *Acanthosoma murreeanum* and their record pertains to *A. rufispinum*. We have examined specimens of *A. rufispinum* from the same locality.

Based on a single male also from Murree, Ahmad & Moizuddin (1990) described a new species, *Sastragala minuta*. According to their diagnosis it only differs from *S. murreana* sensu Ahmad & Moizuddin (= *Acanthosoma rufispinum*) by insignificant characters; its male genitalia, particularly the very characteristic genital capsule (cf. Ahmad & Moizuddin 1990: 299, fig. 24), are identical with those of *A. rufispinum*. Unfortunately we could not access the holotype, but as the original description and illustrations of *S. minuta* convincingly indicate that this species does not differ from *A. rufispinum*, the synonymy of the two species seems justified.

We treat the specific epithet as an adjective (New Latin *rufispinus*, *-a*, *-um*, meaning 'having red spine') and therefore we change the ending according to the gender of the genus.

Distribution. Apparently a Himalayan species occurring in the mountainous regions of north Pakistan, India, and Nepal. It is reported from Nepal for the first time in the present paper.—**PAKISTAN. Punjab**!; **Azad Kashmir**!—**INDIA. Himachal Pradesh**!; **Uttarakhand**!—**NEPAL**!

Acanthosoma tauriforme (Distant, 1887), new combination

Figs 57–59

Anaxandra tauriformis Distant, 1887: 354. Syntype(s): India: Khasia Hills; BMNH!
Anaxandra longispina Liu, 1987: 152. Syntype(s): China: Yunnan, Yuanyang; depository not stated. **New subjective synonym.**

Anaxandra tauriformis: Atkinson 1889: 33 (reproduction of original description, distribution), Lethierry & Severin 1893: 255 (catalogue, distribution), Distant 1902: 324 (redescription, distribution), Kirkaldy 1909: 174 (catalogue, distribution).
Anaxandra longispina: Göllner-Scheiding 2006: 170 (catalogue, distribution).

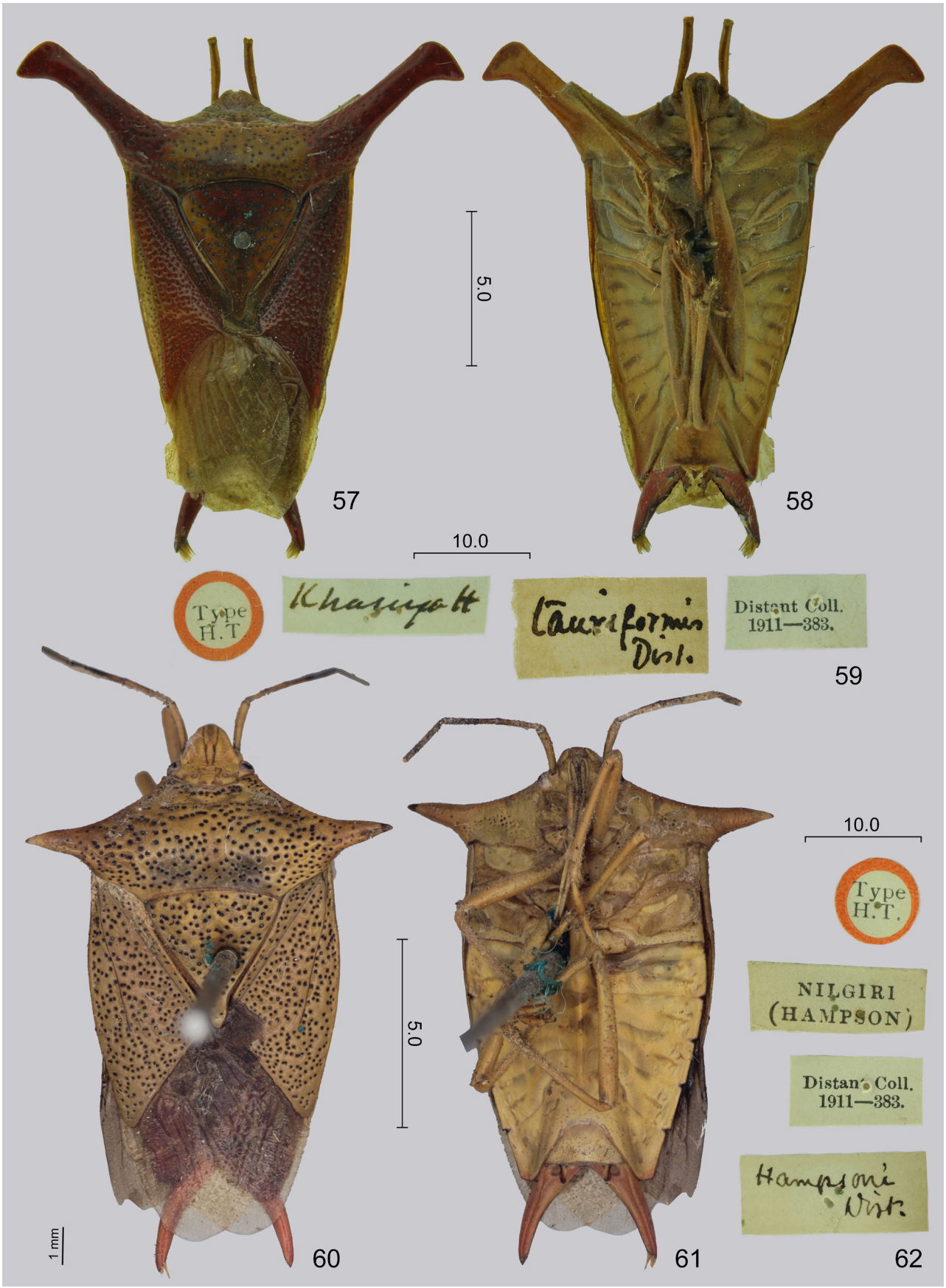
Type material examined. ***Anaxandra tauriformis*. Lectotype**: ♂, "Type \ H. T." [pr circle with red border], "Khasiya H" [hw], "tauriformis \ Dist." [Distant's hw], "Distant coll. \ 1911–383." [pr]; pinned, antennal segments II–IV of both antennae and some tarsal segments lacking, otherwise in good condition; deposited in BMNH (Figs 57–59).

Additional specimens examined. CHINA. Yunnan: Yuanjiang County, Nanxijie, 19.vii.2006, leg. H. Guo (1$, NKUM).

Diagnosis. It is a most distinctive species immediately distinguished from all other congeners by the greatly elongated, straight, apically recurved humeral processes which are produced anteriad of the tip of the head (Figs 57–58).

Notes. *Anaxandra tauriformis* was described based on an unspecified number of specimens (syntypes) from Khasi Hills, Assam (now Meghalaya), India. The species has never been reported again after its original description. A single male (Figs 57–58) is located in BMNH and it is hereby designated as lectotype. The species is transferred into *Acanthosoma* as a result of the proposed synonymy between *Acanthosoma* and *Anaxandra*.

No formal description or illustration of *Anaxandra longispina* (from southern Yunnan, China) was presented by Liu (1987), the name was merely diagnosed within a key; no type specimens were designated. The name was considered as available by Göllner-Scheiding (2006); this is an opinion which we share. No type specimens could be located in TMNH (S.L. Hao, *pers. comm.*), NKUM and IZAS. We have examined a non-type female from southern Yunnan; since it was collected at a locality close (about 7 km) to the type locality of *A. longispina*, moreover it is a most distinctive species, and its unique diagnostic characters (shape and length of humeral processes) are clearly described in the identification key, we are convinced that it represents *A. longispina*. The specimen is apparently conspecific with the male lectotype of *Anaxandra tauriformis* therefore the above subjective synonymy is proposed.



FIGURES 57–62. Lectotypes of Acanthosomatidae species and their labels. Fig. 57, *Anaxandra tauriformis* Distant, 1887, dorsal view; Fig. 58, ventral view; Fig. 59, labels; Fig. 60, *Sastragala hampsoni* Distant, 1900, dorsal view; Fig. 61, ventral view; Fig. 62, labels. © BMNH. Scales in mm.

Distribution. *Acanthosoma tauriforme* is rare in collections, only three localities are known so far, based on these data it probably centers the East Himalaya–Hengduan Mountains region.—**INDIA. Meghalaya**: Khasi Hills!—**CHINA. Yunnan**: Yuanjiang!, Yuanyang (Liu 1987, as *longispina*).

Acanthosoma hampsoni (Distant, 1900), new combination

Figs 60–62

Sastragala hampsoni Distant, 1900: 229. Syntype(s): [India: Tamil Nadu:] Nilgiri Hills; BMNH!

Sastragala hampsoni: Distant 1902: 320 (redescription, distribution), Bergroth 1908: 193 (catalogue, distribution), Kirkaldy 1909: 173 (catalogue, distribution).

Type material examined. Lectotype (present designation): ♂, "Type \ H.T." [pr circle with red border], "NILGIRI \ (HAMPSON)" [pr], "Distant coll. \ 1911-383" [pr], "Hampsoni \ Dist." [Distant's hw]; pinned, segments IV of both antennae and some tarsal segments missing; deposited in BMNH (Figs 60–62).

Additional specimens examined. INDIA. Tamil Nadu: "Inde Mér[e]" [Inde Méridionale = southern India], Trichinopoly [= Tiruchirappalli], leg. J. Dubreuil, coll. W.L. Distant 1911-383 (1 ♂ BMNH).—**Unknown locality**, coll. W.L. Distant 1911-383 (1 ♀ BMNH).

Diagnosis. Pronotum, scutellum and corium with very coarse black punctation, head not punctated; antennal segments IIb–IV black; humeral process yellowish, straight, directed laterally, apically pointed; genital capsule of male with a pair of long, broadly diverging, slightly curved projections posteriorly (Figs 60–61).

Notes. This species was described from Southern India and has never been recorded again since its original description. For fixing the identity and facilitating recognition of this widely ignored species a lectotype is hereby designated and its photographs are presented (Figs 60–61). The species is hereby transferred to *Acanthosoma* based on arguments presented in the Discussion.

The area of this species is rather isolated from those of all other species of *Acanthosoma*: it occurs in Tamil Nadu whilst no other species of the genus extends to the Indian Subcontinent except of marginal areas of the Himalayas. The species is morphologically also quite peculiar and would deserve a detailed study. Unfortunately it is rare in collections and the few specimens available to us did not allow a careful examination.

Distribution. This species is apparently restricted to southern India. Records from Pakistan (Ahmad *et al.* 1979, Ahmad & Moizuddin 1990) are misidentifications and pertain to *Acanthosoma murreeanum* (see above under the respective species).—**INDIA. Tamil Nadu**!

Acanthosoma labiduroides Jakovlev, 1880

Figs 63–80, 158

Acanthosoma labiduroides Jakovlev, 1880: 386. Lectotype (Derzhansky *et al.* 2002: 362) (♂): Russia, Vladivostok; ZMAS.
Acanthosoma labiduroidcs [sic]: Jakovlev (1880: 387). Inadvertent error.
Acanthosoma coralliferum Horváth, 1889: 34. Holotype: ♂, Himalaya; HNHM! **New subjective synonym.**
Acanthosoma zanthoxylum Hsiao & Liu, 1977: 177, 302. Holotype: ♀, China, Sichuan, Guan County; NKUM! **New subjective synonym.**
Acanthosoma distinctum (non Dallas, 1851): Hsiao & Liu (1977: 176). Misidentification.

Acanthosoma labiduroides (selected references): Lethierry & Severin 1893: 254 (catalogue, distribution), Oshanin 1906: 166 (catalogue, distribution), Kirkaldy 1909: 172 (catalogue, distribution), Oshanin 1912: 17 (catalogue, distribution), Esaki 1915: 96 (listed), 97 (in key), 99 (redescription, figures), Mitsuhashi 1915: 523 (listed, distribution), Esaki 1916a: 204 (listed), Esaki 1916b: 127 (comparison with *kyotoanum*), Esaki 1926: 201 (figures, distribution, type depository), Matsumura 1930: redescription, habitus, distribution), Matsumura 1931: 1175 (redescription, habitus, distribution), Esaki 1932: 1589 (redescription, habitus, distribution), Hoffmann 1935: 101 (catalogue, distribution), Tang 1935: 359 (catalogue, distribution), Hirayama 1937: 178 (diagnosis, photo, distribution, record), Tazawa 1938: 255 (listed, habitat, record), Ishihara 1943: 497 (comparison with *ishiharai*), Ishihara 1947: 68 (diagnosis, figures, host plants, distribution), Esaki 1952: 203 (redescription, habitus, distribution), Takeuchi 1955: 47 (diagnosis, photo, record, distribution), Miyamoto 1962: 81 (redescription, photo, habitat, host plant, distribution), Stichel 1962a: 770 (catalogue, distribution),

Stichel 1962b: 251 (catalogue, distribution), Lee 1971: 214 (in key), 215 (redescription, photos, figures, immatures, distribution), 500 (catalogue, distribution), Kawasawa & Kawamura 1975: 70 (listed, figures), 237 (host plants, as *labiduloides* [inadvertent error]), Hiura 1977: 106 (listed, figure, distribution, as *labiduloides* [inadvertent error]), Hsiao & Liu 1977: 175 (redescription, photo, figures, host plant, distribution), Liu 1979: 56 (listed, record), Tomokuni 1979: 107 (listed, distribution), Zhang *et al.* 1980: 32 (listed, record, phenology), Tomokuni 1981: 105 (records), Watanabe 1982: 415 (records), Wu 1984: 38 (host plants, records), Chen 1985: 125 (listed, host plants), Schaefer & Ahmad 1987: 24 (host plants), Kanyukova 1988: 914 (in key, figures, host plant, distribution), Miyamoto & Yasunaga 1989: 188 (listed, distribution), Chen 1990: 107 (redescription, distribution, host plants, phenology), Lee & Kwon 1991: 57 (listed, distribution), Liu 1992: 132 (records, distribution), Zhang & Sie 1992: 249 (redescription, habitus, host plants, distribution), Shen 1993: 32 (listed, distribution, host plant), Tomokuni 1993: 241 (redescription, photos of adults and larvae, host plants, distribution, records), Lee & Kwon 1994: 78 (listed), Liu & Li 1995: 62 (redescription, habitus, host plant, distribution), Vinokurov & Kanyukova 1995: 194 (in key, figures, host plant, distribution), Kwon *et al.* 1996: 116 (listed), Hayashi & Kishi 1998: 23 (records), Lei & Zhou 1998: 42 (listed, distribution), Hua 2000: 166 (listed, distribution, host plants), Chen & Liu 2001: 279 (listed, distribution), Fang & Wu 2001: 61 (listed, host plants, distribution), Kwon *et al.* 2001: 371 (catalogue, distribution, host plants), Hayashi & Kishi 2002: 12 (listed), Hayashi & Ozaki 2004: 247 (listed, distribution), Kobayashi & Tachikawa 2004: 274 (listed), 280 (distribution, diagnosis, egg, larvae, figures, host plants, bionomics, phenology), Liu & Wang 2005: 272 (records, distribution), Xie & Bu 2005: 185 (redescription, distribution), Bao 2006: 361 (listed, host plants), Bao & He 2006: 361 (listed, host plants), Göllner-Scheiding 2006: 168 (catalogue, distribution), Ren *et al.* 2006: 274 (record), Xue & Bu 2006: 225 (redescription, distribution), Li & He 2007: 350 (record), Wang *et al.* 2007: 58 (records, host plant, as *labiburoides* [inadvertent error]), Cui & Cai 2008: 52 (record), Yamamoto & Hayashi 2009: 33 (host plants), Han & Liu 2010: 158 (records, distribution), Yamamoto & Hayashi 2011: 145 (records, figures), 150 (comparison with *ishiharai*), 151 (in key), Yamamoto & Hayashi 2012: 506 (redescription, figure, distribution, record), Zhao & Liu 2012: 130 (redescription, record, distribution), Tomokuni 2014: 367 (record).

Acanthosoma coralliferum: Distant 1902: 316 (English translation of original description, distribution), Esaki 1926: 199 (type material, diagnostic characters, figures, record), Stichel 1962a: 770 (catalogue, distribution), Stichel 1962b: 250 (catalogue, distribution),

Acanthosoma corallifera: Lethierry & Severin 1893: 252 (catalogue, distribution), Kirkaldy 1909: 171 (catalogue, distribution), Ahmad & Moizuddin 1990: 271 (in key, distribution).

Acanthosoma zanthoxylum: Hua 2000: 166 (listed, distribution, host plant), Göllner-Scheiding 2006: 169 (catalogue, distribution).

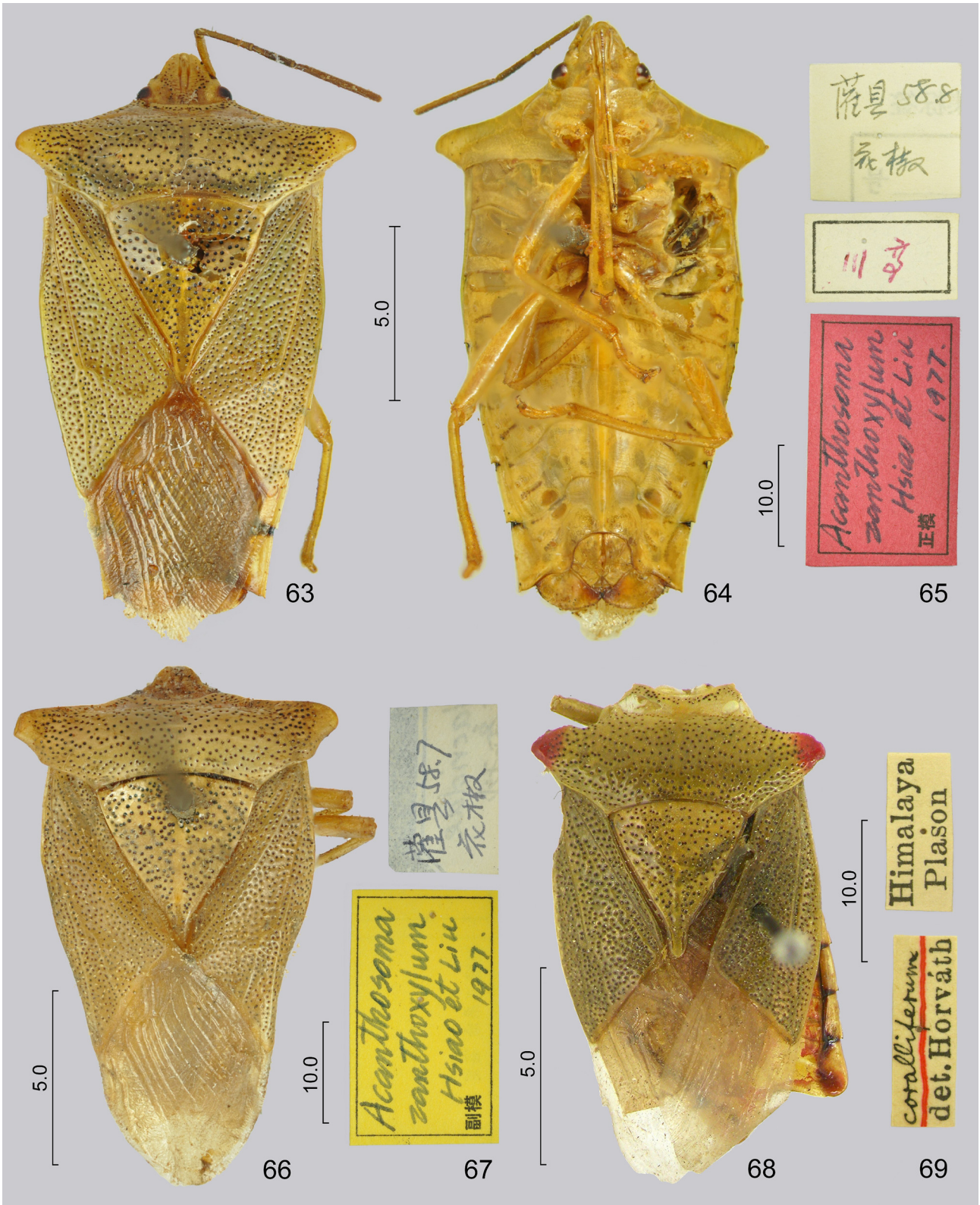
Acanthosoma distinctum (misidentification): Liu 1979: 56 (record), Zhang *et al.* 1980: 32 (listed), Chen 1985: 125 (listed), Liu 1987: 155 (in key, host plant, distribution), Zhang & Sie 1988: 70 (record, distribution), Chen 1990: 107 (redescription, records), Chen *et al.* 1995: 207 (record, host plant), Lei & Zhou 1998: 42 (listed, distribution), Fang & Wu 2001: 61 (listed).

Type material examined

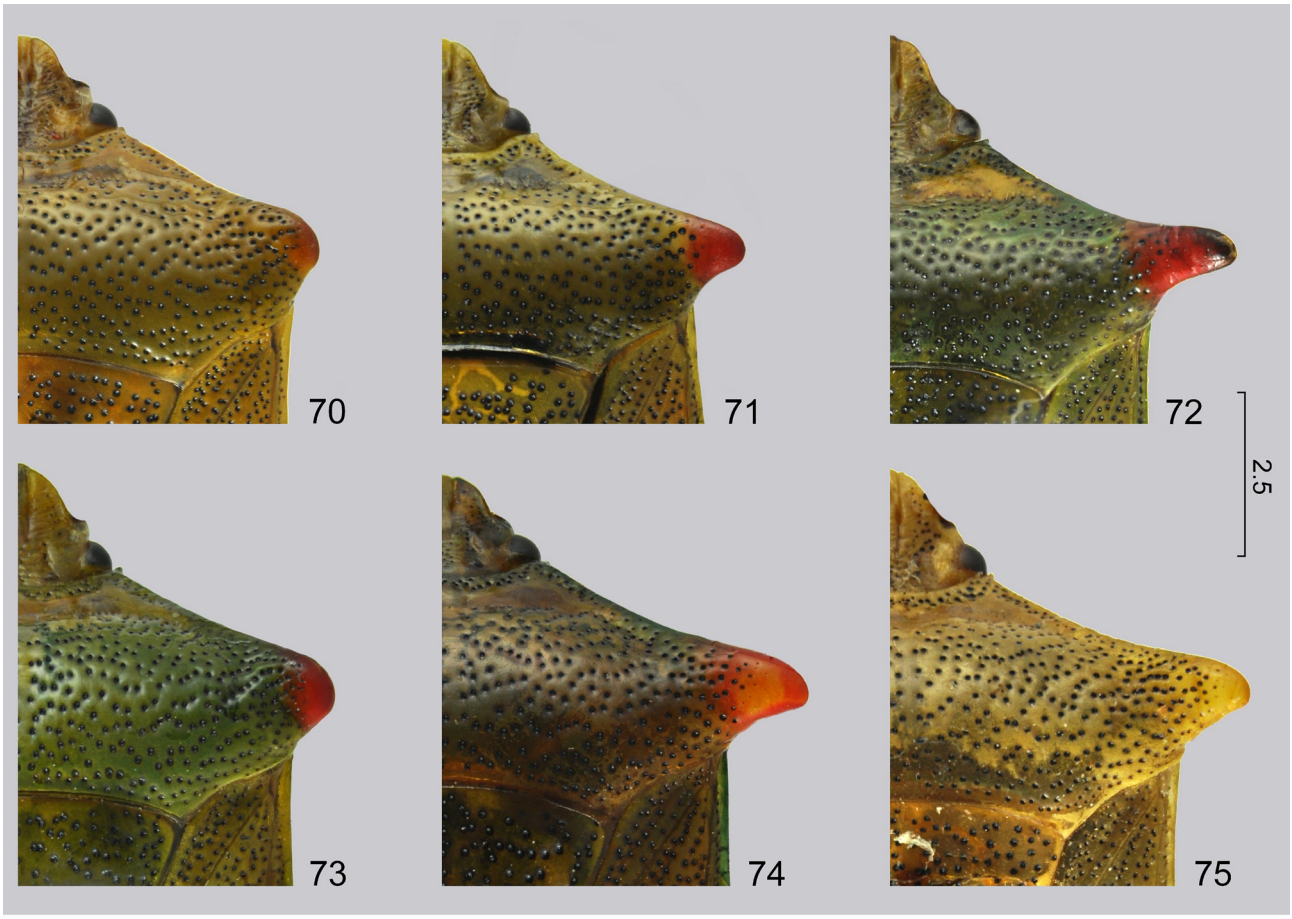
Acanthosoma coralliferum. **Holotype**: ♂, "Himalaya \ Plason" [pr], "coralliferum [Horváth's hw] \ det. Horváth [pr]" [species name underlined with red]; pinned (mounted on card after photographing), head lacking, pronotum greatly eaten by museum beetles, left fore tibia and tarsus, tarsal segment II of left mid leg, left hind leg distad of coxa, and all legs in the right side lacking, left mid(?) leg and segments I–IIb of one antenna glued on card pinned with the specimen, segment VIII and genital capsule lacking; deposited in HNHM (Figs 68–69).

Acanthosoma zanthoxylum. **Holotype**: ♀, "<Guan County> [Ch] 58.8 \ <Northern China peppercorn [= *Zanthoxylum bungeanum* Maxim.]> [Ch]" [hw], "<chuan gao [= Sichuan expressway(?)]> [Ch]" [hw rectangle with black frame], "Acanthosoma [hw] \ zanthoxylum [hw] \ Hsiao et Liu [hw] \ <holotype> [Ch, pr] 1977. [hw]" [red rectangle with black frame]; pinned, teneral, incompletely sclerotized and pigmented specimen, left pterothoracic pleuron, base of abdominal venter on the left side and femur of left hind leg damaged by museum beetle, left antenna, right antennal segment IV, tibia and tarsus of left fore leg, left mid leg distad of coxa, and tarsal segment II of right hind leg lacking; deposited in NKUM (Figs 63–65). **Paratype**: ♀, "<Guan County> [Ch] 58.7 \ <Northern China peppercorn> [Ch]" [hw], "Acanthosoma [hw] \ zanthoxylum [hw] \ Hsiao et Liu [hw] \ <paratype> [Ch, pr] 1977. [hw]" [yellow rectangle with black frame]; pinned, teneral, incompletely sclerotized and pigmented specimen, all body parts compressed and distorted, left pterothoracic pleuron damaged by museum beetle, left hind leg missing; deposited in NKUM (Figs 66–67).

Additional specimens examined. About 200 specimens were examined in connection with the present study, they are not listed in detail but their localities are marked with exclamatory points under Distribution.



FIGURES 63–69. Type material of *Acanthosoma* spp. and their labels. Fig. 63, *A. zanthoxylum* Hsiao & Liu, 1977, holotype, dorsal view; Fig. 64, same, ventral view; Fig. 65, same, labels; Fig. 66, *A. zanthoxylum*, paratype, dorsal view; Fig. 67, same, labels; Fig. 68, *A. coralliferum* Horváth, 1889, holotype; Fig. 69, same, labels. © NKUM (63–67), HNHM (68–69); photos 68–69 by courtesy of T. Németh. Scales in mm.



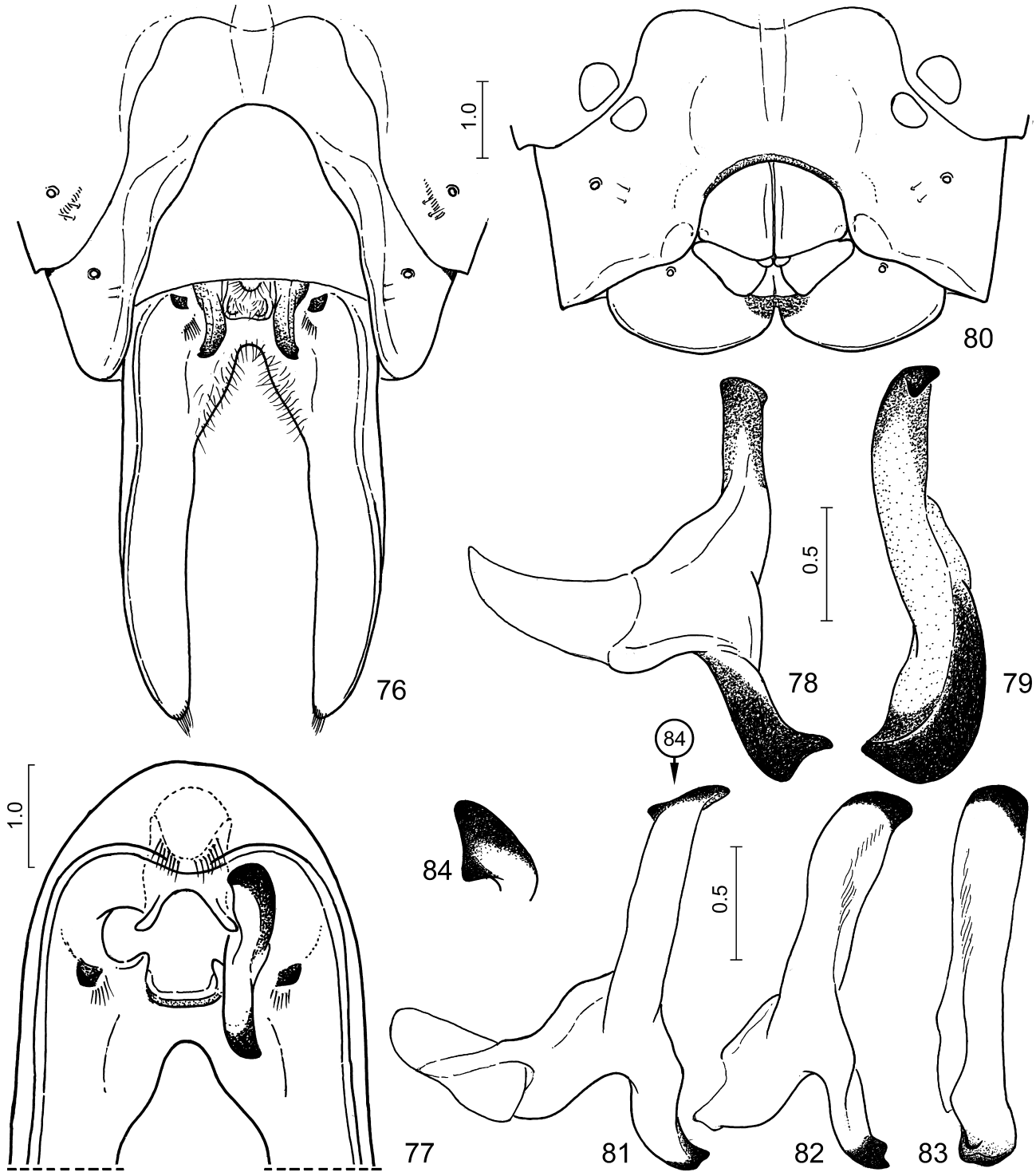
FIGURES 70–75. Intraspecific variability of humeral angle of pronotum of *Acanthosoma labiduroides* (all specimens from China). Fig. 70, Tianjin: Fu County (♂); Fig. 71, Zhejiang: Lin'an (♂); Fig. 72, Yunnan: Longyang (♂); Fig. 73, Tianjin: Fu County (♀); Fig. 74, Guizhou: Mt. Fanjing (♀), Fig. 75, Sichuan: Guan County (♀, holotype of *A. zanthoxylum*). Scales in mm.

Diagnosis. A relatively large species of *Acanthosoma* with obtuse or weakly produced humeri which are tinged with yellowish to red, unpunctured and rounded at the apex (Figs 70–75). Black markings between two connexival segments are very narrow, sometimes insignificant, and at most minute black spots are present at the posterolateral angles of ventrites. The unique genital capsule (Figs 76–77), paramere (Figs 78–79) and shape of the posterior margin of laterotergites VIII (Fig. 80) are the most reliable diagnostic characters of this species.

Description of male and female terminalia. *Male.* Genital capsule (Figs 76–77) with a pair of elongate lateral projections directed posteriad and running subparallel, far surpassing apex of membrane in rest, obtusely rounded apically with a minute tuft of setae; dorsal rim with a narrow, deep, obtusely V-shaped median incision, dorsal infolding pilose proximally; ventral rim broadly arcuate at both sides of meson, its infolding with a pair of obtuse, heavily sclerotized, pigmented denticles laterad of paramere sockets. Paramere (Figs 78–79) T-shaped. Segment X with a dorsoapical protusion (Fig. 76).

Female. Posterior margin of ventrite VII with a deep, shield-shaped median incision margined with a dark rim proximally; laterotergites IX obliquely directed and broadly separated along meson; lateral margins of laterotergites VIII subparallel in their extreme proximal portion, then obtusely broken and broadly rounded in both sides posteriorly, mesal margin (close to anus) with dark marking.

Notes. *Acanthosoma labiduroides* is a widely distributed and rather abundant species in East Asia, specimens are frequent in collections. The length of the humeral process of the pronotum shows a distinct clinal variation on a latitudinal gradient, becoming gradually larger from the northeast to the southwest (Figs 70–75); this phenomenon is similar to the one documented for *Pinthaeus sanguinipes* (Fabricius, 1781) (Pentatomidae) by Zhao *et al.* (2013). Several individuals of both sexes with humeri of various lengths and colour were examined in connection with the present study.



FIGURES 76–84. Diagnostic characters of *Acanthosoma* spp. Fig. 76, *A. labiduroides*, apex of abdomen of male, ventral view; Fig. 77, base of genital capsule, ventral view; Figs 78–79, right paramere, two different views; 80, apex of abdomen of female, ventral view; 81–84, *A. forfex*, right paramere, four different views. Arrow in Fig. 81 shows aspect of Fig. 84. Scales in mm.

Acanthosoma coralliferum was described from the Himalaya based on a single male (holotype) which was lack of genital segment (Horváth 1889). The specimen later lost its head (Esaki 1924). Esaki (1924) also reported a presumably conspecific female from Kulu [= Kullu] (India: Himachal Pradesh) deposited in HNHM; both specimens were reexamined during the present study. Although the holotype is in very bad condition (Fig. 68), we identify it as *A. labiduroides* mainly based on the humeri, the structure of the pregenital abdomen, and the shape

and colour of the intersegmental sutures between the dorsal connexival plates V–VII, and therefore the subjective synonymy of the two names is proposed. The non-type female (label data: "Himalaya, Kulu, 7000 f., C. Rost") reported by Esaki (1924) also pertains to *A. labiduroides*.

Acanthosoma zanthoxylum was described by Hsiao & Liu (1977) based on two females (the holotype and one paratype) from Sichuan and it has never been cited again by subsequent authors except of taxonomic catalogues. Reexamination and direct comparison of the type material with several females of *A. labiduroides* from various localities revealed that the holotype (Figs 63–64; see also Hsiao & Liu 1977: plate 29 fig. 408) is a light, probably not fully coloured individual of *A. labiduroides* with long humeri; the single paratype (Fig. 66) is in bad condition but it is a soft, badly distorted and imperfectly coloured female of presumably the same species. As a consequence the above synonymy is proposed.

Reexamination of the collection of NKUM revealed that Hsiao & Liu (1977) identified specimens of *A. labiduroides* as representing three different species in the following way:

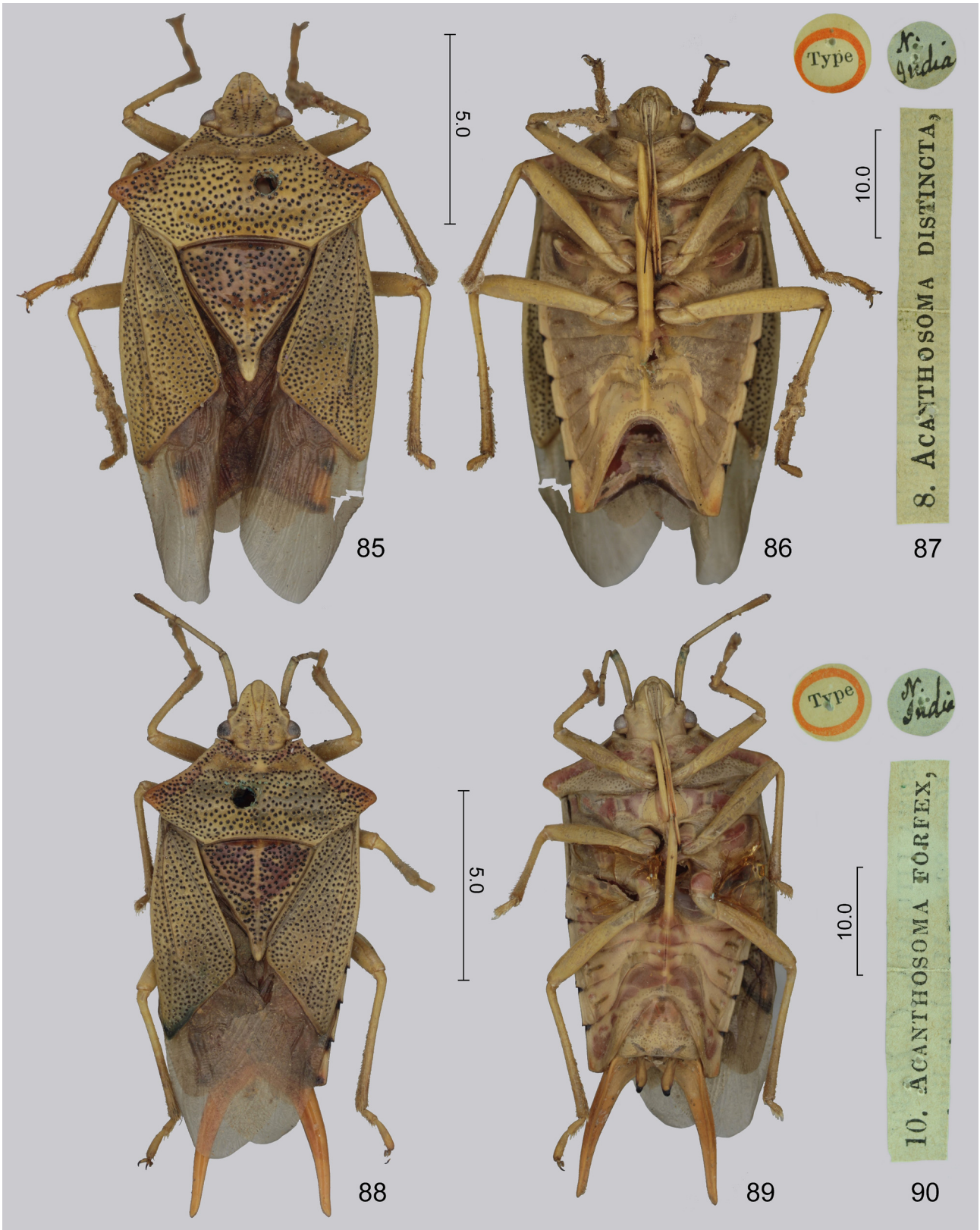
(1) all males with no regard of the humeri and females with short humeri were correctly identified as *A. labiduroides*;

(2) all but two females with long humeri were misidentified as *A. distinctum* (see further comments below under *A. forfex*);

(3) two light, apparently incompletely coloured females with long humeri were designated as the type material of *A. zanthoxylum*.

The keys, redescriptions and illustrations provided by Hsiao & Liu (1977) are consistent with the above concept. As the monograph of Hsiao & Liu (1977) became an influential publication in China representing the single ultimate identification tool of Acanthosomatidae for several subsequent authors it is very likely that nearly all of the subsequent works mentioning these species identified them in the same way.

Distribution. *Acanthosoma labiduroides* is distributed in East Siberia and the Far East Territory of Russia, the Korean Peninsula, Japan, and all over China; the western border of its area is apparently the Gobi Desert and the Plateau of Tibet. We have seen a torso of a male (holotype of *A. coralliferum*) and a female in good condition from Kullu, Himachal Pradesh; since no subsequent authors have ever recorded this species from the region, the occurrence of the species in India is in need of verification. We present the first records for Burma and Vietnam.—**INDIA**?**. Himachal Pradesh**?: Kulu? [= Kullu] (HNHM).—**RUSSIA. East Siberia**; **Far East Territory** (Vinokurov *et al.* 2010): Ussuri! (HNHM), Vladivostok! (BMNH).—**JAPAN. Honshu**: Hiroshima!, Tottori!, Totsutori!, Toyama!, Kanazawa!, Yamanasi!, Niigata!, Wakayama!, Hachioji!, Tochigi!, Fukushima!, Aomori! (SEHU), Kyoto! (HNHM), Kamikochi! (USNM); **Kyushu**: Mt. Sobo!, Nagasaki!, Kirishima!, Kagoshima! (SEHU), Mt. Hoo! (USNM); **Shikoku**!; **Hokkaido**: Otaru!, Sapporo!, Nopporo!, Tomakomai!, Oshima Subpref.!, Sorachi Subpref.! (SEHU); **Rebun Is.**! (SEHU); **Teuri Is.**! (SEHU); **Okushiri Is.**! (SEHU); **Rishiri Is.**; **Kuril Islands** (Miyamoto & Yasunaga 1989, Yamamoto & Hayashi 2012).—**KOREA. North**: Kaesong! (HNHM); **South**: Kangwon! (SEHU); **Ulleungdo** (Lee & Kwon 1991).—**CHINA. Ningxia** (Hua 2000); **Gansu**: Longnan! (NKUM), Wen County! (IZAS, NKUM), "Hweisin" [= Weixin] (1 ♀ RMNH); **Heilongjiang**: Harbin! (NKUM), Maoershan [= Mt. Mao'er] (1 ♂ RMNH); **Jilin**: Mt. Changbai! (NKUM); **Liaoning**: Dandong! (NKUM); **Hebei** (Hua 2000); **Beijing**: Mt. Baihua (Hsiao & Liu 1977); **Tianjin**: Fu County! (NKUM); **Shaanxi**: Zhouzhi! (IZAS), Ankang!, Baoji!, Feng County! (NKUM); **Shanxi**: Zuoquan, Fushan (Wang *et al.* 2007); **Hubei**: Wuhan!, Shennongjia!, Hefeng!, Wuchang!, Zhuxi!, Xingshan County! (NKUM); **Henan**: Jiyuan: Mt. Wangwu! (NKUM); **Hunan**: Xiangxi (Zhang & Sie 1992); **Jiangxi**: Mt. Lu! (NKUM, IZAS), Mt. Wuyi! (IZAS); **Zhejiang**: Lin'an!, Qingyuan!, Mt. Fengyang! (NKUM), Mt. Tianmu! (NKUM, IZAS); **Sichuan**: Xiaojin!, Luding!, Baoxing!, Ma'erkang!, Yajiang!, Xichang: Mt. Lu! (NKUM), Nanjiang! (IZAS), Mt. Emei! (NKUM, IZAS), Guan County! (holotype of *zanthoxylum*, NKUM); **Guizhou**: Guiyang!, Mt. Fanjing!, Mt. Leigong! (NKUM), Shuicheng! (IZAS); **Yunnan**: Lijiang!, Gongshan County!, Longyang!, Baoshan! (NKUM), Weixi Lishu!, Zhongdian! (NKUM, IZAS); **Guangxi**: Huaping!, Xing'an: Mao'ershan! (NKUM), Longteng! (IZAS), Longsheng! (NKUM, IZAS); **Tibet**? (Zhang & Sie 1988, as *distinctum*).—**BURMA (MYANMAR).** Chin State, Chin Hills, 6500 ft., 6.iv.2000, coll. W.G. Ullrich > coll. C.J. Drake (3 ♂♂ USNM).—**VIETNAM. Lao Cai Prov.**: "Chapa" [= Sa Pa], v.1916, leg. R.V. de Salvaza (1 ♂ BMNH).



FIGURES 85–90. Lectotypes of *Acanthosoma* species and their labels. Fig. 85, *A. distinctum* Dallas, 1851, dorsal view; Fig. 86, same, ventral view; Fig. 87, same, labels; Fig. 88, *A. forfex* Dallas, 1851, dorsal view; Fig. 89, same, ventral view; Fig. 90, same, labels. © BMNH. Scales in mm.

Acanthosoma forfex Dallas, 1851

Figs 85–96

Acanthosoma forfex Dallas, 1851: 308. Syntype(s): ♂, N. India; BMNH!
Acanthosoma distinctum Dallas, 1851: 304. Syntype(s): ♂, N. India; BMNH! **New subjective synonym.**
Acanthosoma forficula (non Jakovlev, 1880): Hsiao & Liu (1977: 175). Misidentification.

Acanthosoma forfex: Herrich-Schäffer 1853: 3 (listed, distribution), Walker 1867: 394 (listed, record), Stål 1876: 115 (as of unknown identity, listed, distribution), Distant 1879: 7 (record), Atkinson 1889: 24 (reproduction of original description, distribution), Lethierry & Severin 1893: 253 (catalogue, distribution), Distant 1902: 317 (redescription, distribution), Kirkaldy 1909: 171 (catalogue, distribution), Stichel 1962a: 770 (catalogue, distribution), Stichel 1962b: 251 (catalogue, distribution), Ahmad *et al.* 1979: 8 (listed), 10 (listed, habitus, records, host plant, phenology), 46 (listed), Schaefer & Ahmad 1987: 25 (host plant), Ahmad & Moizuddin 1990: 271 (in key, redescription, habitus, figures, records, host plant).
Lindbergicoris forfex: Göllner-Scheiding 2006: 179 (catalogue, distribution).
Acanthosoma distinctum: Herrich-Schäffer 1853: 3 (listed, distribution), Reuter 1881: 75 (redescription, record), Distant 1902: 316 (redescription, habitus, figures, distribution), Oshanin 1906: 168 (catalogue, distribution), Oshanin 1912: 17 (catalogue, distribution), Esaki 1926: 199 (identity of previous records from Japan, distribution), Göllner-Scheiding 2006: 167 (catalogue, distribution).
Acanthosoma distincta: Walker 1867: 393 (listed, record), Stål 1876: 113 (listed, distribution), Atkinson 1889: 22 (reproduction of original description, distribution), Lethierry & Severin 1893: 253 (catalogue, distribution), Kirkaldy 1909: 171 (catalogue, distribution), Ahmad *et al.* 1979: 8 (listed), 10 (listed, distribution), Ahmad & Moizuddin 1990: 271 (in key, distribution).
Acanthosoma forficula (misidentification): Hsiao & Liu 1977: 175 (in key, redescription, photo, figure, distribution), Chao 1982: 51 (listed), Wu 1984: 38 (records, host plants), Chen 1985: 125 (listed), Chen 1990: 107 (redescription, records, host plant, phenology), Lei & Zhou 1998: 43 (listed), Liu 1992: 132 (records, distribution), Xiong & Liu 1993: 201 (records), Lin *et al.* 1999: 96 (redescription, habitus, host plant, distribution), Hua 2000: 166 (distribution, host plants), Chen & Liu 2001: 279 (listed, distribution), Fang & Wu 2001: 61 (listed, host plant), Ren *et al.* 2006: 274 (record), Wu *et al.* 2006: 409 (listed), Wu *et al.* 2007: 375 (listed), Cui & Cai 2008: 52 (record).

Type material examined

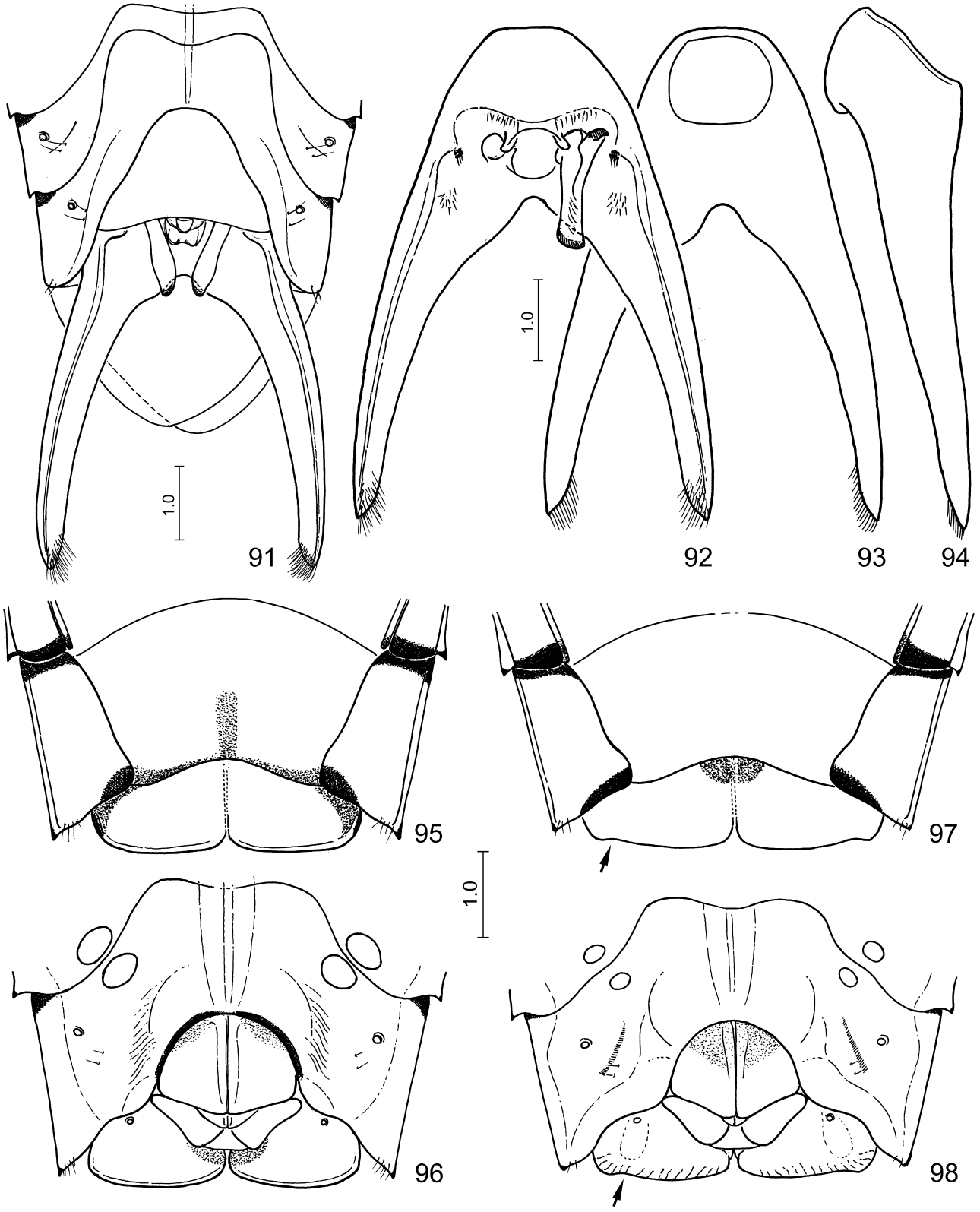
Acanthosoma forfex. **Lectotype** (present designation): ♂, "Type" [pr circle with red border], "N. \ India" [gray circle, hw], "10. ACANTHOSOMA FORFEX," [pr, cut from p. 394 of Walker (1867)]; pinned, segments III–IV of both antennae, tarsal segment II of right fore, right and left mid, and left hind legs lacking; deposited in BMNH (Figs 88–90).

Acanthosoma distinctum. **Lectotype** (present designation): ♂, "Type" [pr circle with red border], "N. \ India" [gray circle, hw], "8. ACANTHOSOMA DISTINCTA," [pr, cut from p. 393 of Walker (1867)]; pinned, both antennae, tarsus of right mid leg, tarsal segment II of right and left hind legs, segment VIII and genital capsule lacking; deposited in BMNH (Figs 85–87).

Additional specimens examined. PAKISTAN. Punjab: Murree, leg. F. Stoliczka, F.S. 118, coll. W.L. Distant 1911-383 (2 ♂♂ BMNH).—**INDIA. West Bengal**: "Ghoom-Sookia Bokhi" [= Ghum to Sukhia Pokhri road], 7200', 30.iv.[19]18, on ground, leg. H. Stevens, B.M. 1922-307 (1 ♂ BMNH); **Uttarakhand**: Kumaon, W. Almora, leg. H.G.C., B.M. 1927-409 (1 ♂ BMNH).—**NEPAL.** 2 miles SE of Shikha, 7000–8000', 21–22.v.1954, J. Quinlan, B.M. Nepal Expedition, B.M. 1954–540 (1 ♂ BMNH), Bagmati, Dunche [= Dhunche], 17.ix.1975, leg. S. Takagi (1 ♂ SEHU), Bagmati, Siwapuri Dara, 18–19.ix.1987, leg. H. Takizawa (1 ♀ SEHU), Gandaki, Marsyandi Valley, Dharapani, Latamarang, 1900–2400 m, 9.vi.1988, leg. M. Suwa (1 ♂ 1 ♀ SEHU).—**CHINA. Zhejiang**: Qingyuan, Baishanzu, 1300 m, 19.iv.1994, leg. Y.Z. Xu (1 ♀ NKUM); **Sichuan**: Mt. Emei, Jiulaodong, 1800–1900 m, 31.viii.1957, leg. Z.Y. Wang (1 ♀ IZAS); **Yunnan**: Kunming, Qiongzhusi, 4.vi.1957, leg. D. Panfilov (1 ♀ IZAS), Nanjian County, Wuliang Mts., Sheyaoqing, Nanjian County, 2200 m, 6.xi.2001, leg. W.B. Zhu (1 ♂ NKUM), Nanjian County, Mt. Fenghuang, 2400 m, 3.xi.2001, collector unknown (1 ♀ NKUM), Lushui, Pianma, 2300 m, 29.v.1981, leg. S.Y. Wang (1 ♀ NKUM); Lushui, 1350 m, 27.v.1981, leg. S.Y. Wang (1 ♂ NKUM), Longyang, Baihualing, 1550 m, 14.viii.2006, leg. Z.H. Fan (1 ♀ NKUM).—**BURMA (MYANMAR).** Chin State, Chin Hills, 6500 ft., 6.iv.2000, coll. W.G. Ullrich > C.J. Drake (3 ♂♂ 3 ♀♀ USNM).

Diagnosis. A relatively small species of *Acanthosoma* (body length: 12–16 mm), but females are significantly larger than males. It can be recognized by the concave lateral margin of the pronotum which is, usually together with the anterior margin, broadly orange, continued in a short, obtuse humeral process directed posterolaterad. Each connexival segment is margined with black anteriorly and posteriorly, the anterior marking is continuous with

a minute patch at the anterolateral angle of the ventrite of the same segment (Figs 86, 88–89, 91, 95–96). Abdomen of male with a strongly elevated median keel, middle portions of intersegmental sutures between ventrites V/VI and VI/VII strongly curved anteriad (Figs 88–89).



FIGURES 91–98. Diagnostic characters of *Acanthosoma* spp. Fig. 91, *A. forfex*, apex of abdomen of male, ventral view; Fig. 92, genital capsule, ventral view; Fig. 93, same, dorsal view; Fig. 94, same, lateral view; Fig. 95, same, apex of abdomen of female, dorsal view; Fig. 96, same, ventral view; Fig. 97, *A. forficula*, apex of abdomen of female, dorsal view; Fig. 98, same, ventral view. Scales in mm.

The species is superficially similar to *A. forficula* Jakovlev, 1880. Males of *A. forfex* can be distinguished from the above mentioned species by their male genitalia (Figs 81–84, 91–94) (*A. forficula*: genital capsule with a pair of rather robust and diverging lateral projections, lower arm of paramere much more strongly bifurcate, with lobe-like distal portions). Females of *A. forfex* can be recognized by the posteriorly very weakly convex, rather truncate laterotergites VIII (Figs 95–96) and the large, narrowly separated Pendergrast's organs of ventrites VI and VII (*A. forficula*: posterior outline of laterotergites VIII slightly excised sublaterally (Figs 97–98: arrow) and Pendergrast's organs are small).

Male and female terminalia. *Male.* Genital capsule (Figs 91–94) with a pair of elongate, posteriorly directed, weakly diverging lateral projections slightly curved inward and weakly tapering distally, apically with a tuft of setae; dorsal rim with a small, obtuse concavity medially; ventral rim broadly arcuate at both sides of meson, its infolding with two pairs of setal tufts laterad of paramere sockets. Paramere (Figs 81–84) T-shaped, lower arm weakly excised apically. Segment X with a dorsoapical protusion (Fig. 91).

Female (Figs 95–96). Posterior margin of ventrite VII with a deep, broadly U-shaped incision margined with black, surrounding valvifers VIII; laterotergites IX obliquely directed and adjacent along meson; posterior margin of laterotergites VIII truncate, mesal margin (close to anus) with dark marking, reaching about level of posterolateral angles of abdominal segment VII posteriorly.

Notes. Both *Acanthosoma forfex* and *A. distinctum* were described based on an unspecified number of specimens from "N India". One male syntype of each were found in BMNH and they are designated as lectotypes of the respective species. The lectotype of *A. forfex* (Figs 88–89) is in good condition whilst that of *A. distinctum* (Figs 85–86) lacks genital capsule. Nevertheless, a careful direct comparison of the two lectotypes left no doubt about their conspecificity, therefore the two species are regarded synonymous. Because the two names were proposed in the same work, acting as First Reviser we hereby give precedence to *A. forfex* over *A. distinctum* (ICZN 1999, Art. 24.2.2).

Both *Acanthosoma forfex* and *A. distinctum* were recorded from various East Asian countries based on misidentifications:

(1) All records of *Acanthosoma distinctum* (sometimes with incorrect gender agreement as *A. distincta*) from Japan (Distant 1883: 415, Scott 1874: 290, Uhler 1896: 257, Matsumura 1913: 127, Esaki 1915: 96–97, Esaki 1916a: 204, Esaki 1916b: 126, Matsumura 1930: 119) pertain to other species of *Acanthosoma*, mainly *A. denticaudum* Jakovlev, 1880 and *A. expansum* Horváth, 1905 (Esaki 1926). *Acanthosoma forfex* (= *A. distinctum*) does not occur in Japan (Miyamoto & Yasunaga 1989, Yamamoto & Hayashi 2012).

(2) The biological species recorded by Chinese authors as *Platacantha forfex* (Hsiao & Liu 1977: 173, Zhang & Sie 1988: 71, Liu 1992: 131, Hu 1995: 69, Hua 2000: 167) or *Lindbergicoris forfex* (Zheng & Wang 1995: 17, 18, 20, 24, 25, Liu & Wang 2005: 273) was recognized as *Lindbergicoris hastatus* Liu & Ding, 2008 by Liu & Ding (2008); the specimen photographed by Hsiao & Liu (1977: plate 28 fig. 395) was designated as a paratype of the latter species and it was reexamined by us during the present study. Taxonomic problems in connection with this species complex will be treated in another paper in preparation.

(3) Liu & Ding (2008) correctly pointed out that previous records of *Acanthosoma forfex* from China were misidentifications and presented a record from Foping County in Shaanxi. Reexamination of their voucher specimen deposited in NKUM concluded that this latter record was based on misidentification too and pertains to another species of *Acanthosoma* not treated in the present paper.

(4) *Acanthosoma distinctum* was redescribed and recorded from several localities in China by Hsiao & Liu (1977: 176). The specimen photographed by these authors (Hsiao & Liu 1977: plate 29, fig. 406) as *A. distinctum* is deposited in NKUM (locality: Guangxi, Longsheng) and it was examined during the present study; it is a female of *A. labiduroides* Jakovlev, 1880 with long humeri. Several other specimens from the localities listed by Hsiao & Liu (1977) were examined too. Apparently all subsequent Chinese authors (Liu 1979: 56, Zhang *et al.* 1980: 32, Chen 1985: 125, Liu 1987: 155, Zhang & Sie 1988: 70, Chen 1990: 107, Chen *et al.* 1995: 207, Lei & Zhou 1998: 42, Fang & Wu 2001: 61) misidentified *A. distinctum* in the same way.

(5) The record from Taiwan by Ishihara (1943: 495) is based on misidentification and pertains to another species of *Acanthosoma*.

In spite of the fact that the records of both *A. forfex* and *A. distinctum* from China are based on misidentifications, *A. forfex* indeed occurs in China, and it was recorded by Hsiao & Liu (1977) as *A. forficula* Jakovlev, 1880. The redescription provided by these authors does not fit *A. forficula*, but it perfectly fits *A. forfex*;

voucher specimens of T.Y. Hsiao (deposited in NKUM) were seen during the present study, all of them misidentified. Because the work by Hsiao & Liu (1977) has became the ultimate resource of information on Acanthosomatidae in China, presumably most or all of the subsequent Chinese authors identified this species in the same sense, but since no voucher specimens of these subsequent records have been seen, most of them are regarded as questionable. Some of the Chinese records of *A. forficula* might even represent *A. labiduroides* as we have seen a specimen misidentified in this way.

The record by Distant (1879) from Murree (now in northern Pakistan) is confirmed based on voucher specimens deposited in BMNH examined by us. Ahmad *et al.* (1979) and Ahmad & Moizuddin (1990) recorded the species from localities in northern Pakistan, including Murree. Although their habitus illustration (Ahmad & Moizuddin 1990: 296, fig. 1) is somewhat inaccurate we believe that their records indeed pertain to *A. forfex*.

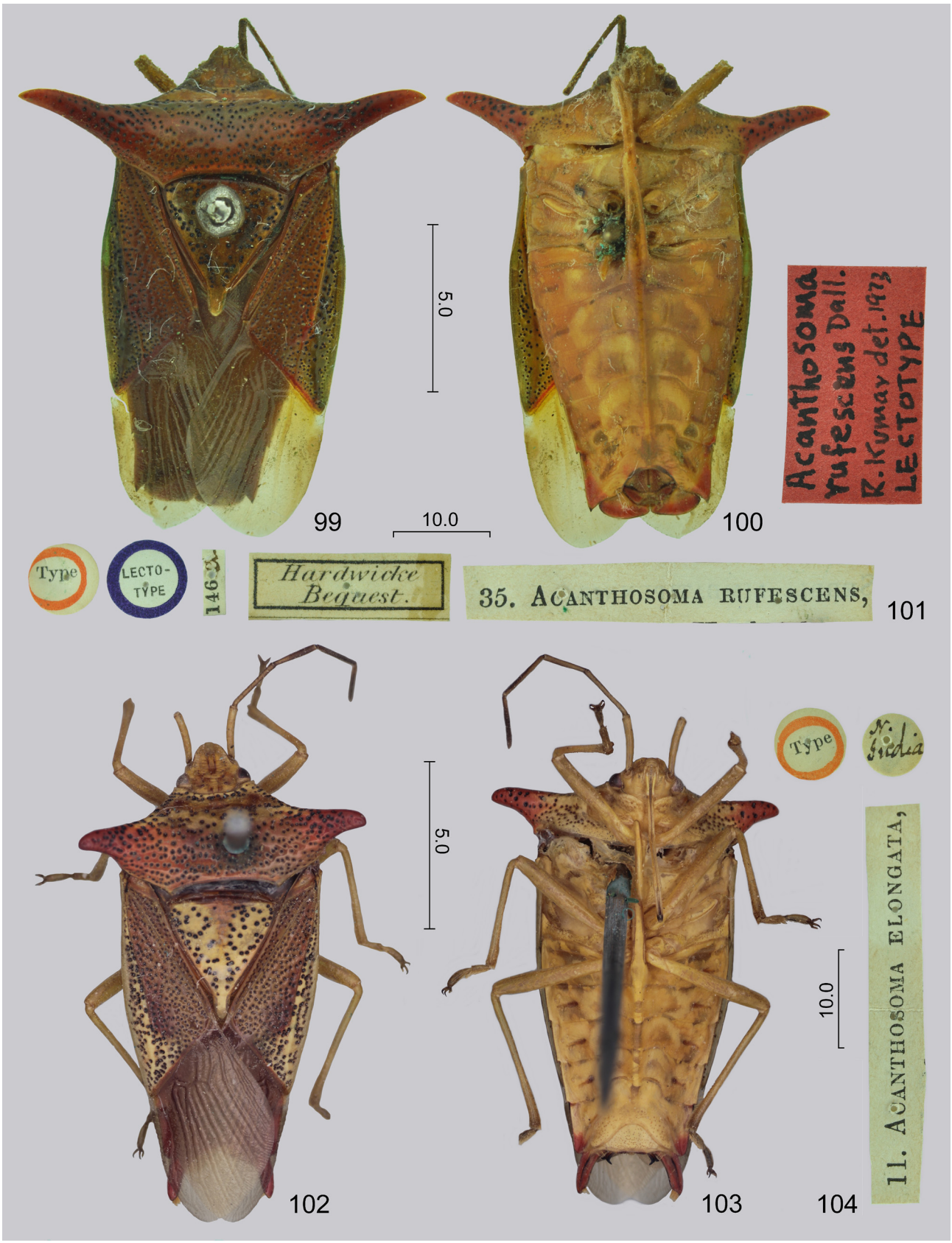
Distribution. Because of the confusion about its identity in the literature the distribution of *Acanthosoma forfex* is uncertain. Potentially it is a Himalayan species; we have seen specimens from Pakistan, northern India, Nepal, western China (Sichuan, Yunnan), and northwestern Burma. The record from Punjab (Distant 1902) refers either to the present India or Pakistan. At least some of the records of *A. forficula* from China certainly pertain to this species, but as these misidentified records are unreliable, our opinion is that it is more advisable to omit them; the distribution all over China needs to be clarified. A single female from Zhejiang Province in eastern China examined by us suggests that the species might have a rather broad distribution in China. The present record from Burma represents the first record from the country.—**PAKISTAN. Punjab**: Murree!; **Gilgit Baltistan**: Gilgit (Ahmad *et al.* 1979, Ahmad & Moizuddin 1990).—**INDIA. West Bengal**: Ghum!, Darjeeling (Reuter 1881, as *distinctum*); **Uttarakhand**!—**NEPAL**!—**CHINA. Zhejiang**!; **Fujian**!; **Yunnan**!; **Hebei**? (Wu *et al.* 2006, 2007, as *forficula*); **Shaanxi**? (Ren *et al.* 2006, as *forficula*); **Henan**? (Cui & Cai 2008, as *forficula*); **Hubei**? (Lei & Zhou 1998, as *forficula*); **Fujian**? (Chao 1982, Lin *et al.* 1999, as *forficula*); **Guizhou**? (Wu 1984, Xiong & Liu 1993, as *forficula*); **Jiangxi**?; **Hunan**? (Hua 2000, as *forficula*).—**BURMA (MYANMAR). Chin State**!

Acanthosoma rufescens Dallas, 1851, reinstated combination

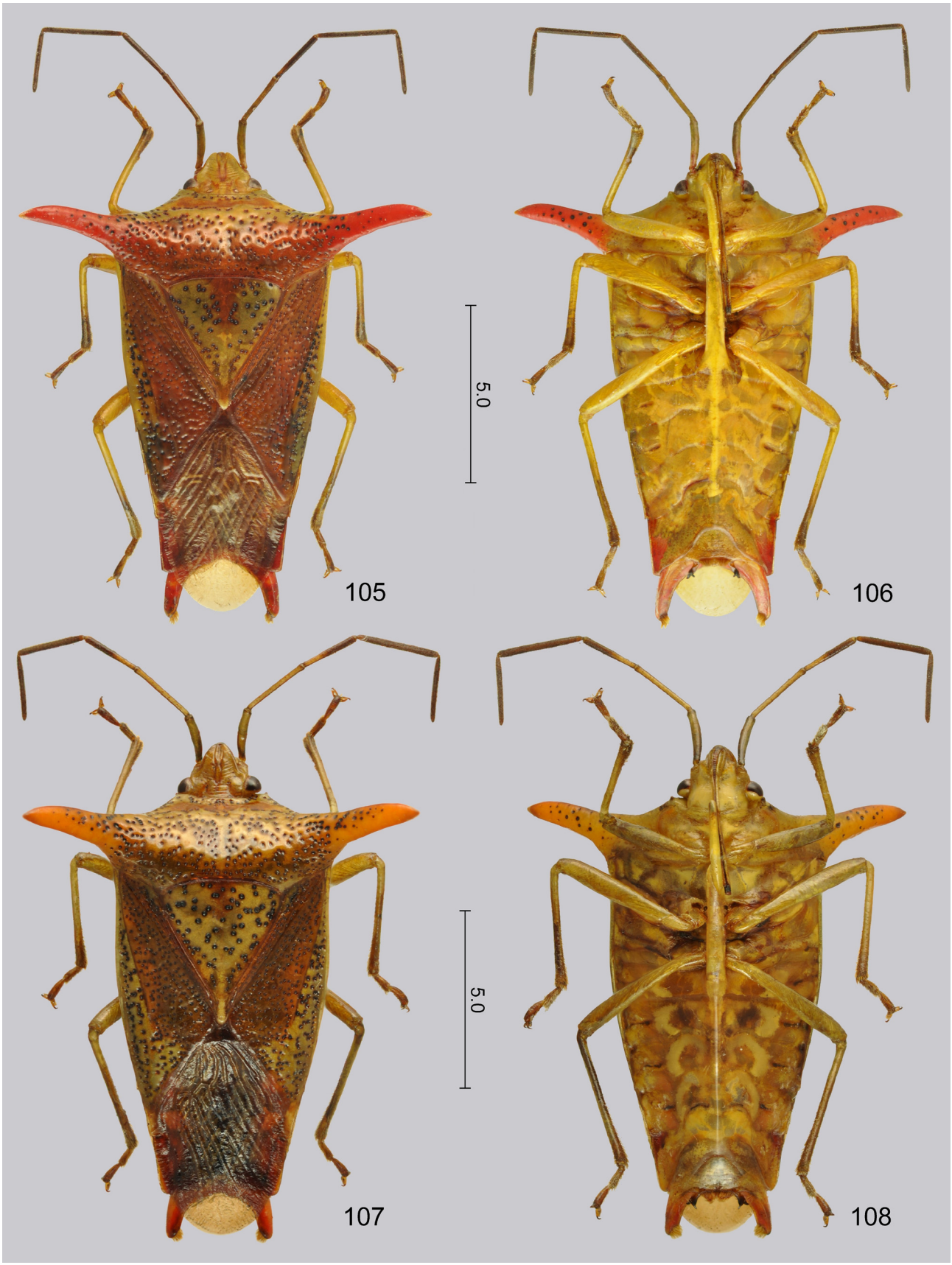
Figs 99–106, 109–113, 164–165, 169–170

Acanthosoma rufescens Dallas, 1851: 311. Lectotype (Kumar 1974: 54): ♀, unknown locality; BMNH!
Acanthosoma elongatum Dallas, 1851: 309. Syntypes: ♂, ♀, North India; BMNH! **New subjective synonym.**
Anaxandra hamata Reuter, 1881: 78. Syntype(s): ♂, [India:] Darjeeling; NRMS! **New subjective synonym.**
Anaxandra taurina (non Kirkaldy, 1909): Hsiao & Liu (1977: 171) and subsequent authors. Misidentification.

Acanthosoma elongatum: Herrich-Schäffer 1853: 3 (listed, distribution), Stål 1876: 115 (listed, distribution).
Acanthosoma elongata: Walker 1867: 394 (record), Atkinson 1889: 24 (reproduction of original description, distribution), Lethierry & Severin 1893: 253 (catalogue, distribution).
Acanthosoma rufescens: Herrich-Schäffer 1853: 4 (listed), Walker 1867: 399 (listed), Kumar 1974: 53 (lectotype designation, figures).
Sastragala rufescens: Stål 1871: 639 (diagnostic characters).
Anaxandra rufescens: Stål 1876: 114 (listed, distribution), Atkinson 1889: 30 (reproduction of original description, record), Lethierry & Severin 1893: 255 (catalogue, distribution), Distant 1902: 322 (redescription, records), Kirkaldy 1909: 174 (catalogue, distribution), Chakraborty *et al.* 1994: 475 (listed).
Anaxandra hamata: Atkinson 1889: 34 (English translation of original description, distribution), Lethierry & Severin 1893: 255 (catalogue, distribution), Distant 1902: 322 (English translation of original description, identity, distribution), Kirkaldy 1909: 174 (catalogue, distribution), Chakraborty *et al.* 1994: 475 (listed).
Sastragala elongata: Distant 1900: 228 (generic placement), Distant 1902: 320 (redescription, record), Kirkaldy 1909: 172 (catalogue, distribution), Ahmad & Moizuddin 1990: 287 (in key, distribution).
Anaxandra taurina (misidentification): Hsiao & Liu 1977: 171 (in key, redescription, photo, figure, distribution), Liu 1980: 234 (diagnostic characters), Wu 1984: 38 (listed, record, as *Anaxandera* [inadvertent error] *taurina*), Liu 1987: 152 (in key, distribution), Zhang & Sie 1992: 250 (redescription, habitus, distribution), Lin & Zhang 1993: 134 (redescription, habitus, distribution), Chen 1987: 45 (listed), Li *et al.* 1989: 39 (listed), Lin & Zhang 1993: 134 (redescription, habitus, distribution), Bu & Zheng 1997: 208 (redescription, figure, record, distribution), Lin *et al.* 1999: 97 (redescription, habitus, distribution), Hua 2000: 166 (listed, distribution), Bu & Wang 2002: 239 (redescription, distribution), Xue & Bu 2006: 226 (redescription, distribution), He *et al.* 2007: 109 (listed).



FIGURES 99–104. Lectotypes of *Acanthosoma* species and their labels. Fig. 99, *A. rufescens* Dallas, 1851, dorsal view; Fig. 100, same, ventral view; Fig. 101, same, labels; Fig. 102, *A. elongatum* Dallas, 1851, dorsal view; Fig. 103, same, ventral view; Fig. 104, same, labels. © BMNH. Scales in mm.



FIGURES 105–108. ***Acanthosoma*** **spp., males.** Fig. 105, *A. rufescens* (China: Yunnan: Ruili), dorsal view; Fig. 106, same, ventral view; Fig. 107, *A. sichuanense* (China: Yunnan: Baoshan), dorsal view; Fig. 108, same, ventral view. Scales in mm.

Type material examined

***Acanthosoma rufescens*. Lectotype** (Kumar 1974: 54): ♀, "Type" [pr circle with red border], "LECTO- \ TYPE" [pr circle with dark blue border], "146 [pr] a [hw]", "Hardwicke \ Bequest." [pr, with black frame], "35. ACANTHOSOMA RUFESCENS," [pr, cut from p. 399 of Walker (1867)], "Acanthosoma \ rufescens Dall. \ R. Kumar det. 1973 \ LECTOTYPE" [red rectangle, hw]; pinned, left antenna, right antennal segments III–IV, left fore tibia and tarsus, right hind leg distad of trochanter, and all remaining legs distad of coxa lacking; deposited in BMNH (Figs 99–101).

***Acanthosoma elongatum*. Lectotype** (present designation): ♂, "Type" [pr circle with red border], "N. \ India" [hw circle], "11. ACANTHOSOMA ELONGATA," [pr, cut from p. 394 of Walker (1867)]; pinned, left antennal segments II–IV, left fore tarsus and segment II of right hind tarsus lacking; deposited in BMNH (Figs 102–104).

***Anaxandra hamata*. Lectotype** (present designation): ♂, "Darjee- \ ling." [pr], "*Staudinger.*" [pr], "Type." [pr], "hamata \ Typ. Reut." [Reuter's hw], "Typus" [red rectangle with black frame, pr]; pinned, wings spread, segments III–IV of right antenna and segment II of left mid tarsus lacking; deposited in NHRS (NHRS-GULI 000011373). **Paralectotype**: ♀, "Darjee- \ ling." [pr], "*Staudinger.*" [pr], "Type." [pr], "Allotypus" [red rectangle with black frame, pr]; pinned, wings spread, segments III–IV of right antenna lacking; deposited in NHRS (NHRS-GULI 000011372).

Additional specimens examined. PAKISTAN. Punjab: Murree, coll. E.T. Atkinson, B.M. 92-6 (1 ♂ BMNH), Murree, [locality in illegible handwriting], coll. W.L. Distant, B.M. 1911-383 (1 ♀ BMNH), Khyra Gully [= Khaira Gali], coll. H. Roberts, B.M. 1925-395 (1 ♂ 1 ♀ BMNH).—**INDIA. Uttarakhand**: W. Almore, Kumaon, H.G.C., coll. G.C. Champion, B.M. 1927-409 (2 ♂♂ BMNH), Uttaranchal [= Uttarakhand], 30 km N of Bageshwar, W of Loharket, 1800 m, 24.vi.2003, leg. B. Greenway (1 ♂ MMBC), ca. 55 km NE of Bageshwar, E of Munsyiari, 220 m, 7.vii., leg. B. Greenway (1 ♀ MMBC), Garhwal, Saklana Tehri, Uniyal Gaon, 5500 ft., 22.v.1946, on leaves of *Alnus nitida*, leg. J.C. Lutz (1 ♀ USNM); **Sikkim**: Gangtok, 1–4.v.1984, leg. A. Hamet (1 ♀ ZJPC), unspecified locality, coll. W.L. Distant, B.M. 1911-383 (1 ♀ BMNH), coll. E.T. Atkinson, B.M. 92-6 (1 ♂ BMNH, genitalia dissected); **West Bengal**: Darjiling [= Darjeeling], coll. W.L. Distant, B.M. 1911-383 (1 ♀ BMNH), same locality, unknown date and collector (1 ♀ RMNH); **Nagaland**: Nága Hills, leg. W. Doherty, coll. W.L. Distant, B.M. 1911-383 (1 ♂ 3 ♀♀ BMNH).—**NEPAL.** Those, leg. T.D. Bourdillon, British Nepal Expedition 1952, B.M. 1955-802 (1 ♀ BMNH).—**CHINA. Yunnan**: Ruili, Mengti, 2.ix.1979, leg. H.G. Zou (1 ♂ 2 ♀$ NKUM), Ruili, Mengxiu, 3.ix.1979, leg. Z.P. Ling (1 ♂ NKUM), Ruili, Botanical Garden, 1.viii.2006, leg. X. Zhang (1 ♂ NKUM), same locality and date, leg. H. Guo (1 ♂ NKUM), Jingdong, Liyue, Luoshuidong, 1750–1950 m, 17.xi.2001, leg. W.B. Zhu (1 ♂ NKUM), Jinping, Zhangpotou, 1000 m, 22.v.1956, leg. K.R. Huang (1 ♀ IZAS), Dehong Dai and Jingpo Autonomous Prefecture, Yingjiang, Tongbiguan, 1324–1369 m, 18.v.2009. leg. B. Cai (1 ♀ NKUM), Xishuanbanna, Menglong, Mengsong, 1600 m, 26.iv.1958, leg. F.J. Pu (1 ♂ IZAS), same locality, altitude and collector, 27.iv.1958 (1 ♀ IZAS), same locality, altitude and date, leg. S.Y. Wang (1 ♀ IZAS), same locality, altitude and date, leg. H.H. Cheng (1 ♂ NKUM).—**TAIWAN. Taitung County:** Haituan, Provincial Rd. No. 20 (157.5 km), 19.vi.2005, light trap, leg. J.H. Chen, NMNS ENT 5019-145 (1 ♂ NMNS).—**BURMA (MYANMAR). Shan State**: Taunggy, 7–28.vi.1952, leg. G.B. Vogt (2 ♀♀ USNM).—**THAILAND. Chiang Mai Prov.**: Chiang Mai, iv.1928, Dr & Mrs J.W. McKean (1 ♀ USNM).—**LAOS. Houaphanh Prov.**: Phu Phan Mt., 20°12'N 104°01'E, 1500–1900 m, 17.v.–3.vi.2007, leg. V. Kubáň, Entomological Expedition "Laos 2007" (1 ♀ MMBC), Ban Saluei, Phu Phan Mt. env., 20°13'N 103°59'E, 1300–2000 m, 6–18.iv.2004, leg. J. Bezděk (1 ♂ NMPC); Ban Saluei env., 30 km S of Xam Neua, Phoi Pan Mt., 1500 m, 6–17.v.2004, leg. P. Kresi & F. Kantner (1 ♂ 1 ♀ ZJPC), unspecified locality, leg. R. Vitalis de Salvaza (1 ♀ RMNH).—**VIETNAM. Lao Cai Prov.**: Sin Chai, Hoáng Lién N.P., Tram Ton, 1936 m, 22°21.16'N 103°46.48'E, 13.xii.2008, at light, leg. L. Papp, L. Peregovits & L. Ronkay, VN2008PL05 (1 ♂ HNHM); same locality, 1900 m, 22°20.94'N 103°46.20'E, 16–17.xii.2008, leg. L. Papp, L. Peregovits & L. Ronkay, VN2008PL11 (1 ♂ HNHM), "Lao Kay" [= Lao Cai], coll. E. le Moult (1 ♀ RMNH); **Tonkin** [= N Vietnam]: vi.1917, leg. R.V. de Salvaza (1 ♀ BMNH).

Diagnosis. A relatively small species of *Acanthosoma* with the humeri provided with a pair of horizontally or somewhat anterolaterally directed processes of variable length (cf. Figs 99, 101, 105) and the genital capsule bearing a pair of projections laterally (Figs 102–103, 105–106, 109–110). It is similar to *A. sichuanense* (see below) in habitus but it can readily be distinguished from the latter species based on the following characters: antennal segment IIa subequal in length or slightly longer than IIb; posterior half of pronotum and humeral processes bright red; with a triangular red marking medially extending from base to middle of scutellum. The most

obvious diagnostic character of this species is the much longer lateral processes of genital capsule (Figs 105–106); the parameres (Figs 111–112) are also different from those of *A. sichuanense*.

Description of male and female terminalia. *Male.* Genital capsule (Figs 109–110) with a pair of lateral projections directed posteriad, reaching about tip of membrane in rest, each with a tuft of setae apically; dorsal rim weakly sinuate around middle; ventral rim arcuate at both sides of meson, with a pair of setal patches submedially, its infolding with two pairs of setal tufts laterad of paramere sockets and another pair subapically. Paramere (Figs 111–112) with a biramous apex, with one stout and one elongate branch, stem with a tubercle basolaterally. Segment X with a dorsoapical, bifurcated protrusion.

Female (Fig. 113). Posterior margin of ventrite VII with a deep, U-shaped incision margined with black, and a pair of red elliptic patches basad of valvifer VIII; posterior margin of laterotergites VIII truncated.

Notes. *Acanthosoma rufescens* and *A. elongatum* were described from North India and unknown locality, respectively. A lectotype of *A. rufescens* (Figs 99–100) was designated by Kumar (1974), whilst a lectotype of *A. elongatum* (Figs 102–103) is designated in the present paper. Direct comparison left no doubt that in spite of the conspicuous difference in the lengths of their humeral processes the two specimens are conspecific, therefore the two species are considered synonymous. Because the two names were proposed in the same work, acting as First Reviser we hereby give precedence to *A. rufescens* over *A. elongatum* (ICZN 1999, Art. 24.2.2).

This biological species shows considerable intraspecific variability in the length of the humeral processes (Figs 99, 101, 105). Examination of several specimens of both sexes from India, China, Vietnam and Laos left no doubt that all the material before us listed above is conspecific; males with identical genitalia but with much different humeri were examined and dissected. The species is transferred into *Acanthosoma* as a result of the proposed synonymy between *Acanthosoma* and *Anaxandra*.

Reuter (1881) redescribed *Acanthosoma rufescens* (as *Anaxandra rufescens*) and described a new species, *Anaxandra hamata* Reuter, 1881. He stressed that these are two morphologically very similar species which mainly differ in the length of the lateral processes of the genital capsule. Reexamination of a syntype of *A. hamata* concluded that it is also conspecific with *A. rufescens*, therefore their synonymy is proposed. Examination of a male from Darjeeling deposited in NHRS identified by O.M. Reuter as *Anaxandra rufescens* revealed that the redescription of the latter species presented by Reuter (1881: 77) is based on misidentification and pertains to another, undescribed species.

Hsiao & Liu (1977) and subsequent Chinese authors treated *A. rufescens* under the name *A. taurina*. The original description of *A. taurina* differs from *A. rufescens* in several important characters therefore we recognize all of these records as misidentifications. The identity of *A. taurina* is unknown.

Distribution. *Acanthosoma rufescens* is a Himalayan species broadly distributed from India to northern parts of Burma, Thailand, Laos and Vietnam; it also occurs in Taiwan. It has been recorded (as *A. taurina*) from several administrative regions of China, but we only could see specimens from Yunnan. Because this species is easily confused with *A. sichuanense* (a widely distributed species in China), and we have seen several specimens of *A. sichuanense* misidentified as *A. taurina* in Chinese collections, we consider all records from other provinces of China as in need of verification. Hua (2000) listed it (as *Anaxandra taurina*) from Japan; since the source of this information is unknow and Japanese authors never listed them from the country we regard this record as erroneous. Our present records from Pakistan, Nepal, Taiwan, Thailand, Laos and Vietnam represent first country records.—**PAKISTAN. Punjab**!—**INDIA. Uttarakhand**!; **Sikkim**!; **West Bengal**!; **Nagaland**!—**NEPAL**!—**CHINA. Yunnan**!; **Guizhou**? (Bu & Wang 2002, Xue & Bu 2006, both as *taurina*); **Fujian**? (Lin & Zhang 1993, as *taurina*); **Hainan**? (Chen 1987, as *taurina*); **Hubei**? (Bu & Zheng 1997, as *taurina*); **Hunan**?; **Guangxi**?; **Sichuan**?; **Tibet**? (Hua 2000, as *taurina*).—**TAIWAN!—BURMA (MYANMAR). Shan State**!—**THAILAND. Chiang Mai Prov.**!—**LAOS. Houaphanh Prov.**!—**VIETNAM. Lao Cai Prov.**!

Acanthosoma sichuanense (Liu, 1980), new combination

Figs 107–108, 114–118

Anaxandra sichuanensis Liu, 1980: 234. Holotype: ♂, China: Sichuan, Emeishan [= Mt. Emei]; TMNH? (not found). Fixed as correct original spelling acting as First Reviser (cf. Article 24.2.3. of ICZN 1999).

Anaxandra sichanensis: Liu (1980: 236). Incorrect original spelling.

Anaxandra sichuanensis: Liu 1992: 131 (records, distribution), Xiong & Liu 1993: 201 (records, distribution), Hua 2000: 166 (listed, distribution), Göllner-Scheiding 2006: 170 (catalogue, distribution), Han & Liu 2010: 158 (records, distribution).

Specimens examined. CHINA. Sichuan: Luding, Dewei, 1230 m, 21.vi.1983, leg. S.Y. Wang (1 ♀ IZAS), Luding, Moxi, 1500 m, 19.vi.1983, leg. X.Z. Zhang (2 ♀♀ IZAS), same locality, 1650 m, 20.vi.1983, leg. Y.Q. Chen (1 ♀ IZAS), same locality, altitude and date, leg. S.Y. Wang (2 ♀♀ IZAS), "Sz." [= Sichuan], Suifu, 7000 ft., viii.1928, coll. D.C. Graham (1 ♂ USNM); **Chongqing**: Mt. Jinfo, 13.viii.1945, unknown collector (1 ♀ IZAS); **Yunnan**: Dali, Cangshan, 2200 m, 18.viii.2006, leg. P.Z. Dong (1 ♂ NKUM), Gongshan, 15.v.1983, unknown collector (1 ♀ NKUM), Baoshan, Longyang Distr., Lujiang Township, Nankang [Station area of] Gaoligong Natural Reserve, 2200 m, 10.v.2009, leg. B. Cai (1 ♂ NKUM), Baoshan, Xiaoheishan Natural Reserve, Mt. Gucheng, Guanli Station, 2000–2100 m, 11.v.2009, leg. B. Cai & M. Li (1 ♀ NKUM), Jinghong, 11.iv.1984, leg. [H.G.] Zou (1 ♂, NKUM), Yunlong, 2400 m, 24.vi.1996, leg. W.J. Bu (1 ♀ NKUM), Yunlong, 5.vi.1998, 2400 m, leg. W.J. Bu (1 ♀ NKUM), "Yunnan-Fou" [= Kunming]: "San-nen-Kai" (1 ♂ 3 ♀♀ RMNH); **Guizhou**: Mt. Fanjing, Huguosi, 1300 m, 1.viii.2001, leg. W.B. Zhu (1 ♀ NKUM), same locality and collector, 1400 m, 3.viii.2001 (2 ♂♂ NKUM), same locality, 1400 m, 3.viii.2001, leg. R.L. Zhang (1 ♀ NKUM), Daozhen, Dashahe Nature Reserve, 17–26.viii.2004, leg. F.M Shi (2 ♂♂ NKUM), same locality, 1300–1500 m, 22.v.2004, leg. W.B. Zhu (1 ♀ NKUM), same locality and collector, 1370 m, 24.v.2004 (1 ♀ NKUM), same locality and collector, 1300 m, 25.v.2004 (1 ♀ NKUM), "Kweichow" [= Guizhou], "Shih Men Kan" [= Heituhe], 11.vii.[19]34, coll. D.C. Graham (1 ♀ USNM); "Kiautschau" [= Guizhou], unknown locality, date and collector (1 ♂ 1 ♀ HNHM); **Hubei**: Xingshan, Longmen River, 1400 m, 8.v.1994, leg. X.K. Yang (1 ♀ IZAS), Xianning, Tongshan County, Mt. Jiugong, Tonggubao, 1580 m, 27.vii.2010, leg. W.J. Bu (1 ♀ NKUM); **Hunan**: Shimen, Hupingshan, 30.iv.2000, leg. H.Y. Nie (1 ♂ NKUM); **Zhejiang**: Wuyanling [National Nature Reserve], 28.vii.2007, leg. W.B. Zhu (1 ♂ NKUM), Mt. Fengyang, 26.vii.2007, leg. G.P. Zhu (1 ♂ 1 ♀ NKUM), same locality, 27.vii.2007, leg. W.B. Zhu (1 ♂ NKUM), same locality, 29.vii.2007, leg. W.B. Zhu (1 ♂ NKUM), same locality and date, leg. G.P. Zhu (2 ♀♀ NKUM), same locality, 30.vii.2007, leg. G.P. Zhu & Z.H. Fan (2 ♂♂ 3 ♀♀ NKUM), same locality and date, leg. W.B. Zhu (5 ♂♂ 5 ♀♀ NKUM); **Fujian**: N.W. Fokien [= Fujian], Kualun [Mts.], unknown collector, B.M. 99-252 (1 ♀ BMNH).

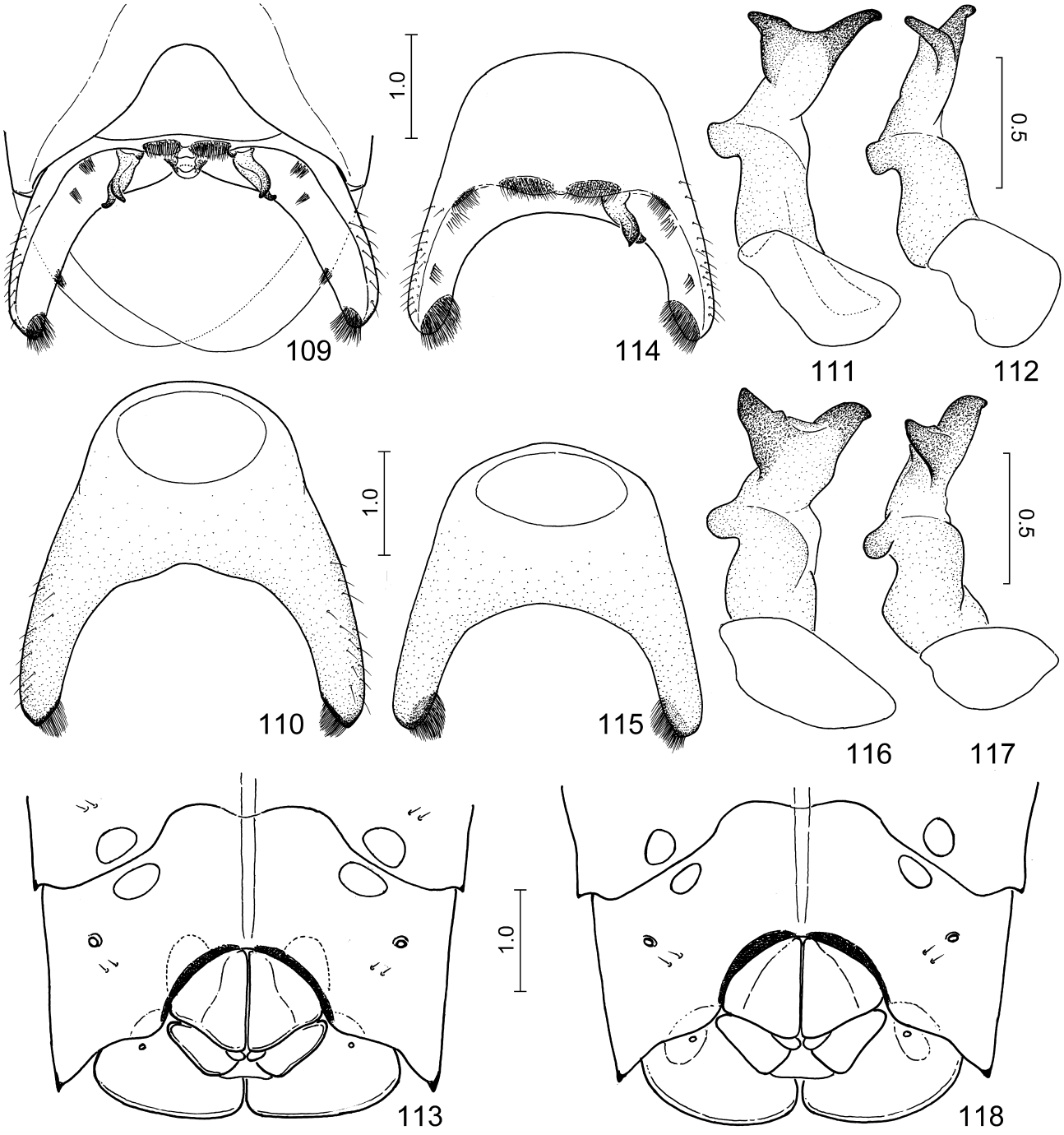
Diagnosis. Similar to *A. rufescens*, but it can be distinguished by the following characters: antennal segment IIa distinctly longer than IIb; humeral processes yellowish to orange, anterior margin of base of the process usually darkened, posterior half of pronotum concolorous with scutellum. The most easily noticeable diagnostic character is the short posterior projections of the genital capsule (Figs 107–108); the paramere has short, robust apical branches (Figs 116–117).

Description of male and female terminalia. *Male.* Genital capsule (Figs 114–115) with a pair of lateral projections much shorter than those of *A. rufescens*, directed posteriad, not reaching tip of membrane in rest, with a tuft of setae apically; dorsal rim without weak sinuation around middle; ventral rim broadly incised, with a pair of setal patches submedially, its infolding with two pairs of setal tufts laterad of paramere sockets and another pair subapically. Paramere (Figs 116–117) with a biramous apex, both branches stout, obtuse, stem with a tubercle laterally.

Female (Fig. 118). Posterior margin of ventrite VII with a deep, U-shaped incision margined with black; posterior margin of laterotergites VIII rather broadly rounded.

Notes. The type material of *Anaxandra sichuanensis* was not found in TMNH (S.L. Hao, *pers. comm.*), NKUM and IZAS; however, the species can readily be recognized by the original description and accompanying illustrations (Liu 1980). The species is transferred into *Acanthosoma* as a result of the proposed synonymy between *Acanthosoma* and *Anaxandra*. *Acanthosoma sichuanense* is highly similar to *A. rufescens*; for facilitating its recognition the external genitalia of the male (Figs 114–117) and female (Figs 118) are illustrated.

Distribution. The species is widely distributed all over the Oriental parts of China south of the Yangtze River. Although so far it is only known to occur in China, it likely occurs in neighbouring parts of India, Burma, Laos and Vietnam too. At least part of the records of *A. rufescens* by Chinese authors probably pertains to this species (see above under *A. rufescens*). Han & Liu (2010) listed it from several provinces of China and a number of countries from India to Australia, but these data are obviously erroneous and therefore they are not repeated here.—**CHINA. Sichuan**!; **Chongqing**!; **Yunnan**!; **Guizhou**!; **Hubei**!; **Hunan**!; **Zhejiang**!; **Fujian**!



FIGURES 109–118. Diagnostic characters of *Acanthosoma* spp. Fig. 109, *A. rufescens*, apex of abdomen of male, ventral view; Fig. 110, same, genital capsule, dorsal view; Figs 111–112, right paramere, two different views; Fig. 113, apex of female abdomen, ventral view; Fig. 114, *A. sichuanense*, genital capsule, dorsal view; Fig. 115, same, ventral view; Figs 116–117, right paramere, two different aspects; Fig. 118, apex of female abdomen, ventral view. Scales in mm.

Acanthosoma nigricorne Walker, 1868, reinstated combination

Figs 119–133, 162–163

Acanthosoma nigricornis Walker, 1868: 574. Holotype: "Hindostan" [= India or northern India]; BMNH!

Anaxandra nigrocornuta Reuter, 1881: 77. Syntype(s): India, Darjeeling; NHRS! Synonymized by Distant (1900: 229). **Confirmed subjective synonym.**

Acanthosoma nigrospina Hsiao & Liu, 1977: 180, 302. Holotype: ♂, China, Gansu, Tianshui; NKUM! **New subjective synonym.**

Acanthosoma (?) *nigricornis*: Atkinson 1889: 27 (reproduction of original description, distribution).

Anaxandra nigricornis: Lethierry & Severin 1893: 255 (catalogue, distribution); Distant 1900: 229, 233 (synonymy, generic placement); Distant 1902: 324 (redescription, records); Kirkaldy 1909: 174 (catalogue, distribution); Chakraborty *et al.* 1994: 475 (listed), Hua 2000: 166 (listed, distribution), Göllner-Scheiding 2006: 170 (catalogue, distribution).

Anaxandra nigrocornuta: Atkinson 1889: 32 (English translation of original description, distribution), Lethierry & Severin 1893: 255 (catalogue, distribution).

Acanthosoma nigrospina: Liu 1979: 56 (records), Wu 1984: 38 (listed, record, host plants), Lei & Zhou 1998: 42 (listed, distribution), Hua 2000: 166 (listed, distribution), Bao & He 2006: 361 (listed, host plant), Göllner-Scheiding 2006: 168 (catalogue, distribution), Han & Liu 2010: 158 (records, distribution).

Type material examined

Acanthosoma nigricornis. **Holotype**: ♀, "Type" [pr circle with green border], "E. Ind" [hw circle], "ACANTHOSOMA ALATICORNIS." [pr, cut from p. 573 of Walker (1868)]; pinned with wings spread, segments III–IV of right and segment IV of left antenna, tarsus of right fore leg, tibia and tarsus of left fore and hind leg, and right mid leg distad of coxa lacking, with some damage on hind wings; deposited in BMNH (Figs 119–120).

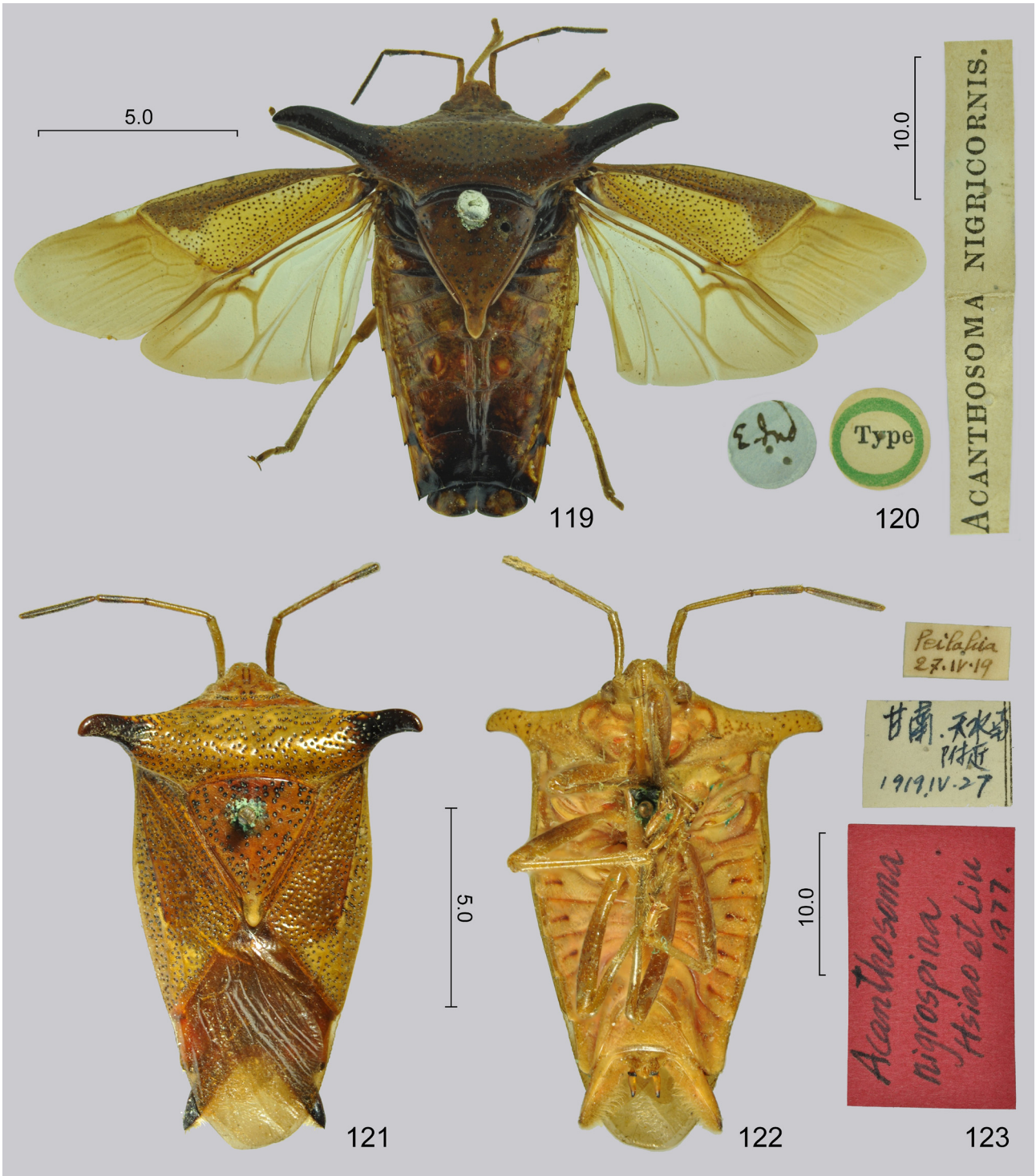
Anaxandra nigrocornuta. **Lectotype** (present designation): ♀, "Darjee- \ ling." [pr], "*Staudinger.*" [pr], "Type" [pr], "Typus" [red rectangle with black frame, pr]; pinned, wings spread, intact; deposited in NHRS (NHRS-GULI 000011371).

Acanthosoma nigrospina. **Holotype**: ♂, "Peilahia [hw] \ 27.iv.19 [hw] \\ Licent [pr]", "<Gansu near S of Tianshui> [Ch] \ 1919.IV.27" [hw], "Acanthosoma \ nigrospina \ Hsiao et Liu \ 1977." [red rectangle, hw]; pinned, segment IV of left and segments III–IV of right antenna and left mid leg lacking; deposited in NKUM (Figs 121–123). **Allotype**: ♀, "<Guangxi Longsheng along the way from Baiya to Huaping> [Ch] \ 1964.VIII.28 \ <Liu Sheng-Li> [Ch] \ <Tianjin Museum of Natural History> [Ch]" [pr], "Acanthosoma [hw] \ nigrospina [hw] \ Hsiao et Liu [hw] \ <allotype> [Ch, pr] 1977. [hw]" [red rectangle]; pinned, segments III–IV of right antenna and right fore tarsus lacking; deposited in NKUM.

Additional material examined. INDIA. Uttaranchal: 30 km N of Bageshwar, W of Loharket, 1800 m, 24.vi.2003, leg. Greenway (1 ♂ MMBC), same locality and date, 1800–1900 m, leg. Z. Kejval & M. Trýzna (1 ♀ ZJPC); **Sikkim**: Gangtok, 6150 ft., 8.ix.[19]09, unknown collector (1 ♂ BMNH), unspecified locality, leg. [A.V.] Knyvett, coll. W.L. Distant, B.M. 1911-383 (1 ♂ BMNH), coll. E.T. Atkinson, B.M. 92-6 (1 ♀ BMNH); **Unspecified**: N. India, coll. W.L. Distant, B.M. 1911-383 (1 ♀ BMNH).—**NEPAL.** Ghanpokhara, 5500–7000 ft., 2.v.1954, leg. J. Quinlan, B.M. Nepal Expedition, B.M. 1954-540 (1 ♀ BMNH), Lantang National Park, Singagomp, Dhunche trek, 3250–1900 m, 28°04'74"N 85°20'77"E, 5.v.2000, leg. Konstantinov, Lingafelter & Volkovitch (1 ♀ USNM).—**CHINA. Shaanxi**: Foping, 900 m, 27.vi.1999, leg. J. Yao (1 ♂ IZAS); **Sichuan**: Garzê Tibetan Autonomous Prefecture, Luding County, 28.vii.2011, leg. X.J. Wang (1 ♂ NKUM); **Hubei**: Shennongjia, Dayawu, 26.vi.1977, leg. H.G. Zou (1 ♀ NKUM), same locality and collector, 28.vi.1977 (1 ♂ NKUM), same locality, 28.vi.1977, leg. S.L. Liu (1 ♂ NKUM), Shennongjia, Hongping, 1.vii.1977, leg. S.L. Liu (1 ♂ NKUM), Shennongjia, Jiuhu, 2.vii.1977, leg. S.L. Liu (1 ♀ NKUM), Changyang Tujia Autonomous County, Huoshaoping Township, 1700 m, 27.viii.1990, leg. C.R. Li & B. Hai (1 ♀ NKUM); **Zhejiang**: Mt. Fenyang, 400–1500 m, 10.viii.2007, leg. Z.H. Fan (1 ♂ NKUM); **Yunnan**: Lijiang, Mt. Yulongxue, Maoniuping, 2371 m, 2.vi.2012, 27.18°N 100.27°E, leg. Y. Liu *et al.* (1 ♂ NKUM), Lijiang, 7.viii.1979, leg. H.G. Zhou (1 ♀ NKUM), Yunlong, 2400 m, 24.vi.1996, leg. W.J. Bu (1 ♀ NKUM), Lanping, 2300 m, 19.viii.1984, leg. S.Y. Wang (1 ♂ IZAS), Jingdong, Wuliang Mts., 1500–1900 m, 29.v.2001, leg. Q. Xie (1 ♂ NKUM), Tengchong, Mangbang Township, Dahaoping, 2417–2440 m, 24.v.2009, leg B. Cai (1 ♀ NKUM); **Guizhou**: Mt. Fanjing, Huguosi, 1400 m, 3.viii.2001, leg. W.J. Bu (1 ♂ NKUM).—**BURMA (MYANMAR).** Seinghku Valley, 28.5°N 97.35°, 6500 ft., 26.v.1926, F. Kingdon-Ward, B.M. 1926-400 (1 ♂ BMNH).—**VIETNAM. Lao Cai Prov.**: Sin Chai, Hoan Lien N.P., 22°20.43'N 103°49.35'E, 1586 m, partly open slopes grazed by buffaloes, 14.xii.2008, leg. L. Papp, VN2008 PL06 (1 ♂ HNHM).

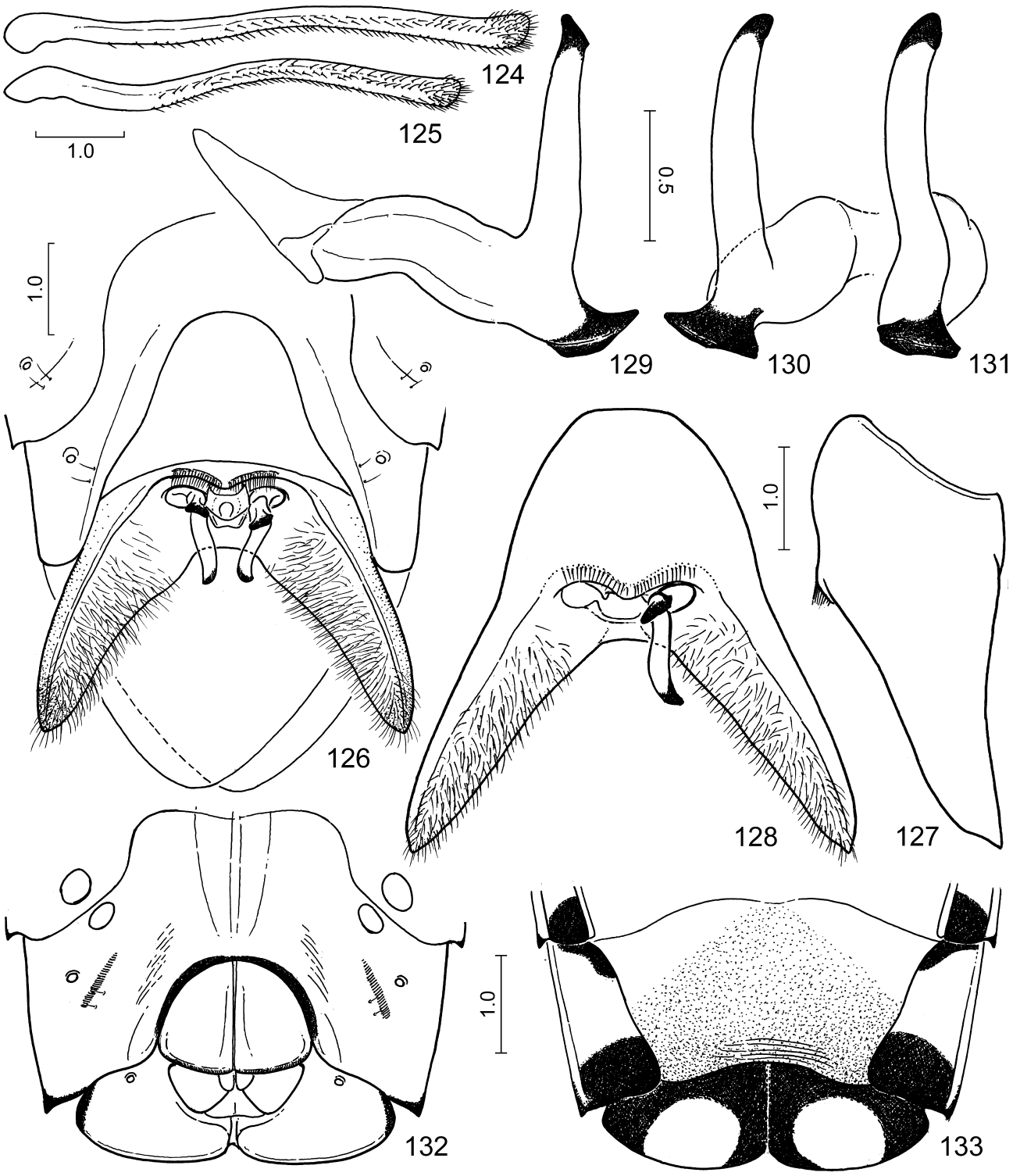
Diagnosis. The species can easily be recognized based on the hind tibia which is strongly curved in the male (Fig. 125), less strongly in the female (Fig. 124). The habitus of this species is very similar to that of *A. shensiense* and *A. montanum*; the much longer posterolateral lobes of the genital capsule of the male (Figs 126–128) and the broad, U-shaped excision of the posterior margin of ventrite VII of the female (Fig. 132) are diagnostic.

Description of male and female terminalia. *Male.* Genital capsule (Figs 126–128) with a pair of robust, diverging lateral projections; ventral rim with a pair of setal patches submedially, its infolding strongly and densely pilose. Paramere (Figs 129–131) biramous, lower branch long, upper branch short. Segment X with a dorsoapical protrusion.



FIGURES 119–123. Holotypes of *Acanthosoma* species and their labels. Fig. 119, *A. nigricornis* Walker, 1868, dorsal view; Fig. 120, same, labels; Fig. 121, *A. nigrospina* Hsiao & Liu, 1977, dorsal view; Fig. 122, same, ventral view; Fig. 123, same, labels. © BMNH (119–120), NKUM (121–122). Scales in mm.

Female (Figs 132–133). Tergite VIII at least with distinct black suffusion basally, frequently broadly margined with black basally, in extreme cases (Fig. 133) tergite VIII with extensive black marking; posterior margin of ventrite VII with a broad, U-shaped median incision margined with black, surrounding valvifers VIII; posterior margin of laterotergites VIII shallowly rounded; Pendergrast's organs of segment VI slightly larger than that of segment VII but both relatively small.



FIGURES 124–133. Diagnostic characters of *Acanthosoma nigricorne.* Fig. 124, hind tibia of female; Fig. 125, hind tibia of male; Fig. 126, apex of abdomen, posteroventral view; Fig. 127, genital capsule, lateral view; Fig. 128, genital capsule, ventral view; Figs 129–131, right paramere, three different views; Fig. 132, apex of female abdomen, ventral view; Fig. 133, same, dorsal view. Scales in mm.

Notes. The holotype of *Acanthosoma nigricorne*, deposited in the BMNH, is a female (Fig. 119) and it was examined during the present study. Although the original description of *Acanthosoma nigrospina* (Hsiao & Liu 1977) states that its holotype and allotype are deposited in TMNH, both specimens were found in NKUM.

Several additional specimens of both sexes were examined from various localities. Distinct clinal variation of the following morphological characters was found:

(1) Length and shape of the humeral process: in specimens from northern and central China it is short, apically distinctly curved posteriad (Fig. 121); in specimens from southern China (Yunnan), northeastern India and in Indochina it is distinctly longer (Fig. 119).

(2) Mesosternal carina: it always distinctly surpasses anterior margin of prosternum but in specimens from central China it is usually shorter than specimens from southern China, northern India and Indochina (Figs 162–163).

All of these characters show gradual variation, several intermediates exist. No differences were found in the external genitalia of the male (Figs 126–131) and female (Figs 132–133). Our conclusion, therefore, is that in spite of the obvious difference in the general habitus of the holotypes of *A. nigricorne* (Fig. 119) and *A. nigrospina* (Figs 121–122) the two specimens are conspecific, and their subjective synonymy is hereby proposed.

This species was spelled as *Acanthosoma nigricornis* in the original description; the grammatically correct form of the specific epithet agreeing in gender with the generic name is *A. nigricorne*.

Distribution. This species is widely distributed in the Himalayas and all over southern China. The records from Nepal, Burma and Vietnam represent first country records.**—INDIA. Uttaranchal**!; **Sikkim**!; **West Bengal**: Darjeeling (Distant 1902).—**NEPAL**!—**CHINA. Gansu**!; **Shaanxi**!; **Sichuan**!; **Hubei**!; **Zhejiang**!; **Yunnan**!; **Guizhou**!; **Guangxi**!; **Shanxi** (Han & Liu 2010, as *nigrospina*); **Tibet** (Hua 2000).—**BURMA (MYANMAR)**!—**VIETNAM. Lao Cai Prov.**!

Acanthosoma shensiense Hsiao & Liu, 1977

Figs 134–135, 140–145, 150

Acanthosoma shensiensis Hsiao & Liu, 1977: 179, 302. Holotype: ♀, China: "Shensi" [= Shaanxi], Huashan; NKUM!
Acanthosoma shansiensis: Cui & Cai (2008: 52). Incorrect subsequent spelling.

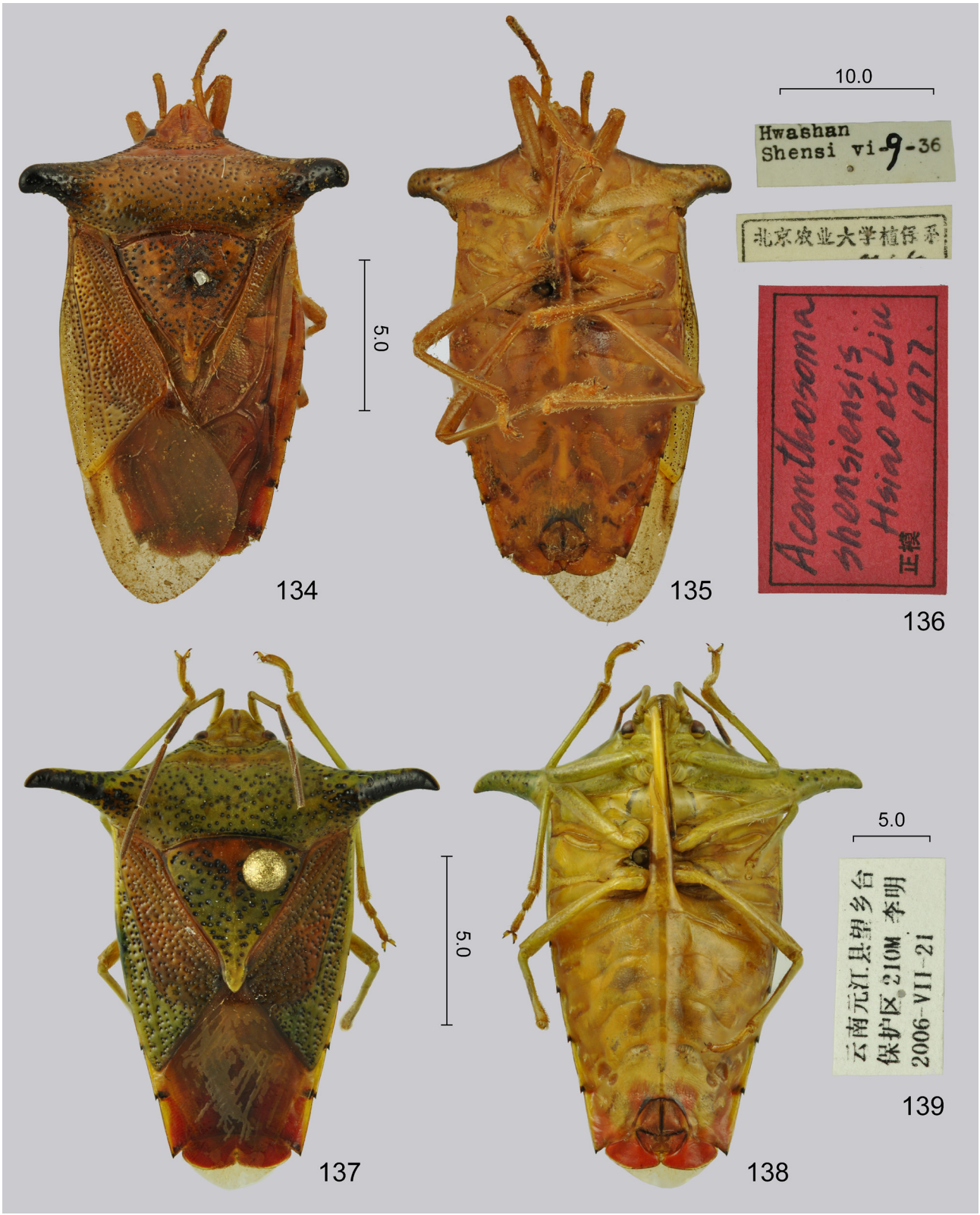
Acanthosoma shensiensis: Liu 1979: 56 (records), 58 (description of male, figure), Zheng & Wang 1995: 23 (morphology, figure), Bu & Zheng 1997: 208 (redescription, figure, record), Lei & Zhou 1998: 42 (listed, distribution), Hua 2000: 166 (listed, distribution), Liu & Wang 2005: 271 (records, distribution), Guo *et al.* 2007: 343 (listed, host plants), Li & He 2007: 350 (record).
Acanthosoma shensiense: Göllner-Scheiding 2006: 168 (catalogue, distribution).
Acanthosoma shansiensis: Cui & Cai 2008: 52 (record).

Type material examined

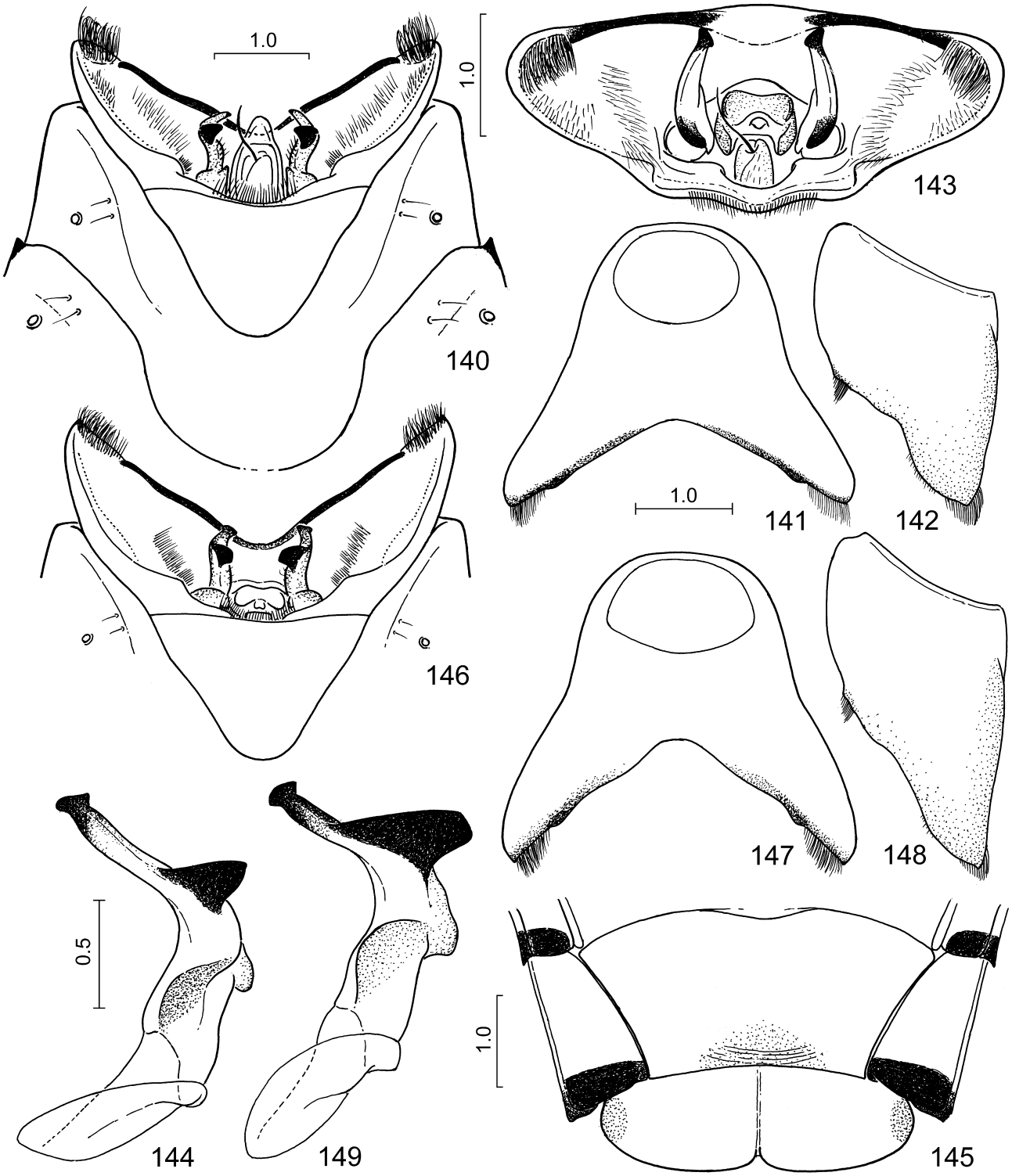
Acanthosoma shensiense. **Holotype**: ♀, "Hwashan [pr] \ Shensi vi- [pr] 9 [hw] -36 [pr]", "<China Agricultural University Department of Plant Protection> [Ch]" [printed], "Acanthosoma [hw] \ shensiensis [hw] \ Hsiao et Liu [hw] \ <holotype> [pr, Ch] 1977. [hw]" [red rectangle]; pinned, segments II–IV of left and III–IV of right antenna, right fore wing, tarsus of left mid leg and tarsal segment II of left hind lacking; deposited in NKUM (Figs 134–136).

Additional material examined. CHINA. Gansu: Kang County, Qinghe Forestry Farm, 27.viii.2000, leg. C.F. Zhou (1 ♂ NKUM), "Hweisin" [= Weixin] (1 ♀ RMNH); **Shaanxi**: Zhenba, 20.vii.1986, leg. S.Z. Ren (1 ♀ NKUM), Liuba, Miaotaizi, 31.viii.2000, leg. C.F. Zhou (1 ♂ 2 ♀♀ NKUM), Zhouzhi, Houzhenzi, 1350 m, 24.vi.1999, leg. J. Yao (1 ♀ NKUM); **Hubei**: Shennongjia, Songbai, 17.vii.1977, leg. H.G. Zhou (1 ♂ NKUM), same locality and collector, 22.vi.1977 (2 ♂♂ NKUM), same locality, 23.vi.1977, leg. S.L. Liu (3 ♂♂ 1 ♀ NKUM), same locality, 20.vii.1977, leg. L.Y. Zheng (1 ♀ NKUM), Shennongjia, Dayawu, 26.vi.1977, leg. H.G. Zou (1 ♀ NKUM), Xianning, Tongshan County, Mt. Jiugong, Anping, 900 m, 27.vii.2010, leg. M.H. Lü (1 ♀ NKUM), Xianning, Tongshan County, Mt. Jiugong, Gulaomiao, 1000 m, 9.viii.2010, leg. J. Du (1 ♂ NKUM), Qiaoshang, Fang County, 16.vi.1977, leg. Q. Mu (1 ♀ NKUM), Xingshan, Longmen River, 1400 m, 24.vii.1993, leg. B.W. Sun (1 ♀ IZAS); **Anhui**: Mt. Huo, Majiahe, 800 m, 1.ix.1978, leg. S.Y. Wang (1 ♀ IZAS); **Zhejiang**: Mt. Tianmu, 6.ix.1949, unknown collector (1 ♀ IZAS), Mt. Fengyang, 400–1500 m, 10.viii.2007, leg. W.B. Zhu (1 ♀ NKUM), same locality, altitude and date, leg. Z.H. Fan (1 ♀ NKUM).

Diagnosis. The species is similar to *A. montanum*, it can be distinguished from the latter species based on its short humeral processes (Figs 134–135), its rather short mesosternal carina, the somewhat shorter lateral projections of the genital capsule (Figs 140–141) particularly apparent in lateral view (Fig. 142), and the different paramere (Fig. 144).



FIGURES 134–139. Type specimens of Acanthosomatidae species and their labels. Fig. 134, *Acanthosoma shensiense* Hsiao & Liu, 1977, holotype, dorsal view; Fig. 135, same, ventral view; Fig. 136, same, labels; Fig. 137, *Anaxandra montana* Liu, 1987, neotype, dorsal view; Fig. 138, same, ventral view; Fig. 140, same, label. © NKUM. Scales in mm.



FIGURES 140–149. Diagnostic characters of *Acanthosoma* spp. Fig. 140, *A. shensiense*, apex of abdomen of male, posteroventral view; Fig. 141, same, genital capsule, dorsal view; Fig. 142, same, genital capsule, lateral view; Fig. 143, same, genital capsule, posterior view; Fig. 144, same, left paramere; Fig. 145, same, apex of abdomen of female, dorsal view; Fig. 146, *A. montanum*, apex of abdomen of male, posteroventral view; Fig. 147, same, genital capsule, dorsal view; Fig. 148, same, genital capsule, lateral view; Fig. 149, same, left paramere. Scales in mm.

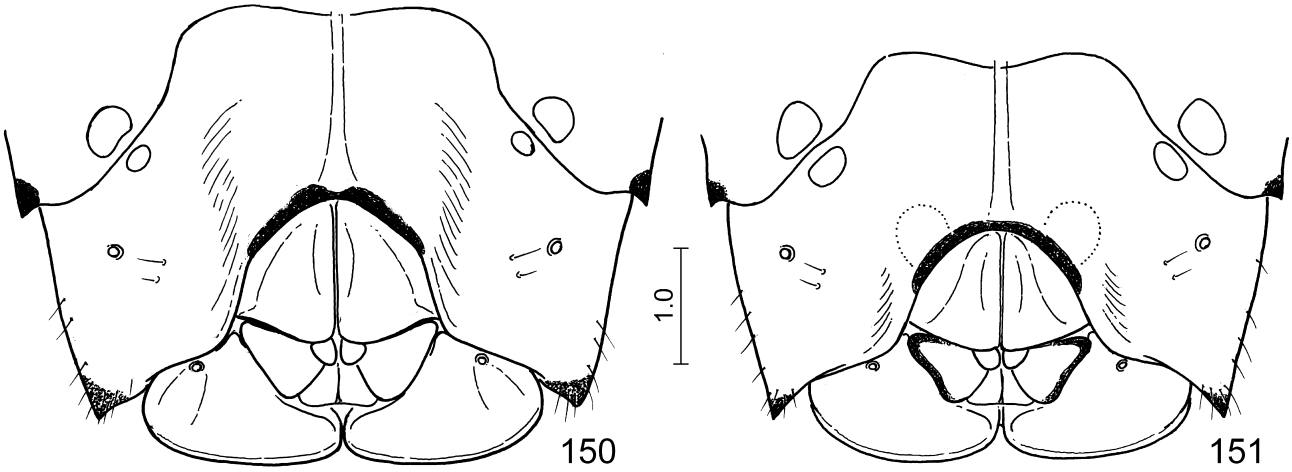
Description of male and female terminalia. *Male.* Genital capsule (Figs 140–143) with a pair of short, widely diverging lateral projections provided with a tuft of dense setae apically; dorsal rim with a longitudinal, pigmented ridge marginally; ventral rim with a pair of small protuberances laterally, its infolding with two pairs of setal patches. Paramere as in Fig. 144. Segment X with a dorsoapical protrusion.

Female (Figs 145, 150). Posterior margin of ventrite VII with a narrow median incision with outline broken around middle therefore shield-shaped, margined with black at bases of valvifers VIII; posterior margin of laterotergites VIII shallowly rounded.

Notes. The female holotype of *Acanthosoma shensiense* (Figs 134–135), deposited in NKUM, was reexamined during the present study; although it subsequently lost its right fore wing and some antennal segments, there is no doubt that the photograph published by Hsiao & Liu (1977: plate 29 fig. 413) shows the same specimen. Several non-types of both sexes were seen too. We intend to facilitate recognition of this rather poorly known species therefore we present detailed illustrations of its diagnostic characters.

The species was spelled as *Acanthosoma shensiensis* in the original description; the grammatically correct form of the specific epithet agreeing in gender with the generic name is *A. shensiense*.

Distribution. The species is apparently distributed in Central and East China.—**CHINA. Gansu**!; **Shaanxi**!; **Hubei**!; **Anhui**!; **Zhejiang**!; **Henan** (Cui & Cai 2008, as *shansiensis*).



FIGURES 150–151. ***Acanthosoma*** **spp., apex of abdomen in ventral view.** Fig. 150, *A. shensiense*; Fig. 151, *A. montanum*. Scales in mm.

Acanthosoma montanum (Liu, 1987), new combination

Figs 137–139, 146–149, 151

Anaxandra montana Liu, 1987: 152. Syntypes: China, Yunnan, Heqing and Tengchong; depository not stated.

Anaxandra montana: Liu 1992: 131 (record), Göllner-Scheiding 2006: 170 (catalogue, distribution).

Type material examined. Neotype (present designation): ♀, "<Yunnan Yuanjiang County Wangxiangtai> [Ch] \ <Nature Reserve 210M Li Min> [Ch] \ 2006-VII-21"; pinned, segment IV of right antenna, segment II of left mid tarsus, and tarsus of right hind leg lacking; provided with our neotype label; deposited in NKUM (Figs 137–139).

Specimens examined. CHINA. Yunnan: Lüchun, 1900 m, 31.v.1996, leg. L.Y. Zheng (1 ♀ NKUM), Longling, Longxin, Dapo, 2140 m, 14.x.2002, H.J. Xue (2 ♂♂ NKUM), Longyang, Baihualing, 1600 m, 12.viii.2006, leg. P.Z. Dong (1 ♀ NKUM), Dali, Xiaguan, on tea plant, viii.1981, unknown collector (1 ♂ NKUM); Gudong env., Mt. Yufeng Shen, 25°22.7'N 98°25.4'E, 1825 m, 8.vi.2007, leg. J. Hájek & J. Růžička (1 ♀ NMPC).—**LAOS.** Unspecified locality, leg. R. Vitalis de Salvaza (1 ♂ RMNH).—**VIETNAM. Tuyen Quang Prov.**: Tuyen Quang, v. 1915, leg. R.V. de Salvaza (1 ♂ BMNH); **Lao Cai Prov.**: Lao Cai Prov., Hoang Lien National Park, Fan Si Pan Mts., Cat Cat, stream valley, 2050 m, 22°18.337'N 103°49.291'E, 15.iii.1998, No. 17, at light, leg. L. Peregovits & T. Vásárhelyi (1 ♀ HNHM); "Chapa" [= Sa Pa], v.1916, leg. R.V. de Salvaza (1 ♂ BMNH); **Tay Ninh Prov.**: "Tayninh" [= Tay Ninh], coll. E. le Moult (1 ♀ RMNH).

Diagnosis. The species is similar to *A. shensiense*, it can be distinguished from the latter species based on its long and gracile humeral processes (Figs 137–138), its long mesosternal carina surpassing middle of head (Fig. 138), the slightly longer lateral projections of the genital capsule (Figs 146–147) particularly apparent in lateral view (Fig. 148), and the different paramere (Fig. 149).

Description of male and female terminalia. *Male.* Genital capsule (Figs 146–148) similar to that of *A. shensiense*, but shape of lateral projections somewhat longer (Fig. 148), median incision between projections deeper (Figs 146–147); paramere as in Fig. 148.

Female (Fig. 151). Female terminalia similar to those of *A. shensiense*, but posterolateral angles of ventrite VII more produced, ventrite VII a pair of submarginal red patches around U-shaped median incision, and the somewhat larger Pendergrast's organ of ventrite VII.

Notes. No formal description or illustration of *Anaxandra montana* (from western and southern Yunnan, China) was presented by Liu (1987), the species was merely diagnosed within a key; no type specimens were designated and no depository of specimens was mentioned. The name was considered as available by Göllner-Scheiding (2006); this is an opinion which we share. No specimens which might possibly be syntypic could be located in TMNH (S.L. Hao, *pers. comm.*), NKUM and IZAS, the most important depositories of types of S.L. Liu; the specimens are likely lost. Considering the fact that the species was not explicitly indicated as intentionally new and no types were designated in the original description, even if syntypes exist, probably they are impossible to recognize.

Specimens from Yunnan and additional specimens from northern Vietnam fitting rather well with Liu's (1987) key were examined during the present study and we recognize them as conspecific with *Anaxandra montana*. However, the very brief and poor diagnosis offered by the key does not allow unambiguous recognition of this species. Therefore, with the express purpose of clarifying the taxonomic status of this nominal taxon, a neotype is designated under Article 75.3. of ICZN (1999).

We select a female from Yunnan for neotype. The specimen is in good condition clearly showing diagnostic characters of the species, and in the same time it comes as nearly as practicable from the original type locality, therefore we recognize it as the specimen available to us that best suits the purpose of neotype designation. The specimen fits in all respect with the diagnosis of Liu (1987). Based on this specimen and additional males and females we present a diagnosis and several illustrations which will allow future identification of the species.

The species is transferred into *Acanthosoma* as a result of the proposed synonymy between *Acanthosoma* and *Anaxandra*.

Distribution. So far only known from mountaneous regions of Southwest China; first country records are provided for Laos and Vietnam in this paper.—**CHINA. Yunnan**!—**LAOS**!—**VIETNAM. Tuyen Quang Prov.**!; **Lao Cai Prov.**!

Acanthosoma alaticorne Walker, 1868

Figs 152–156, 166

Acanthosoma alaticornis Walker, 1868: 573. Holotype: "Hindostan" [= India or northern India]; BMNH!

Anaxandra laticollis Hsiao & Liu, 1977: 170, 301. Holotype: ♀, China: Sichuan, Emeishan [= Mt. Emei]; NKUM! **New subjective synonym.**

Acanthosoma alaticornis: Atkinson 1889: 26 (as of doubtful generic placement, reproduction of original description, distribution), Lethierry & Severin 1893: 260 (as of doubtful identity, catalogue, distribution).

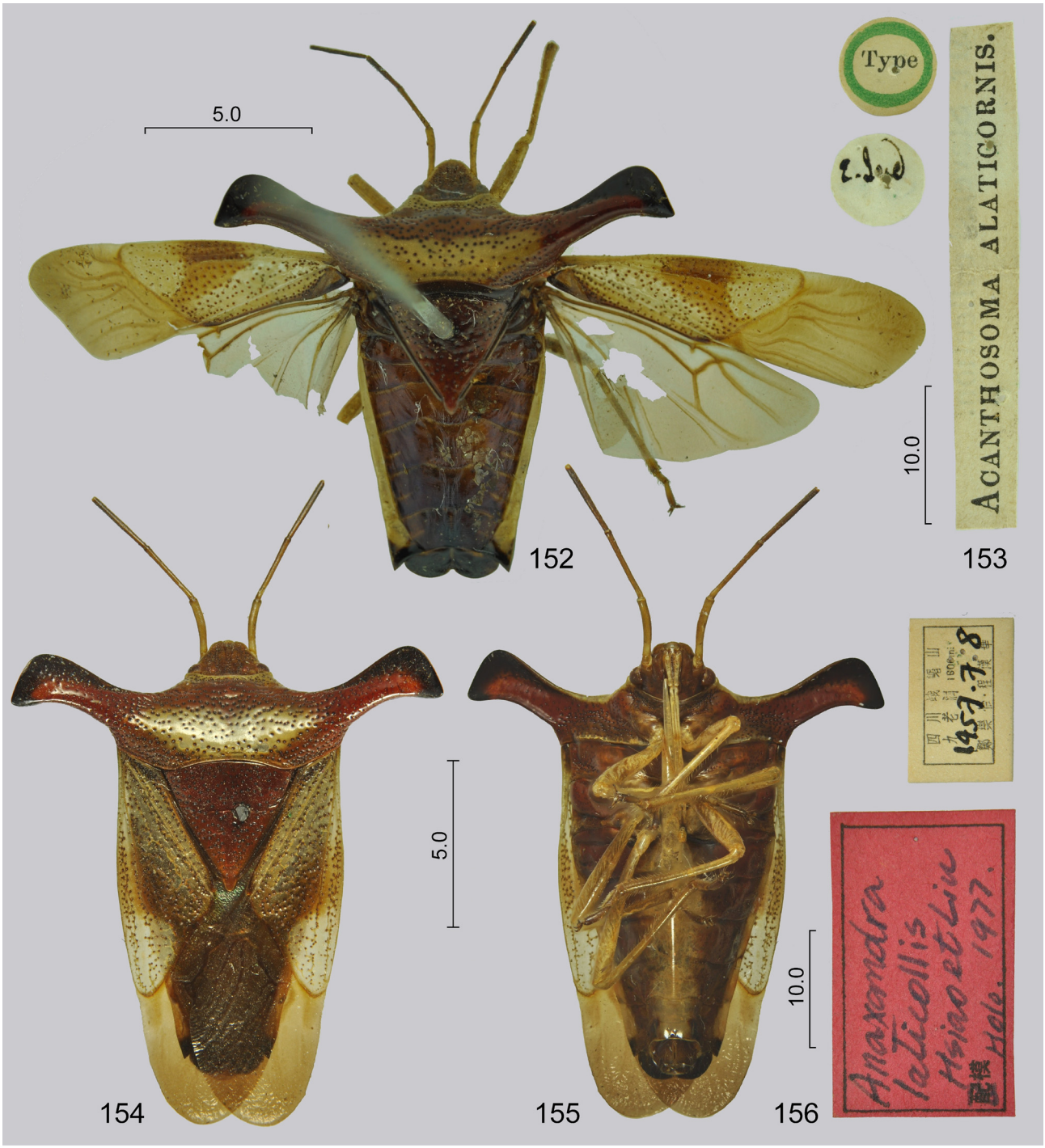
Anaxandra alaticornis: Distant 1900: 229, 233 (generic placement), Distant 1902: 324 (redescription, distribution), Kirkaldy 1909: 174 (catalogue, distribution).

Anaxandra laticollis: Liu 1988: 122 (record), Xiong & Liu 1993: 201 (record, distribution), Hua 2000: 166 (listed, distribution), Wang *et al.* 2002: 13 (record), Liu *et al.* 2004: 41 (record, distribution), Göllner-Scheiding 2006: 169 (catalogue, distribution), Xie *et al.* 2011: 80 (listed).

Type material examined.

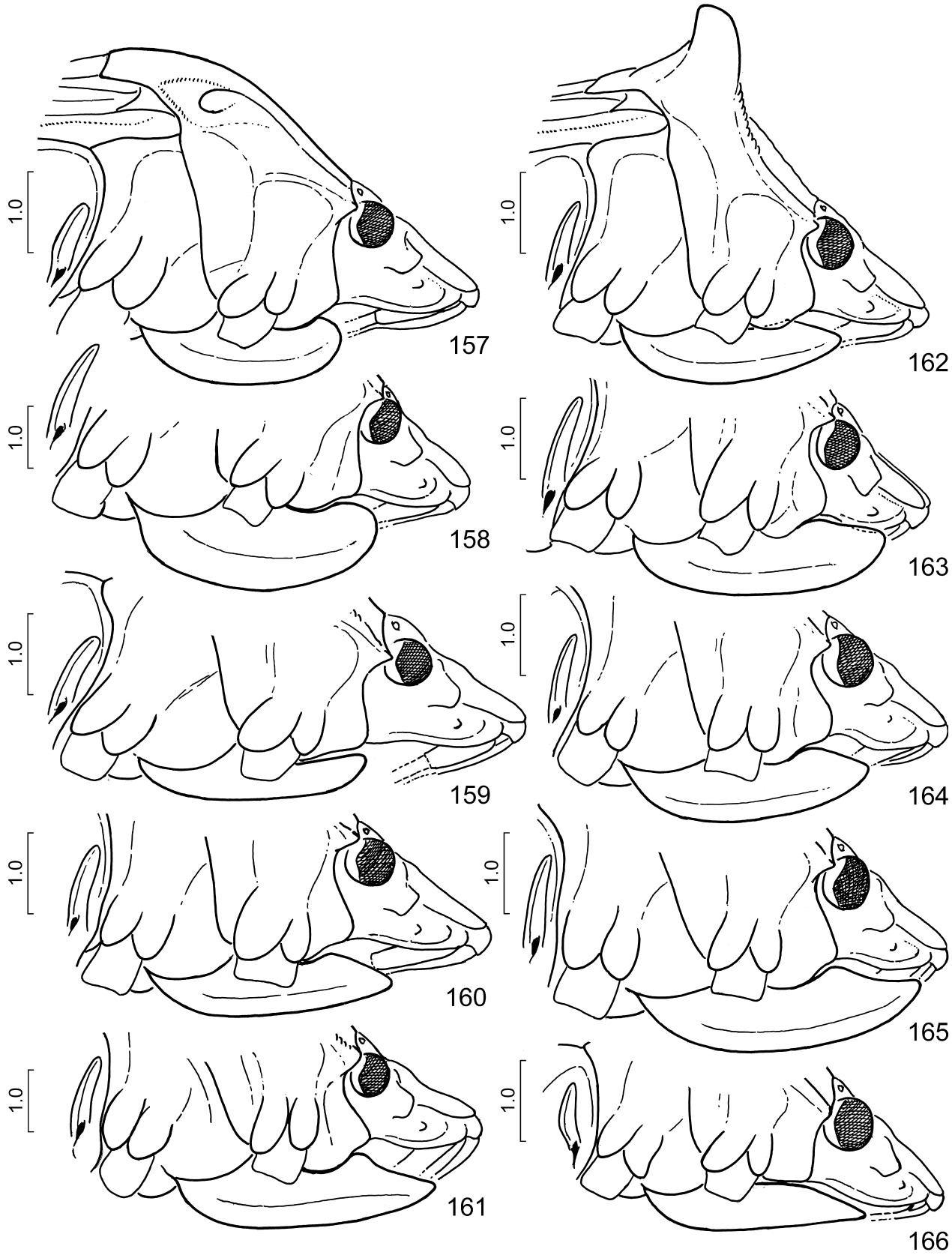
***Acanthosoma alaticorne*. Holotype**: ♀, "Type" [pr circle with green border], "E. Ind" [hw circle], "ACANTHOSOMA ALATICORNIS." [pr, cut from p. 573 of Walker (1868)]; pinned with wings spread, segments III–IV of right and segment IV of left antenna, tarsus of right fore leg, tibia and tarsus of left fore and hind leg, and right mid leg distad of coxa lacking, with some damage on hind wings; deposited in BMNH (Figs 152–153).

***Anaxandra laticollis*. Holotype**: ♀, "<Sichuan Emeishan> [Ch, pr] \ <Jiulaodong> [Ch, pr] 1800m. [pr] \ 1957.7.8 [hw] \ <Zheng Le-Yi · Cheng Han-Hua> [Ch, pr]" [rectangle with black frame], "Anaxandra [hw] \ laticollis [hw] \ Hsiao et Liu [hw] \ <holotype> [Ch, pr] Holo. 1977 [hw]" [red rectangle]; pinned, segments III–IV of both antennae lacking; deposited in NKUM (Figs 154–156).

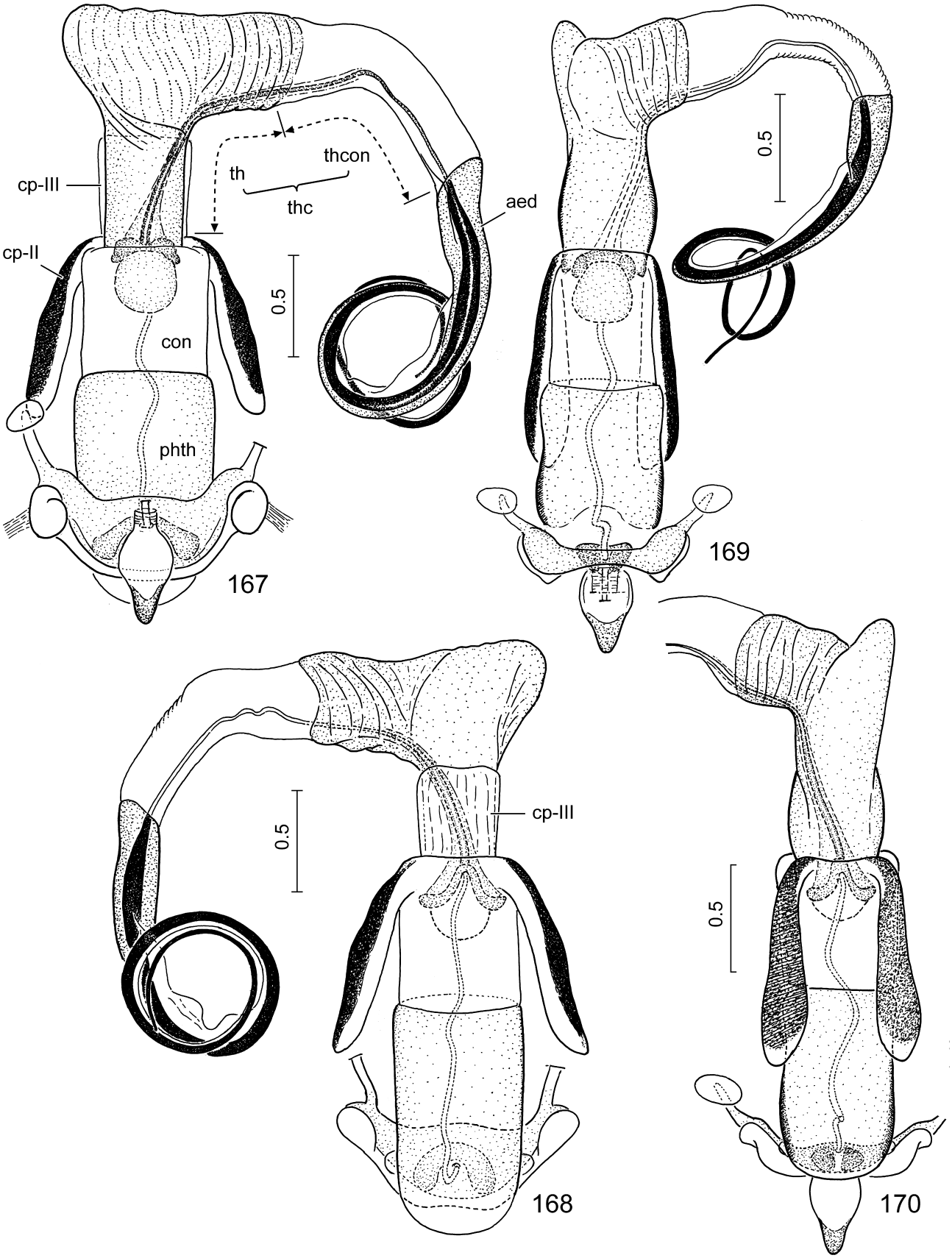


FIGURES 152–156. Holotypes of Acanthosomatidae species and their labels. Fig. 152, *Acanthosoma alaticornis* Walker, 1868, dorsal view; Fig. 153, same, labels; Fig. 154, *Anaxandra laticollis* Hsiao & Liu, 1977, dorsal view; Fig. 155, same, ventral view; Fig. 156, same, labels. © BMNH (152–153), NKUM (154–156). Scales in mm.

Additional specimens examined. INDIA. West Bengal: Darjeeling, B.M. 1926-171 (1 ♂ BMNH); "Darjiling Museum", B.M. 1961-465 (1 ♀ BMNH).—**NEPAL.** Taplejung Dist., Sangu, ~6200 ft., ix–x.1961, Brit. Mus. East Nepal Exp. 1961–62, leg. R.L. Coe, B.M. 1962-177 (1 ♂ 1 ♀ BMNH).—**CHINA. Sichuan**: Mt. Emei, 1800–2100, 24.vi.1955, leg. Y.Z. Zi (1 ♀ IZAS), 40 km S of Luding, Moxi vill. env., Hailougou glacier park, Gongga Mt., 2000–3200 m, 14-20.viii.1995, leg. J. Schneider (1 ♀ ZJPC); **Tibet**: Mêdog, Bangxin, 900–1200 m, 9.xii.1982, leg. Y.H. Han (1 ♀ IZAS).



FIGURES 157–166. Mesosternal carina of *Acanthosoma* spp. Lateral view. Fig. 157, *Acanthosoma haemorrhoidale* (♂, Denmark); Fig. 158, *A. labiduroides* (♀, Japan: Hokkaido); Fig. 159, *A. murreeanum* (♂, China: Yunnan); Fig. 160, *A. rufispinum* (♂, Nepal); Fig. 161, *A. laevicorne* (♂, Vietnam); Fig. 162, *A. nigricorne* (♂, India: Uttarakhand); Fig. 163, same species (♂, Vietnam); Fig. 164, *A. rufescens* (♀, India: Punjab); Fig. 165, same species (♀, Laos); Fig. 166, *A. alaticorne* (♂, Nepal). Scales in mm.



FIGURES 167–170. Phalli of *Acanthosoma* spp. Fig. 167, *A. haemorrhoidale*, dorsal view; Fig. 168, same, ventral view; Fig. 169, *A. rufescens*, dorsal view; Fig. 170, same, ventral view. Lettering: aed = aedeagus s. str.; con = conjunctiva; cp-II, cp-III = second and third pairs of conjunctival processes; phth = phallotheca; th = theca; thc = thecal complex; thcon = thecal conjunctiva. Scales in mm.

Diagnosis. It is a distinctive species immediately recognized by the greatly elongated and peculiarly shaped humeri (Figs 152, 154–155) which are not particularly similar to the condition found in any other species of Acanthosomatidae.

Notes. Although the original description of *Anaxandra laticollis* (Hsiao & Liu 1977) states that its holotype is deposited in TMNH, the specimen (Figs 154–155) was found in NKUM. The holotype of *Acanthosoma alaticorne* (Fig. 152) was reexamined too. As the two specimens are undoubtedly conspecific, the subjective synonymy of the two is proposed.

This species should be excluded from *Acanthosoma*, but this problem will be treated in detail in another paper currently in preparation. For the present we cite the species name in its original combination.

Distribution. Specimens of *Acanthosoma alaticorne* are rare in collections therefore its distribution range is uncertain. It apparently centers the East Himalaya–Hengduan Mountains region, but it was sporadically recorded from the neighbouring areas of central China too. We present the first record from Nepal.—**INDIA. West Bengal**!—**NEPAL**!—**CHINA. Sichuan**!; **Tibet**!; **Gansu** (Wang *et al.* 2002, as *laticollis*); **Hubei** (Xiong & Liu 1993, as *laticollis*); **Yunnan** (Liu *et al.* 2004, as *laticollis*); **Guangxi** (Xie *et al.* 2011, as *laticollis*).

Discussion

Stål (1876: 110) presented a set of diagnostic characters for differentiating *Acanthosoma*, *Anaxandra* and *Sastragala*; these are presented in Table 1.

TABLE 1. Differentiating characters of *Acanthosoma* + *Sastragala* and *Anaxandra* provided by Stål (1876).

	Acanthosoma + *Sastragala*	*Anaxandra*
1	laminate process of mesosternum not or hardly surpassing anterior margin of prosternum, its apex more or less distinctly rounded	laminate process of mesosternum long, far protruding anteriad of anterior margin of prosternum, the anterior portion gradually narrowed or tapering
2	humeral process of pronotum horizontally directed, not produced anteriad	humeral process of pronotum directed laterad and somewhat dorsad, distinctly anteriad
3	pronotum anteriorly irregularly punctured (*Acanthosoma*) or anterior margin smooth and more or less distinctly elevated, posteriad of this elevated part with few punctures which are occasionally arranged irregularly or in a double series (*Sastragala*)	pronotum irregularly biserially punctured along anterior margin
4	apical angle of sixth [= VII] segment of male rounded (*Acanthosoma*) or rectangular or slightly acute (*Sastragala*)	apical angle of sixth [= VII] segment of male subobtuse

Kumar (1974) recognized *Anaxandra* and *Sastragala* as junior synonyms of *Acanthosoma* but this decision was not followed by most subsequent authors (Hsiao & Liu 1977, Ahmad & Moizuddin 1985, 1990, Liu 1987, Liu & Wang 2004, Göllner-Scheiding 2006, Han & Liu 2010, Aukema *et al.* 2013). The status of the three genera needs reconsideration.

All but one members of *Acanthosoma* and *Anaxandra* and all but 4 species of *Sastragala* were examined during the present study. Based on this material we briefly evaluate the morphological characters available for the recognition of *Anaxandra* and *Sastragala* below.

Evaluation of *Anaxandra*.—*Acanthosoma* and *Anaxandra* form a complex of phylogenetically closely related species. Specimens of all described species except of *Anaxandra taurina* Kirkaldy, 1910, including several types, were examined in connection with the present study. Based on the material before us we offer the following comments on the diagnostic characters presented by Stål (1876) (Table 1).

(1) Process of mesosternum.—The most easily visible character provided by Stål (1876) is the length of the median carina of the mesosternum; apparently subsequent authors attributed a special importance to it when placing species into one of the two genera. Both the length and shape of this carina differs strongly among the

species of this complex (Figs 157–166) and strong adherence to this character will lead to unacceptable taxonomic decisions. Some examples:

Acanthosoma firmatum (most frequently treated by its synonymic name *A. giganteum*) was placed into *Anaxandra* by several authors apparently based on its relatively long mesosternal carina. However, a close taxonomical relationship between this species and two other acanthosomatids, *Acanthosoma crassicaudum* Jakovlev, 1880 and *Acanthosoma denticaudum* Jakovlev, 1880, is suggested by the highly similar shape of their genital capsules, and assigning these species into different genera is certainly not justified.

Acanthosoma murreeanum (Fig. 159), *A. rufispinum* (Fig. 160), *A. laevicorne* (Fig. 161) and *A. tauriforme* obviously form a monophyletic clade clearly indicated by their highly similar external male genitalia. The mesosternal carina of these species, however, shows strong interspecific differences. Too strict adherence to this character resulted in the fact that previous authors recognized *A. murreeanum* (usually cited under the synonymic name *A. acutangulatum*) as belonging to *Acanthosoma*, the other three species to *Anaxandra*.

Acanthosoma shensiense and *A. montanum* are two highly similar and phlogenetically obviously closely related species as it is indicated by their similar male genitalia (Figs 140–144 and 146–149, respectively). Since the length of the mesosternal carina of the two species is markedly different, previous authors placed the former one into *Acanthosoma* and the latter one into *Anaxandra*.

Strong intraspecific variability is found in a number of species, e.g. in *A. nigricorne* (Figs 162–163) or *A. rufescens* (Figs 164–165). As a result, short- and long-carina individuals of the first species were recognized as two different species belonging to the genera *Acanthosoma* and *Anaxandra*, respectively, by previous authors.

Similarly to its length, the shape of the mesosternal carina is also of little significance. As a general tendency, if the carina is long, it is usually more strongly narrowed anteriorly. No clear-cut definitions can be made of the anteriorly rounded or narrowed carina, intermediate forms are common.

As a conclusion we stress that the length and shape of the sternal carina is insufficient for defining *Acanthosoma* and *Anaxandra* in a way that is congruent with other morphological characters. It cannot be used to separate these genera from *Sastragala* since the latter genus shows similar variability in respect of this character.

(2) Humeral process.—It is a highly variable and homoplasious character not congruent either with the length and shape of the mesosternal carina or any other morphological characters, most importantly the external male and female genitalia, therefore it is unsuitable for separating *Acanthosoma*, *Anaxandra* and *Sastragala*. Both *Acanthosoma* and *Sastragala* contain species with differently developed humeri, and any grouping based on this character will result in highly artificial genera.

(3) Anterior margin of pronotum.—No difference could be observed among species traditionally placed into *Acanthosoma* and *Anaxandra* in this respect. However, the presence of a distinct, elevated anterior collar posteriorly delimited by a transversal furrow is a good character for defining *Sastragala*.

(4) Ventrite VII of the male.—The difference between the condition found in *Acanthosoma* ("rotundatus") and *Anaxandra* ("subobtusus") (Stål 1876) is insignificant and certainly not suitable for unambiguous generic assignment of a given species, moreover in some species it is subject of considerable intraspecific variability (Figs 10–11). The sharply angulate posterolateral angles of ventrite VII of the male are a good character for defining *Sastragala*.

Male genitalia of the following species were dissected (placements proposed by previous authors provided in brackets): (*Acanthosoma*:) *asahinai*, *crassicaudum*, *denticaudum*, *forfex*, *forficula*, *haemorrhoidale haemorrhoidale*, *h. angulatum*, *ishiharai*, *labiduroides*, *nigrodorsum*, *spinicolle*, *shensiense*; (*Anaxandra*:) *laevicorne*, *montanum*, *nigricorne*, *rufescens*, *sichuanense*; (erroneously placed in *Sastragala*:) *firmatum*, *murreeanum*, *rufispinum*. In spite of the striking external differences between some of these species, and dramatic differences in the shape of their genital capsules, in most cases the phalli were so similar that it was impossible to find any distinguishing characters for recognizing the species. A careful compasion of the phalli of *A. haemorrhoidale* (type species of *Acanthosoma*) (Figs 167–168) and *A. rufescens* (type species of *Anaxandra*) (Figs 169–170), reveals high similarity. The most significant differences between the two are the shape of theca (= the basal, sclerotized region of the thecal complex situated between the conjunctiva and aedeagus) and the presence of a third pair of conjunctival processes (cp-III). These characters can be evaluated as follows:

A third pair of conjunctival processes which are fused along midline into a single medioventral, membranous, flap-like process are found in *A. haemorrhoidale* but it is lacking in *A. rufescens* and in all species previously placed into *Anaxandra* examined by us. This character, however, is certainly unsuitable for separating

Acanthosoma and *Anaxandra*, because it is strongly reduced (*A. haemorrhoidale angulatum*, *asahinai*, *denticaudum*, *firmatum*, *labiduroides*, *murreeanum*) or completely lacking (*A. forfex*) in several species traditionally placed into *Acanthosoma*. The most parsimonious explanation of this pattern is that cp-III independently underwent a reduction in various subgroups of this complex.

The proximal portion of the theca is tubular in *A. haemorrhoidale* but broadened, barrell-shaped in *A. rufescens*. The condition found in *A. rufescens* is quite rare, only *A. nigricorne* and an undescribed species from Nepal is similar; *A. sichuanense*, *A. rufispinum*, *A. laevicorne*, *A. labiduroides*, *A. forfex*, *A. firmatum*, *A. nigricorne* are somewhat intermediate, whilst *A. denticaudum*, *A. murreeanum*, *A. montanum* and *A. shensiense* possess tubular theca. This character is difficult to define precisely and because of the big number of intermediates between the extreme conditions it cannot be utilized for defining genera.

On the other hand, the shape of genital capsule and paramere is phylogenetically significant and allow recognition of several monophyletic subgroups (species groups) among a broadly understood *Acanthosoma* (comprising members placed into *Acanthosoma* and *Anaxandra* by previous authors). These subgroups are frequently incongruent with the two traditionally recognized genera. As a conclusion, we are convinced that no reasonable separation of *Acanthosoma* and *Anaxandra* is possible, and we agree with the subjective synonymy of the two proposed by Kumar (1974).

Evaluation of *Sastragala*.—*Sastragala* was also recognized as a junior subjective synonym of *Acanthosoma* by Kumar (1974). The type species of this genus is *Cimex uniguttatus* Donovan, 1804 (India) by monotypy. Although the type material of this species is apparently lost, it is possible to recognize it based on the illustration accompanying the original description (Donovan 1804) and we have examined non-types of both sexes from India; types and/or non-types of the majority of the other species have been examined too. *Sastragala* can be differentiated from *Acanthosoma* by a distinct, elevated anterior collar posteriorly delimited by a transversal furrow; acute posterolateral angle of ventrite VII of male; genital capsule being relatively small in relation to pregenital abdomen, round or subrectangular in posterior view, invariably lacking posterior projections; invariable lack of Pendergrast's organs (secondary loss); and strongly curved posterior margin of valvifer VIII of female. The phallus of *Sastragala* species examined by us is similar to that of *Acanthosoma* spp., but endophallic reservoir is larger (occupying most of the conjunctiva), conjunctival processes are larger (subequal in size with the theca), directed laterally, and aedeagus is short, curved, whip-like, never forming coils. Most species seen by us have more or less distinctly bicolorous pronotum (posterior lobe darker) and all of them have a large, unpunctured, usually yellow central patch (occasionally heart-shaped or broken into a pair of submedian patches) on scutellum.

Summary

Species of which the type material has been reexamined by us are marked with asterisk. Non-types of all other listed species have been seen except when noted. Unavailable names are omitted. Junior synonyms are cited as published originally, without changing the endings of the epithets according to the gender of the genus.

List of the species currently placed into *Acanthosoma*

Acanthosoma Curtis, 1824
= *Anaxandra* Stål, 1876, **confirmed synonym**

Acanthosoma asahinai Ishihara, 1943
Acanthosoma crassicaudum Jakovlev, 1880
= *Acanthosoma glaucum* Esaki, 1916
Acanthosoma denticaudum Jakovlev, 1880
= **Acanthosoma serratula* Reuter, 1881, **confirmed synonym**
= *Acanthosoma denticauda japonica* Jensen-Haarup, 1931
Acanthosoma emeiense Liu, 1980
Acanthosoma firmatum (Walker, 1868), **new combination**
= **Acanthosoma giganteum* Matsumura, 1913, **new synonym**

******Acanthosoma forcipatum*** Reuter, 1881
= ******Acanthosoma kiritschenkoi* Lindberg, 1934, **confirmed synonym**
******Acanthosoma forfex*** Dallas, 1851, **reinstated combination**
= ******Acanthosoma distinctum* Dallas, 1851, **new synonym**
Acanthosoma forficula Jakovlev, 1880
= ******Acanthosoma virens* Reuter, 1881, **confirmed synonym**
= *Acanthosoma kyotoanum* Esaki, 1916
Acanthosoma haemorrhoidale haemorrhoidale (Linnaeus, 1758)
= *Cimex sanguineotuberculatus* Goeze, 1778
= *Cimex pungens* Geoffroy, 1785
= *Cimex carunculatus* Gmelin, 1790
= *Cimex retusus* Thunberg, 1822
= ******Acanthosoma proximum* Dallas, 1851, **new synonym**
= ******Acanthosoma difficile* Dallas, 1851, **new synonym**
= ******Acanthosoma dubium* Dallas, 1851, **new synonym**
= *Acanthosoma haemorrhoidale* var. *inhabilis* Schumacher, 1911
= *Acanthosoma stadleri* Stichel, 1946
Acanthosoma haemorrhoidale angulatum Jakovlev, 1880
= *Acanthosoma ziozankeanum* Matsumura, 1911
= *Acanthosoma rubicorne* Matsumura, 1913
Acanthosoma haemorrhoidale ouchii Ishihara, 1950
******Acanthosoma hampsoni*** (Distant, 1900), **new combination**
Acanthosoma ishiharai Yamamoto & Hayashi, 2011
Acanthosoma labiduroides Jakovlev, 1880
= ******Acanthosoma coralliferum* Horváth, 1889, **new synonym**
= ******Acanthosoma zanthoxylum* Hsiao & Liu, 1977, **new synonym**
******Acanthosoma laevicorne*** Dallas, 1851, **reinstated combination**
******Acanthosoma montanum*** (Liu, 1987), **new combination**
******Acanthosoma murreeanum*** (Distant, 1900), **new combination**
= *Acanthosoma acutangulata* Liu, 1979, **new synonym**
= *Sastragala neoelongata* Ahmad & Moizuddin, 1990, **new synonym**
******Acanthosoma nigrodorsum*** Hsiao & Liu, 1977
******Acanthosoma nigricorne*** Walker, 1868, **reinstated combination**
= ******Acanthosoma nigrocornuta* Reuter, 1881, **confirmed synonym**
= ******Acanthosoma nigrospina* Hsiao & Liu, 1977, **new synonym**
******Acanthosoma rufescens*** Dallas, 1851, **reinstated combination**
= ******Acanthosoma elongatum* Dallas, 1851, **new synonym**
= ******Anaxandra hamata* Reuter, 1881, **new synonym**
******Acanthosoma rufispinum*** (Distant, 1887), **new combination**
= *Sastragala minuta* Ahmad & Moizuddin, 1990, **new synonym**
******Acanthosoma shensiense*** Hsiao & Liu, 1977
Acanthosoma sichuanense (Liu, 1980), **new combination**
******Acanthosoma spinicolle*** Jakovlev, 1880
= ******Acanthosoma frater* Reuter, 1881, **confirmed synonym**
= *Acanthosoma axillaris* Jakovlev, 1889
= *Acanthosoma vicina* Reuter, 1902
= *Acanthosoma korolkovi* Jakovlev, 1904
= *Acanthosoma manchuriana* Kirkaldy, 1909
= *Acanthosoma potanini* Lindberg, 1934
******Acanthosoma tauriforme*** (Distant, 1887), **new combination**
= *Anaxandra longispina* Liu, 1987, **new synonym**

Species transferred to *Sastragala* Amyot & Serville, 1843

The following four species do not belong to *Acanthosoma* and we transfer them into *Sastragala*.

****Sastragala nigrolineata*** (Stål, 1876), **new combination**
= *Anaxandra fulvicornis* Distant, 1887
****Sastragala sigillata*** (Stål, 1876), **new combination**
****Sastragala versicolor*** Distant, 1910, **reinstated combination**
****Sastragala yunnana*** (Hsiao & Liu, 1977), **new combination**

Species transferred to *Elasmostethus* Fieber, 1860

The following species does not belong to *Acanthosoma* and we transfer it into *Elasmostethus*.

****Elasmostethus singhalensis*** (Distant, 1902), **new combination**

Species removed from *Acanthosoma*

The following six species do not belong to *Acanthosoma*. These species are involved in a complex taxonomic problem which will be elaborated in another paper. Tentatively we cite them in their original combinations.

****Acanthosoma alaticorne*** Walker, 1868
= **Anaxandra laticollis* Hsiao & Liu, 1977, **new synonym**
*****Acanthosoma chinanum*** Kiritshenko, 1931
****Acanthosoma cornutum*** Dallas, 1849
****Acanthosoma expansum*** Horváth, 1905
****Anaxandra pteridis*** Hsiao & Liu, 1977
Acanthosoma sinense Liu, 1980

Species of unknown identity

The following species is of unknown identity, we could not locate its type material. According to its original description it most probably belongs to *Elasmucha* Stål, 1864. Records of this species by Hsiao & Liu (1977) and subsequent Chinese authors are misidentifications and pertain to *Acanthosoma rufescens* (see under the latter species).

Anaxandra taurina Kirkaldy, 1910

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References

Ahmad, I. & Moizuddin, M. (1985) Aspects of anatomy of two species of *Sastragala* Amyot & Serville (Pentatomoidea: Acanthosomatidae) of Pakistan with reference to phylogeny. *Karachi University Journal of Science*, 13 (1), 65–70.

Ahmad, I. & Moizuddin, M. (1986) Eggs and immature characters of *Sastragala murreeana* Distant (Pentatomoidea: Acanthosomatidae) of Pakistan with reference to phylogeny. *Biologia (Lahore)*, 32 (1), 169–176.

Ahmad, I. & Moizuddin, M. (1990) A revision of Acanthosomatidae (Hemiptera, Pentatomomorpha, Pentatomoidea) from Indo-Pakistan area with a cladistic analysis of the genera. *Oriental Insects*, 24, 267–304.

Ahmad, I., Moizuddin, M. & Khan, A.A. (1979) Generic and supergeneric keys with reference to a check list of lower pentatomoid fauna of Pakistan (Heteroptera: Pentatomoidea) with notes on their distribution and food plants. *Supplement of the Entomological Society of Karachi*, 4 (4), 1–50.

Atkinson, E.T. (1889) Notes on Indian Rhynchota, Heteroptera, No. 5. *Journal of the Asiatic Society of Bengal*, 58 (1), 20–109.

Aukema, B., Rieger, Ch. & Rabitsch, W. (2013) *Catalogue of the Heteroptera of the Palaearctic Region. Vol. 6. Supplement.* The Netherlands Entomological Society, Amsterdam, xxiii+629 pp.

Bao, G.M. & He, L.D. (Eds.) (2006) [*Report on the scientific investigation of Tao River Nature Reserve, Gansu.*] Xi'an Map Press, Xi'an, 2+2+5+393 pp., 10 unnumbered plates, 7 unnumbered maps. [in Chinese]

Bergroth, E. (1908) Enumeratio Pentatomidarum post Catalogum bruxellensem descriptarum. *Mémoires de la Société Entomologique de Belgique*, 15 (10), 131–200.

Bu, W.J. & Wang, H.J. (2002) Tessaratomidae and Acanthosomatidae. *In*: Li, Z.Z. & Jin, D.C. (Eds.), *Insects from Maolan Landscape.* Guizhou Science and Technology Publishing House, Guizhou, pp. 237–239. [10+5+615 pp., 8 unnumbered plates, in Chinese, English summary]

Bu, W.J. & Zheng, L.Y. (1997) Hemiptera: Tessaratomidae, Dinidoridae, Scutelleridae, Pentatomidae and Acanthosomatidae. *In*: Yang, X.K. (Ed.), *Insects of the Three Gorge Reservoir Area of Yangtze River. Vol. 1.* Chongqing Publishing House, Chongqing, pp. 187–211. [xx+974 pp., VIII plates, in Chinese, English summary]

Cassis, G. & Gross, G.F. (2002) Hemiptera: Heteroptera (Pentatomomorpha). *In*: Houston, W.W.K. & Wells, A. (Eds.), *Zoological Catalogue of Australia. Vol. 27.3B.* CSIRO Publishing, Melbourne, xiv+737 pp.

Chakraborty, S.P., Ghosh, L.K. & Basu, R.C. (1994) Insecta: Hemiptera: Pentatomoidea - 1. *In*: Ghosh, A.K. (Ed.), *Fauna of West Bengal. Part 5. (Insecta: Hemiptera).* Zoological Survey of India, Calcutta, pp. 469–493. [558 pp.]

Chao, H.F. (1982) *An annotated checklist of insects heretofore recorded from Fujian Province.* Fujian Science and Technology Press, Fuzhou, 2+2+658 pp. [in Chinese, English summary]

Chen, C. & Liu, G.Q. (2001) Hemiptera: Acanthosomatidae. *In*: Wu, H. & Pan, C.W. (Eds.), *Insects of Tianmushan National Nature Reserve.* Science Press, Beijing, pp. 278–279. [xv+764 pp., in Chinese, English summary]

Chen, C.C. (1987) An investigative report on insect fauna of Hemiptera in Jainfengling [sic] forest region of Hainan Island. *Natural Science Journal of Hainan University*, 5 (2), 34–48. [in Chinese, English summary]

Chen, H.L., Xu, Z.W., Tang, Y.Y. & Jin, G.M. (1995) A list of Hemiptera and their hosts from the forest regions in Lishui Prefecture, Zhejiang Province, China. *Acta Agriculturae Universitatis Jiangxiensis*, 17 (2), 204–214. [in Chinese, English summary]

Chen, Q.H. (1985) The catalogue and geographical distribution of bugs (Hemiptera: Pentatomoidea) in Zhejiang Province. *Acta Agriculturae Universitatis Zhejiangensis*, 11 (1), 115–127. [in Chinese, English summary]

Chen, Q.H. (Ed.) (1990) [*Plant diseases and harmful insects of Zhejiang. Insects. Vol. 1.*] Sanghai Science and Technology Press, Shanghai, 3+264 pp. [in Chinese]

Cui, J.X. & Cai, W.Z. (2008) Hemiptera: Heteroptera. *In*: Shen, X.C. & Lu, C.T. (Eds.), *The fauna and taxonomy of insects in Henan. Vol. 6. Insects of Baotianman National Nature Reserve.* China Agricultural Science and Technology Press, Beijing, pp. 51–55. [1+4+4+431 pp., in Chinese, English summary]

Cui, J.Z., Bai, M., Wu, H. & Ji, L.Q. (2007) *Catalogue of the insect type specimens deposited in China. Vol. 1.* China Forestry Publishing House, Beijing, 10+792 pp. [in Chinese]

Curtis, J. (1824a) *British entomology, being illustrations and descriptions of the genera of insects found in Great Britain and Ireland; containing coloured figures from nature of the most rare and beautiful species, and in many instances of the plants upon which they are found. Vol. 1*. London, 50 plates with legends. [plates 19–22, published 1 May 1824]

Curtis, J. (1824b) *British entomology, being illustrations and descriptions of the genera of insects found in Great Britain and Ireland; containing coloured figures from nature of the most rare and beautiful species, and in many instances of the plants upon which they are found. Vol. 1*. London, 50 plates with legends. [plates 27–30, published 1 July 1824]

Dallas, W.S. (1849) Notice of some hemipterous insects from Boutan (East Indies), with descriptions of the new species. *Transactions of the Entomological Society of London*, 5 (8), 186–194, 1 plate.

Dallas, W.S. (1851) *List of the specimens of hemipterous insects in the collection of the British Museum. Part 1.* Trustees of the British Museum, London, 368 pp., XI plates.

Derzhansky, V.V., Kerzhner, I.M. & Danilovich, L.P. (2002) Holotypes and lectotypes of Palaearctic Pentatomoidea in the collection of the Zoological Institute, St. Petersburg (Heteroptera). *Zoosystematica Rossica*, 10 (2), 361–371. [2001]

Distant, W.L. (1879) Rhynchota. *In*: *Scientific results of the second Yarkland mission; based upon the collections and notes of the late Ferdinand Stoliczka, PhD.* Office of the Superintendent of Government Printing, Calcutta, 15 pp., 1 plate.

Distant, W.L. (1883) First report on the Rhynchota collected in Japan by Mr. George Lewis. *Transacions of the Entomological*

Society, 1883 (4), 413–443, plates XIX–XX.
Distant, W.L. (1887) Contributions to a knowledge of Oriental Rhynchota. Part 1. Fam. Pentatomidae. *Transactions of the Entomological Society of London*, 1887 (3), 341–359, 1 plate.
Distant, W.L. (1900) Rhynchotal notes. – VI. Heteroptera: Dinidorinae, Phyllocephalinae, Urolabidinae, and Acanthosominae. *Annals and Magazine of Natural History*, Series 7, 6 (32), 220–234.
Distant, W.L. (1902) *The fauna of British India, including Ceylon and Burma. Rhynchota, vol. I. Heteroptera.* Taylor & Francis, London, xxxviii+438 pp.
Distant, W.L. (1918) *The fauna of British India, including Ceylon and Burma. Rhynchota–vol. VII. Homoptera: Appendix. Heteroptera: Addenda.* Taylor & Francis, London, viii+210 pp.
Doi, H. (1933) [Miscellaneous notes on insects (III).] *Journal of Chosen Natural History Society*, 15, 85–96. [in Japanese]
Donovan, E. (1804) *An epitome of the natural history of the insects of India, and the islands in the Indian seas.* E. Donovan, London, 2+[68] pp., 55 unnumbered plates.
Esaki, T. (1915) [On Heteroptera of Japan, 2.] *Insect World, Gifu*, 19 (3), 95–100, 1 plate. [in Japanese]
Esaki, T. (1916a) [On Heteroptera of Japan, 7.] *Insect World, Gifu*, 20 (5), 201–205. [in Japanese]
Esaki, T. (1916b) Two new species of the Pentatomidae (Heteroptera) from Japan. *Entomological Magazine*, 2 (3), 125–127.
Esaki, T. (1926) Notes on some species of *Acanthosoma* (Hemiptera: Pentatomidae). *Annales Musei Nationalis Hungarici*, 23, 198–201.
Esaki, T. (1931) [Who was the first to collect in Minoh?] *Transactions of the Kansai Entomological Society*, 2, 114–124. [in Japanese]
Esaki, T. (1932) Hemiptera: Heteroptera. *In*: Uchida, S. *et al.* (Eds.), *Iconographia Insectorum Japonicorum.* Hokuryukan, Tokyo, pp. 1556–1696.
Esaki, T. (1952) Hemiptera: Heteroptera. *In*: Esaki, T., Ishii, T., Kawamura, T., Kinoshita, S., Kuwayama, S., Shiraki, T., Uchida, S. & Yuasa, H. (Eds.), *Iconographia Insectorum Japonicorum. Editio secunda, reformata.* Hokuryukan, Tokyo, pp. 185–270. [6+13+1738+2+203 pp., 15 plates, in Japanese, first edition: 1950; third, revised edition seen]
Fang, Z.G. & Wu, H. (Eds.) (2001) *A checklist of insects from Zhejiang.* China Forestry Publishing House, Beijing, 3+6+452 pp. [in Chinese]
Faúndez, E.I. (2014) A new genus for a Chilean species of Acanthosomatidae (Hemiptera: Heteroptera). *Zootaxa*, 3768 (5), 596–600.
http://dx.doi.org/10.11646/zootaxa.3768.5.7
Faúndez, E.I., Rider, D.A. & Carvajal, M.A. (2014a) *Cochabambia* Pirán, 1959 (Hemiptera: Heteroptera: Acanthosomatidae), a senior homonym of *Cochabambia* Marcuzzi, 1985 (Coleoptera: Tenebrionidae), with notes on the placement of *Cochabambia* Pirán. *Zootaxa*, 3793 (5), 595–596.
http://dx.doi.org/10.11646/zootaxa.3793.5.7
Faúndez, E.I., Carvajal, M.A. & Rider, D.A. (2014b) *Archaeoditomotarsus crassitylus*, gen. and sp. nov. (Hemiptera: Heteroptera: Acanthosomatidae) from Chile. *Zootaxa*, 3860 (1), 87–91.
http://dx.doi.org/10.11646/zootaxa.3860.1.5
Fischer, C. (1996) On the systematic position of *Pseudobebaeus goyazensis* Distant, 1911 within the Pentatomoidea (Heteroptera, Pentatomoidea). *Deutsche Entomologische Zeitschrift*, 43 (1), 83–87.
http://dx.doi.org/10.1002/mmnd.19960430107
Froeschner, R.C. (1997) *Rolstonus rolstoni*, new genus and new species of Acanthosomatidae from Argentina (Heteroptera: Pentatomoidea: Ditomotarsini). *Journal of the New York Entomological Society*, 103 (4), 360–363. [1995]
Göllner-Scheiding, U. (2006) Family Acanthosomatidae Signoret, 1864. *In*: Aukema, B. & Rieger, Ch. (Eds.), *Catalogue of the Heteroptera of the Palaearctic Region. Vol. 5. Pentatomomorpha II.* The Netherlands Entomological Society, Amsterdam, pp. 166–181. [xiii+550 pp.]
Guo, W.Y., Dang, K.L. & Zhao, Y.B. (2007) [*Comprehensive scientific investigation and research on Motianling Nature Reserve, Shaanxi.*] Shaanxi Science and Technology Press, Xi'an, 7+404 pp., 6 unnumbered plates. [in Chinese]
Han, Y. & Liu, G.Q. (2010) Hemiptera: Acanthomatidae [sic]. *In*: Xu, H.C. & Ye, T.X. (Eds.), *Insects of Fengyangshan National Nature Reserve.* China Forestry Publishing House, Beijing, pp. 157–160. [10+396 pp., 8 unnumbered plates, in Chinese, English summary]
Hanelová, H. & Vilímová, J. (2013) Behaviour of the central European Acanthosomatidae (Hemiptera: Heteroptera: Pentatomoidea) during oviposition and parental care. *Acta Musei Moraviae, Scientiae Biologicae*, 98 (2), 433–457.
Hayashi, M. (1987) Parental care observed in *Anaxandra gigantea* (Heteroptera, Acanthosomatidae). *Rostria*, 38, 569–570. [in Japanese, English summary]
Hayashi, M. & Kishi, K. (1998) [True bugs of Chigasaki (Heteroptera).] *Bulletin of Chigasaki City Museum of Heritage*, 6, 11–24. [in Japanese]
Hayashi, M. & Kishi, K. (2002) [True bugs of Chigasaki (Heteroptera), 2.] *Bulletin of Chigasaki City Museum of Heritage*, 10, 1–12. [in Japanese]
Hayashi, M. & Ozaki, M. (2004) Hemiptera (Heteroptera & Auchenorrhyncha). *In*: *Insect fauna of Kanagawa, I.* Kanagawa Konchû Danwakai, Odawara, pp. 213–272. [314 pp., in Japanese]
He, Q.J., Yi, C.H., Ren, Y.H., Wang, T. & Zhang, Z.W. (2007) A list of garden plant insects in the urban districts of Kunming City. *Journal of Sichuan Forestry Science and Technology*, 28 (4), 108–112. [in Chinese, English summary]

Herrich-Schäffer, G.A.W. (1853) *Alphabetisch synonymisches Verzeichniss der wanzenartigen Insecten nebst historischer Uebersicht der einschlägigen Literatur. In*: *Die Wanzenartigen Insecten. Getreu nach der Natur abgebildet und beschrieben*, 9 (8), pp. 1–31, 1–104 and 9 (9), pp. 105–210. Lotzbeck, Nürnberg.

Hirayama, S. (1937) [*Colour atlas of further thousand insects.*]. Sanseido, Tokyo, 194+28+3+40 pp., 88 plates. [in Japanese; a copy of the 18th printing, 1941, was seen]

Hiura, I. (1977) Hemiptera Heteroptera. *In*: Ito, S., Okutani, T. & Hiura, I. (Eds.), *Coloured illustrations of the insects of Japan. Vol. II.* Revised edition. Hoikusha, Osaka, pp. 95–129. [xx+385 pp., 64 plates, in Japanese]

Hiura, I. (1980) On the distribution of *Anaxandra gigantea* (Acanthosomatidae). *Rostria*, 32, 331–333.

Hoffmann, W.E. (1932) A list of the Pentatomidae, Plataspidae, and Coreidae (order Hemiptera) of China, Korea, and Indo-China. *Journal of the Pan-Pacific Research Institution*, 7 (1), 6–11.

Hoffmann, W.E. (1935) An abridged catalogue of certain Scutelleroidea (Plataspidae, Scutelleridae, and Pentatomidae) of China, Chosen, Indo-China, and Taiwan. *Lignan University Science Bulletin*, 7, 1–294.

Horváth, G. (1889) Analecta ad cognitionem Heteropterorum Himalayensium. *Természetrajzi Füzetek*, 12, 29–40.

Hsiao, T.Y. & Liu, S.L. (1977) Family Acanthosomatidae. *In*: Hsiao, T.Y., Ren, S.Z., Zheng, L.Y., Jing, H.L. & Liu, S.L. (Eds.), *A handbook for the determination of the Chinese Hemiptera-Heteroptera. Volume I.* Science Press, Beijing, pp. 159–180, 300–302, plates 25–29. [iii+330 pp., 52 plates, in Chinese, English summary]

Hu, S.C. (1995) *Platacantha forfex*. *In*: Zhang, S.M. (Ed.), Hemiptera (2). *Economic insect fauna of China. Vol. 50*. Science Press, Beijing, p. 69. [xiii+169 pp., XXIV plates, in Chinese]

Hua, L.Z. (2000) *List of Chinese insects. Vol. I.* Zhongshan University Press, Guangzhou, 2+7+448 pp.

ICZN (1999) *International Code of Zoological Nomenclature. Fourth edition.* International Trust for Zoological Nomenclature, London, 306 pp.

Ishihara, T. (1943) Zwei *Acanthosoma*-arten der Insel Formosa (Hemiptera: Pentatomidae). *Transactions of the Natural History Society of Taiwan*, 33, 495–497.

Ishihara, T. (1947) An introduction to Pentatomidae of Japan. *Mushi-shizen*, 17, 55–69. [in Japanese]

Ishikawa, H. (2001) Notes on some Heteroptera distributed in Shizuoka Prefecture, central Honshu, Japan (2). *Rostria*, 50, 9–13. [in Japanese, English summary]

Jakovlev, V.E. (1880) Contributions to the fauna of bugs of Russia and the neighbouring countries. IV. *Bulletin de la Société Impériale des Naturalistes de Moscou*, 55 (2), 385–398. [in Russian and German]

Kanyukova, E.V. (1988) [Family Acanthosomatidae]. *In*: Lehr, P.A. (Ed.), [*Keys to the identification of insects of the Soviet Far East. Vol. 2. Homoptera and Heteroptera.*] Nauka, Leningrad, pp. 912–915. [972 pp., in Russian]

Kawasawa, T. & Kawamura, M. (1975) [*One hundred species of true bugs.*] Zenkoku-noson-kyoiku-kyokai, Tokyo, 301 pp. [in Japanese]

Kerzhner, I.M. (1972) Shieldbugs of the genus *Elasmucha* Stål (Heteroptera, Acanthosomatidae) of the fauna of the USSR. *Zoologicheskii Zhurnal*, 52 (2), 214–219. [in Russian, English summary]

Kirkaldy, G.W. (1909) *Catalogue of the Hemiptera (Heteroptera) with biological and anatomical references, lists of foodplants and parasites, etc. Vol. I. Cimicidae.* Berlin, xl+392 pp.

Kment, P. (2006) Revision of *Mahea* Distant, 1909, with a review of the Acanthosomatidae (Insecta: Heteroptera) of Madagascar and Seychelles. *Acta Entomologica Musei Nationalis Pragae*, 45 [2005], 21–50.

Kobayashi, T. & Tachikawa, S. (2004) [*Illustrated eggs and larvae of Heteroptera. Morphology and ecology.*] Yokendo, Tokyo, 7+323 pp. [in Japanese]

Kudo, S. & Nakahira, T. (1993) Brooding behavior in the bug *Elasmucha signoreti* (Heteroptera, Acanthosomatidae). *Psyche*, 100 (3–4), 121–126.
http://dx.doi.org/10.1155/1993/51480

Kumar, R. (1974) A revision of world Acanthosomatidae (Heteroptera: Pentatomoidea): Keys to and descriptions of subfamilies, tribes and genera, with designation of types. *Australian Journal of Zoology, Supplementary Series*, 34, 1–60.
http://dx.doi.org/10.1071/AJZS034

Kwon, Y.J., Lee, J.H., Suh, S.J., An, D.L., Huh, E.Y. & Lu, L.S. (1996) III Invertebrate, 2 (Insects & spiders). *In*: *List of biological species from Korea.* Korean National Council for Conservation of Nature, Seoul, pp. 93–292. [504 pp.]

Kwon, Y.J., Suh, S.J. & Kim, J.A. (2001) Hemiptera. *Economic insects of Korea* 18, 1–512. [*Insecta Koreana*, 25 (Supplement). National Institute of Agricultural Science and Technology, Suwon]

Lee, C.E. (1971) Heteroptera. *In*: Lee, C.E., Cho, P.S., Kee, K.W., Kim, C.W., Park, S.H. & Lee, T.J. (Eds.), *Illustrated encyclopedia of fauna & flora of Korea. Vol. 12. Insecta (IV).* Samhwa Publishing Co., Seoul, pp. 99–448, 475–601, 1051–1059, plates 1–30. [1069 pp., in Korean, English summary]

Lee, C.E. & Kwon, Y.J. (1991) Annotated check list of Hemiptera from Korea. Part 4. Pentatomorpha 1 (excluding Pentatomidae). *Nature and Life*, 21 (1), 39–61.

Lee, C.E. & Kwon, Y.J. (1994) Order 20. Hemiptera. *In*: Ryu, H.S. *et al.* (Eds.), *Check list of insects from Korea.* Kon-Kuk University Press, Seoul, pp. 60–81. [744 pp.]

Lei, C.L. & Zhou, Z.B. (Eds.) (1998) [*List of the insects of Hubei Province.*] Hubei Science and Technology Press, Wuhan, 650 pp. [in Chinese]

Lethierry, L. & Severin, G. (1893) *Catalogue général des Hémiptères. Tome I. Hétéroptères, Pentatomidae.* F. Hayez, Bruxelles, x+286 pp.

Li, B.G. & He, P.J. (2007) [*Biodiversity of Zhouzhi National Nature Reserve, Shaanxi.*] Shaanxi Science and Technology Press, Xi'an, 5+406 pp., 16 plates, 7 maps. [in Chinese]
Li, C.A. (1985) Record of bugs of three families (Hemiptera: Acanthosomatiade [sic], Urostylidae and Berytidae) collected in Shanxi. *Journal of Shanxi University (Natural Science Edition)*, 1985, 116–119. [in Chinese, English summary]
Li, C.A. (1995) *Sastragala edessoides*. *In*: Zhang, S.M. (Ed.), Hemiptera (2). *Economic insect fauna of China. Vol. 50*. Science Press, Beijing, pp. 69–70. [xiii+169 pp., XXIV plates, in Chinese]
Li, L.S., Wang, Y.X., Yang, D.S. & Yang, L.Y. (1989) [List of Hemiptera-Heteroptera of Xishuangbanna Nature Reserve.] *Yunnan Forestry Science and Technology*, 1989 (3), 37–47. [in Chinese]
Lin, Y.J. & Zhang, S.M. (1993) Hemiptera: Pentatomoidea. *In*: Huang, C.M. (Ed.), *The series of the bioresources expedition to the Longqi Mountain Nature Reserve: Animals of Longqi Mountain.* China Forestry Publishing House, Beijing, pp. 106–139. [2+2+3+6+8+1130 pp., in Chinese, English summary]
Lin, Y.J., Zhang, S.M. & Lin, Z. (1999) Acanthosomatidae. *In*: Huang, B.K. (Ed.), *Fauna of Insects, Fujian Province of China. Vol. 2*. Fujian Science and Technology Publishing House, Fuzhou, pp. 95–104. [2+2+3+806 pp., in Chinese]
Linnaeus, C. (1758) *Systema naturae, per regna tria naturae, secundum classes, ordines, genera, species, cum characteribus, differentiis, synonymis, locis. Tomus I. Editio decima, reformata.* Salvii, Holmiae, 824 pp.
Liu, G.Q. & Ding, D. (2008) The new species of the genus *Lindbergicoris* and the first record of *Acanthosoma forfex* Dallas from China (Hemiptera, Acanthosomatidae). *Acta Zootaxonomica Sinica*, 33 (4), 768–774. [in Chinese, English summary]
Liu, G.Q. & Wang, H.J. (2004) Hemiptera: Acanthosomatidae. *In*: Yang, X.K. (Ed.), *Insects from Mt. Shiwandashan Area of Guangxi.* China Forestry Publishing House, Beijing, pp. 140–141. [2+3+3+668 pp., in Chinese, English summary]
Liu, G.Q. & Wang, H.J. (2005) Hemiptera: Acanthosomatidae. *In*: Yang, X.K. (Ed.), *Insect fauna of Middle-West Qinling Range and South Mountains of Gansu Province.* Science Press, Beijing, pp. 271–274. [ix+1055 pp., in Chinese, English summary]
Liu, S.L. (1979) Acanthosomatidae from West Hubei Province, China (Hemiptera). *Entomotaxonomia*, 1 (1), 55–59. [in Chinese, English summary]
Liu, S.L. (1980) Six new species of Acanthosomatidae from China (Hemiptera: Heteroptera). *Zoological Research*, 1 (2), 233–242. [in Chinese, English summary]
Liu, S.L. (1987) Acanthosomatidae. *In*: Huang, F.S. (Ed.), *Forest insects of Yunnan.* Yunnan Science and Technology Press, Kunming, pp. 149–155. [9+1622 pp., 16 plates, in Chinese]
Liu, S.L. (1988) Hemiptera: Pyrrhocoridae, Acanthosomatidae, Aradidae. *In*: Huang, F.S. *et al.* (Eds.), *Insects of Mt. Namjagbarwa Region of Xizang.* Science Press, Beijing, pp. 121–123. [xii+621 pp., in Chinese, English summary]
Liu, S.L. (1992) Hemiptera: Acanthosomatidae. *In*: Chen, S. (Ed.), *Insects of the Hengduan Mountains Region. Vol. 1.* Science Press, Beijing, pp. 130–134. [xii+865 pp., in Chinese, English summary]
Liu, S.L. (1995) *Anaxandra cornuta*. *In*: Zhang, S.M. (Ed.), Hemiptera (2). *Economic insect fauna of China. Vol. 50*. Science Press, Beijing, pp. 68–69. [xiii+169 pp., XXIV plates, in Chinese]
Liu, S.L. & Li, C.A. (1995) *Acanthosoma labiduroides*. *In*: Zhang, S.M. (Ed.) Hemiptera (2). *Economic insect fauna of China, vol. 50*. Science Press, Beijing, pp. 62–63. [xiii+169 pp., XXIV plates, in Chinese]
Liu, X.Z., Xiao, Z.Y. & Ma, J.H. (Eds.) (2002). *Scientific survey and study on the forest ecosystem in Jiangxi Jiulianshan Nature Reserve.* China Forestry Publishing House, Beijing, 4+2+448 pp., 12 unnumbered plates. [in Chinese]
Mai, G.Q. (2001) *Sastragala edessoides* Distant. *Entomological Knowledge (Kunchong Zhishi)*, 38 (3), 224. [in Chinese]
Matsumura, S. (1913) *Thousand insects of Japan. Additamenta 1.* Keiseisha, Tokyo, 184 pp., 15 plates. [in Japanese]
Matsumura, S. (1930) *The illustrated thousand insects of Japan. Vol. I. (Rhynchota)*. Tōkō Shoin, Tokyo, 198+38 pp., 16 plates. [in Japanese]
Matsumura, S. (1931) *6000 illustrated insects of Japan-Empire.* Tōkō Shoin, Tokyo, 191+1496 pp. [in Japanese]
Miller, N.C.E. (1956) *The biology of the Heteroptera*. Leonard Hill [Books] Ltd., London, x+162 pp. [Ed. 1]
Mitsuhashi, S. (1915) A list of Pentatomidae of Japan [continued]. *Insect World*, 19 (12), 523–528. [in Japanese]
Miyamoto, S. (1962) Hemiptera [part]. *In*: Asahina, S., Ishihara, T. & Yasumatsu, K. (Eds.), *Iconographia Insectorum Japonicorum. Colore naturali edita. Vol. III.* Hokuryukan, Tokyo, pp. 75–84, 89–108, plates 38–42, 45–54. [76 +358 pp., 156 plates, in Japanese]
Miyamoto, S. & Yasunaga, T. (1989) Heteroptera. *In*: Hirashima, Y. (Ed.), *A check list of Japanese insects. Vol. I.* Entomological Laboratory, Faculty of Agriculture, Kyushu University, Fukuoka, pp. 151–188. [in Japanese]
Onoda, K. & Onoda, I. (1938) *Naigai dobutsu genshoku dai-zukan* [*Color illustrated book of the domestic and international animals*]. *Vol. 4*. Seibundo-Shinkosha, Tokyo, 2+182+10 pp., 43 plates. [in Japanese]
Oshanin, B. (1906) *Verzeichnis der palaearktischen Hemipteren, mit besonderer Berücksichtigung ihrer Verteilung im Russischen Reiche. I. Band. Heteroptera. I. Lieferung. Pentatomidae-Lygaeidae.* Kaiserliche Akademie der Wissenschaften, St. Petersburg, LXXIV+393 pp. [Supplement to *Ezhegodnik Zoologicheskogo Muzeya Imperatorskoi Akademii Nauk* 11]
Oshanin, B. (1912) *Katalog der paläarktischen Hemipteren (Heteroptera, Homoptera-Auchenorhyncha und Psylloideae).* R. Friedländer & Sohn, Berlin, XVI+187 pp.
Ren, Y., Liu, M.S., Tian, H. & Li, Z.J. (Eds.) (2006) *Biodiversity, conservation and management of Taibaishan Nature Reserve.* China Forestry Publishing House, Beijing, 2+2+22+492 pp., 8 unnumbered plates. [in Chinese]
Reuter, O.M. (1881) Acanthosomina et Urolabidina nova et minus cognita. *Berliner Entomologische Zeitschrift*, 25 (1), 67–86.

http://dx.doi.org/10.1002/mmnd.18810250112
Reuter, O.M. (1908) Einege von A. Becker und A. Kouschakewitsch benannte Hemiptera-Heteroptera. *Ezhegodnik Zoologicheskogo Muzeya Imperatorskoi Akademii Nauk*, 12 (4) [1907], 541–545.
Rolston, L.H. & Kumar, R. (1974) Two new genera and two new species of Acanthosomatidae (Hemiptera) from South America, with a key to the genera of the Western Hemisphere. *Journal of the New York Entomological Society*, 82 (4), 271–278.
Schaefer, C.W. & Ahmad, I. (1987) The food plants of four pentatomoid families (Hemiptera: Acanthosomatidae, Tessaratomidae, Urostylidae, and Dinidoridae). *Phytophaga*, 1, 21–34.
Scott, J. (1874) On a collection of Hemiptera Heteroptera from Japan. Descriptions of various new genera and species. *Annals and Magazine of Natural History*, Series 4, 14 (82), 289–304, 360–365, 426–452.
Shen, X.C. (Ed.) (1993) [*List of the insects of Henan.*] China Agricultural Science and Technology Press, Beijing, 2+5+353 pp. [in Chinese]
Stål, C. (1871) Hemiptera insularum Philippinarum. Bidrag till Philippinska öarnes Hemipter-fauna. *Öfversigt af Kongliga Vetenskaps-Akademiens Förhandlingar*, 27 (7), 607–776, plates VII–IX. [1870]
Stål, C. (1876) Enumeratio Hemipterorum. Bidrag till en förteckning öfver alla hittills kända Hemiptera, jemte systematiska meddelanden. 5. *Kongliga Svenska Vetenskaps-Akademiens Handlingar*, 14 (4), 1–162.
Stichel, W. (1962a) *Illustrierte Bestimmungstabellen der Wanzen. II. Europa. (Hemiptera-Heteroptera Europae). 23. Heft. Liste der Paläarktischen Arten. Pentatomomorpha I [part] Vol. 4 (25)*. Stichel, Berlin-Hermsdorf, 32 pp. [pp. 769–800]
Stichel, W. (1962b) *Verzeichnis der paläarktischen Hemiptera-Heteroptera. IV. Pentatomomorpha (Coreoidea-Pentatomoidea).* Stichel, Berlin-Hermsdorf, pp. 187–362.
Suzuki, Y. (1978) [*Anaxandra gigantea* Matsumura collected in the Miura Peninsula.] *Kanagawa-Chûhô*, 53, 28. [in Japanese]
Takeuchi, K. (1955) *Coloured illustrations of the insects of Japan. Orthoptera, Odonata, Hemiptera, Neuroptera, Lepidoptera, Hymenoptera & Diptera.* Hoikusha, Osaka, 190 pp., 68 plates. [in Japanese]
Tallamy, D.W. & Schaefer, C.W. (1997) Maternal care in the Hemiptera: ancestry, alternatives and current adaptive value. *In*: Choe, J.C. & Crespi, B.J. (Eds.), *The evolution of social behavior in insects and arachnids.* Cambridge University Press, Cambridge, pp. 94–115. [541 pp.]
Tang, T.H. (1935) Family Pentatomidae. *In*: Wu, C.F. (Ed.), *Catalogus insectorum sinensium. Vol. II.* Fan Memorial Institute of Biology, Peiping, pp. 275–382. [634 pp.]
Tazawa, M. (1938) A list on Heteroptera from Chiisagata-gun, Nagano Province. *Entomological World*, 6 (49), 249–262. [in Japanese]
Tomokuni, M. (1979) The pentatomoid fauna of the Kii Peninsula. *Memoirs of the National Science Museum, Tokyo*, 12, 103–111. [in Japanese, English summary]
Tomokuni, M. (1981) Heteroptera of the Izu Peninsula, Central Japan. *Memoirs of the National Science Museum, Tokyo*, 14, 103–116. [in Japanese, English summary]
Tomokuni, M. (Ed.) (1993) *A field guide to Japanese bugs. Terrestrial heteropterans.* Zenkoku Noson Kyoiku Kyokai, Tokyo, 380 pp. [in Japanese]
Tomokuni, M. (2014) Heteroptera from the Garden of the Imperial Palace, Tokyo, Japan. *Memoirs of the National Science Museum, Tokyo*, 50, 359–369. [in Japanese, English summary]
Tsai, J.F. & Rédei, D. (2015) The identity of *Acanthosoma vicinum*, with proposal of a new genus and species level synonymy (Hemiptera: Heteroptera: Acanthosomatidae). *Zootaxa*. 3936 (3), 375–386.
http://dx.doi.org/10.11646/zootaxa.3936.3.4
Tsai, J.F., Rédei, D., Yeh, G.F. & Yang, M.M. (2011) *Jewel bugs of Taiwan (Heteroptera: Scutelleridae).* National Chung Hsing University, Taichung, 309 pp.
Tsai, J.F. & Yang, M.M. (2005) The primary identification of phytophagous and predaceous bugs (Hemiptera: Heteroptera). *In*: Lu, K.H. (Ed.), *Workshop on the identification and diagnosis of important pests of plant health inspection and quarantine*, Special Issue, 5, pp. 81–111. [Bureau of Animal and Plant Health Inspection and Quarantine, Council of Agriculture, Executive Yuan, Taipei, and Department of Entomology, National Chung Hsing University, Taichung, in Chinese]
Uhler, P.R. (1896) Summary of the Hemiptera of Japan, presented to the United States National Museum by Professor Mitzukuri. *Proceedings of the United States National Museum*, 19 (1108), 255–297.
http://dx.doi.org/10.5479/si.00963801.1108.255
Vinokurov, N.N. & Kanyukova, E.V. (1995) [*True bugs (Heteroptera) of Sibiria.*] Nauka, Novosibirsk, 237 pp. [in Russian]
Vinokurov, N.N., Kanyukova, E.V. & Golub, V.B. (2010) *Catalogue of the Heteroptera of the Asian part of Russia.* Nauka, Novosibirsk, 319 pp. [in Russian]
Walker, F. (1867) *Catalogue of the specimens of Heteropterous Hemiptera in the collection of the British Museum. Part II. Scutata.* Trustees of the British Museum, London, pp. 241–417.
Walker, F. (1868) *Catalogue of the specimens of Hemiptera Heteroptera in the collection of the British Museum. Part III.* Trustees of the British Museum, London, pp. 419–599.
Wang, H.J., Li, P., Gao, Y.D. & Yuan, M. (2002) A list of insect pests of bamboos in Baishuijiang Natural Reserve (2). *Journal of Gansu Forestry Science and Technology*, 27 (4), 12–16. [in Chinese, English summary]
Wang, R., Cao, T.W. & Zhang, Z.J. (2007) Hemiptera, Pentatomoidea in Shanxi Province. *Journal of Shanxi Agricultural Sciences*, 35 (7), 58–61. [in Chinese, English summary]

Watanabe, K. (1982) Acanthosomatidae from Shizuoka Prefecture. *Rostria*, 34, 415–416. [in Japanese]
Wu, L. (Ed.) (1984) *A list of agricultural and forest insects of Guizhou.* Guizhou People's Publishing House, Guiyang, 7+271 pp. [in Chinese]
Wu, Y.F., Zhao, J.C. & Cheng, J. (Eds.) (2006) *Scientific survey and study on biodiversity in Hebei Maojingba Nature Reserve, China.* Science Press, Beijing, vi+470 pp., 10 unnumbered plates. [in Chinese]
Wu, Y.F., Zhao, J.C. & Liu, B.Z. (Eds.) (2007) *Scientific investigation and biodiversity research in Hebei Liaohe River Source Nature Reserve.* Science Press, Beijing, vi+424 pp., 4 unnumbered maps. [in Chinese]
Xie, Q. & Bu, W.J. (2005) Hemiptera: Acanthosomatidae, Cydnidae, Plataspidae, Scutelleridae, Dinidoridae, Tessaratomidae and Pentatomidae. *In*: Yang, M.F. & Jin, D.C. (Eds.), *Insects from Dashahe Nature Reserve of Guizhou.* Guizhou People's Publishing House, Guiyang, pp. 184–191. [6+607 pp., 8 unnumbered plates, in Chinese, English summary]
Xie, W.H., Lin, S.X. & Bei, R.J. (2011) A survey on the Heteroptera community in Cenwanglao Mountains National Nature Reserve. *Journal of Yulin Normal University (Natural Science)*, 32 (2), 78–83. [in Chinese, English summary]
Xiong, J. & Liu, S.L. (1993) Hemiptera: Acanthosomatidae. *In*: Huang, F.S. (Ed.), *Insects of Wuling Mountains Area, southwestern China.* Science Press, Beijing, pp. 201–202. [x+777 pp., in Chinese, English summary]
Xue, H.J. & Bu, W.J. (2006) Plataspidae, Scutelleridae, Tessaratomidae, Pentatomidae, Acanthosomatidae and Parastrachiidae. *In*: Li, Z.Z. & Jin, D.C. (Eds.), *Insects from Fanjingshan Landscape.* Guizhou Science and Technology Publishing House, Guiyang, pp. 218–228. [6+6+780 pp., 8 unnumbered plates, in Chinese, English summary]
Yamamoto, A. & Hayashi, M. (2011) A new species of the genus *Acanthosoma* from Japan (Heteroptera, Acanthosomatidae). *Japanese Journal of Systematic Entomology*, 17 (2), 145–152.
Yamamoto, A. & Hayashi, M. (2012) Family Acanthosomatidae Signoret, 1864. *In*: Ishikawa, T., Takai, M. & Yasunaga, T. (Eds.), *A field guide to Japanese bugs – Terrestrial heteropterans. Vol. 3.* Zenkoku Noson Kyoiku Kyokai Publishing Co., Tokyo, plates 122–128, pp. 500–516. [pp. 1–46, plates 1–128, pp. 177–573, in Japanese]
Yamamoto, A., Hayashi, M. & Kudo, S. (2009) Host plants of Japanese acanthosomatid bugs (Heteroptera: Acanthosomatidae). *Japanese Journal of Entomology*, New Series, 12 (1), 31–38. [in Japanese, English summary]
Zhang, S.M. & Lin, Y.J. (1981) Hemiptera: Pentatomoidea. plate 1. *In*: *The series of the comprehensive scientific expedition to the Qinghai-Xizang Plateau. Insects of Xizang. Vol. 1.* Science Press, Beijing, pp. 133–143. [xi+600 pp., in Chinese, English summary]
Zhang, S.M., Lin, Y.J., Yin, Y.S., Hu, M.C. & Gui, A.L. (1980) Notes on the Hemiptera Pentatomoidea of Jiangxi. [*Journal of the Communist Labour University*], 1980 (1), 17–33. [in Chinese]
Zhang, S.M. & Sie, R.F. (1988) [1987] Hemiptera: Plataspidae, Acanthosomatidae, Urostylidae and Cydnidae. *In*: Zhang, S.M. (Ed.), *Agricultural insects, spiders, plant diseases and weeds of Xizang. Vol. 1.* Hunan Science and Technology Press, Changsha, pp. 69–74. [1+3+3+463 pp., in Chinese, English summary]
Zhang, S.M. & Sie, R.F. (1992) Acanthosomatidae. *In*: Peng, J.W. & Liu, Y.Q. (Eds.), *Iconography of forest insects in Hunan China.* Hunan Science and Technology Press, Changsha, pp. 249–251. [4+60+1473 pp., in Chinese, English summary]
Zhao, Q. & Liu, G.Q. (2012) Hemiptera: Acanthosomatidae. *In*: Dai, R.H., Li, Z.Z. & Jin, D.C. (Eds.), *Insects from Kuankuoshui Landscape.* Guizhou Science and Technology Publishing House, Guiyang, pp. 130–132. [2+5+2+4+8+978+16 pp., in Chinese, English summary]
Zhao, Q., Rédei, D. & Bu, W.J. (2013) A revision of the genus *Pinthaeus* (Hemiptera: Heteroptera: Pentatomidae). *Zootaxa*, 3636 (1), 59–84.
http://dx.doi.org/10.11646/zootaxa.3636.1.3
Zheng, L.Y. & Wang, H.J. (1995) Contribution to the taxonomy of *Lindbergicoris* Leston (Hemiptera: Acanthosomatidae). *Entomologica Scandinavica*, 26 (1), 17–25.
Zheng, S.Z. & Lin, Y.X. (2013) Stinkbug. *In*: Xu, H.Y. (Ed.), *Taiwan Nature Identification Series*. *Vol. 29.* Morning Star Publishing, Taipei, pp. 1–381. [in Chinese]
Zhou, J.H., Zhao, S.X., Song, S.Y., Wu, C.B. & Li, W.F. (1992) List of harmful insects of Qiandongnan forest area. *Guizhou Forestry Science and Technology*, 20 (3), 72–80. [in Chinese]