



A review of the Asian species of the genus *Pachysternum* (Coleoptera: Hydrophilidae: Sphaeridiinae)

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Abstract

The Asian species of the genus *Pachysternum* Motschulsky, 1863 are revised and redescribed. Three new species are described: *Pachysternum kubani* **sp. nov.** (Laos, China: Sichuan), *P. rugosum* **sp. nov.** (China: Gansu, Shaanxi) and *P. sandakanum* **sp. nov.** (Malaysia: Sabah, Sarawak). Three new synonyms are established: *Megasternum gibbulum* Motschulsky, 1866 and *Pachysternum sibiricum* Kuwert, 1890 are junior synonyms of *Pachysternum haemorrhoum* Motschulsky, 1866; *Pachysternum nigratum* Jia, Wu & Pu, 1998 is a junior synonym of *P. stevensi* Orchymont, 1926. *Pachysternum keralense* Hebauer, 2002 is transferred to the *pilocnemoides* group of the genus *Australocyon* Hansen, 1990. *Megasternum japonicum* Shatrovskiy, 1989 is resurrected from the synonymy with *M. gibbulum* and considered as a valid name. Lectotypes are designated for the following species: *Pachysternum apicatum* Motschulsky, 1863, *P. curvatum* Orchymont, 1925, *P. haemorrhoum* Motschulsky, 1866, *P. nigrovittatum* Motschulsky, 1863, *P. sibiricum* Kuwert, 1890, *Megasternum gibbulum* Motschulsky, 1866 and *M. distinctum* Sharp, 1873. All *Pachysternum* species are diagnosed, relevant morphological characters are illustrated, and an updated identification key is provided. *Pachysternum apicatum* is interpreted as a polymorphic species exhibiting high geography-based variation and possibly consisting of some sibling taxa; diagnosing of these taxa requires more material and additional (ideally molecular) characters and is therefore left unresolved at the present time.

Key words: *Pachysternum*, *Australocyon*, *Megasternum*, Megasternini, taxonomy, new species, new synonym, new combinations, coprophagous beetles, Oriental Region, Palearctic Region, Sundaland

Introduction

The megasternine genus *Pachysternum* Motschulsky, 1863 currently contains 22 species distributed throughout the Afrotropical and Oriental Regions and in the eastern Palearctic (Hansen 1999, Short & Fikáček 2011). In addition, the African species *P. capense* Mulsant, 1844 recently expanded to southern and central Europe (Fikáček & Boukal 2004, Rocchi *et al.* 2006, Queney 2009) and also seems to be accidentally introduced (but possibly not established) to Australia (Hansen 1990; M. Fikáček, unpubl. data). Most Asian (and African) *Pachysternum* species are rather common inhabitants of mammal excrements and are therefore frequently represented in the collections.

The identity of the Asian representatives of the genus is rather clear, in contrast to the Afrotropical fauna which remains largely unknown and complicated by the problematic status of the genera *Cercillum* Knisch, 1921 and *Pigrillum* Knisch, 1921. Motschulsky (1863) described the genus on the basis of two species, *Pachysternum nigrovittatum* Motschulsky, 1863 and *P. apicatum* Motschulsky, 1863 which are both rather common and widely distributed throughout the Oriental region. Later, he included one additional species, the Japanese *Pachysternum haemorrhoum* Motschulsky, 1866, into the genus (Motschulsky 1866); the generic placement of this species was later questioned by Sharp (1879, 1884). An additional four species were described sixty years later by Orchymont (1925, 1926a, b), who also provided an identification key to all species known at that time. No additional taxa were subsequently described until studies by Jia *et al.* (1998), Hebauer (2002a) and Fikáček (2006) who described a new species from southern China, southern India, and Sulawesi respectively.

Between 2004 and 2006, the first author studied the rich material of the genus deposited in the Naturhistorisches Museum in Vienna, mainly to confirm the identity of European specimens of *P. capense* (see Fikáček & Boukal 2004). As a part of these studies, he found several seemingly undescribed species as well as many new faunistic records concerning the Oriental taxa. One of these was described by Fikáček (2006), who also defined the formal *P. nigrovittatum* species group containing all Asian species of the genus. Problematic specimens were either left undescribed (*P. rugosum* **sp. nov.** described herein) or erroneously identified as *P. nigratum* Jia, Wu et Pu, 1998 (the specimens actually are dark forms of *P. kubani* **sp. nov.** described herein) and the faunistic data concerning the Palearctic and Chinese species were published in a shortened form in the respective volume of the Catalogue of Palearctic Coleoptera (Hansen 2004) for which the Sphaeridiinae part was updated by M. Fikáček and S. Ryndevich. Since then, additional material was accumulated, and the study of all type specimens was made possible in the cooperation with the second and third authors of this paper. This allowed us to prepare a complete review of the taxonomy and distribution of the Asian species of *Pachysternum*. Results of this study are summarized in the presented paper.

Material and methods

For this study, we have examined more than 2000 specimens of Asian *Pachysternum* including the type specimens of all included species. A portion of the specimens of each species was dissected; male genitalia as well as one anterior tibia of these specimens were transferred to pure alcohol and subsequently mounted into a drop of alcohol-soluble Euparal resin on a piece of glass attached below the respective specimen. The median lobe of the aedeagus was studied separately from the tegmen in order to accurately examine details of its shape. The external morphology of selected specimens of most species was also examined using the Hitachi S-3700N environmental electron microscope at the Department of Entomology, National Museum in Prague. As the external morphology was found very uniform in all treated species, few selected micrographs illustrating the general morphology of the taxa are presented in this paper.

Male genitalia and isolated anterior tibiae were examined using the Nikon Eclipse TS100 compound microscope which was also used to take photographs of all these structures. These photographs were either used for the preparation of drawings (tegmen and sternite 9) or were adapted using Adobe Photoshop CS2 and are presented here directly (median lobe of the aedeagus and anterior tibia). Habitus photographs were taken using Canon D-550 digital camera with attached Canon MP-E65mm f/2.8 1–5× macro lens, and subsequently adapted in Adobe Photoshop CS2.

The morphological terminology largely follows Komarek (2004) and Fikáček (2010), the higher-level taxonomic nomenclature follows Hansen (1999). This contribution is the third in the series of species-level revisions of the taxa belonging to the *Megasternum* group of genera published by the first author; see Fikáček (2007, 2008) for previous publications focused in this group of genera.

A database of the examined specimens was generated using the freeware Mantis software (Nasrecki 2008). The maps were generated by the freeware PanMap GIS software (Diepenbroek *et al.* 2000) using the GPS coordinates exported from Mantis through GoogleEarth to plain text format.

The depository of the specimens examined is abbreviated using the following acronyms throughout the paper:

ANIC	Australian National Insect Collection, Canberra, Australia (C. Lemann).
ASHC	coll. A. Shavrin, Irkutsk, Russia.
ASKC	coll. A. Skale, Hof, Germany.
BMNH	the Natural History Museum, London (M. Barclay).
FHGC	coll. F. Hebauer, Grafing, Germany.
FMNH	Field Museum of Natural History, Chicago, U.S.A. (A. Newton, M. Thayer).
HHCR	coll. Hans Hebauer, Rain/Niedersachsen, Germany.
HNHM	Hungarian Natural History Museum, Budapest, Hungary (Gy. Makranczy).
IRSNB	Institute Royal des Sciences Naturelles de Belgique, Bruxelles, Belgium (P. Limbourg).
KSEM	Natural History Museum, University of Kansas, Lawrence, USA (A. Short);
MPU	Department of Zoology, Moscow State Pedagogical University, Moscow, Russia (K. Makarov).
NHMB	Naturhistorisches Museum, Basel, Switzerland (M. Geiser).
NHMW	Naturhistorisches Museum, Wien, Austria (M. Jäch, A. Komarek).
NMPC	National Museum, Prague (M. Fikáček, J. Hájek).
PJWP	coll. P. Jalszynski, Wrocław, Poland.
SMF	Senckenberg Forschungsinstitut und Naturmuseum, Frankfurt am Main (D. Kovac).
SMNS	Staatliches Museum für Naturkunde, Stuttgart, Germany (W. Schawaller).
SYSU	Institute of Entomology, Sun Yat-sen University, Guangzhou, China (F.-L. Jia).
ZMUC	Zoological Museum, University of Copenhagen, Denmark (A. Solodovnikov).
ZMUM	Zoological Museum, University of Moscow, Russia (N. B. Nikitskiy).

Generic morphology

Pachysternum Motschulsky, 1863

Pachysternum Motschulsky, 1863: 446.

Type species. *Pachysternum nigrovittatum* Motschulsky, 1863 (designated by Knisch 1924a: 158).

Composition. Contains ten Oriental species, one species distributed in eastern Palaearctic, and 14 African species (one of them, *P. capense*, also now occurs in Europe and Australia).

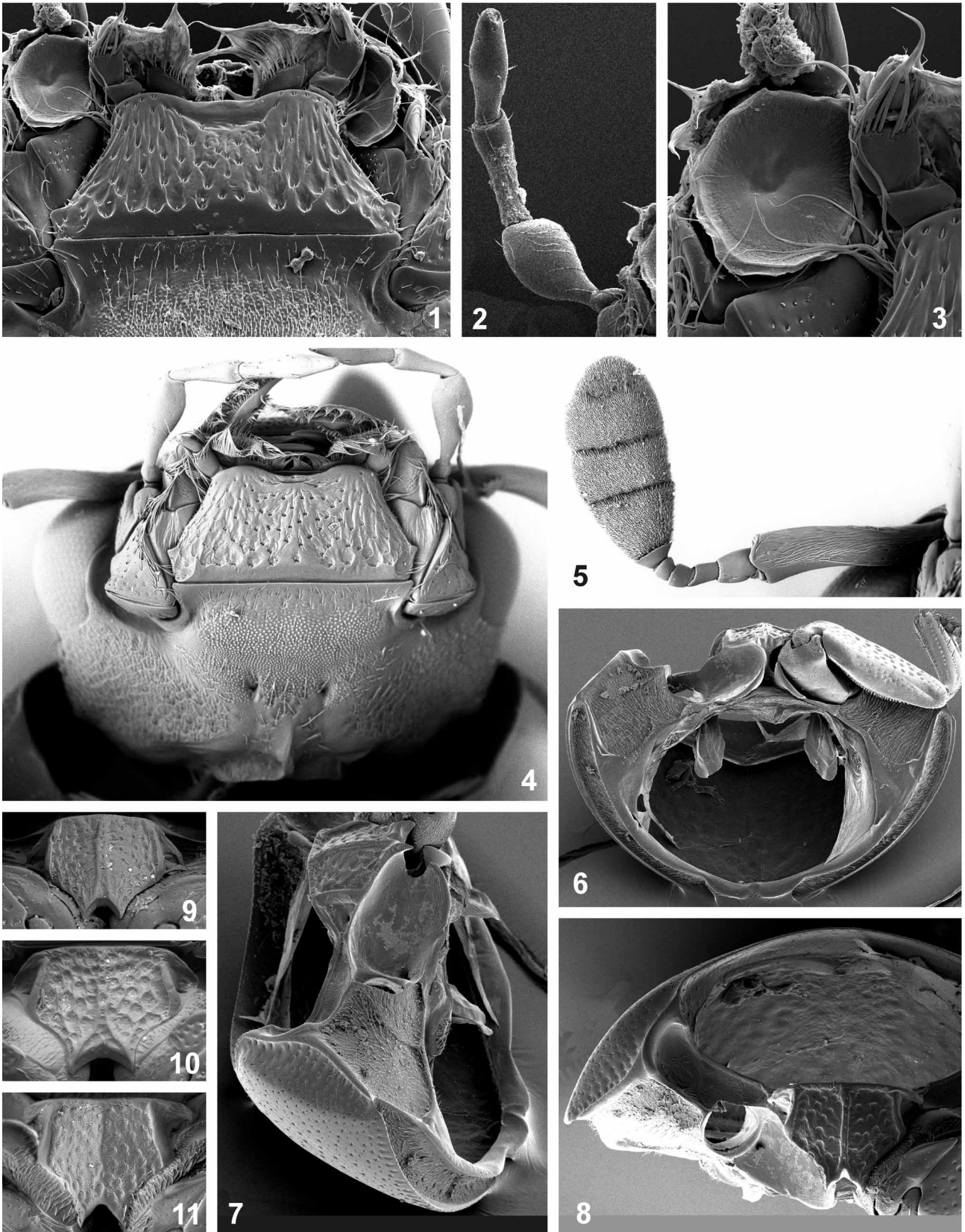
Asian *Pachysternum*

Description. Body widely oval, sexually dimorphic in shape; males widely rounded in dorsal view, without pronouncing shoulders (e.g., Fig. 52a, b, 60e); females more elongate, with pronouncing shoulders and elytra (rather strongly narrowing posteriad (e.g., Fig. 52e, g, 60d). Body length 2.0–4.5 mm. Body coloration often with distinct pattern of pale reddish to yellowish and dark brown or black spots (in this case beetles appearing dark with pale pattern or pale with dark pattern according to the extent of pale/dark parts); in some species body more or less uniformly pale reddish to dark brown (see *P. apicatum*, *P. coomani* and *P. rugosum*).

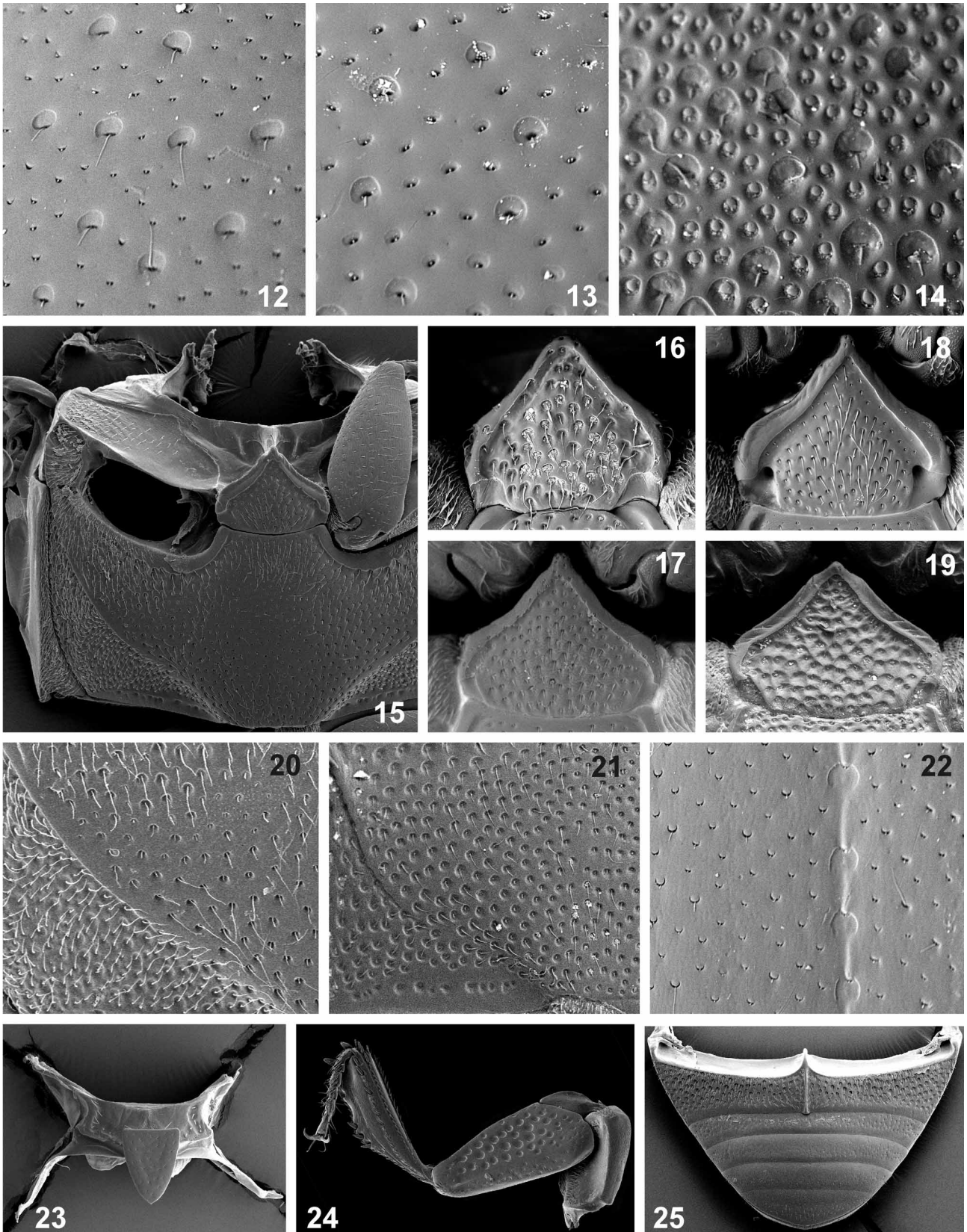
Head. Anterior margin of clypeus convex medially, strongly angulate laterally, bearing rather wide and very distinct rim. Frontoclypeal sutures angulate, lateral portions very distinct as transverse ridges arising above antennal bases and reaching submedially, median portions weakly developed or totally missing. Median portion of frons not elevated above lateral portions. Eyes moderately large, separated by 5–6× the width of one eye in dorsal view. Labrum membranous, partly concealed by clypeus. Maxillary palpomere 2 club-like, strongly widened distally, palpomere 3–4 thin, palpomere 4 spindle-like (Fig. 2); maxilla of male with sucking disc (Figs. 1, 3). Mentum (Figs. 1, 4) transverse, ca. 2.5× as wide as long; lateral margin angulate slightly before posterolateral corner; anterior margin slightly concave medially, anterolateral corners rounded; transverse groove lying along anterior margin present medially; punctation consisting of coarse shallow punctures elongate anteriorly and therefore forming low longitudinal ridges in anterior portion. Submentum densely pubescent, ridges arising from posterior margin of maxillary groove absent. Posterior tentorial pits present, minute; gular sutures weakly developed, slightly diverging posteriad; gula carinate medially in posterior portion, bearing coarse setiferous punctures (Fig. 4). Antenna with 9 antennomeres (Fig. 5); scapus strongly arcuate, bearing a distinct longitudinal ridge dorsally; pedicel ca. as long as antennomere 3, antennomeres 3–5 gradually decreasing in length; cupula small; antennal club compact, densely pubescent, widely rounded at apex, lacking any fields of special sensorial structures.

Prothorax. Pronotum arcuate on posterior margin, shallowly bisinuate on anterior margin; lateral portions deflexed and therefore seen ventrally (Fig. 8), false pronotal margin absent, lateral margin of pronotum angular in lateral view (Fig. 7). Pronotal punctation consisting of large shallow punctures intermixed among fine ground punctation (Figs. 12–14). Series of large punctures along posterior margin present. Prosternum highly elevated into a subpentagonal plate medially (Figs. 8–11), the plate sharply to indistinctly carinate medially, bearing coarse punctures; anterior margin of prosternum constricted just laterally of the plate, deep pits laterally of lateral margins of the plate present (Fig. 7). Antennal grooves very distinct, large, laterally reaching deflexed lateral margin of pronotum (Fig. 8). Profurcal arms short, reaching ca. ventral third of prothoracic height, leaf-like, strongly asymmetrical in shape, protruding of the posterior foramen of prothorax (Fig. 6). Additional ridge below posterior pronotal margin present, very distinct, reaching lateral margin of hypomeron.

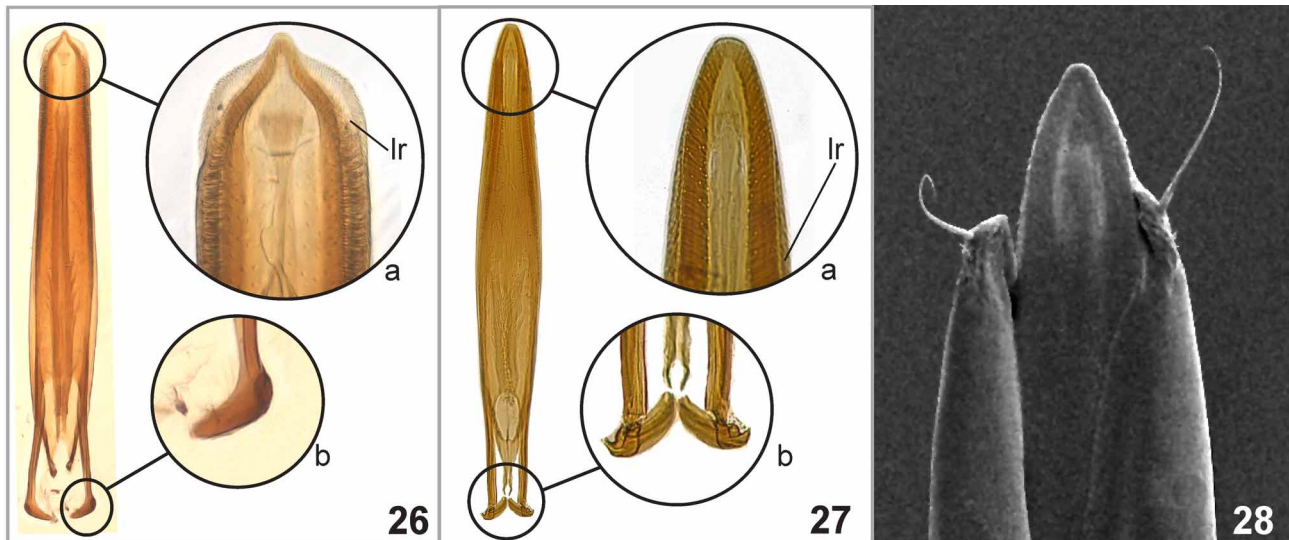
Mesoventer. Mesoventrite much shorter than metaventrite, distinctly inclined and therefore not lying in the same plane as mesepimera (Fig. 15). Median portion of mesoventrite elevated into preepisternal plate, the plate triangular in shape, slightly wider than long (Figs. 15–19), bearing very distinct rim on anterolateral margins; posterior margin of the plate widely contacting metaventral process. Grooves for reception of procoxae developed, large, reaching anterior margin of mesocoxal cavities (Fig. 15). Mesepimeron with very distinct oblique ridge laterally. Mesocoxal cavities widely isolated from each other. Mesofurca not examined. Scutellar shield triangular, slightly longer than wide (Fig. 23). Elytron with 10 elytral series; all elytral intervals of the same height; lateral portions of elytron not deflexed. Epipleuron totally missing except very basally.



FIGURES 1–11. General morphology of Asian *Pachysternum*. 1: mentum of *P. nigrovittatum*; 2: maxillary palpus of *P. nigrovittatum*; 3: maxillary sucking disc of male of *P. nigrovittatum*; 4: head of *P. curvatum*, ventral view; 5: antenna of *P. curvatum*; 6–8: prothorax of *P. nigrovittatum* (6: posterior view, 7: lateral view, 8: ventral view); 9–11: prosternal plate (9: *P. haemorrhoum*, 10: *P. rugosum*, 11: *P. sulawesicum*).



FIGURES 12–25. General morphology of the Asian *Pachysternum*. 12–14: pronotal punctation (12: *P. nigrovittatum*, 13: *P. haemorrhoum*, 14: *P. rugosum*); 15: meso- and metathorax of *P. nigrovittatum*, ventral view; 16–19: preepisternal elevation of mesothorax (16: *P. haemorrhoum*, 17: *P. sulawesicum*, 18: *P. apicatum*, 19: *P. rugosum*); 20–21: surface sculpture of metaventrite mesally and laterally of femoral line (20: *P. nigrovittatum*, 21: *P. haemorrhoum*); 22: elytral punctation of *P. nigrovittatum*; 23: scutellum of *P. nigrovittatum*; 24: anterior leg of *P. nigrovittatum*; 25: abdomen of *P. nigrovittatum*.



FIGURES 26–28. Characters of male genitalia of possible phylogenetic significance (a: detail of apex, b: detail of basal struts). 26: median lobe of *P. haemorrhoum*; 27: median lobe of *P. kubani*; 28: apical portion of the aedeagus of *P. nigrovittatum*. Abbreviations: lr: lateral rim.

Metathorax. Metaventricle (Fig. 15) without elevate median portion; metaventral process wide, widely attaching posterior margin of preepisternal elevation of mesothorax. Anterior margin of metaventricle with distinct anterior ridge lying subparallel to posterior margin of mesocoxal cavity, defining rather wide marginal bead, but disappearing submedially. Femoral lines developed, complete, reaching anterolateral corners of metaventricle. Anepisternum extremely narrow anteriorly, slightly widening posteriad (Fig. 15). Metafurca Y-shaped, basal stalk ca. as long as arms, nearly parallel-sided, bearing high median carina; lateral arms long, narrow, lateral extensions of furcal arm rather large.

Legs. Procoxa without ventral ridge; ventral surface of anterior femur bearing very coarse and rather shallow punctures (Fig. 24); anterior tibia variable in shape, in some species bisinuate on outer margin (Figs. 39–49). Meso- and metacoxa deeply excised on posterior margin, with dense pubescence developed only basally; ventral surface of meso- and metafemur with sparse semierect setae; meso- and metatibiae widened apically, bearing longitudinal rows of stout spines and some intermixed fine setae on ventral surface, distal margin with a series of stout spines and two long inner spurs; metatarsus shorter than metatibia, bearing dense brushes of thin setae ventrally, metatarsomere 1 ca as long as metatarsomere 2. Claws arcuate.

Abdomen with five exposed ventrites, ventrite 1 carinate medially, bearing dense and coarse setiferous punctation, lacking sublateral longitudinal ridges (Fig. 25). Punctation on ventrites 2–5 much finer than on ventrite 1.

Male genitalia. Phallobase as long as parameres or distinctly longer, with or without distinct basal manubrium (Figs. 29–38,a). Median lobe ca. as long as phallobase and parameres combined, not attached to bases of parameres and therefore freely movable within tegmen; gonopore subapical, rather indistinct. Sternite 9 with tongue-like median process of variable shape. Sternite 8 without median projection.

Female genitalia corresponding to those of the genus *Kanala* Balfour-Browne 1939 described by Fikáček (2010).

Recognition. The Asian species of *Pachysternum* may be easily distinguished from remaining Megasternini genera by the combination of the following characters:

(1) Pronotum with two sizes of punctures (Figs. 12–14): small ground punctation is intermixed with sparser but much larger and more apparent punctures. [A similar kind of punctation also occurs in *Pseudocercyon* Orchymont, 1926, *Australocyon pilocnemoides* group, *Cercyon diversipunctus* Hebauer, 2002 and some Oriental *Cryptopleurum* Mulsant, 1844; all of them may be distinguished by the characters below].

(2) Antennal grooves large, reaching to lateral margin of hypomerion (Fig. 8). [This character distinguish Asian *Pachysternum* from all taxa mentioned under (1) except of *Cryptopleurum*]

(3) Preepisternal elevation of mesothorax triangular, only slightly wider than long (Figs. 15–19). [The shape of the elevation distinguishes *Pachysternum* from all taxa mentioned under (1). Wide preepisternal plate is also developed in *Cryptopleurum* in which it is much wider than long and pentagonal rather than triangular, and in *Australocyon pilocnemoides* group, in which it is bluntly arcuate rather than sharply pointed apically.]

(4) Median portion of the prosternum elevated into prosternal plate, which is finely but distinctly carinate medially (Figs. 8–11). [There is no prosternal plate in *Pseudocercyon* and *Cercyon*, the plate is developed but not carinate medially in *Cryptopleurum*, in *Australocyon pilocnemoides* the median portion of prosternum is rather similar to *Pachysternum* on the first view].

Taxonomic status. The Asian species of the genus *Pachysternum* were placed into the formal *Pachysternum nigrovittatum* group defined by Fikáček (2006), who considered all Asian species as highly similar in the morphology of male genitalia and the presence of the sexual dimorphism in the body shape. The detailed examination of all Asian species revealed that this is valid for all species from the Oriental region, but not for the Palaearctic *P. haemorrhoum* which differs from the Oriental species in several aspects. The monophyly of the Asian *Pachysternum* needs therefore to be tested, which was currently impossible for us as the taxonomy of the Afrotropical species assigned to *Pachysternum* is unsolved. No formal phylogenetic analysis is performed here and we therefore refrain from a redefinition of *P. nigrovittatum* group in this paper. Below, the characters of possible phylogenetic importance are only briefly discussed.

1. Phallobase of the aedeagus: (0) with large, asymmetrical and very distinctly detached manubrium; (1) with small basal manubrium or manubrium absent.

The basal portion of the phallobase is only slightly symmetrical and does not bear any distinctly detached manubrium in all Asian *Pachysternum* species (Figs. 29, 30–38, a) except *P. haemorrhoum*, in which the manubrium is large and very distinct (Fig. 31a). The Afrotropical *P. capense* Mulsant, 1844 as well as most other taxa of the *Megasternum* group of genera (i.e. those having large antennal grooves reaching lateral margin of hypomeron, see Hansen (1991) and Fikáček (2008)) bear a very distinct asymmetrical manubrium, which suggests that the character state (1) might be a synapomorphy of all Oriental species of *Pachysternum*.

2. Apex of the paramere: (0) with two minute setae; (1) with one long and thick seta, and one very minute one.

Two apical setae are present on the paramere apex of all *Pachysternum* examined. In all Asian species except *P. haemorrhoum*, the apical seta is very long and rather stout (Fig. 28). In *P. haemorrhoum*, both setae are minute only (Fig. 31a). *Pachysternum haemorrhoum* shares the character state (0) with *P. capense* as well as with many other taxa of the *Megasternum* group of genera (see character 1 for the definition of the group), and the large apical setae might therefore be a synapomorphy of the Oriental *Pachysternum* species.

3. Basal part of struts of the median lobe: (0) expanded but not divided into a separate sclerite; (1) hook-like, divided into a separate sclerite.

Basal part of the struts of the median lobe is divided into a separate sclerite of the hook-like shape in all Oriental *Pachysternum* (Fig. 27b), whereas the basal part is only expanded but not divided in *P. haemorrhoum* (Fig. 26b). The character state (1) is unique for the Oriental *Pachysternum* and was not observed in any other taxon of the Megasternini examined so far (basal portion is never divided into a separate sclerite in other Megasternini examined, even though they may be hook-shaped (see, e.g., the median lobe of *Cercyon dieganus* Régimbart, 1903 in Fikáček (2005)).

4. Apical portion of the median lobe: (0) at most with very narrow membranous lobes; (1) with large membranous lobes forming a wide rim of the apex.

Only narrow membranous rim are present in Asian species of *Pachysternum* (Fig. 27a) except *P. haemorrhoum*, in which the membranous parts are wide and the apex of the median lobe is therefore widely rounded (Fig. 26a). Only small membranous lobes are usually developed in the Megasternini, but this character is highly variable on the species level in some cases (e.g., Fikáček *et al.* 2009, Fikáček & Hebauer 2009). Relevance of this character is therefore unclear at present.

5. Lateral portion of the metaventricle (lying laterad of the femoral lines): (0) with moderately coarse punctation and shiny interstices, similar to median portion of the metaventricle; (1) with coarse punctation and dense pubescence, therefore of different appearance than the median portion of the metaventricle.

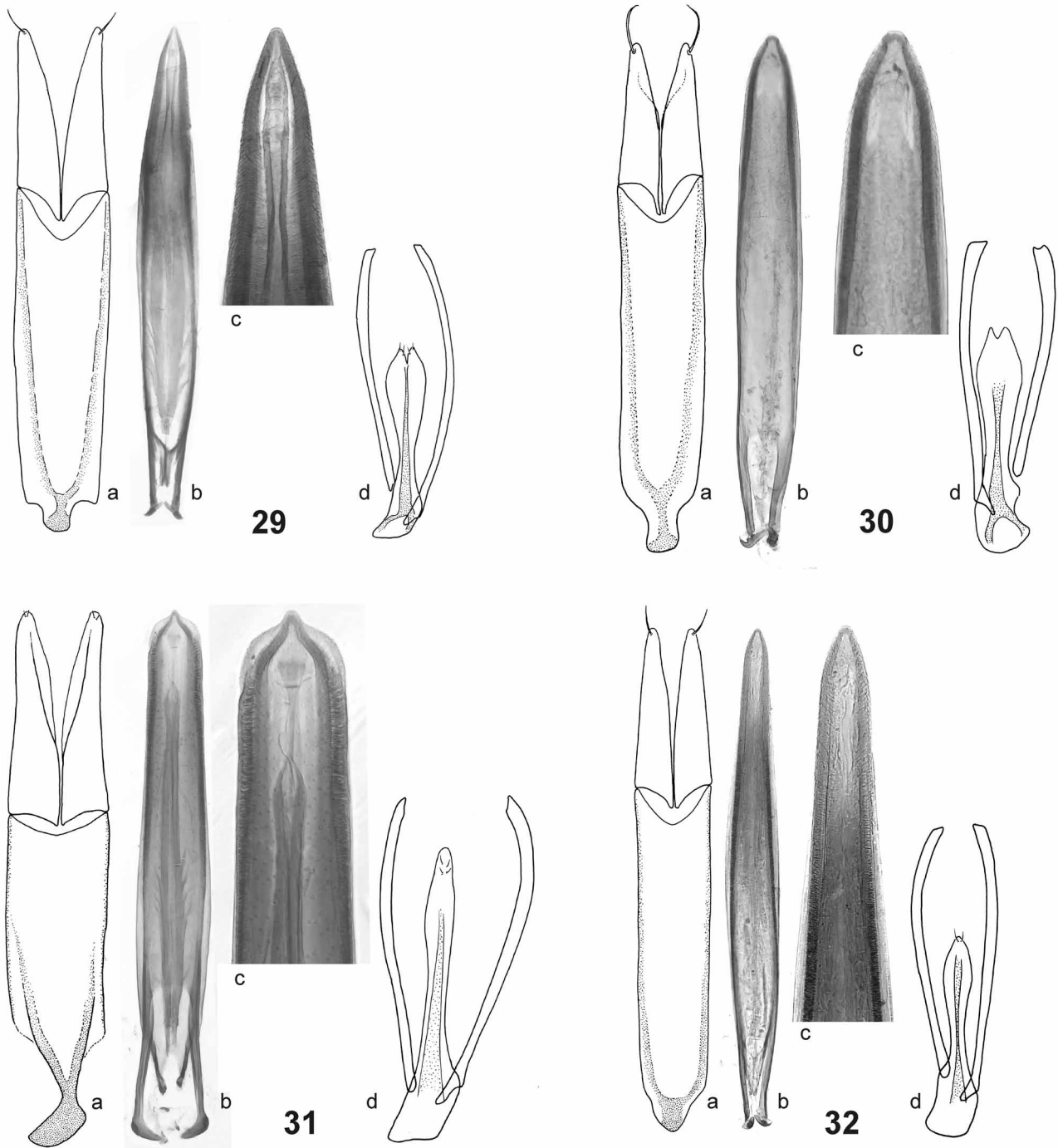
Lateral portions of the metaventricle bears the coarse setiferous sculpture in all Oriental species of *Pachysternum* (Fig. 20), but fine punctation and shiny interstices in *P. haemorrhoum* (Fig. 21). The state present in *P. haemorrhoum* corresponds with the condition found in *P. capense*. However, the appearance is rather variable in various

genera of the *Megasternum* group (see character 1 for the definition of the group) and its relevance is therefore unclear at present.

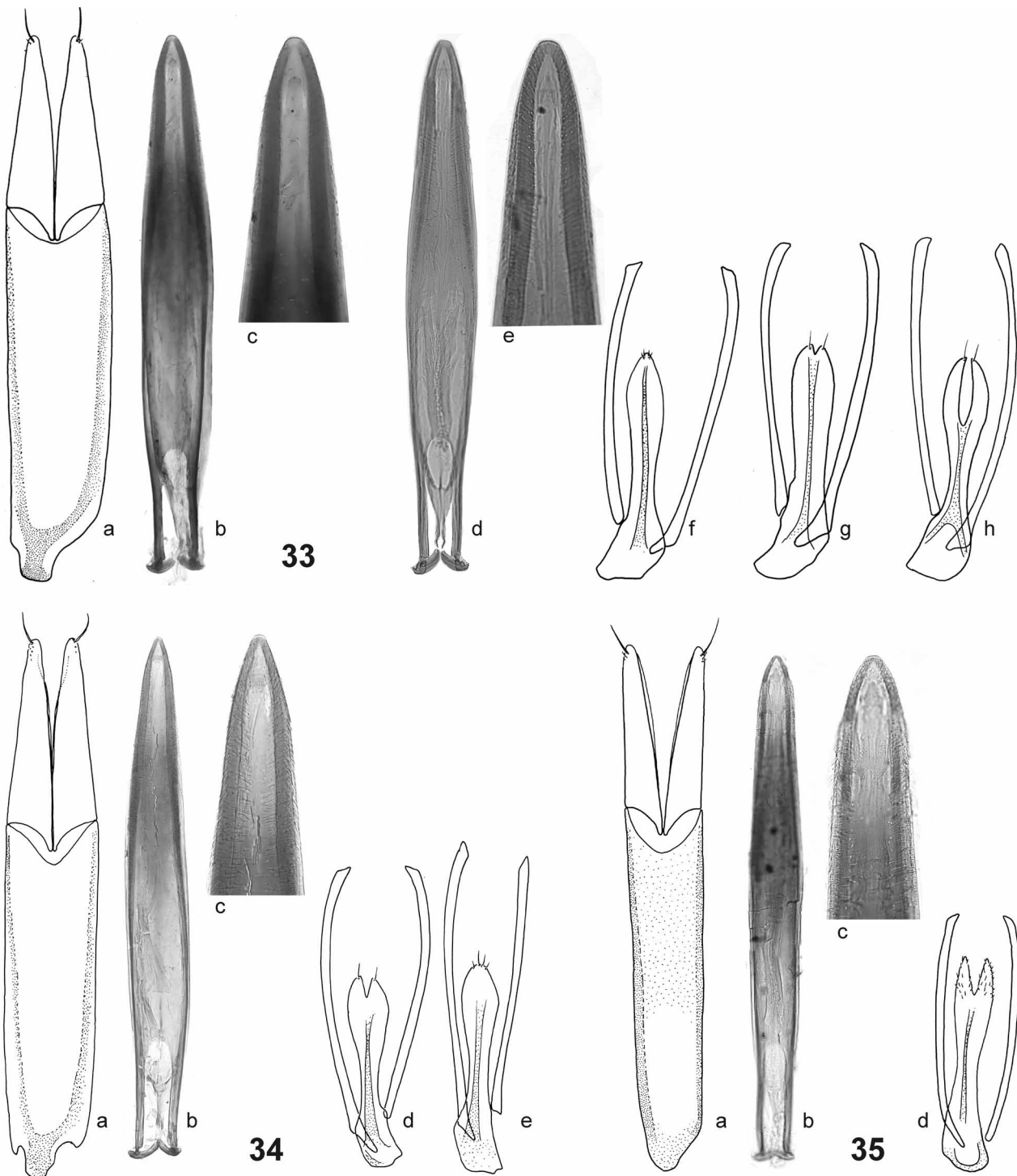
6. Deep pits in posterolateral margins of the preepisternal plate of mesothorax: (0) absent; (1) present.

The appearance of the preepisternal plate of the mesothorax is very uniform in all Asian *Pachysternum* (Figs. 15–19), but the species differ in the presence/absence of deep pits in its posterolateral corners: pits are missing in all Asian *Pachysternum* except of those assigned here to the *P. apicatum* species group (i.e., *P. apicatum*, *P. curvatum* and *P. sandacanam*; Fig. 18). No pits are developed in the Afrotropical *P. capense*, and the presence of the pits may therefore be a possible synapomorphy of the *P. apicatum* species group.

7. Sexual dimorphism in body shape (males widely rounded, females more elongate with distinctly pronounced shoulder): (0) absent; (1) present.

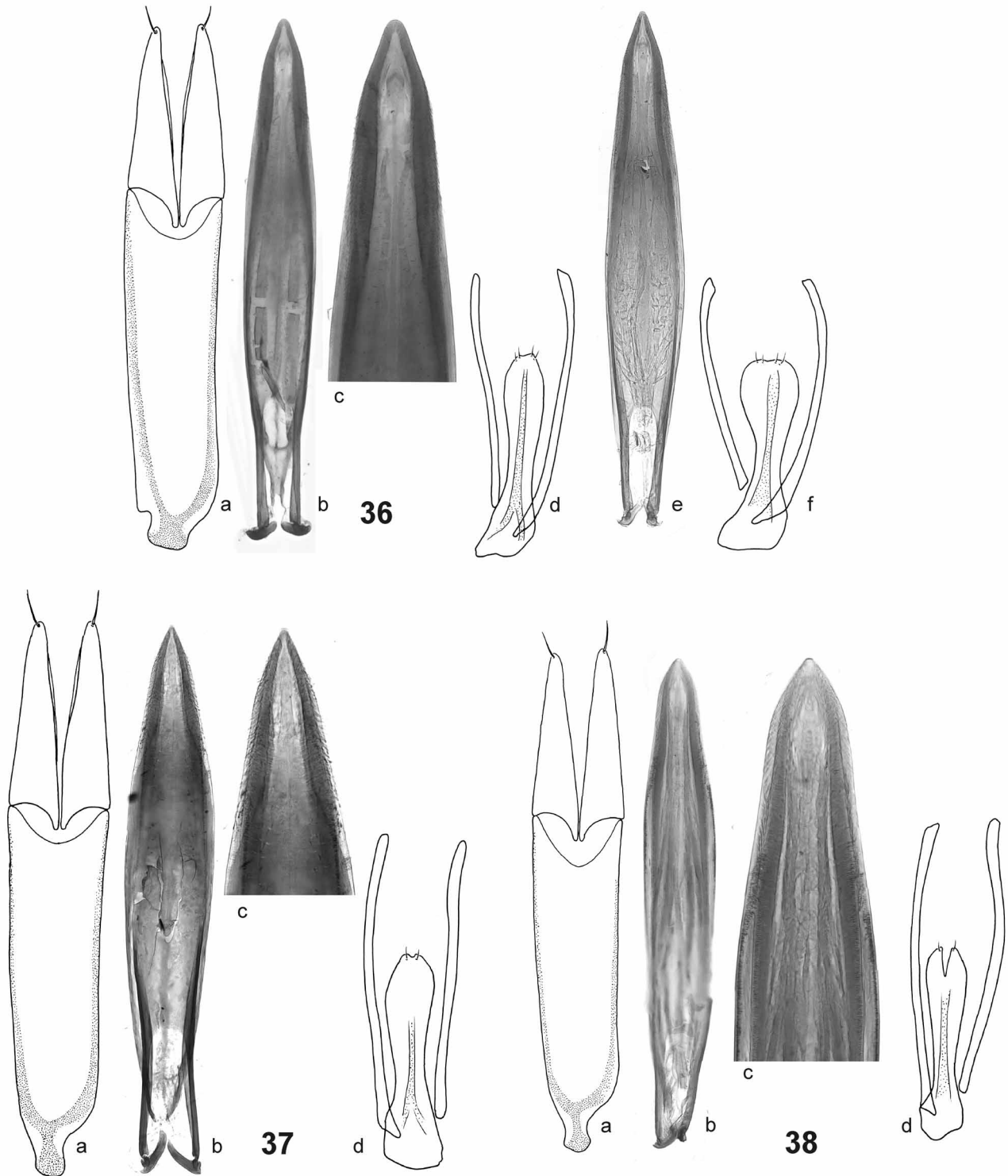


FIGURES 29–32. Male genitalia of Asian *Pachysternum* (a: tegmen, b: median lobe, c: apical portion of median lobe, d: sternite 9). 29: *P. cardoni*, 30: *P. coomani*, 31: *P. haemorrhoum*; 32: *P. nigrovittatum*.

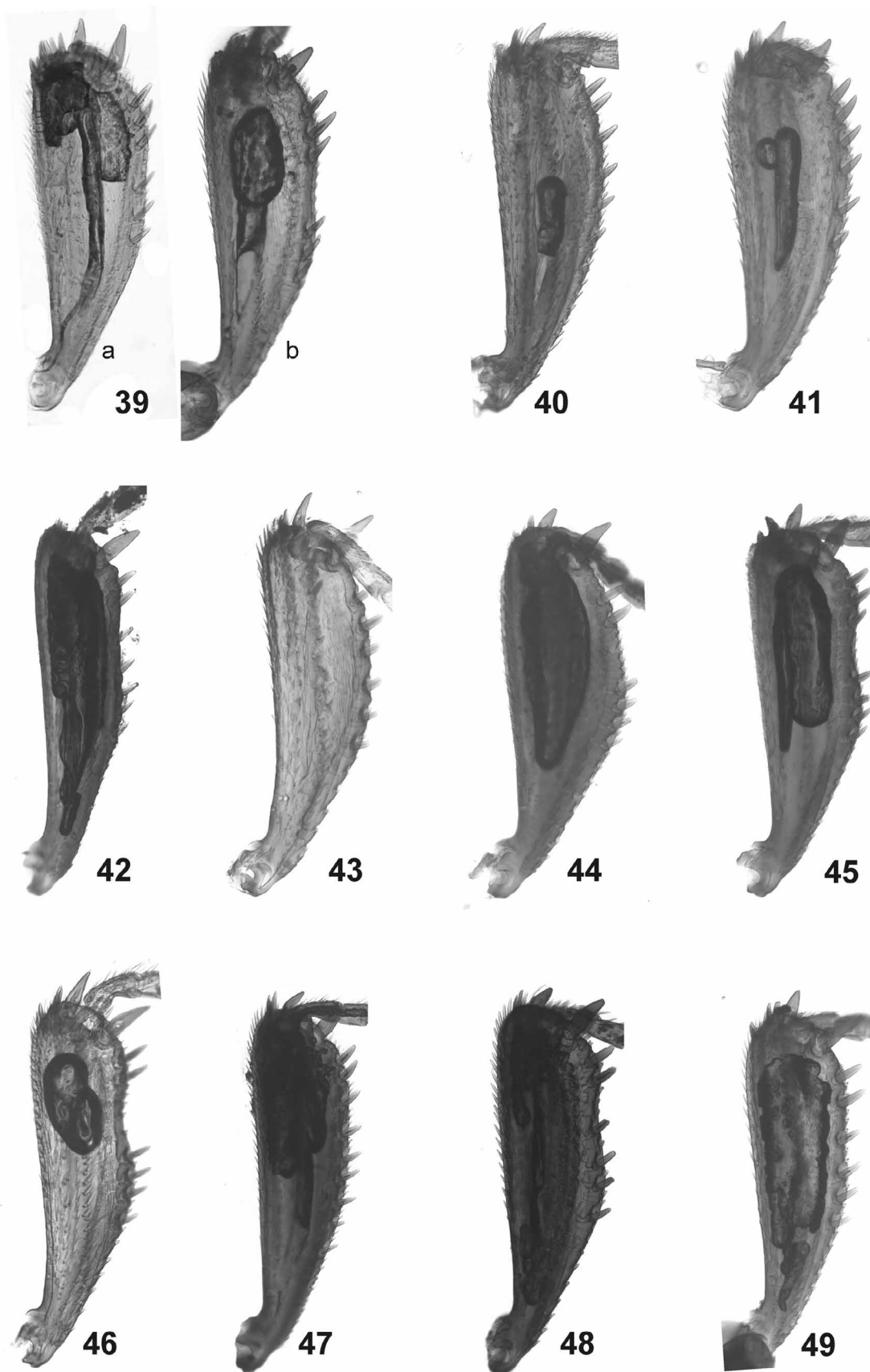


FIGURES 33–35. Male genitalia of Asian *Pachysternum*. 33: *P. kubani* (a–c, f: holotype; d–e: dark specimen from Sichuan; g: specimen from Laos, Ban Nape; h: terratological specimen from Laos, Phou Pane Mt.; a: tegmen, b, d: median lobe, c, e: apical portion of median lobe, f–h: sternite 9); 34: *P. stevensi* (a: tegmen, b–c: median lobe, d–e: variation of the shape of sternite 9); 35: *P. sulawesicum* (a: tegmen, b: median lobe, c: apical portion of median lobe, d: sternite 9).

Sexual dimorphism in the body shape is not known in any other Megasternine taxa and seems to be unique for the Asian species of *Pachysternum*; at the same time it seems to be the only character supporting the monophyly of all Asian *Pachysternum* including *P. haemorrhoum*. On the other hand, the extent of the difference between the shapes of male and female varies both intra- and interspecifically.



FIGURES 36–38. Male genitalia of the species of *P. apicatum* complex. 36: *P. apicatum* (a–d: typical form from Lombok Is., e: unicolor form from Borneo, Sabah, f: specimen from Malaysia, Pahang; a: tegmen, b, e: median lobe, c: apical portion of median lobe, d, f: sternite 9); 37: *P. curvatum* (a: tegmen, b: median lobe, c: apical portion of median lobe, d: sternite 9); 38: *P. sandacatum* (a: tegmen, b: median lobe, c: apical portion of median lobe, d: sternite 9).



FIGURES 39–50. Anterior tibia of Asian *Pachysternum* species. 39: *P. apicatum* (a: lectotype, b: specimen from Borneo, Sabah); 40: *P. curvatum*, 41: *P. sandacanam*; 42: *P. cardoni*; 43: *P. coomani*, 44: *P. haemorrhoum*, 45: *P. kubani*, 46: *P. nigrovittatum*, 47: *P. rugosum*, 48: *P. stevensi*, 49: *P. sulawesicum*.

List of species

<i>P. apicatum</i> Motschulsky, 1863	China (Hainan), Indonesia (Sumatra, Mentawai Isl., Java, Lombok, Sulawesi), Laos, Malaysia (peninsular part, Sarawak, Sabah), Singapore, Thailand, Vietnam
<i>P. cardoni</i> d'Orchymont, 1926	Nepal, northeastern India, southern China, Laos, Thailand, Vietnam
<i>P. coomani</i> d'Orchymont, 1926	India (Manipur), Myanmar, Thailand, Vietnam, Malaysia (peninsular part)
<i>P. curvatum</i> d'Orchymont, 1925	Philippines (Luzon, Leyte, Mindanao)
<i>P. haemorrhoum</i> Motschulsky, 1866	Kazakhstan, Mongolia, Russia (Far East, southern Siberia, Sakhalin, Kuril Isl.), northern China, Korea, Japan
<i>P. kubani</i> sp. nov.	northern Laos, China (Sichuan)
<i>P. nigrovittatum</i> Motschulsky, 1863	Nepal, India, Sri Lanka, southern China, Laos, Singapore, Thailand, Vietnam, Malaysia (peninsular part), Indonesia (Sumatra, Sumba)
<i>P. rugosum</i> sp. nov.	China (Gansu, Shaanxi)
<i>P. sandakanum</i> sp. nov.	Malaysia (Sabah, Sarawak)
<i>P. stevensi</i> d'Orchymont, 1926	Nepal, southern and northeastern India, southern China, Laos, Vietnam
<i>P. sulawesicum</i> Fikáček, 2006	Indonesia (Sulawesi)

Diagnostic characters.

The Asian species of *Pachysternum* are rather uniform in most external characters. The characters varying between the species and therefore useful for identification are often quite variable even intraspecifically, which makes the identification rather difficult in many cases. Therefore, diagnostic characters are briefly commented here to make the understanding of their importance and pitfalls easier to the reader.

General habitus and body coloration. General habitus and the coloration of dorsal side are rather reliable for the identification, but their using usually requires some experience and/or comparison with correctly identified specimens. Shape of the elytra varies to variable extent between male and female of the same species in most taxa, which may be confusing when body shape is used as a diagnostic criterion. Shape of the elytra in females may moreover vary even within a single species, with shoulders being more or less pronounced (the highest variation in this aspect was observed in *P. apicatum* and *P. nigrovittatum*). Coloration of dorsal surface is a very useful diagnostic character, but may be extremely variable intraspecifically. The intraspecific variation is described under each species below, and we also tried to cover it by the habitus photographs published within this paper (Figs. 50, 52, 54, 56, 58, 60, 62, 64, 66, 68, 70).

Shape of anterior tibia. The shape the anterior tibia is a very useful character (Figs. 39–49). The outer margin of the tibia may be either continually arcuate, or slightly angulate at midlength (the median portion is more or less straight instead of being arcuate in such cases), or bears a distinct but usually shallow emargination (the outer margin is bisinuate in such cases). The shape is invariable in most species except *P. apicatum*. In addition, the appearance of the series of spines on the outer margin of protibia may be used for the identification – it is either continuous (e.g. in *P. cardoni*, *P. coomani* and *P. sulawesicum*) or interrupted by a wider gap without any spines (e.g. in *P. kubani*, *P. nigrovittatum*, *P. stevensi*). In few species (e.g., *P. apicatum*), this character is however variable and both continuous and interrupted series of spines may be present in various specimens of the same species. Teratologic malformation of the protibial spines was observed in one specimen of *P. kubani* (the spines are extremely reduced in this specimen).

Morphology of male genitalia. Male genitalia (Figs. 29–38) are very uniform in most species, and only those of *P. haemorrhoum* may be easily distinguished from the remaining species even without any detailed examination. In spite of that, the shape of the median lobe provides useful characters in some cases, with the differences found usually in its general shape and/or the shape of its apical portion. The reliable examination of these characters, however, requires mounting the median lobe separately from the tegmen. The shape of the sternite 9 differs considerably between the species (it may be either entire or bear a more or less deep V-shaped emargination apically). Although the shape is rather constant in most species, a wide variation was observed in *P. stevensi* (Figs.

34d–e) and *P. kubani* (Figs. 33f–h), and may possibly concern other species as well (although we did not observe any variation in specimens examined for this study).

Meso- and metaventrite. The shape of the preepisternal elevation of the mesothorax is very similar in all species treated in this paper, but varies considerably in the presence/absence of slightly depressed areas and/or deep pits in posterolateral corner of the elevation (Figs. 15–19). Reliable examination of this character is, however, very difficult using an usual binocular microscope and it is therefore useless for identification. The appearance of the lateral portions of the metaventrite (Figs. 20–21) provides a good character for distinguishing *P. haemorrhoum* from all remaining species, but is otherwise uniform in all Oriental species (see under *P. haemorrhoum* for details).

Microsculpture of dorsal body surface. The presence/absence of the mesh-like microsculpture was used in the key by Orchymont (1926a). Although it may be helpful in some cases (e.g., *P. cardoni* usually bears distinct microsculpture, whereas *P. kubani* usually lacks it), the character is very variable in most species examined (i.e., the microsculpture may be completely absent or very strongly developed in various specimens of the same species). The only exception seems to be *P. stevensi* in which a strong microsculpture is always present and no variation was observed.

Identification key

Because of the scarcity of useful diagnostic characters and their considerable variability within species, the identification may be rather problematic in some cases. We recommend to use the following sequence for the identification: (1) compare your specimen with the photographs of dorsal habitus; (2) check the shape of anterior tibia for the species similar to your specimens by general habitus and coloration; (3) use the following key to confirm the preliminary identification and separate between similarly looking species (the key counts with the intraspecific variability and some species are therefore keyed several times); (4) check carefully the differential diagnosis and variation of the species you decided for in steps 1–3.

1. Pronotal disc uniformly dark (without pale submedian spots in posterior half), only lateral margins of the pronotum narrowly to widely pale (Figs. 50, 54, 56, 58, 60d–i, 64, 66, 68, 70). Outer margin of anterior tibia continually arcuate to deeply excised. 4
- Pronotal disc usually pale, with dark median M-shaped spot of variable extent (Figs. 52a–e, 62a–e); in dark specimens pronotal disc is more or less dark, but with clearly defined pair of submedian spots on the disc (Figs. 52f–g, 60a–c, 62f–g). Outer margin of anterior tibia angulate (Fig. 42) to deeply excised (Figs. 45–46), never continually arcuate. 2
2. Large, widely oval species, body length 2.9–4.3 mm. Elytra pale, darkened along striae, dark spots often extending to the intervals and joining together, elytral interval 4 never completely dark; in extremely dark specimens the elytra may be nearly entirely black (Figs. 52, 60). Median lobe of the aedeagus gradually narrowing apicad (Figs. 29b–c, 33b–e) 3
- Medium-sized to small species (2.2–3.5 mm). Elytra with some intervals completely pale, and at least intervals 1 and 4 largely dark. In darker specimens, dark spots are more extending and joining together, but at least interval 2 always pale throughout (Fig. 62). Median lobe very narrow and nearly parallel-sided in apical fourth (Figs. 32b–c) *P. nigrovittatum*
3. Dark spot on pronotum M-shaped or with a pair of pale spots in posteromesally (Fig. 52). Darkening of elytral series 2–4 reaching subapically (Fig. 52). Elytral interstices usually with distinct microsculpture. Median lobe of the aedeagus subtriangular apically (Fig. 29c) *P. cardoni* (in part)
- Dark spot on pronotum wide posteriorly, trilobate anteriorly (Figs. 60a–c). Darkening of elytral series 2–4 reaching at most elytral midlength (Figs. 60a–e). Elytral interstices shiny, without microsculpture. Median lobe of the aedeagus widely rounded apically (Fig. 33c, e) *P. kubani* sp. nov. (in part)
4. Outer margin of anterior tibiae continually arcuate, without any trace of straight or concave portion in distal third (Figs. 39a, 41, 43, 44, 47, 49) 5
- Outer margin of anterior tibiae not continually arcuate, bearing a distinct straight or concave portion in distal third (39b, 42, 45, 46, 48) 11
5. Lateral portions of metaventrite (lying laterad of the femoral lines) of the same appearance as the median portion of the metaventrite, lacking rugose sculpture and pubescence (Fig. 21). Median lobe abruptly narrowing just before the apex (Fig. 31c), phallobase with large and well detached basal manubrium (Fig. 31a). Elytra generally dark, with pale apex (Fig. 58). East-Palaearctic species. *P. haemorrhoum*
- Lateral portions of metaventrite bearing rugose sculpture and dense pubescence, hence of the different appearance than the median portion of the metaventrite (as in Fig. 20). Apex of the median lobe gradually narrowing to apex (Figs. 30c, 35c, 36c, 37c, 38c). Phallobase without large and distinctly delimited manubrium (Figs. 30a, 35a, 36a, 37a, 38a). Elytra dark, with pale apical spot or longitudinal stripes (Figs. 50, 54, 56, 64, 66, 70). Species from Oriental Region and islands of SE Asia. 6
6. Large and widely oval species (body length 3.3–3.8 mm). Dorsal surface bears a rugose sculpture (Fig. 14), therefore the beetle is very opaque in general appearance (Fig. 64). Body uniformly dark brown *P. rugosum* sp. nov.

- Small to large species (2.2–3.6 mm). Punctuation of the dorsal surface never as coarse and dense to form rugose sculpture (Figs. 12–13, 22), the beetle is therefore rather shiny in general appearance. Body uniformly dark brown, with pale elytral apex or pale spots in humeral area and elytral apex (Figs. 50, 54, 56, 66, 70) 7
- 7. Elytron dark, with sharply defined yellowish horseshoe-shaped spot at apex and large yellowish spot in humeral area; in pale specimens additionally with pale elytral interval 2 and base of interval 3 (Fig. 70). Median lobe nearly parallel-sided, very narrow throughout (Fig. 35b). Sulawesi. ***P. sulawesicum***
- Elytron uniformly pale or dark, or with small to large yellowish spot on elytral apex, never with sharply defined spot in humeral area (Figs. 50, 54, 56, 66). Median lobe either parallel-sided and wide (Fig. 30b), or distinctly widened at midlength (Figs. 36b, 37b, 38b) 8
- 8. Dorsal surface either uniformly reddish brown, or brown with elytra slightly paler subbasally and apically (Fig. 54). Median lobe parallel-sided and rather wide throughout (Fig. 30b) ***P. coomani***
- Dorsal surface usually dark brown to black, elytra uniformly dark or with small to large apical yellowish spot (Figs. 50a–g). Median lobe distinctly widened at midlength (Figs. 36–38, b). *Pachysternum apicatum* complex. 9
- 9. Small species (2.3–3.1 mm). Median lobe slightly constricted subapically, its apex rather wide (Figs. 38b–c). Sternite 9 always with V-shaped apical emargination (Fig. 38d). Elytra always with yellowish spot on apex (Fig. 66). Northern Borneo (Sabah, Sarawak) ***P. sandacanam* sp. nov.**
- Small to large species (2.2–3.6 mm). Median lobe gradually narrowing apicad, subapical constriction absent (Figs. 36b–c, 37b–c). Sternite 9 usually entire to very shallowly emarginate apically (Figs. 36d, f, 37d). Elytra uniformly dark or with small to large yellowish apical spot (Figs. 50a–g, 56) 10
- 10. Outer margin of anterior tibia at least with slight hint of straight or angular shape at midlength (Fig. 39a; see also from slightly different angles than only dorsally); the series of spines on outer margin usually interrupted at least by a small gap at midlength (Fig. 39a). Median portion of the head very distinctly paler than lateral portions, or whole head pale reddish brown (Fig. 50). Median lobe rounded at extreme apex (Fig. 36c). SE Asia and islands of Sundaland, but absent from Philippines ***P. apicatum*** (in part)
- Outer margin of anterior tibia continually arcuate, the series of spines on the margin continual, not interrupted by a gap (Fig. 40). Median portion of frons not apparently paler than lateral portions (Fig. 56). Median lobe acute at extreme apex (Fig. 37c). Philippines. ***P. curvatum***
- 11. Elytra uniformly colored or only with sharply or vaguely defined pale apical spot (Figs. 50, 52g, 60h–i, 68g–h) 13
- Elytra with pale areas basally as well as apically (Figs. 60e–g, 68a–f) 12
- 12. Elytral interstices without microsculpture, shiny. General coloration of elytra yellowish, with sharply defined dark transverse stripe at anterior third which is extending along elytral series both anteriorly and posteriorly and is therefore lobate in shape (Fig. 60). Median portion of frons pale ***P. kubani* sp. nov.** (in part)
- Elytral interstices with strong, mesh-like microsculpture. General coloration of elytra reddish, usually with rather vaguely defined dark reddish to black area at anterior third (Figs. 68a–f), margins of darker area never sharply lobate. Median portion of frons dark, not paler than lateral portions and clypeus ***P. stevensi*** (in part)
- 13. Whole head (in pale specimens) or at least median portion (in dark specimens) of frons pale reddish. Elytra with or without distinct mesh-like microsculpture on interstices. 14
- Whole head dark brown to black, without any trace of paler median portion of frons (Fig. 68g–h). Elytra always with strong mesh-like microsculpture on interstices ***P. stevensi*** (in part)
- 14. Large and robust species (body length 2.9–4.3 mm). Pronotum posteriorly at least with rather indistinct paler areas submedially (Fig. 52g). Series of spines on outer margin of anterior tibia always not interrupted on the emargination (Fig. 42). Elytra usually with distinct mesh-like microsculpture at least laterally, rarely totally without microsculpture ***P. cardoni*** (in part)
- Smaller species (body size 2.2–3.6 mm). Pronotum never with paler submedian spots along posterior margin. Series of spines on outer margin of anterior tibia interrupted on the emargination (Figs. 39b, 45) or forming continual series. Elytra without any trace of mesh-like microsculpture on interstices. 15
- 15. Elytron dark with very distinct pale reddish apical spot (Figs. 60h–i). Apex of median lobe rounded (Figs. 33c, e). Anterior tibia always deeply emarginate, outer series of spines always interrupted (Fig. 45) ***P. kubani* sp. nov.** (in part)
- Elytron either uniformly colored, reddish to dark brown (Figs. 50f–j), or black with vaguely to rather sharply defined reddish apical spot (Figs. 50a–e). Apex of median lobe triangular (Figs. 36b–c, e). Outer margin of anterior tibia deeply to very shallowly emarginate (Figs. 39a–b), outer series of spines usually not interrupted (specimens with interrupted series rarely occur in continental Asia only) ***P. apicatum*** (in part)

Species treatments

***Pachysternum apicatum* Motschulsky, 1863**

(Figs. 18, 36, 50, 72)

Pachysternum apicatum Motschulsky, 1863: 448.

Pachysternum apicatum: Knisch (1921: 88, faunistics); Knisch (1934: 158, catalogue); Orchymont (1926a: 224, identification key, distribution); Orchymont (1928: 83, catalogue), Hansen (1999: 306, catalogue).

Type locality. Sumatra. Motschulsky (1863: 448) indicated “le continent indien” as the type locality. This was interpreted as India by all subsequent authors, although Orchymont (1926a) most probably recognized the discordance between this interpretation of the type locality and the distributional area of the species, indicating the distribution as “Tonkin, Malacca, Iles Mentawai, Java, Iles Lombok (Inde d’après Motschulsky)”. Based on the label data of the types of *P. nigrovittatum* (see below), Motschulsky used the term “India” (or “India orientalis”) in a very broad sense corresponding with the whole Oriental Region including the islands of Sundaland. This may be also the case of the expression “le continent indien” used in the original description of *P. apicatum*, even though it seems to refer rather to the continental part of the Oriental Region than to the islands. Taking into account the locality data of type specimens, we specify Sumatra as the type locality of this species and consider the type locality indicated by Motschulsky (1863) as ambiguous.

Type material. Lectotype (hereby designated): male (ZMUM): “[small yellow triangular label] // Type [small white label, in handwritten] // Pachysternum / apicatum / Motsch / Ind. or. Sumatra [yellow label, in handwritten]”. Paralectotypes: 3 males (ZMUM): same label data as lectotype. [Note: We received four syntypes glued on the same paper label bearing the label mentioned above from ZMUM. One additional specimen, originally glued on the same label according to the remnants of glue, was lost. All four specimens have large hole in the right elytron, indicating that they were pinned originally. The indices of re-mounting of the specimens as well as the discordance of their label data with the type locality given by Motschulsky (1863) impeach the type status of these specimens. However, other indices seem to support their type status: (i) label data, handwriting on the labels and the arrangement of labels corresponds with those attached to the types of *Pachysternum nigrovittatum*, whose type status is unambiguous; (ii) the specimens correspond with short diagnosis by Motschulsky (1863). For these reasons, we consider all four specimens as syntypes and designate the lectotype from this series. We have re-mounted each specimen on a separate label, with the lectotype bearing the original labels and paralectotypes bearing their copies.]

Additional material examined. **BRUNEI:** 42 spec. (BMNH, NMPC): Kuala Belalong FSC, 4°34'N 115°07'E, i.1992, lgt. N. Mawdsley; 14 spec. (BMNH): same locality and collector, ii.1992. **CHINA: Hainan:** 1 female (NMPC): Jiangfengling Mts., Tiachi Lake env., Bishu villa, elev. 950 m, 18°44.7'N 108°50.7'E, lgt. Fikáček. **INDONESIA: Bali:** 3 spec. (ZMUC): Lake Bratan, elev. 1200 m [8°17'S, 115°9'E], 27.i.1994. lgt. J. Pedersen. **North Sumatra:** 1 female (NHMW): Prapat [= Parapat] env., elev. 1000 m [2°39'46"N 98°56'7"E], 17.ii.1990, lgt. S. Schödl. **Sulawesi [unspecified]:** 2 spec. (IRSNB): “Celebes”, without date and collector. **West Java:** 2 spec. (IRSNB): Buitenzorg [=Bogor], ii.1890, lgt. Kannegieter; 1 spec. (IRSNB): Tjigembong [=Cigembong, 7°9'S, 106°55'59.88"E], vi.1915, lgt. J. B. Corporaal. **West Nusa Tenggara:** 4 spec. (IRSNB): Lombok, Sapit, elev. 610 m [8°39'S, 116°19'E], iv.1896, lgt. H. Fruhstorfer; 9 spec. (SMNS): Lombok, Senaro, N slope of Rinjani, elev. 1100 m [8°19'53"S, 118°25'2"E], 2–5.ii.1994, lgt. Bolm. **West Sumatra:** 1 spec. (IRSNB): Fort de Kock [= Bukittinggi], elev. 920 m [0°18'20"S 100°22'9"E], viii.1894, lgt. E. Modiglian; 3 spec., 1 female (IRSNB, NHMW): same locality, x.1922, lgt. E. Jacobson; 1 female (NHMW): Lembah Anai, W Padang Panjang [0°29'2"S 100°20'19"E], 12.ii.1991, lgt. H. Schillhammer; 3 spec. (IRSNB): Mentawai, Si Oban [= Mentawai Islands, Sipora Is., Sioban, 2°11'S, 99°43'E], iv–viii.1894, lgt. Modigliani; 2 spec. (NHMW): Padang, Bungus beach [0°57'13"S, 100°21'7"E], 14.ii.1991, lgt. S. Schödl (17); 1 spec. (IRSNB): Sipora [= Sipura Is.], Sereinu [2°11'S, 99°40'E], v–vi.1894, lgt. Modigliani; 4 spec. (NHMW): Siberut, Madobak, W Muarasiberut [1°38'23"S 99°7'22"E], 19.ii.1991, lgt. S. Schödl (24). **LAOS: Bolikhamxai:** 11 males (NHMB, NMPC): 8 km NE Ban Nape, elev. 600 m, 18°21'N, 105°8'E, 1–18.v.2001, lgt. V. Kubáň. **Louangphabang:** 1 spec. (NHMB): 5 km W of Ban Song Cha, elev. 1200 m, 20°33'N 102°14'E, 10–16.v.1999, lgt. V. Kubáň; 11 spec. (NHMB): Thong Khan, elev. 750 m, 19°35'N 101°58'E, 11–21.v.2002, lgt. V. Kubáň. **Phongsali:** 3 spec. (NHMB, NMPC): Phongsali env., elev. 1500 m, 21°41'N, 102°6'E, 6–17.v.2004, lgt. V. Kubáň. **MALAYSIA: Johor:** 3 spec. (IRSNB): “Johore”, without date and collector. **Melaka:** 6 spec. (BMNH): Malacca [2°11'53"N 102°14'59"E], without date, lgt. Wallace; 1 spec. (IRSNB): same locality, without date, lgt. Kirsch. **Pahang:** 1 spec. (FHGC): 30 km NE Raub, Lala Lembik, elev. 200–400 m [3°56'N 101°38'E], 22.iv.–15.v.2002, lgt. E. Jendek & O. Šauša; 3 spec. (BMNH): Taman Negara [= Taman Negara National Park, ca. 4°41'N, 102°34'E], 1–13.iii.1984, lgt. L. Jessop; 1 female (NHMW): same locality, 12–14.vii.1993, lgt. H. Forster; 5 spec. (NHMW): Tioman Is., E. Kg. Tekek, elev. 30 m [2°48'56"N 104°9'18"E], 30.i.1992, lgt. H. Schillhammer (11); 1 female (NHMW): same locality, 15–24.vii.1993, lgt. Schuh; 2 spec. (FHGC): Tekek [2°48'56"N 104°9'18"E], 5.iv.1987, lgt. Leller. **Perak:** 6 spec. (NMPC): Cameron Highlands, Batu 19 village env., elev. 590 m, 4°22.2'N 101°20.0'E, 5–15.v.2009, lgt. J. Hájek. **Sabah:** 1 spec. (BMNH): 5 miles S of Mt. Trus Madi, elev. 549 m [5°28'29"N 116°31'6"E], 18–28.viii.1977, lgt. M. E. Bacchus; 17 spec. (BMNH, NMPC): same locality, 18–28.viii.1977, lgt. M. E. Bacchus; 1 spec. (NHMW): 50 km

E Kota Kinabalu, Crocker Mts., Gunung Emas [5°49'41"N 116°20'1"E], 16–27.iv.1993, lgt. I. Jeniš; 15 spec. (BMNH): R. Karamuak, 7 miles SSE Telupid, elev. 61 m [6°5'13"N 117°15'17"E], 1–7.ix.1977, lgt. M. E. Bacchus; 2 spec. (BMNH): same locality, 1–7.ix.1977, lgt. M. E. Bacchus; 3 spec. (BMNH): 30 miles, Sandakan-Keningau Rd., alt. 76 m, leaf litter, lgt. M. E. Bacchus; 1 spec. (BMNH): "Sandakan, S. Lokan" [= Sandakan, Sungai Lokan, ca. 5°25'58"N 117°43'58"E], ix.1996, lgt. A. Y. C. Chung. **Sarawak:** 9 spec. (BMNH, NMPC): 4th Division, Gn. Mulu NP, nr. base camp, aluvial forest litter, elev. 50–100 m [4°2'55"N 114°49'17"E], v–viii.1978, lgt. P. M. Hammond & J. E. Marshall; 3 spec. (BMNH): same data, rotting fruit; 3 spec. (BMNH): same data, pitfall trap, fish bait; 1 spec. (BMNH): same data, cut grass; 1 spec. (BMNH): same locality, pitfall trap, fish bait, alluvial forest, iii–v.1978, lgt. I. Hanski; 1 spec. (BMNH): same locality, pitfall trap, iii–v.1978, lgt. I. Hanski; 3 spec. (BMNH): 4th Division, Gn. Mulu NP, nr. Camp I, elev. 150–200 m [ca. 4°03'N 114°50'E], v–viii.1978, lgt. P. M. Hammond & J. E. Marshall; 3 spec. (BMNH): Kuching, [1°31'52"N 110°20'54"E], 1910, lgt. J. E. A. Lewis; 2 spec. (NMPC): Kapit, Sebong, Baleh river [2°9'N 113°25'E], 6–21.iii.1994, lgt. S. Bílý. **Selangor:** 3 spec. (FHGC): Ulu Gombak Field Studies Centre (22 km NE Kuala Lumpur), elev. 300 m [3°19'32"N 101°45'16"E], 17–22.xi.1988, lgt. W. Rohe; 13 spec. (SMF): same locality, felled young bamboo shoot (*Gigantochloa scortechinii*) laying on the ground, 21.vii.2007, lgt. D. Kovac (BS31/07); 11 spec. (SMF): same locality, felled young bamboo shoot (*Gigantochloa scortechinii*), 21.viii.2007, lgt. D. Kovac (BS30/07); 8 spec. (SMF): same locality, in decaying *Arthrocarpus* fruit, 24.viii.2007, lgt. D. Kovac (V5/07/2); 3 spec. (SMF): same locality, felled young bamboo shoot (*Gigantochloa scortechinii*) laying on the ground, 24.viii.2007, lgt. D. Kovac (BS50/07); 9 spec. (SMF): same locality, decaying *Arthrocarpus* fruit, 25.viii.2007, lgt. D. Kovac (V7/07/02). **SINGAPORE:** 4 spec. (IRSNB): Singapore [1°21'N 103°50'E], without date, lgt. Saunders; 3 spec. (IRSNB): same locality, without date, lgt. Baker; 1 spec. (IRSNB): same locality, 1921, lgt. J. C. Maulton; 4 spec. (ANIC): Yishun, 3.vii.1997, lgt. T. Gush. **THAILAND: Chiang Mai:** 1 male (NHMW): Doi Inthanon, Bang Khun Klang, elev. 1200 m [18°32'N, 98°32'E], 16–23.i.1990, lgt. Malicky & Chantaramongkol; 28 spec. (BMNH): Chang Dao Hill Resort, 19°33.54'N 99°4.605'E, 27.vi.2006, lgt. M. V. L. Barclay & H. Mendel. **Loei:** 1 spec. (ASKC): ca. 8 km S Khao Lak, Merlin resort env. [8°36'36"N 98°14'31"E], 30.vii.–11.viii.2007, lgt. A. Skale. **Mae Hong Son:** 2 spec. (SMF): Pang Mapha, 5 km SE of Soppong [= Pang Mapha], Ban Pha Mon env. [19°30'2"N 98°16'41"E], 1.viii.2006, lgt. D. Kovac (B195/06); 1 spec. (SMF): same locality, 14.viii.2006, lgt. D. Kovac (B105/06). **Yala:** 1 male (NHMW): Betong, Gunung Cang dun village [5°52'N 101°7'E], 26.iii.–22.iv.1993, lgt. Horák & Strnad. **VIETNAM: Bac Thai:** 1 male (NHMW): Tam Dao [National Park], 75 km NW Hanoi [21°38'N, 105°30'E], 16–23.v.1991, lgt. Strnad. **Nghe An:** 26 spec. (IRSNB): Lactho [=Lac Tho, 21°4'N, 106°6'E], without date, lgt. de Cooman.

Differential diagnosis. Because of the polymorphism of the dorsal coloration and shape of the anterior tibiae (but not the male genitalia), the correct identification of this species may be rather difficult. Generally, all specimens lacking sharply limited subbasal pale spots of elytra, alternating longitudinal pale and dark stripes on elytra, and/or pale submedian spots at posterior margin of pronotum should be checked for their possible assignment to *P. apicatum*. Among those, *P. haemorrhoum* may be easily distinguished by the lateral portions of metaventrite lacking microsculpture on interstices and therefore shiny in appearance (Fig. 21), as well as by its distribution in Palaearctic Region and its completely different male genitalia (Fig. 31). In continental SE Asia and southern and central China, similar species may be distinguished as follows: dark specimens of *Pachysternum kubani* differ from mainland forms of *P. apicatum* by the uniformly dark frons (the frons entirely or at least medially pale reddish in mainland *P. apicatum*) and by the different shape of the apical portion of the median lobe (widely rounded in *P. kubani*, triangular in *P. apicatum*; compare Figs. 33c, e and 36c). *Pachysternum coomani* differs from continental *P. apicatum* by more or less entirely pale reddish dorsal body surface (body dark brown to black, with small to large yellow apical elytral spot in continental *P. apicatum*, Figs. 50d–g) and by the wide and parallel-sided median lobe of the aedeagus. In the islands of SE Asia, *Pachysternum apicatum* is very similar to *P. curvatum* from the Philippines, but is for one thing missing from Philippines, and for another differs in at least very weakly bisinuate or angular outer margin of anterior tibia (Figs. 39a–b, this character should be checked in other than strict dorsal views as well), by the morphology of the median lobe (Fig. 36), and partly also by the coloration (see *P. curvatum* for details). The only species without basal spots on elytra with which *P. apicatum* co-occurs on the islands of SE Asia is *P. sandacanam* in northern Borneo; the Bornean form of *P. apicatum* (Figs. 50h–j) may be, however, very easily distinguished from it according to the coloration and shape of anterior tibia (see under *P. sandacanam* for details).

Redescription (based on a typical specimen from Lombok Is. corresponding with the lectotype, Figs. 50a–b). Body widely oval, shape of elytra sexually dimorphic, female with distinctly pronounced humeral portion of elytra. Body length 2.2–3.6 mm (lectotype: 3.1 mm); body width 1.6–2.2 mm (lectotype 2.0 mm).

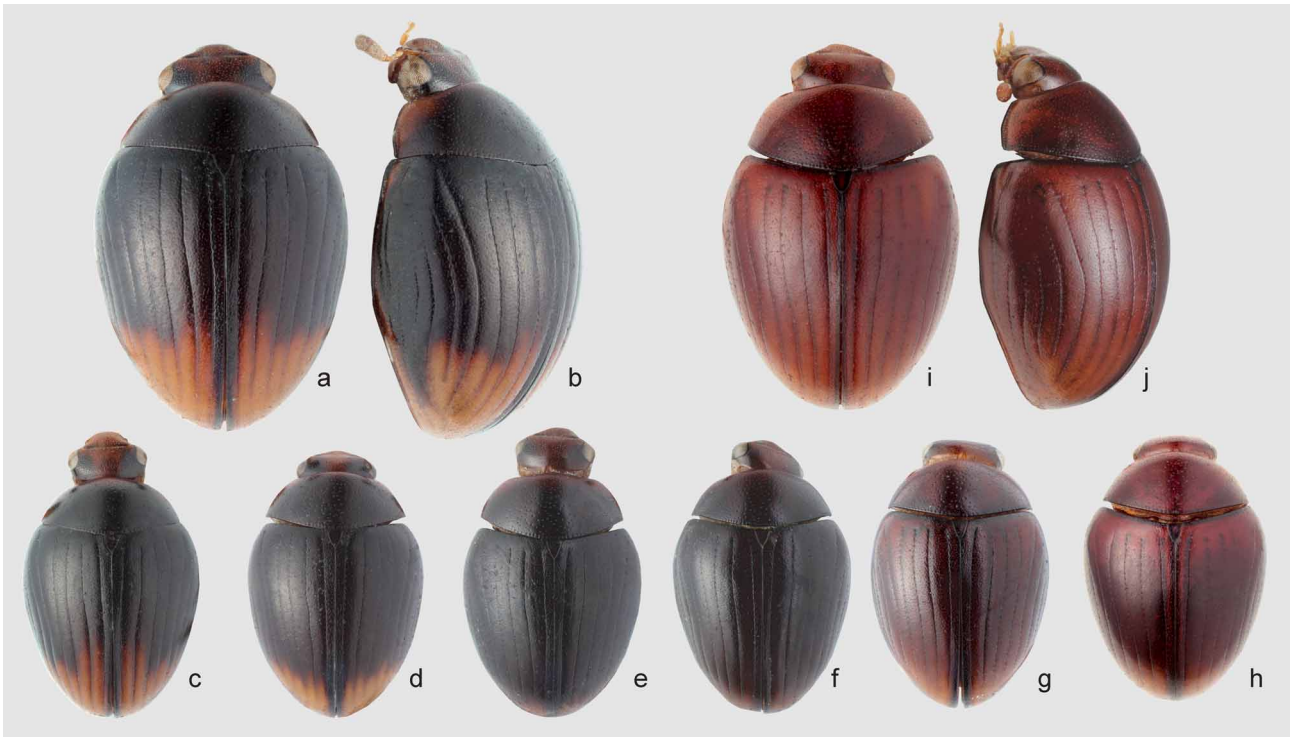


FIGURE 50. *Pachysternum apicatum*, general habitus (a, c–h, i: dorsal view, b, j: laterodorsal view). Localities of specimens: a–c: Lombok Is. (males); d: Laos, Ban Nape env. (male); e–g: Malaysia, Selangot, Ulu Gombak Field studies centre; h: Sarawak, Gunung Mulu NP; i–j: Sabah, Mt. Trus Madi.

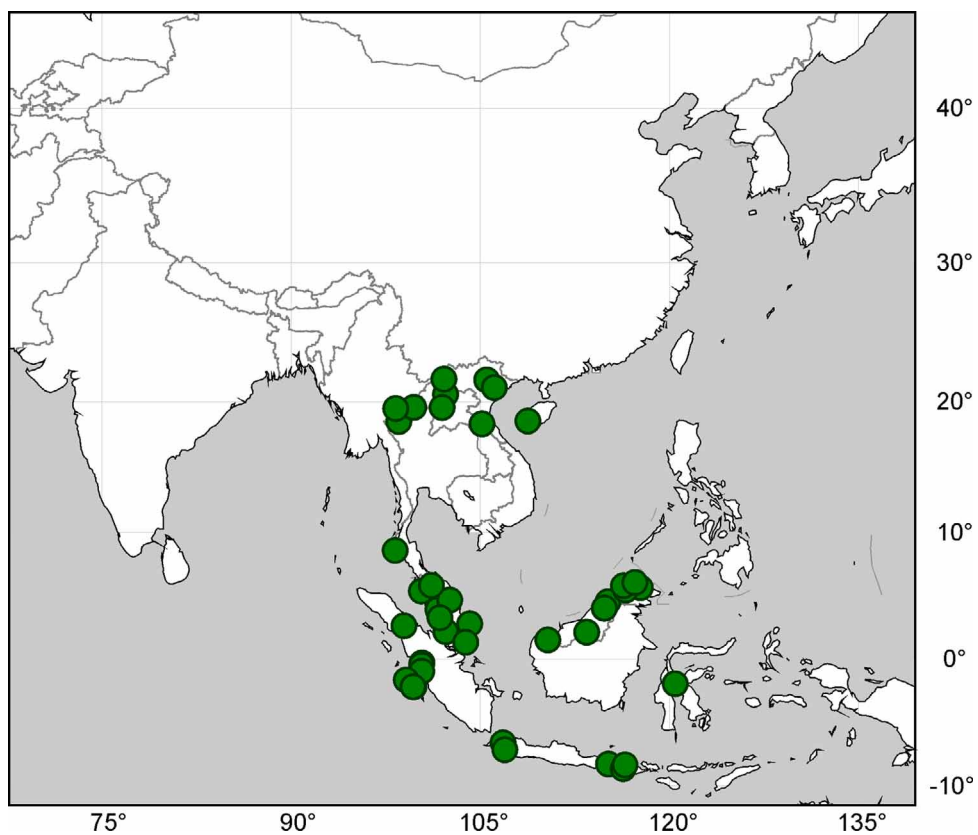


FIGURE 51. Known distribution of *Pachysternum apicatum*.

Coloration. Head dark brown with pale median portion of frons and clypeus. Pronotum dark brown, with large vaguely limited reddish spot in each anterolateral corner and vague slightly paler spot medially at anterior margin. Elytra black except for pale reddish spot on apex of each elytron extending up to posterior third on intervals 2–6 and along lateral margin. Ventral surface of head and prothorax brown, meso- and metathoracic sclerites black to dark brown; abdominal ventrites 1–4 dark brown with pale lateral portions, ventrite 5 entirely pale. Legs reddish brown, posterior portions of femora darker, brown.

External morphology. Clypeus with coarse and dense punctation consisting of punctures of two slightly different sizes. Frons with similar but sparser punctation as on clypeus, punctures separated ca. 2–3× puncture diameter. Interstices without microsculpture. Larger punctures on pronotum rounded, much larger than small punctures, small punctures minute, scar-like, divided by 2–3× puncture width. Pronotal interstices without microsculpture. Prosternum with very distinct median carina. Elytral series consisting of large, shallow punctures; interval punctation with minute semicircular punctures much smaller than serial ones, interval punctation consisting of two slightly different sizes of punctures, larger punctures setiferous; interstices without any trace of microsculpture. Elytral series distinctly impressed. Preepisternal elevation of mesothorax with deep posterolateral pits. Femoral lines on metaventrite slightly angulate, median portion of metaventrite bearing moderately large and rather dense setiferous punctation, interstices without microsculpture; lateral portions with very coarse and dense, densely pubescent punctation. Outer margin of anterior tibia very weakly bisinuate, outer series of spines slightly interrupted at the place of the sinuation.

Male genitalia (Fig. 36). Tegmen 1.5–1.6 mm long, median lobe 1.5 mm long. Phallobase ca. twice as long as parameres, bearing small, slightly asymmetrical basal manubrium. Median lobe widest at midlength, gradually narrowing apicad, apical portion triangular, stump at very apex; gonopore subapical, rather indistinct; lateral pubescent lobes narrow. Sternite 9 with widely rounded median projection, without apical emargination.

Variation. Extremely variable species, varying especially in coloration and the shape of anterior tibiae, but rather constant in genital morphology. General coloration varies from very dark brown (typical form and majority of mainland forms, Figs. 50a–f) to pale brown (some mainland forms and the Bornean form, Figs. 50g–j). Wide variability concerns the color patterns of elytra, the extent of apical elytral pale spot varies from totally absent (Figs. 50i–j) through very small and confined to very apex only (Figs. 50d–h, these specimens are very similar to dark specimens of *P. kubani* **sp. nov.**) to specimens with large apical spot corresponding with the redescription above (Figs. 50a–c, this coloration is also present in the lectotype). Very rarely, there is also a vaguely defined pale humeral spot (these specimens resemble *P. sulawesicum* and may be distinguished by the morphology of male genitalia). Uniformly colored specimens or those with very small and rather indistinct apical elytral spot occur in Borneo and predominate also in the southern part of the Malayan peninsula. On the other hand, specimens from the chain of islands between Sumatra and Lombok and in Sulawesi usually have very distinct and large apical spot, which is also the case of the specimens from northern parts of the continental Asia.

The shape of anterior tibia varies highly from nearly continually arcuate (in specimens from Java, which are therefore very similar to allied *P. curvatum* and *P. sandacanum* **sp. nov.**) through weakly angular to indistinctly bisinuate (the most usual form, Fig. 39a) to deeply emarginate and therefore resembling *P. kubani* **sp. nov.** (Fig. 39b). Deeply excised tibiae occur especially in all examined specimens from Borneo (where *P. apicatum* is therefore easily recognizable from similar *P. sandacanum* with continually arcuate outer margin of anterior tibiae) and with higher frequency also in the specimens from continental Asia. In continental specimens we have also found few specimens (from northern Laos and Vietnam) in which the series of spines on outer margin of the tibiae is not interrupted by a gap, as it is usual for the majority of the examined specimens of *P. apicatum*.

The wide variability mentioned above makes *P. apicatum* rather difficult to recognize in many cases. In contrast, the local populations are rather constant in all these characters in most cases (Fig. 72). For example, all specimens from Borneo are rather pale brown, lack the apical elytral spot and have rather deeply bisinuate anterior tibiae; specimens from Malayan peninsula are similar to those from Borneo, but usually much darker; specimens from the island chain from Sumatra to Lombok are most frequently very dark brown, with large and very apparent apical elytral spot and only slightly angular anterior tibiae; and specimens from northern Thailand and northern Vietnam are similar to those from Sumatra in coloration, but have rather deeply bisinuate anterior tibiae. This may suggest that *P. apicatum* as it is understood here may be in fact a cluster of very similar sibling species. Further studies on wider material and possibly using other than morphological characters would be desirable for complete understanding of the problem which is left unresolved here. The lectotype designated above corresponds with the form with large apical elytral spot and only indistinctly sinuate/angular outer margin of anterior tibiae, and in the case of splitting into more species, the name *P. apicatum* had to be therefore applied for that form occurring from Sumatra and adjacent islands through Java to Lombok Is.

Biology. Based on label data and personal experience, the specimens were collected from various kinds of decaying organic matter, most frequently from decaying plant remains (rotten manihot skins, rotten durian, native vegetable garden refuse, rotting fruit, leaf litter, felled young bamboo shoots), sometimes also collected in baited pitfall traps (with dead fish or dung as the bait) or on carcasses (“dead pig”). No specimen was collected from mammal excrements, which suggests that the biology of *P. apicatum* probably differs from most other Asian *Pachysternum* except from *P. curvatum* and *P. sandacanam*.

Distribution. Widely distributed in the whole southeastern Asia, reaching from southern China (Hainan) and northern Thailand, Laos and Vietnam through Malayan peninsula to the islands of Sundaland (Sumatra, Java, Bali Lombok, Sulawesi, Borneo).

Pachysternum cardoni Orchymont, 1926

(Figs. 29, 42, 52)

Pachysternum cardoni Orchymont, 1926a: 220.

Pachysternum cardoni: Orchymont (1928: 83, catalogue); Satô (1979: 49, faunistics); Biswas & Mukhopahyay (1995: 154, faunistics); Hebauer (2002b: 57, faunistics); Hansen (1999: 307, catalogue); Mukhopadhyay & Sengupta (2003: 38, faunistics); Hansen (2004: 66, catalogue).

Type locality. India, Barway [Mission] [=India, Chhattisgarh state, Jashpur district, Chainpur env., coordinates ca. 23°08'N 84°14'E]. The type locality was erroneously mentioned as “India, Madhya Pradesh, Barwah” by Hansen (1999). The name Barway, even though missing from recent maps, refers to the name of the Mission led by Belgian Jesuits in the second half of 19th and at the beginning of 20th century, situated around the recent city of Chainpur (see the map by Tete 1984). Tete (1984) also mentions that Farther Cardon was the missionary in charge of the Barway region in 1890's - this person is evidently the same as “R. P. Cardon” mentioned as a collector of the holotype by Orchymont (1926a).

Type material examined. Paratypes: 3 spec. (IRSNB): “Gopaldhara / Br. Sikkim / H. Stevens // A. d'Orchymont det. / Pachysternum / Cardoni / d'Orchymont // Para- / type”. [Note. The holotype from “Barway” was not found in the Orchymont collection in IRSNB – it may be lost or was possibly returned to the collection of the Zoological Survey in Kolkata, India which would mean it is inaccessible and possibly damaged. As the original Orchymont's understanding of this species is clear and not problematic, we refrain from designating the neotype at the moment].

Additional material examined. CHINA: Anhui: 3 spec. (NHMB, NMPC): Dabieshan, 65 km SW Huoshan, elev. 1400 m [30°51'N 116°2'E], 21–23.vi.1996, lgt. Bolm. **Guangxi:** 1 spec. (NHMB): Miaoershan, S slope, elev. 1300–2000 m [ca. 25°50'N 110°30'E], 25–26.vi.1997, lgt. Bolm. **Guizhou:** 1 female (NHMW): 30 km NW Jiangkou, Fanjing, Shan-Kuaichang, elev. 500 m, 27°54'23.34"N 108°41'55.31"E, 9.v.2000, without collector; 1 spec. (NMPC): 60 km N Kaili, Shibing-Yuntai Shan, 27°7'25"N, 107°59'E, 21–25.v.1995, lgt. E. Jendek & O. Šauša. **Hunan:** 5 spec. (NHMB, NMPC): Wulingyuan, Tianzishan nature reserve, elev. 800 m, 29°20'47"N, 110°32'17"E, 16–18.vi.1997, lgt. Bolm. **Shandong:** 1 spec. (IRSNB): Kiautschau [= Jiaozhou, 36°16'N 120°2'E], without date and collector. **Sichuan:** 2 spec. (NHMB): Mt. Emei, elev. 600–1050 m [29°33'N 103°22'E], 5–19.v.1989, lgt. L. Bocák; 1 male (NMPC): “Wassuland, Chunchwa, Szechuan” [=Yingxiuwan env., 31°17'24"N 103°21'36"E], without date, lgt. Reitter. **Yunnan:** 1 male (NHMW): 100 km W Baoshan, Gaoligong Shan nature reserve, 25°5'43.34"N 98°15'11.49"E, 14–21.vi.1993, lgt. E. Jendek & O. Šauša. **INDIA: Arunachal Pradesh:** 1 spec. (BMNH): “Burma, Mishmi hills” [currently in India, coordinates ca. 27°51'N, 96°34'E], 1935, lgt. M. Steele. **Sikkim:** 2 spec. (FHGC, ASKC): Pemayangtse env., elev. 1900–2080 m, 27°18'16"N 88°15'10"E, 15–17.v.1998, lgt. Fabrizi & Ahrens. **West Bengal:** 11 spec. (BMNH): Gopalghara [coordinates ca. 27°4'42"N 88°16'2"E], without date, lgt. H. Stevens. **LAOS: Bolikhamxai:** 1 spec. (NHMB): 8 km NE Ban Nape, elev. 600 m, 18°21'N, 105°8'E, 1–18.v.2001, lgt. Pacholátko; 14 spec. (NHMB, NMPC): same locality and date, lgt. V. Kubáň. **Houaphan:** 3 spec. (NMPC): Phou Pane Mt., 20°13'09–19"N 103°59'54"–104°00'03", 1–16.vi.2009, lgt. V. Kubáň. **Louangphabang:** 1 spec. (NHMB): 5 km W of Ban Song Cha, elev. 1200 m, 20°33'N 102°14'E, 10–16.v.1999, lgt. V. Kubáň; 1 spec. (NHMB): Thong Khan, elev. 750 m 19°35'N 101°58'E, 11–21.v.2002, lgt. V. Kubáň. **Phongsali:** 3 spec. (NHMB): Phongsali env., elev. 1500 m, 21°41'N 102°6'E, 6–17.v.2004, lgt. V. Kubáň. **NEPAL: Gandaki:** 2 spec. (FHGC): Kaski, Ghandruk, elev. 2200 m, 28°29'24"N 83°50'24"E, 25.iii.1994, lgt. Ahrens. **THAILAND: Mae Hong Son:** 1 female (NHMW): Ban Huai Po, elev. 1700 m, 19°16'N, 97°56'E, 24–30.vi.1993, lgt. Schneider. **VIETNAM: Bac Thai:** 1 spec. (NMPC): Tam Dao [National Park, ca. 21°38'N, 105°30'E], without date, lgt. P. Marhoul. **Hoa Binh:** 1 unsexed specimen (IRSNB): Hoa Binh [20°50'N, 105°20'E], without date, lgt. A. de Cooman.

Published records (not examined). **INDIA: Chhattisgarh:** “Barway” [= Jashpur district, Chainpur env., coordinates ca. 23°08'N 84°14'E], depository unknown (holotype) (Orchymont 1926a). **Sikkim:** Mangan [precise localtion not found], coll. ? Zoological Survey of India (Mukopadhyay & Sengupta 2003). **West Bengal:** Kalimpong env. [27°3'N 88°28'2 0"E], coll. NHMB (Satô 1979). **NEPAL: Gandaki:** Manaslu Mts., Dudh Pokhari Lekh, upp. Jorney vill., elev. 1900–2400 m [coordinates ca. 28°15'N 84°33'E], coll. Museum Erfurt (Hebauer 2002b); Sikles Range, Kyojo Kharka N Sikles, N Pokhara, elev. 1850 m [coordinates ca. 28°23.5'N 84°7'E], coll. Museum Erfurt (Hebauer 2002b).

Differential diagnosis. *Pachysternum cardoni* is rather easily recognizable by its large and widely oval body, weakly bisinuate outer margin of anterior tibiae, by the pale reddish coloration with large M-shape spot on pronotum (in most specimens) and longitudinal dark stripes along elytral series reaching subapically on series 2–4, and in most cases by rather distinct microsculpture of elytral interstices. However, the species varies rather widely in coloration and dorsal microsculpture, and darker specimens may resemble *P. stevensi* and *P. kubani*, which have both also very similar male genitalia. *Pachysternum cardoni* differs from both these species by clearly developed M-shaped dark spot on the pronotum leaving submedian parts of the pronotum behind midlength pale (in dark specimens, the M-shape of the dark spot may be indistinct, but the pale submedian areas remain always distinct, Figs. 52e–f). In contrast, no pale submedian spots are developed in most *P. kubani* and in all *P. stevensi*; in pale *P. kubani*, the dark spot is never M-shaped (for additional diagnostic characters, see couplets 3 and 13 in the key above). The pale coloration of the pronotum with the black M-shaped spot of *P. cardoni* also resembles the coloration of *P. nigrovittatum*; see couplet 2 in the key above and *P. nigrovittatum* for diagnostic characters.

Redescription. Body widely oval, shape of elytra slightly sexually dimorphic, female with distinctly pronounced humeral portion of elytra. Body length 2.9–4.3 mm; body width 2.2–2.8 mm.

Coloration (Fig. 52). Head dark brown with paler posterolateral corners of clypeus, median portion of frons and yellowish transverse ridge. General coloration of pronotum pale reddish, bearing a wide M-shaped black spot of variable extent, posterolateral corners black. Elytra pale reddish brown, with black stripes of variable extent along elytral series. Ventral surface of head reddish brown, thoracic sclerites dark brown, abdominal ventrites 1–4 largely pale reddish posteriorly, ventrite 5 entirely pale reddish. Legs pale reddish.

External morphology. Clypeus with moderately coarse but sparse punctation consisting of punctures of two different sizes separated by ca. 1–2× puncture diameter. Punctation of frons similar to that on clypeus. Interstices on head without microsculpture. Larger punctures on pronotum rounded, deeply impressed, much larger than small punctures; small punctures slightly scar-like, divided from each other by 2–3× puncture width. Pronotal interstices without microsculpture. Prosternum with very distinct median carina. Elytral series consisting of large, shallow punctures; interval punctation with rather fine semicircular punctures much smaller than serial ones, with sparsely intermixed slightly larger setiferous punctures of the same shape; interstices without any trace of microsculpture. Elytral series 1 weakly impressed, lateral series distinctly impressed. Preepisternal elevation of mesothorax without posterolateral pits. Femoral lines on metaventrite indistinctly angulate, median portion of metaventrite bearing rather fine and sparse setiferous punctation, interstices without microsculpture; lateral portions with very coarse and dense, densely pubescent punctation. Anterior tibia rather narrow, outer margin slightly bisinuate, outer series of spines not interrupted at the place of the situation.

Male genitalia (Fig. 29). Tegmen 1.6–1.7 mm long, median lobe 1.6–1.7 mm long. Phallobase 2.2× as long as parameres, bearing small, slightly asymmetrical but weakly detached basal manubrium. Median lobe widest at midlength, weakly narrowing apicad, apex narrowly rounded; gonopore subapical, rather indistinct; lateral pubescent lobes indistinct even subapically. Sternite 9 with deep V-shaped apical emargination.

Variation. Variable in the extent of the black spots on pronotum and especially elytra. Pronotal M-shaped spot may be slightly more or less expanded, but in all cases retains its M-like shape and leaves large submedian areas on the pronotum pale reddish. Elytral dark stripe along the punctate series vary from largely expanded and therefore completely or partly merging the adjacent stripes, to slightly darkening of elytral series not expanding to intervals at all and leaving the elytra nearly uniformly reddish. Microsculpture of elytra varies from totally absent even laterally to very clearly developed mesh-like microsculpture on lateral portion of the elytron.

Biology. Unknown.

Distribution. Widely distributed through NE India and Nepal, central and southern China and northern part of SE Asia. Recorded for the first time for Thailand and Vietnam. The unspecified records from the Chinese provinces Guizhou and Yunnan mentioned by Hansen (2004) were based on the above specimens from these regions.



FIGURE 52. *Pachysternum cardoni*, general habitus (a, c–g: dorsal view, b: laterodorsal view). Localities of the specimens: a–b: India, Sikkim, Gopaldhara (male); c: China, Hunan (male); d, f: same locality (female); e: Burma (female); g: China, Anhui (female).

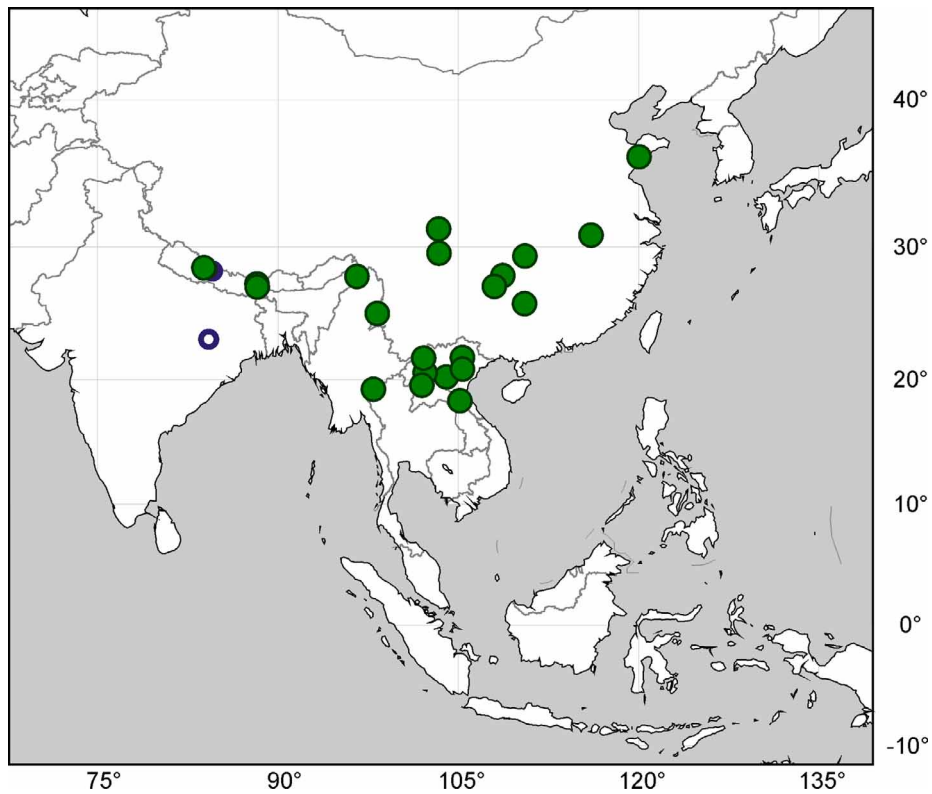


FIGURE 53: Known distribution of *Pachysternum cardoni* (green dots: examined material; blue circles: published data, not examined).

Pachysternum coomani Orchymont, 1926

(Figs. 30, 54)

Pachysternum coomani Orchymont, 1926a: 221.

Pachysternum coomani: Orchymont (1928: 83, catalogue); Mukhopadhyay & Sengupta (2004: 453, faunistics); Hansen (1999: 307, catalogue).

Type locality. Vietnam, Hoa Binh province [coordinates ca. 20°50'N, 105°20'E].

Type material examined. Holotype: 1 female (IRSNB): “Hoa Binh / Tonkin / de Cooman // Coll. d’Orchym. / *Pachysternum* / *coomani* / Type”. Paratypes: 2 females, 4 spec. (IRSNB): same data as the holotype.

Additional material examined. **MALAYSIA: Kedah:** 1 male, 4 spec. (NMPC, ASKC): Pulau Langkawi, environs of hotel Berjaya [= Pantai Kok village, coordinates ca. 6°22'N, 99°40.5'E], 7–22.xi.2009, lgt. U. Schmidt. **MYANMAR: Shan:** 1 male, 1 spec. (FHGC): Kinda dam, Palaung river mouth [coordinates ca. 21°5'N, 96°19'E], 23–25.xi.1989, lgt. Tobias. **THAILAND: Phetchabun:** 1 male (FHGC): 120 km N Phetchabun, Lom Sak, elev. 120 m [coordinates ca. 16°47'N 101°14'30"E], viii.1987, lgt. W. Thielen; **VIETNAM: Ho Chi Minh:** 1 spec. (IRSNB): Saigon [= Ho Chi Minh city, coordinates ca. 10°46.5'N 106°41.5'E], without date and collector.

Published records. **INDIA: Manipur:** Imphal district, Ucharthal, 5 km E of Jiribam (Mukhopadhyay & Sengupta 2004).

Differential diagnosis. Rather easily distinguishable from all remaining species occurring in continental SE Asia by its pale reddish general coloration (Fig. 54), small body size and continually arcuate outer margin of anterior tibiae (Fig. 43); the very wide and nearly parallel-sided median lobe of the aedeagus (Fig. 30) is also very characteristic and cannot be confused with any other species. Darker specimens with stronger interstitial microsculpture on elytra may resemble *P. stevensi*, but can be easily distinguished from it by continually arcuate outer margin of anterior tibiae (distinctly sinuate in *P. stevensi*) and wide, nearly parallel-sided median lobe. By general coloration, *Pachysternum coomani* also slightly resembles Bornean specimens of *P. apicatum*, from whose it also differs by continually arcuate outer margin of anterior tibiae (rather deeply sinuate in Bornean *P. apicatum*).

Description. Body widely oval, shape of elytra not sexually dimorphic, female without distinctly pronounced humeral portion of elytra. Body length 2.2–2.9 mm (holotype: 2.4 mm); body width 1.5–1.8 mm (holotype 1.6 mm).

Coloration (Fig. 54). Whole dorsal surface more or less uniformly reddish brown, with slightly darker lateral portions of frons, posterolateral portions of pronotum, base of elytra and elytra at midlength. Ventral surface of head reddish brown, thoracic sclerites brown, abdominal ventrites reddish brown, legs pale reddish.

External morphology. Clypeus with moderately coarse but sparse punctation consisting of uniformly-sized rasp-like punctures separated from each other by ca. 1–3× puncture diameter. Punctation of frons similar to that on clypeus. Interstices on head without microsculpture. Larger punctures on pronotum rounded, shallow, much larger than small punctures; small punctures scar-like, divided from each other by ca. 3× puncture width. Pronotal interstices without microsculpture. Prosternum with very distinct median carina. Elytral series consisting of large, shallow punctures; interval punctation with rather fine semicircular punctures much smaller than serial ones, with sparsely intermixed setiferous punctures of the same shape and size; interstices with weak mesh-like microsculpture. Elytral series 1 not impressed, lateral series only very weakly impressed. Preepisternal elevation of mesothorax without posterolateral pits. Femoral lines on metaventrite indistinctly angulate, median portion of metaventrite bearing rather fine, moderately dense setiferous punctation, interstices without microsculpture medially, with weak microsculpture consisting of partially joint ridges laterally; lateral portions with very coarse and dense, densely pubescent punctation. Anterior tibia rather wide, outer margin continually arcuate, outer series of spines not interrupted.

Male genitalia (Fig. 30). Tegmen 1.0–1.1 mm long, median lobe 1.0–1.1 mm long. Phallobase 2.5× as long as parameres, bearing small, slightly asymmetrical, distinctly detached basal manubrium. Median lobe rather wide, nearly parallel-sided at midlength, strongly narrowing apicad, apex widely rounded; gonopore subapical, rather indistinct; lateral pubescent lobes narrowly developed subapically. Sternite 9 with moderately large V-shaped apical emargination.



FIGURE 54. *Pachysternum coomani*, general habitus (a, c–d: dorsal view, b: laterodorsal view). Localities of the specimens: a–b: Malaysia, Kedah (male); c: same locality (female); d: Thailand, Phetchabun (male).

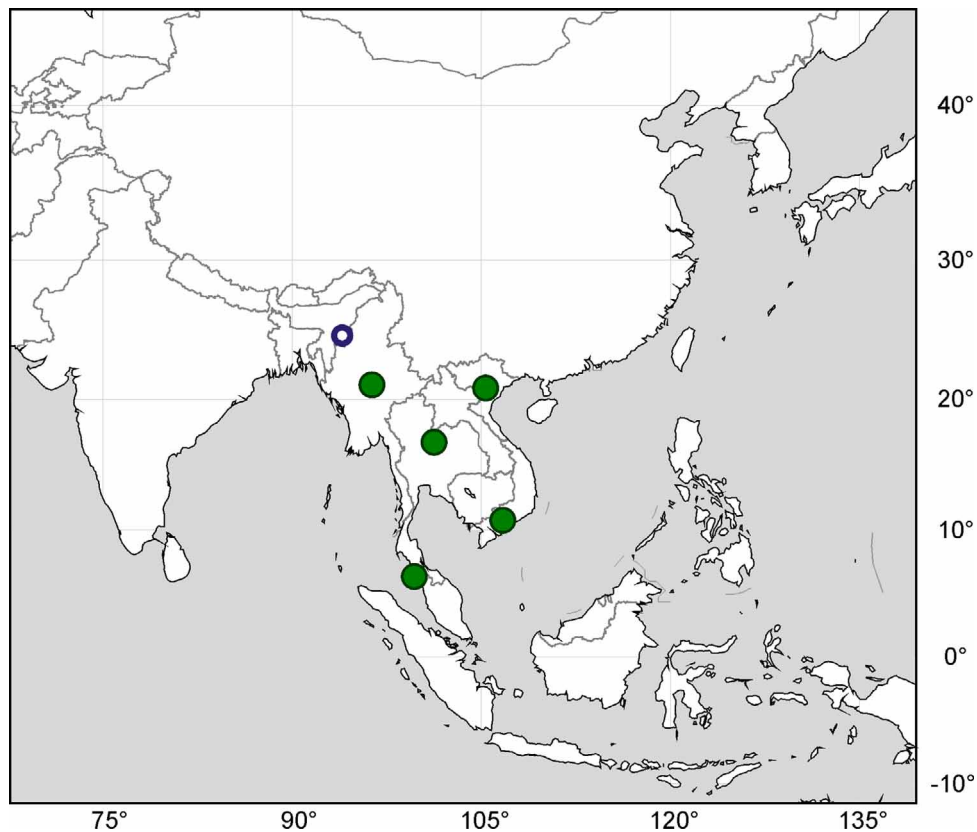


FIGURE 55. Known distribution of *Pachysternum coomani* (green dots: examined material; blue circles: published data, not examined).

Variation. Dorsal coloration varies slightly in the extent of the darker areas on the head, pronotum and elytra: type specimens are paler (uniformly reddish) than some specimens from Malaysia, in which some parts of the elytra are distinctly darker, brown (Fig. 54d). Microsculpture of elytral interstices varies from weakly developed to very distinct.

Biology. The specimens from Malaysia were collected in cow excrements; most probably a coprophilous species.

Distribution. Based on the examined specimens, the species seems to be widely distributed in the mainland SE Asia, reaching from northeastern India (Manipur state) to southern Vietnam and Malayan peninsula, but the specimens are rather rare in collections. The species is recorded here for the first time from Malaysia, Myanmar and Thailand.

***Pachysternum curvatum* Orchymont, 1925**

(Figs. 4–5, 37, 40, 56, 72)

Pachysternum curvatum Orchymont, 1925: 201.

Pachysternum curvatum: Orchymont (1926a: 224, identification key); Orchymont (1926b: 374, second, more detailed English description with the specification of type specimens); Hansen (1999: 307, catalogue).

Type locality. Philippines, Luzon island, Imugan.

Type material examined. Lectotype (here designated): 1 male (IRSNB): “Imugan, Luzon // Cotype // *Pachysternum / curvatum* // coll. d’Orchymont // Para- / type” [considered as a paratype by Orchymont (1926b)]. Paralectotypes: 1 female (IRSNB): same locality data as the lectotype [considered as the holotype by Orchymont (1926b)]; 1 female 1 male (IRSNB): “Mt. Banahao / Luzon // Cotype // *Pachysternum / curvatum* // coll. d’Orchymont // Para- / type”. The species was described twice: (1) a short Latin description lacking any data on type specimens was published by Orchymont (1925); (2) a detailed English description with precise citing of type specimens was published by Orchymont (1926b). The description published by Orchymont (1925) fulfills all requirements of the International Code of Zoological Nomenclature (ICZN 1999) and the paper is therefore correctly considered as the original description (see, e.g., Hansen 1999). However, the type material is not specified in this paper and no holotype is designated; all type specimens used for the description has to be therefore formally considered as syntypes. The subsequent designation of the holotype by Orchymont (1926b) is therefore invalid following Articles 73.1.3. and 72.4.1 of the Code (ICZN 1999). Hence, the lectotype of the species is designated herein: as the differences in male genitalia are crucial for the diagnosis of the species, we have chosen the single male available as the lectotype, irrespectively to the previous decision by Orchymont (1926b) to designate the female from Imugan as “the holotype”.

Additional material examined: PHILIPPINES: Leyte: 1 spec. (FHGC): Visca, N of Baybay, elev. 200–500 m [10°42'N 124°48.5'E], 1991, lgt. Schawaller. **Luzon:** 3 spec. (IRSNB): Mt. Makiling [14°8'4.5"N 121°12'30"E], without date, lgt. Baker; 3 spec. (FMNH): Laguna, Los Baños, elev. 300 m [14°10'N, 121°12'E], vi.1947, lgt. F. G. Werner; 598 spec. (FMNH, NMPC): Mt. Makiling, 4 km SE Los Baños, [14°8'17"N 121°14'22"E], 11.iv.1977, lgt. L. Watrous. **Mindanao:** 5 spec. (FMNH): E slope Mt. McKinley, Davao Province [= ? Mt. Apo, close to Davao city, 7°6'N 125°24.5'E], ix.1946, lgt. H. Hoogstraal & D. Heyneman; 1 spec. (FMNH): same locality, 28.ix.1946, lgt. F. G. Werner; 1 male (IRSNB): Momungan [=Baloi, 8°6'54"N 124°13'19"E], without date and collector; 2 spec. (FMNH): Davao del Sur, Mainit river, Mt. Apo, elev. 1829 m [6°59'N, 125°16'E], 2.ix.1930, lgt. C. F. Clagg; 1 spec. (FMNH): Mainit, E slope of Mt. Apo, elev. 1311 m [6°59'N 125°16'E], xi.1946, without collector; 17 spec. (NHMW, NMPC): South Cotabato, Mt. Matutum, Tupi [6°21'28"N 125°4'18"E], ii.1996, lgt. Mohagan. **Unknown location:** 3 spec. (IRSNB): Tangrolan, Bukidnon, withoutdate, lgt. Baker.

Differential diagnosis. By the general coloration and continually arcuate outer margin of anterior tibiae rather easily distinguishable from all *Pachysternum* species except the some forms of *P. apicatum*, *P. sandacanam* from northern Borneo and *P. haemorrhoum* from eastern Palaearctic. Except for the fact that *P. curvatum* is the only species of the genus in Philippines and does not co-occur with any above species (as well as with any other species of *Pachysternum*), it may be distinguished from them by the shape of the median lobe of the male genitalia (gradually narrowing apicad and acute at the very apex (Fig. 37b–c), in contrast to blunt at very apex in *P. apicatum*, distinctly narrowed in apical fourth in *P. sandacanam* and widely expanded subapically in *P. haemorrhoum*). *Pachysternum sandacanam* also differs by smaller body size (2.6–3.3 mm in *P. curvatum*, 2.3–3.1 mm in *P. sandacanam*). Most specimens of *P. apicatum* may be distinguished by at least weakly sinuate or angulate



FIGURE 56. *Pachysternum curvatum*, general habitus (a, c: dorsal view, b: laterodorsal view). Localities of the specimens: a–c: Philippines, Mindanao, Mt. Matutum.

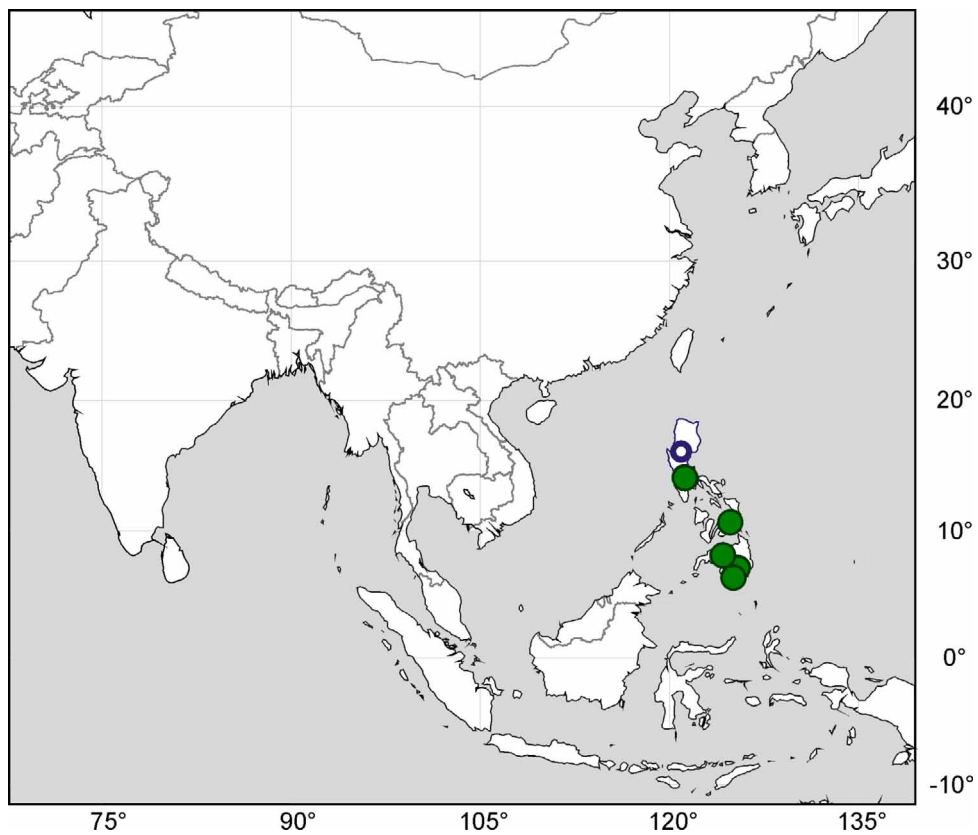


FIGURE 55: Known distribution of *Pachysternum curvatum* (green dots: examined material; blue circles: published data, not examined).

outer margin of anterior tibiae (at least when seen in slightly different angles than dorsally; outer margin of anterior tibiae is continually arcuate in *P. curvatum* even when seen from slightly oblique angles). *Pachysternum haemorrhoum* also differs by the uniform microsculpture throughout the metaventricle (Fig. 21), in contrast to the highly microsculptured and densely pubescent metaventricle laterally of the femoral lines in *P. curvatum* (as in Fig. 20)

Redescription. Body widely oval, shape of elytra sexually dimorphic, female with distinctly pronounced humeral portion of elytra. Body length 2.1–3.3 mm (lectotype: 2.3 mm); body width 1.6–2.2 mm (lectotype 1.7 mm).

Coloration (Fig. 56). Clypeus reddish to dark brown, frons uniformly dark brown without apparently pale median portion. Pronotum dark brown, lateral margins only very vaguely and narrowly paler. Elytra brown to dark brown, except for pale reddish spot on apex of each elytron extending up to posterior fourth to third on intervals 2–5. Ventral surface brown to dark brown, abdominal ventrites 1–4 brown with pale lateral portions, ventrite 5 entirely pale. Legs reddish brown.

External morphology. Clypeus with coarse and dense punctation consisting of uniform punctures. Frons with punctations similar to that on clypeus, punctures separated ca. 2–3× puncture diameter. Interstices without microsculpture. Larger punctures on pronotum rounded, much larger than small punctures, small punctures minute, scar-like, divided by 2–3× puncture width. Pronotal interstices without microsculpture. Prosternum with very distinct median carina. Elytral series consisting of large, shallow punctures; interval punctation with minute semicircular punctures much smaller than serial ones, interval punctation consisting of two slightly different sizes of punctures, larger punctures setiferous; interstices without any trace of microsculpture. Elytral series distinctly impressed. Preepisternal elevation of mesothorax with deep posterolateral pits. Femoral lines on metaventricle slightly angulate, median portion of metaventricle bearing moderately coarse but rather sparse setiferous punctation, interstices without microsculpture; lateral portions with very coarse and dense, densely pubescent punctation. Outer margin of anterior tibia continually arcuate, outer series of spines not interrupted.

Male genitalia (Fig. 37). Tegmen 1.1–1.2 mm long, median lobe 1.2–1.3 mm long. Phallobase ca. twice as long as parameres, bearing small, slightly asymmetrical basal manubrium. Median lobe widest at midlength, gradually narrowing apicad, apical portion triangular, acute at very apex; gonopore subapical, rather indistinct; lateral pubescent lobes narrow. Sternite 9 with widely rounded median projection, without apical emargination.

Variation. Slight variability was observed only in the extent of pale spots on elytra (Fig. 56) and in the coloration of the clypeus, which may be pale reddish to dark brown.

Biology. A long series of this species has been collected from “rotting figs” at Mt. Makiling by L. Watrous. Collecting circumstances of other specimens are unknown.

Distribution. Endemic to Philippines, known from islands of Luzon, Leyte and Mindanao.

Discussion. The species is rather similar to the some specimens of *P. apicatum* in all external characters including the presence of deep pits in posterolateral corners of the preepisternal elevation of the mesothorax (as in Fig. 18). Based on its vicariant distribution with *P. apicatum*, it may in fact even represent only a local population or subspecies of *P. apicatum*. However, the small differences in the shape of the apex of the median lobe of the aedeagus and in the shape of the anterior tibiae support the status of *P. curvatum* as a separate species. *Pachysternum curvatum* is also very similar to *P. sandacanum* from northern Borneo in dorsal coloration and shape of anterior tibiae, but the differences in body size and in the shape of the median lobe between these species is very apparent and clearly supports the separate specific status of the populations in Philippines and in northern Borneo.

***Pachysternum haemorrhoum* Motschulsky, 1866**

(Figs. 9, 13, 16, 21, 26, 31, 44, 58)

Pachysternum haemorrhoum Motschulsky, 1866: 168.

Pachysternum haemorrhoum: Harold (1878: 69, redescription); Sharp (1884: 464, catalogue); Knisch (1924: 159, catalogue); Shatrovskiy (1989: 287, identification key); Hebauer (1995: 31, faunistics); Hansen (1999: 307, catalogue); Hansen (2004: 66, catalogue); Hebauer & Ryndevich (2005: 50, faunistics); Ôhara & Jia (2006: 145, faunistics, male genitalia); Short & Kanda (2006: 12, catalogue); Prokin (2009, faunistics).

Megasternum gibbulum Motschulsky, 1866: 169. **Syn. nov.**

Megasternum distinctum Sharp, 1873: 66.

Megasternum distinctum: Harold (1878: 69, synonymized with *Pachysternum haemorrhoum*); Sharp (1879: 278, synonymy with *P. haemorrhoum* denied); Sharp (1884: 462, 464, catalogue, synonymy with *P. haemorrhoum* denied); Knisch (1924: 158, catalogue); Orchymont (1926b: 373, synonymy with *P. haemorrhoum* confirmed).

Pachysternum sibiricum Kuwert, 1890: 172, 324. **Syn. nov.**

Pachysternum sibiricum: Knisch (1924: 159, catalogue); Balfour-Browne (1947: 457, faunistics); Bellstedt (1985: 140, faunistics); Hebauer (1995: 31, faunistics).

Pachysternum haemorrhoum var. *sibiricum*: Orchymont (1926b: 373, downgraded to the variety of *P. haemorrhoum*).

Pachysternum haemorrhoum ssp. *sibiricum*: Hansen (1999: 307, catalogue); Hansen (2004: 66, catalogue); Ôhara & Jia (2006: 146, faunistics).

Type localities. *Pachysternum haemorrhoum*: Japan. *Megasternum gibbulum*: Japan. *Megasternum distinctum*: Japan. *Pachysternum sibiricum*: Russia, Vladivostok.

Type material. *Pachysternum haemorrhoum*: Lectotype (hereby designated): 1 spec. (ZMUM): “Pachysternum / haemorrhoum / Motsch. / Japonia [yellow label, in handwritten]” Paralectotype: 1 spec. (ZMUM): same label data as the lectotype, with additional lectotype label “Lectotypus / Pachysternum haemorrhoum / Motsch. / design. Shatrovskiy 1986”. There are two specimens of *P. haemorrhoum* in the Motschulsky collection, both corresponding with the original description in the locality data and the characters mentioned (including of the coloration). In contrast to type specimens of *P. nigrovittatum* and *P. apicatum*, the specimens do not bear the original indication of the type status. In accordance with A. G. Shatrovskiy who designated one of these specimens as lectotype, and with Hansen (1998), we consider them as a part of the original type series. The lectotype designation by Shatrovskiy was never published and is therefore invalid according to International Code of Zoological Nomenclature (ICZN 1999). As the specimen bearing Shatrovskiy’s lectotype label is totally disarticulated, we designate here the second, complete specimen as the lectotype.

Megasternum gibbulum: Lectotype (hereby designated): 1 male (ZMUM): “Megasternum / gibbulum / Motsch. / Japonia [yellow label, handwritten] // Lectotypus ♂ / Megasternum / gibbulum / Motsch. / design. Shatrovskiy 1985 // Pachysternum / haemorrhoum Motsch. / det. Shatrovskiy 1986”. The lectotype designation was never published and is therefore invalid according to International Code of Zoological Nomenclature (ICZN 1999). Hence, the single available specimen is formally designated as lectotype here.

Megasternum distinctum: Lectotype (hereby designated): 1 spec. (BMNH): “Lecto- / type [round label with violet margin] // Type [round label with red margin] // Japan [printed label with yellow stripe] // Sharp Coll / 1905–131 // Japan [round yellow label, handwritten] // Megasternum / distinctum / Type D. S. [in handwritten] // Lectotypus ♀ / Megasternum / distinctum Sharp / design. Shatrovskiy 1984 [red label, partly handwritten]”. The species was described according to two specimens (Sharp 1873). Only one of these specimens is deposited in BMNH, bearing the lectotype label by A. Shatrovskiy. However, the lectotype designation was never published and is therefore invalid according to International Code of Zoological Nomenclature (ICZN 1999). Hence, the specimen is formally designated as lectotype here.

Pachysternum sibiricum: Lectotype (hereby designated): 1 spec. (HNHM): “Siberia or. / Wladiwostock [printed] // coll. Reitter [printed] // Holotype 1890 / Pachysternum / sibiricum / Kuwert [white label with red border]”. On our request we have received the only specimen labeled as holotype from HNHM. However, the holotype label corresponds with those attached routinely to the type specimens in this museum and its handwriting does not correspond with Kuwert’s handwriting. Number of type specimens is not indicated in the original description, therefore we must consider the single available specimen as a part of type series. For this reason, we hereby designate this specimen as the lectotype.

Additional material examined. **CHINA: Heilongjiang:** 1 spec. (FMNH): Hsiolin Station, 60 miles W of Harbin [coordinates ca. 45°48.5'N 125°16'E], 10–25.vii.1938, lgt. M. Weymarn. **Jilin:** 1 spec. (BMNH): “Chengchin, Lesser Khingan, Manchukuo” [= Changchun, coordinates 43°49'N 125°19.5'E], 20.iv.2038, lgt. M. Weymarn. **Inner Mongolia:** 2 spec. (SYSU): Hailar City [coordinates ca. 49°12'N 119°42'E], 23–26.vii.2003, lgt. F. L. Jia; 7 spec. (SYSU): Yitulihe, without date, lgt. F.L. Jia. **JAPAN: Hokkaido:** 3 spec. (BMNH): Otaru [coordinates ca. 43°11.5'N 141°0'E], without date, lgt. G. Lewis. **Honshu:** 4 spec. (IRSNB): Kyoto [coordinates ca. 35°1'N 135°46'E], without date and collector; 1 spec. (IRSNB): Nagano, Mt. Yatsu, 24.vii.1955, lgt. M. Sato; 3 spec. (BMNH): Nara, “ft of Mt. Kasuga” [coordinates ca. 34°41'N, 135°51'E], 20.viii.1980, lgt. P. M. Hammond. **Kyushu:** 1 spec. (BMNH): Nagasaki [coordinates ca. 32°45'N 129°52'E], 20.ii.1881, lgt. C. Lewis. **Shikoku:** 2 spec. (FMNH) Ehime, Ishizuchi Mtn. NP Omogo Valley, elev. 700 m [coordinates ca. 33°43'N 133°6'E], 18–25.viii.1980, lgt. S. & J. Peck. **Unspecified localities:** 2 spec., 1 male (BMNH, IRSNB): “Japan”, without date and collector; 3 spec. (BMNH): “Japan”, without date, lgt. C. Lewis. **MONGOLIA: Arkhangai:** 1 spec. (NHMW): Ugij-nur, Aimak Arkhangai, elev. 1340 m, 47°48'N 102°48'E, 7.vi.1964, lgt. Mongolian-German biological expedition. **RUSSIA: Amur:** 1 spec. (HNHM): Chitaizki-Sterena [= Khitayskiy-Storona, Blagoveshchensk env., coor-

dinates ca. 50°15'42"N 127°31'56"E], without date, lgt. B. v. Bodemeyer. **Buryatia:** 4 spec. (HNHM): Quellgebiet des Irkut [= spring area of the Irkut River, coordinates ca. 51°38.5'N 101°29'E], without date, lgt. Leder. **Chita:** 2 spec. (FMNH): Chita [coordinates ca. 52°3'N 113°30'E], without date, lgt. Jul. Isaak; 2 spec. (IRSNB, NHMW): same locality, without date, lgt. H. Frieb; 1 spec. (NMPC): Strjetensk [=Sretensk, coordinates ca. 52°15'N, 117°43'E], without date, lgt. von Bodemeyer. **Altay Republic:** 1 spec. (MPU): "okr. Gorno-Altayska" [= near Gorno-Altaysk], elev. 500 m, 28.v.1996 [coordinates ca. 51°57'N 86°58'E], lgt. A.Matalin & A.Brinev. **Khakassia:** 1 spec. (MPU): Zap. Sayany, per. Zapadnosyanskiy [West Sayan Mts., Zapadnosayanskiy pass; situated on the road from Tashtyp to Bolshoy On (Makarov., pers. comm.), coordinates ca. 52°26'N 89°48'E], elev. 2200 m, alpine, brook shore, 8.viii.1989, lgt. S. Bugrov. **Evreyskaya Avtonomnaya Oblast:** 8 spec. (NHMW, NMPC): O. Siberien, Sotka-Gora [= Pompeyevka env., coordinates ca. 48°21'N 130°48'E], without date, lgt. B. v. Bodemeyer; 1 spec. (MPU): okr. st. Bira [= near station Bira], 14.vii – 2.viii.1993, lgt. P.Udovichenko; 1 spec. (MPU). **Irkutsk:** 1 spec. (ASHC): Shelekhov [coordinates ca. 52°12'32"N 104°5'30"E], 28.v.1992, lgt. A. Shavrin; 3 spec. (ASHC, NMPC): same locality, 9.vi.1992, lgt. A. Shavrin; 2 spec. (ASHC): same locality, 19.vi.1992, lgt. A. Shavrin; 9 spec. (ASHC, NMPC): same locality, 29.vi.1992, lgt. A. Shavrin; 4 spec. (ASHC): same locality, 27.viii.1992, lgt. A. Shavrin. **Primorsky krai:** 1 spec. (NHMW): Arsenev [= Arsenyev, coordinates ca. 44°9'40"N 133°17'6"E], vi.1991, lgt. Štrba; 1 spec. (NHMW): same locality, vii.1991, lgt. Šauša; 3 spec. (NHMW): Novochiguievka [=Novochuguyevka, coordinates ca. 44°13'37"N 133°50'33"E], 26–31.vii.1992, lgt. D. Boukal; 2 spec. (NHMW): Sergejevka by Chanka [coordinates ca. 44°18'10"N 131°46'E], 28–30.vii.1990, lgt. D. Boukal; 33 spec. (NHMW): Sergejevka, 70 km NW of Ussuriysk [coordinates ca. 44°18'10"N 131°46'E], 27.vii.1990, lgt. S. Bečvář sen.; 1 spec. (NHMW): "Ussuri", without date, and collector; 7 spec. (IRSNB): Vladivostok [coordinates ca. 43°6'27"N 131°52'50"E], without date, lgt. H. Frieb; 3 spec. (NMPC): same locality, 1919, lgt. Jureček; 2 spec. (NHMW): same locality, 23.viii.1919, lgt. H. Frieb; 1 spec. (ZMUM): V. Primorye, Kamenushka bliz Ussuriysk [= East Primorye, Kamenushka near Ussuriysk, coordinates ca. 43°37'N 132°13'E], 24.vi.1982, lgt. Nikitskiy; 1 spec. (ZMUM): same locality and collector, 20.vi.1982; 3 spec. (ZMUM): same locality and collector, 24–27.vi.1984; 2 spec. (ZMUM); same locality and collector, 3.vii.1982; 2 spec. (ZMUM): Primorye, Shkotovskiy rayon, okr. g. Bol. Kamen [= Primorye, Shkotovo district, near Bolshoi Kamen Mt., coordinates ca. 43°11'N, 132°39'E], dung on a pasture, 17–18.viii.1988, lgt. I. V. Melnik; 4 spec. (MPU): U. Primorye, Khasanskiy rayon, okr. buh. Perevoznaya [South Primorye, Khasanskiy district, near Perevoznaya bay, coordinates ca. 43°3'N, 131°34'E], on mushrooms, 25.vi.1990, lgt. I. Melnik; 1 spec. (NMPC): Lazovsky Reserve, Urochishche Amerika, [coordinates ca. 43°00'N 133°52'E], 17–20.vii.2006, lgt. V. Shokhrin. **Tomsk:** 3 spec. (HNHM): Tomsk [coordinates ca. 56°29'19"N 84°58'E], without date and collector. **Kuril islands:** 2 spec. (MPU): Kunashir Is., dolina ruchiya Asin U. Tretiyakovo [floodplane of the brook Asin, south Tretiyakovo], coordinates ca. 43°59'03"N 145°37'33"E, 2.viii.2009, lgt. K. Makarov & A.Zaitsev; 2 spec. (MPU): Kunashir Is., Alekhinskaya zastava [border station "Alekhinskaya"], coordinates ca. 43°55'06"N 145°31'34"E, lgt. I. Melnik; 1 spec. (MPU): Iturup Is., vulk. Atsu-Napuri, zal. Dobroe nachalo [Atsu-Napuri volcano, Dobroe Nachalo gulf], dry meadow on hillocks, on a surface, 15.viii. [19]75, lgt. Kuznetsov. **Unspecified localities:** 39 spec. (IRSNB, NMPC): "Siberia orient.", without date, lgt. B. v. Bodemeyer; 1 spec. (NMPC): same locality, without date, lgt. Reitter.

Published records. KAZAKHSTAN: East Kazakhstan: Dzhungarskiy Alatau, area of river Musdybulak (Hebauer & Ryndevich 2005). **RUSSIA: Khabarovsk, Amur, Primorsky Krai, Chita:** without specified locality (Shatrovskiy 1989). **Kemerovo:** Novokuznetsk distr., Lipoviy Ostrov (Hebauer & Ryndevich 2005). **Kuril islands:** Shikotan Is., Kunashir Is. (Shatrovskiy 1989, Ôhara & Jia 2006). **Sakhalin:** without specified locality (Shatrovskiy 1989). **Unspecified:** Sayan Mts., Altay Mts. (Shatrovskiy 1989). **"KOREA":** unspecified record from "Korean Peninsula" (Shatrovskiy 1989).

Differential diagnosis. *Pachysternum haemorrhoum* is characteristic by continually arcuate outer margin of anterior tibiae (Fig. 44), rather large body size and uniformly dark coloration with elytra becoming largely pale reddish apically (Fig. 58). By these characters it may be distinguished from all remaining species of Asian *Pachysternum* except the species of the *P. apicatum* complex (*P. apicatum*, *P. curvatum* and *P. sandacatum*). However, it differs from all species including those of the *P. apicatum* complex by the lateral portions of the metaventrite being of the same appearance as the median portion (i.e. shiny and without pubescence (Fig. 21); in all remaining species the lateral portions bear coarse sculpture and dense pubescence) and by the morphology of its male genitalia (especially by large and very distinctly detached manubrium of the basal piece and by widely rounded apex of the median lobe (Fig. 31)). The species is also the only eastern Palaearctic species of *Pachysternum* and does not occur with any other Asian species of the genus.



FIGURE 58. *Pachysternum haemorrhoum*, general habitus (a, c: dorsal view, b: laterodorsal view). Localities of the specimens: a–c: Russia, Pompeyevka env.

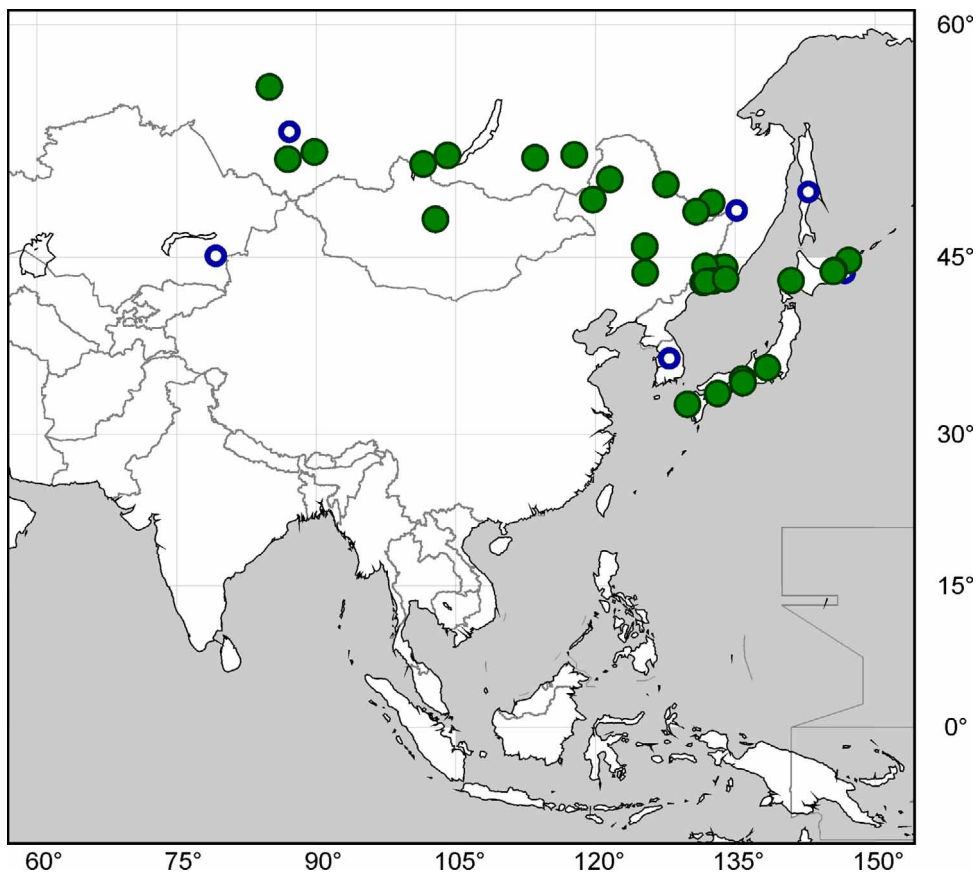


FIGURE 55. Known distribution of *Pachysternum haemorrhoum* (green dots: examined material; blue circles: published data, not examined).

Redescription. Body widely oval, shape of elytra sexually dimorphic, female with slightly pronounced humeral portion of elytra. Body length 2.6–3.5 mm (lectotype: 2.9 mm); body width 1.9–2.3 mm (lectotype 2.0 mm).

Coloration (Fig. 58). Head black, only with dark reddish narrow transverse ridge. Pronotum black, with vaguely defined dark reddish spot in anterolateral corners. Elytra black to dark brown basally, elytral interval 1 dark throughout, remaining portions of elytra becoming gradually paler towards brown to reddish brown apex. Ventral surface of head and thoracic sclerites black to dark brown, abdominal ventrites 2–5 largely reddish brown, legs pale reddish with darker basal portions of femora.

External morphology. Clypeus with coarse and rather dense punctation consisting of uniformly-sized rounded punctures separated from each other by ca. by puncture diameter. Punctation of frons similar to that on clypeus but slightly sparser, punctures separated by ca. 1–2× puncture diameters and becoming slightly transverse at least laterally. Interstices on head without microsculpture. Larger punctures on pronotum rounded, moderately impressed, slightly larger than small punctures; small punctures fine, slightly transverse, rather deeply impressed, divided from each other by ca. 2–3× puncture diameter. Pronotal interstices without microsculpture. Prosternum with very distinct median carina. Elytral series consisting of large, shallow punctures; interval punctation with rather fine semicircular punctures much smaller than serial ones, with sparsely intermixed slightly larger setiferous punctures of the same shape; interstices without microsculpture. Elytral series 1–7 not impressed, series 8–10 only very weakly impressed. Preepisternal elevation of mesothorax without posterolateral pits. Femoral lines on metaventrite continually arcuate, median portion of metaventrite bearing rather dense and coarse setiferous punctation, interstices without microsculpture; punctation of lateral portions similar to that of median portion, lacking dense pubescence. Anterior tibia rather wide, outer margin continually arcuate, outer series of spines only indistinctly interrupted.

Male genitalia (Fig. 31). Tegmen 1.1 mm long, median lobe 1.1 mm long. Phallobase 1.5× as long as parameres, bearing large asymmetrical, very distinctly detached basal manubrium. Median lobe rather wide, nearly parallel-sided throughout except apically, abruptly triangularly narrowing apically; gonopore subapical, rather indistinct; lateral pubescent lobes wide, forming a rounded rim of apical portion of the lobe. Sternite 9 very narrow, without V-shaped apical emargination.

Variation. The species varies slightly in the coloration of elytra and in structures of the metaventrite. The elytra of paler specimens may be nearly uniformly dark reddish brown, without the black bases (Fig. 58c). Interstices of the metaventrite may bear shallow but rather distinct mesh-like microsculpture laterally (some specimens from Irkutsk province: Shelekhov). Femoral lines may be more or less elevated anteriorly, and relatively more or less distinct posteriorly; variation in this character is rather narrow and is not influenced geographically. Specimens with variable development of the femoral lines, with presence/absence of microsculpture on the metaventrite, as well as with described variations of elytral coloration agree with “typical” specimens in all other external characters including of the shape of anterior tibia and the male genitalia, and the variation is therefore considered as intraspecific.

Discussion. The strength of the femoral lines was used as diagnostic character distinguishing the Japanese *P. haemorrhoum* from the mainland *P. sibiricum*. The variation of this character is very low, is not affected by the geography and the character vary even in the specimens from a single locality. We therefore consider *P. sibiricum* as a synonym to *P. haemorrhoum*. This also agrees with the opinion by Shatrovskiy (1989) and Hebauer & Ryndevich (2005) who published the mainland specimens under the name *P. haemorrhoum* and refrained from distinguishing *P. sibiricum* as a distinct taxon (F. Hebauer, pers. comm.).

Distribution. Widely distributed from the eastern Kazakhstan and western Siberia through southern parts of eastern Siberian and Russian Far East, northern China and Korean peninsula to Japan. The record from the Philippines by Shatrovskiy (1989) is very probably based on misidentified specimens of *P. curvatum* and is not considered here.

***Pachysternum kubani* sp. nov.**

(Figs. 27, 33, 45, 60)

Type locality. Laos, Houaphan province, Mt. Phou Pane, Phongsali env., 20°13'09–19"N 103°59'54"–104°00'03"E, 1480–1510m.

Type material. Holotype: male (NMPC): “LAOS-NE, Houa Phan prov. / 20°13'09–19"N 103°59'54"- / 104°00'03"E, 1480–1510m / PHOU PANE Mt., 1–16.vi. / 2009, Vít Kubáň leg. // Primary mountain forest / flight intercept trap / Laos 2009 Expedition / NHMB Basel / NMPC Prague”. Paratypes: 1 female, 1 spec. (NMPC): same data as the holotype; 1 male, 1 female (NMPC): “LAOS-NE, Xieng Khouang / prov., 19°38.20'N 103°20.20'E /

Phonsavan (30 km NE): / PHOU SANE Mt., 1420m / 10.–30.v.2009, V. Kubáň lgt. // secondary mountain forest / flight intercept trap / Laos 2009 Expedition / NHMB Basel / NMPC Prague"; 3 males, 2 females. (NHMB, BMNH, NHMW): "LAO, Phongsaly prov. / 21°41'N 102°6'E / PHONGSALY env., / 6.–17.v.2004, ~1500m, / Vít Kubáň lgt."; 8 males, 12 spec. (NHMB, BMNH, NMPC): "LAOS, 1.–18.v.2001 / Bolikhamsai prov. / 18°21'N, 105°08'E / Ban Nape (8 km NE) / ~ 600 m, Vít Kubáň lgt."; 1 male, 11 spec. (NHMW, NMPC, SYSU, KSEM): "China, Sichuan, Qingcheng Shan / 65 km NW Chengdu, 103.33E 30.53N / 18.v./3.–4.vi.1997, 8 km W Taiping / 800–1000 m, leg. A. Pütz".

Differential diagnosis. Pale specimens of *Pachysternum kubani* **sp. nov.** (Figs. 60a–f) are easily recognizable from other *Pachysternum* species by pale yellowish elytra with irregularly lobate transverse dark stripe in anterior third (Figs. 60a–e) or by very distinct pale humeral spots (Fig. 60f), and distinctly bisinuate outer margin of anterior tibiae. By the coloration, these specimens may be confused with *P. stevensi*, from which they differ by the characters given in couplet 12 of the identification key. The body form of large specimens (and also the presence of pale spots on pronotal disc in pale specimens) resembles *P. cardoni*; in contrast to it, the dark coloration of elytral series 2–4 reaches at most the midlength in pale specimens of *P. kubani* (it reaches subapically in *P. cardoni*), both species differ in the color pattern of the pronotum (with dark M-shaped spot or at least distinct pair of pale spots submedially in *P. cardoni*, with anteriorly trilobate dark spot or completely dark pronotal disc in *P. kubani*) and the elytral microsculpture is also frequently different (absent in *P. kubani*, distinctly developed or rarely missing in *P. cardoni*). Dark specimens, which are usually slightly smaller than paler ones, highly resemble the mainland forms of *P. apicatum* (with which they sometimes even co-occur) in the coloration and very often also in the shape of anterior tibia; they may be distinguished from *P. apicatum* by the characters given in the couplet 15 of the identification key.

Description (based on the holotype). Body widely oval, shape of elytra slightly sexually dimorphic, female with distinctly pronounced humeral portion of elytra. Body length 2.2–3.5 mm (holotype: 3.3 mm); body width 1.6–2.2 mm (holotype 2.2 mm).

Coloration (Fig. 60). Clypeus and lateral portions of frons black, transverse ridge between eyes and large median portion of the head pale reddish. Pronotum widely pale reddish along lateral and anterior margins, bearing large posteriorly wide and anteriorly trilobate black spot. General coloration of elytral yellowish; interval 1 black throughout, all elytral series black in anterior half, the black coloration slightly extending to intervals from series 2–5, but largely extending across intervals 6–11, forming large lateral black spot in anterior third of elytra. Ventral surface of head brown, mentum and thoracic sclerites black, abdominal ventrites dark brown anteriorly, largely pale reddish posteriorly. Legs brown, femora black.

External morphology. Clypeus with moderately coarse but rather sparse punctation consisting of rounded punctures of two slightly different sizes. Punctation of frons similar to that on clypeus, with punctures separated by 2–4× the puncture diameter. Interstices on head without microsculpture. Larger punctures on pronotum slightly crescent-like, deep, much larger than small punctures; small punctures slightly semicircular, divided from each other by ca. 1–1.5× puncture width. Pronotal interstices without microsculpture. Prosternum with very distinct median carina. Elytral series consisting of large, shallow punctures; interval punctation with rather fine semicircular punctures much smaller than serial ones, with sparsely intermixed slightly larger setiferous punctures of the same shape; interstices without microsculpture. Elytral series weakly impressed. Preepisternal elevation of mesothorax without posterolateral pits. Femoral lines on metaventricle indistinctly angulate, median portion of metaventricle bearing moderately coarse and dense punctation, interstices without microsculpture; lateral portions with very coarse and dense, densely pubescent punctation. Anterior tibia rather wide, outer margin distinctly bisinuate, outer series of spines interrupted at the place of emargination.

Male genitalia (Fig. 33). Tegmen 1.3–1.5 mm long, median lobe 1.3–1.5 mm long. Phallobase 2× as long as parameres, bearing small, slightly asymmetrical, indistinctly detached basal manubrium. Median lobe rather narrow, widest in basal third, weakly narrowing apicad, apex narrowly rounded; gonopore subapical, rather indistinct; lateral pubescent lobes indistinct even subapically. Sternite 9 entire, rather narrow.

Variation. The species varies considerably in the extent of the black coloration on the head, pronotum and elytra. Coloration of the frons may vary from entirely dark brown to wide pale spot situated medially. Pronotum may bear large black spot which is wide posteriorly, but trilobate anteriorly, or may be completely black on the disc, with widely pale lateral margins (the pale areas widest anteriorly and narrowest posteriorly in that case) and median

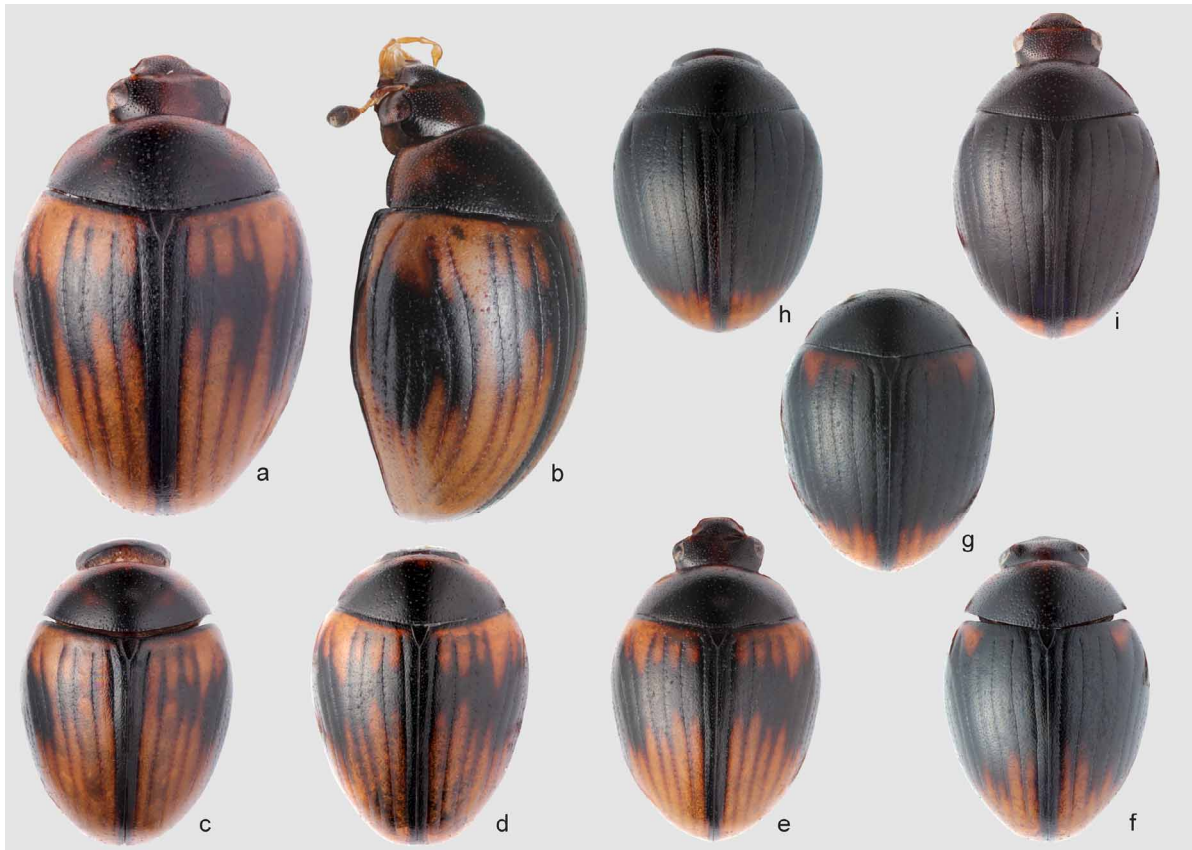


FIGURE 60. *Pachysternum kubani*, general habitus (a, c–i: dorsal view, b: laterodorsal view). Localities of the specimens: a–b: Laos, Phou Pane Mt.; c: same locality (holotype, male); d: Laos, Phongsaly env. (female); e: same locality (male); f–h: Laos, Ban Nape; i: China, Sichuan, Qingcheng Shan.

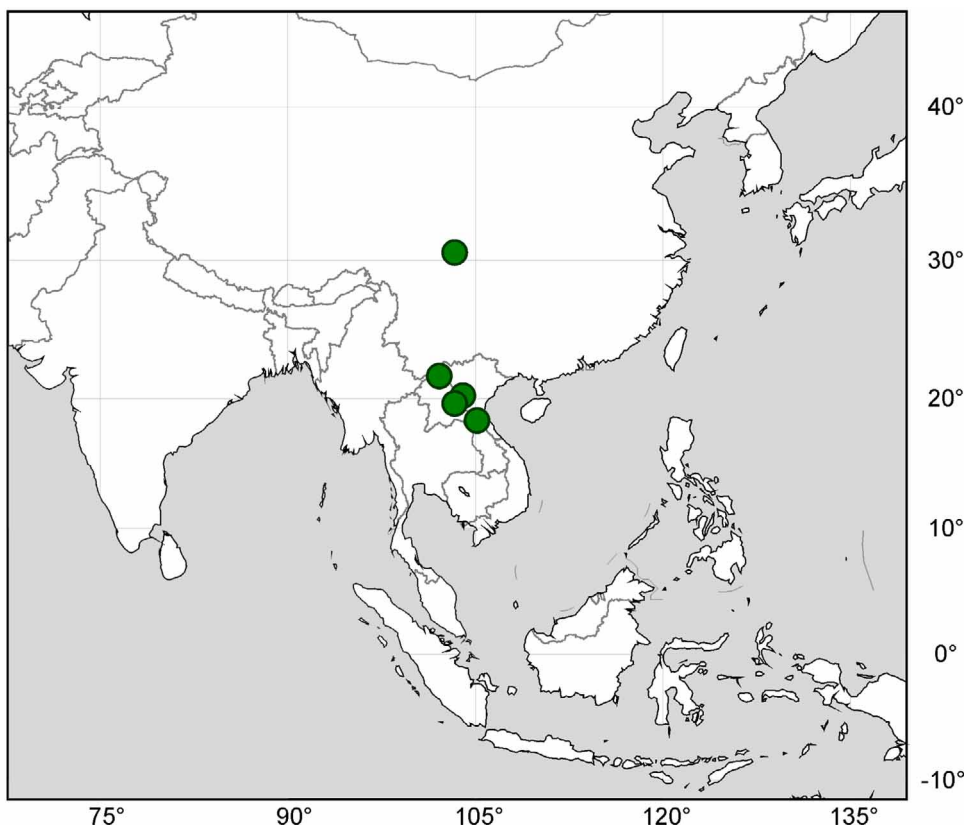


FIGURE 61. Known distribution of *Pachysternum kubani*.

portion of anterior margin. Elytral coloration varies from largely reddish with irregular dark spots at anterior third of the elytral series (Fig. 60c) through reddish with a more or less extended irregularly shaped transverse dark stripe at anterior third (Figs. 60a–b, d–e) to largely dark brown to black with large to very small apical reddish spot and in some cases also basal pale spots (Figs. 60f–i). The shape of the male sternite 9 varies from rounded (in the holotype and majority of the specimens examined; Fig. 33f) to shallowly emarginate (rarely found at the same localities where specimens with rounded apex of the sternite 9 predominate, Fig. 33g); a very deeply emarginate sternite 9 was found in a male from Xiangkhouang (Fig. 33h) which also has extremely shortened tibial spines (all remaining specimens from the locality have usually developed sternite 9 as well as tibial spines, and the specimen is therefore considered as teratological here). This variation of the shape of the sternite 9 resembles that observed in *P. stevensi*, in which both rounded and emarginate forms are more frequent, however.

Etymology. The species is dedicated to my colleague Vítězslav Kubáň (NMPC) who collected most type specimens of this species.

Biology. Unknown. Most specimens were collected in primary or secondary mountain forests using flight intercept traps.

Distribution. Known from four localities in northern Laos (provinces Bolikhamsai, Houaphan, Phongsali and Xiangkhouang) and from central China (Sichuan).

***Pachysternum nigrovittatum* Motschulsky, 1863**

(Figs. 1–3, 6–8, 12, 15, 20, 22–25, 28, 32, 46, 62)

Pachysternum nigrovittatum Motschulsky, 1863: 447.

Pachysternum nigrovittatum: Knisch (1921: 88, morphological note); Knisch (1924: 159, catalogue); Orchymont (1926a: 222, 227, identification key, notes on variation); Orchymont (1928: 84, catalogue); Satô (1979: 50, faunistics); Biswas & Mukhopadhyay (1995: 154, faunistics); Hebauer (2000: 7, faunistics); Mukhopadhyay & Sengupta (2003: 38, faunistics); Hebauer & Ryndevich (2005: 50, faunistics); Mukhopadhyay (2007: 408, faunistics).

Megasternum nigrovittatum (Motschulsky): Sharp (1890: 358).

Type locality. Sri Lanka, a mountain in the environs of Nuwara Eliya (“Montagne de Nura-Ellia”).

Type material. Lectotype (hereby designated): 1 female (ZMUM): “[tiny red piece of paper] // [small rounded yellow label] // Type [small white label, in handwritten] // *Pachysternum* / *nigrovittatum* / Motsch. / Ind. or. Ceyl. M^l. N. [yellow label, in handwritten]”. Paralectotype: 1 spec. [only head, prothorax and a mesothoracic leg preserved] (ZMUM): same label data as lectotype. On our request we have received two above mentioned specimens from the Motschulsky collection in ZMUM; both were glued on the same paper label. There is no indication of the number of syntypes in the original description, but the given type locality (“Montagne de Nura-Ellia et sur le continent indien”) indicates that Motschulsky (1863) examined also the specimens from other localities than Sri Lanka when describing the species. Therefore, some syntypes seem to be missing in his collection. In the present paper we are designating the complete specimen mentioned above as the lectotype, the remaining incomplete specimens as well as the remaining specimens not available to us have to be considered as paralectotypes.

Additional material examined. **CHINA: Fujian:** 48 spec. (SYSU): Nanjing County, Hexi town [coordinates ca. 24°52'N 117°14'E], cow dung, 13.vii.2010, lgt. F. L. Jia. **Guangdong:** 1 spec. (BMNH): Guangzhou, Baiyunshan [23°9'N 113°17'E], 27.ix.1980, lgt. P. M. Hammond; 17 spec., (SYSU): Sanshui county, Lubao town [23°21'13"N, 112°53'46"E], 28.v.2004, lgt. F. L. Jia; 14 spec. (SYSU): Gaoming county, Yangmei town, 23–26.iv.2006, lgt. F.L. Jia; 1 spec. (SYSU): Lianjiang County, Wuling, 29.ii.1985, lgt. Wu Wu; 2 spec. (SYSU): Xinyi County, 9.5.1986, lgt. Wu Wu; 13 spec. (SYSU): Xinyi Cattle Farm, 7–13.vi.1986, lgt. Wu Wu; 9 spec. (SYSU): Guangzhou, Shipai Cattle Farm, 25.viii.1985, lgt. Wu Wu; 4 spec. (SYSU): Guangzhou, Henan Cattle Farm, 10.x.1985, lgt. Wu Wu. **Guangxi:** 5 spec. (BMNH): Bama [24°10'14"N 107°14'56"E], i.1988, without collector; 5 spec. (SYSU): Wuzhou, viii.1986, lgt. Wu Wu. **Hainan:** 1 female (NHMW): 2 km S Mao'an, elev. 250 m [19°8'39.84"N 108°56'48.84"E], 20.i.1996, lgt. M. A. Jäch. **Hong Kong:** 4 spec. (BMNH, NHMW): Hong Kong [ca. 22°24'N 114°8'E], without date, lgt. J. J. Walker; 4 spec. (NHMW): New Territories, Luk Keng marsh near Kai Kuk Shue Ha [22°31'28"N 114°13'10"E], 14.i.1996, lgt. M. A. Jäch; 3 spec. (NHMW): University Campus [= campus of the University of Hong Kong, ca. 22°17'N 114°8'E], 1996, lgt. G. de Rougemont. **Zhejiang:** 1 spec. (BMNH): Chusan Is. [=Zhoushan, ca. 30°2'N, 122°7'E], without date, lgt. J. J. Walker. **INDIA: Arunachal**

Pradesh: 1 female (NMPC): 3.6 km NW Bhalukpong, elev. 280 m, 27°15'N 92°36'24"E, 7.v.2008, lgt. Fikáček, Podskalská, Šípek (16). **Assam:** 2 spec. (BMNH): Sudiya [27°50'N 95°45'E], without date and collector. **Goa:** 6 spec. (NMPC): 30 km S of Margao [= Madgaon], Palolem env., elev. 0–30 m, 15°0'47"N 74°1'58"E, 4–12.viii.2002, lgt. P. Šípek & M. Fikáček. **Karnataka:** 1 spec. (BMNH): Belgaum [15°51'N 74°33'0"E], without date, lgt. Andrewes & Bequest. **Kerala:** 1 spec. (NHMW): 35 km NNE Trivandrum, Ponmudi, elev. 600 m [8°46'N 77°7'E], 2.i.1999, lgt. D. Boukal; 1 spec. (BMNH): “Malabar” [without specified locality], without date and collector. **Puducherry:** 1 spec. (FMNH): Karaikal, Kurumbagatam [10°55'N 79°49'E], ii.1947, lgt. Susai Nathan. **Tamil Nadu:** 3 spec. (FMNH): Negapatam [= Nagappattinam, 10°46'N 79°50'E], without date, lgt. F. Psota; 40 spec. (BMNH): Nilgiri Hills [without specified locality], without date, lgt. H. L. Andrewes; 2 spec. (IRSNB): Shempagonur [= Shenbaganur, 6 km of Kodaikanal, ca. 10°14'N 77°30'E], without date and collector. **Uttarakhand:** 1 spec. (BMNH): Akaswar, S Garhwal, Gauri Dutt. [29°48'N 78°37'E], 23.xi.1923, without collector; 2 spec. (IRSNB): Dehradun, Dobhalwala [30°20'N 78°2'37"E], without date and collector; 6 spec. (BMNH): W Almora, [ca. 29°36'N 79°34'E], without date, lgt. H. G. Champion. **INDONESIA: East Nusa Tenggara:** 5 spec. (NMPC): Sumba, 20 km S of Waingapu, Wairinding [9°51'5"S 120°18'32"E], 30.i.–2.ii.2001, lgt. P. Votruba. **North Sumatra:** 1 spec. (NHMW): Prapat [= Parapat] env., elev. 1000 m [2°39'46"N 98°56'7"E], 17.ii.1990, lgt. S. Schödl. **West Sumatra:** 2 spec. (BMNH): Fort de Kock [= Bukittinggi, 0°18'20"S 100°22'9"E], elev. 920 m, x.1922, lgt. E. Jacobson; 5 spec. (IRSNB): same locality, 1925, lgt. E. Jacobson. **LAOS: Bolikhamxai:** 1 spec. (NHMB): 70 km NEE Vientiane, elev. 150 m, 18°16'N, 103°11'E, 27–30.iv.1997, lgt. V. Kubáň; 28 spec. (NHMB, NMPC): 8 km NE Ban Nape, elev. 600 m, 18°21'N, 105°8'E, 1–18.v.2001, lgt. V. Kubáň; 1 spec. (FHGC): Ban Nape, Kaew Nua P. [18°18'7"N 105°4'24"E], 18.iv.–1.v.1998, lgt. E. Jendek & O. Šauša. **Houaphan:** 2 spec. (NMPC): Phou Pane Mt., elev. 1480–1510 m, 20°13'9"N 103°59'54"E, 1–16.vi.2009, lgt. V. Kubáň. **Louangphabang:** 1 spec. (NHMB): Thong Khan, elev. 750 m, 19°35'N 101°58'E, 11–21.v.2002, lgt. V. Kubáň. **Xiangkhouang:** 2 spec. (NMPC): Phou Sane Mt., 30 km NE Phonsavan, elev. 1420 m, 19°38.2'N 103°20.2'E, 10–30.v.2009, lgt. V. Kubáň. **MALAYSIA: Kedah:** 3 spec. (ASKC): Pulau Langkawi, environs of hotel Berjaya [= Pantai Kok village, 6°22'N, 99°40.5'E], 7–22.xi.2009, lgt. U. Schmidt. **Melaka:** 2 spec. (BMNH): Malacca [2°11'53"N 102°14'59"E], without date, lgt. Wallace. **Pahang:** 1 spec. (BMNH): Taman Negara [= Taman Negara National Park, ca. 4°41'N 102°34'E], 1–13.iii.1984, lgt. L. Jessop. **Perak:** 1 spec. (BMNH): “Perak” [without specified locality], without date and collector. **NEPAL: Gandaki:** 1 spec. (FHGC): Sikles Mts., überh. Garland, elev. 2000 m [28°19'N 84°0'E], 29.vii.1995, lgt. Fabrizi, Schmidt, Jäger. **SINGAPORE:** 8 spec. (BMNH, IRSNB): Singapore [1°21'N 103°50'E], without date and collector. **SRI LANKA:** 2 spec. (BMNH): “Ceylon” [without specified locality], without date and collector; 1 spec. (IRSNB): same locality, without date, lgt. F. Chapuis. **Saba-ragamuwa:** 1 spec. (BMNH): Kitulgalle [= Kitulgala, 6°59'30"N 80°26'54"E], without date, lgt. C. Lewis. **Uva:** 1 spec. (FHGC): 2 miles NW Haldummulla, elev. 1097 m [6°47'26"N 80°51'53"E], 2.iii.1962, lgt. Brinck, Anderson & Cederholm (11). **Western Province:** 5 spec. (BMNH): Colombo [6°55'N 79°50'30"E], 14–15.xi.1915, lgt. M. Cameron; 1 spec. (FHGC): lagoon 17 miles N of Colombo [ca. 6°45'N 79°54'E], 11.i.1962, lgt. Brinck, Anderson & Cederholm (8); 1 spec. (FHGC): Yakkala, 18 miles NE Colombo [7°5'25"N 80°2'2"E], 15–21.i.1962, lgt. Brinck, Anderson & Cederholm (11). **THAILAND: Uthai Thani:** 1 spec. (NHMW): 25 km NW Lan Sak, 240 km N of Bangkok [ca. 15°34'N 99°31'E], iii.1989, lgt. Thielen. **VIETNAM: Bac Thai:** 1 spec. (NMPC): Tam Dao [National Park, ca. 21°38'N, 105°30'E], without date, lgt. P. Marhou. 1 spec. (IRSNB): “Tonkin, Foret de Kep”, without date and collector. **Gia Lai:** 20 spec. (NHMW): 40 km NW An Khe, Buon Luoi, elev. 620–750 m, 14°10'N 108°30'E, 28.iii.–12.iv.1995, lgt. Pacholátko & Dembický. **Hoa Binh:** 1 spec. (IRSNB): “Chobo” [= Hoa Binh province, without precise locality], without date, lgt. H. Perrot; 1 spec. (BMNH): Hoa Binh [ca. 20°50'N 105°20'E], viii.1918, lgt. R. V. de Salvaza; 36 spec., 1 male (IRSNB): same locality, without date, lgt. A. de Cooman. **Lam Dong:** 1 spec. (NHMW): Da Lat city [11°56'N 108°27'E], 27–21.iv.1994, lgt. Pacholátko & Dembický. **Nghe An:** 3 spec. (BMNH): Lactho [=Lac Tho, 21°4'N 106°6'E], without date, lgt. de Cooman; 66 spec. (IRSNB): same locality, without date and collector.

Published records (not examined). INDIA: Andhra Pradesh: Kurnool district, Betamcherla; Prakasan district, Matur [= Martur] (both Mukhopadhyay 2007). **Manipur:** Andro, Imphal (Mukhopadhyay & Sengupta 2004). **Sikkim:** Mongan (Mukhopadhyay & Sengupta 2003). **West Bengal:** without detailed localities (Mukhopadhyay 2007). **LAOS: Loung Namtha:** Louang Namtha env. (Hebauer & Ryndevich 2005). **THAILAND: Chiang Mai:** Chiang Mai (Hebauer & Ryndevich 2005).

Diagnosis. The species may be very easily distinguished from all remaining Asian *Pachysternum* by the combination of pale pronotum with large M-shape spot, elytra pale with at least some of elytral intervals 2–10 completely dark (Fig. 62), and deeply bisinuate outer margin of anterior tibia (Fig. 46). By the coloration of pronotum it resembles *P. cardoni* which is much larger and wider and never bears the combination of entirely pale elytral interval 2 and largely dark interval 4, and the apical portion of its median lobe is gradually narrowing apicad (narrow and nearly parallel-sided in *P. nigrovittatum*, Fig. 32b). The elytral coloration of *P. nigrovittatum* may resemble pale specimens of *P. sulawesicum*, but may be easily distinguished from it by deeply bisinuate outer margin of anterior tibiae (continually arcuate in *P. sulawesicum*) and distinctly narrowed apical portion of the median lobe (nearly parallel-sided throughout in *P. sulawesicum*).

Redescription (based on specimens from Sri Lanka). Body elongate oval, shape of elytra sexually dimorphic, female with very distinctly pronounced humeral portion of elytra. Body length 2.2–3.0 mm (lectotype: 2.3 mm); body width 1.4–2.0 mm (lectotype 1.6 mm).

Coloration (Fig. 62). Head brown widely pale reddish median portion of frons and transverse ridge. General coloration of pronotum pale reddish, bearing M-shaped black spot of variable extent, leaving wide lateral portions, anteromedian part and a pair of large posterior submedian parts reddish; posterior margin black. Elytra pale reddish brown, with alternating pale and black intervals as follows: interval 1 entirely black, interval 2 entirely pale, interval 3 pale except of short black portion in anterior third, interval 4 black in anterior four fifths, pale apically, interval 5 entirely pale, interval 6 similar to 4, but with short pale area subbasally, intervals 7–9 pale subbasally (forming pale humeral spot), otherwise black except for apical-most portion, Interval 10 (lateralmost one) pale. Ventral surface of head and prothorax reddish brown, meso- and metathorax dark brown, abdominal ventrites 1–4 largely pale reddish posteriorly, ventrite 5 entirely pale reddish. Legs pale reddish.

External morphology. Clypeus with fine and rather sparse punctation consisting of slightly semicircular punctures of two slightly different sizes separated by ca. 1–2× puncture width. Punctation of frons similar to that on clypeus, only with slightly larger punctures. Interstices on head without microsculpture. Larger punctures on pronotum semicircular, deeply impressed, much larger than small punctures; small punctures transverse, divided from each other by 2–3× puncture width. Pronotal interstices without microsculpture. Prosternum with distinct median carina. Elytral series consisting of large, shallow punctures; interval punctation with very fine semicircular punctures much smaller than serial ones, with sparsely intermixed slightly larger setiferous punctures of the same shape; interstices with weakly developed mesh-like microsculpture. Elytral series weakly impressed. Preepisternal elevation of mesothorax without posterolateral pits. Femoral lines on metaventrite indistinctly angulate, median portion of metaventrite bearing moderately coarse and dense setiferous punctation, interstices without microsculpture; lateral portions with very coarse and dense, densely pubescent punctation. Anterior tibia rather narrow, outer margin deeply bisinuate, outer series of spines interrupted at the place of the situation.

Male genitalia (Fig. 32). Tegmen 1.3–1.4 mm long, median lobe 1.3–1.4 mm long. Phallobase ca. 2× as long as parameres, basally slightly asymmetrical but without detached manubrium. Median lobe widest in basal third, weakly narrowing to apical third, narrow and nearly parallel-sided in apical third, apex rounded; gonopore subapical, rather indistinct; lateral pubescent lobes distinct only subapically. Sternite 9 narrow, without V-shaped apical emargination.

Variation. Rather variable species, with the variation concerning mainly the coloration, dorsal microsculpture, body size and slightly also the extent of sexual dimorphism in body shape. Pale specimens (Fig. 62c) have largely reddish elytra with dark T-shape spot (consisting of dark elytral interval 1 and base of elytra) and dark spots at midlength of intervals 4 and 6–9 and subbasally on intervals 6–7. The extent of dark area is increasing in other specimens through the most typical coloration mentioned in the redescription (Figs. 62a–b), to dark specimens with largely black elytra and very apparent reddish spots at bases and in apical portions of intervals 2, 3, 5 and 8–10 and narrowly pale lateral margin of elytron (Fig. 62g). The coloration of pronotum varies in the same extent, bearing a median and a pair of submedian dark spots in palest specimens (Fig. 62c), the dark M-shaped spot in most specimens (Figs. 62a–b, d–e) and a being largely dark at pronotal disc with only a weakly developed pale spots submedially in dark specimens (Figs. 62f–g). Dorsal microsculpture usually consists of rather weak mesh-like microsculpture which is often rather inconspicuous, but in extremely dark and/or small specimens the microsculpture is often very distinct. The body shape of males is constant in all specimens examined, but the shape of females may vary from rather short and wide specimens with weakly pronounced shoulders to very distinctly

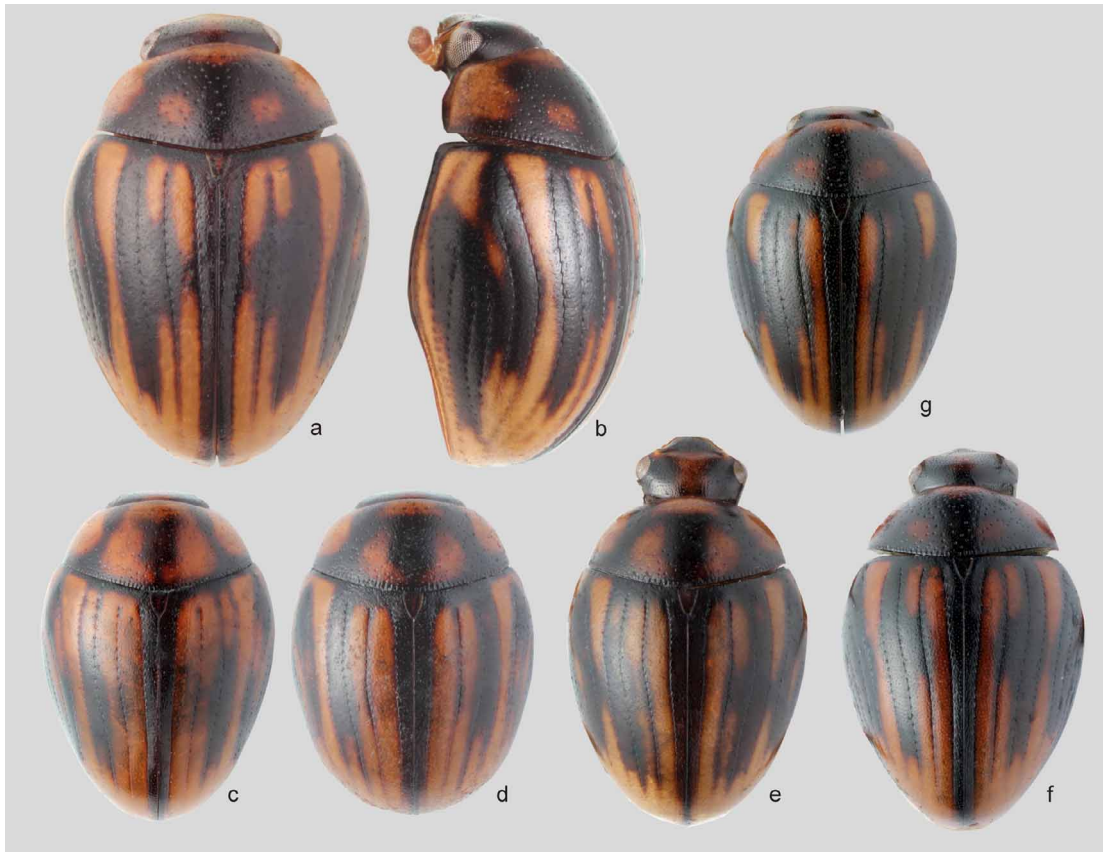


FIGURE 62. *Pachysternum nigrovittatum*, general habitus (a, c–g: dorsal view, b: laterodorsal view). Localities of the specimens: a–b: China, Guangxi; c–d: India, Nilgiri Hills; e: India, Goa; f–g: Laos, Ban Nape.

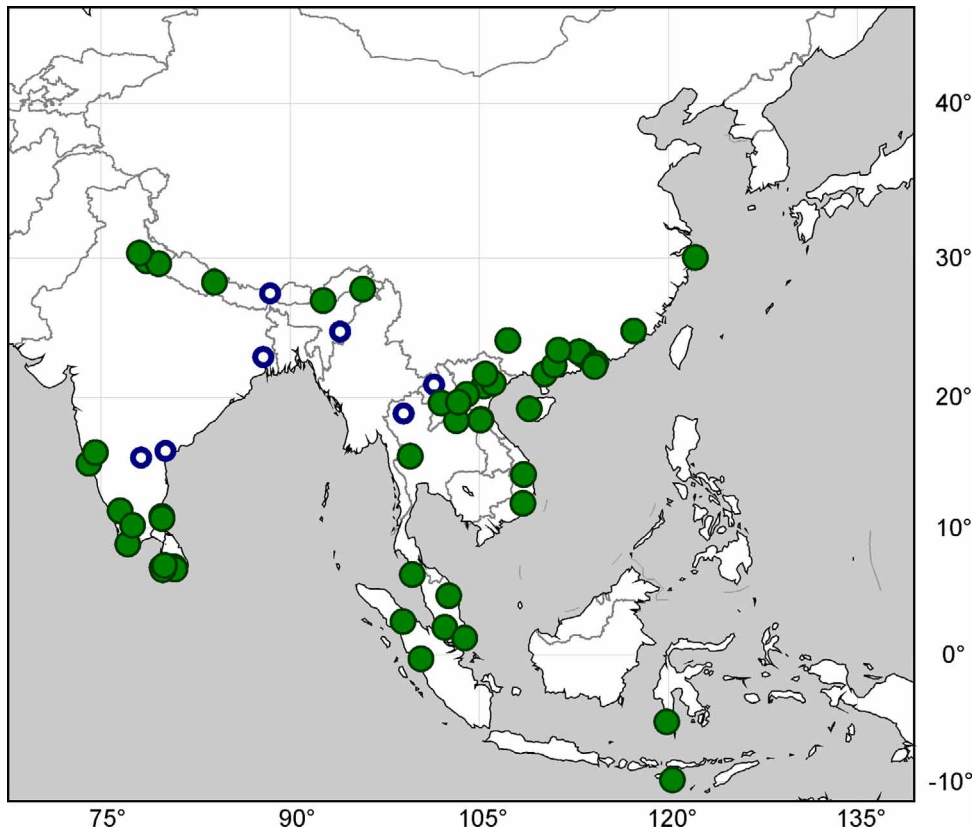


FIGURE 63. Known distribution of *Pachysternum nigrovittatum* (green dots: examined material; blue circles: published data, not examined).

elongate specimens with highly pronounced shoulders and elytra strongly narrowing apicad (the most elongate females are known from the island of Sumba). The shape of the anterior tibia as well as of the male genitalia (including the median lobe and sternite 9) is very constant in all examined specimens irrespectively to their variation in the above characters, which we therefore consider as intraspecific.

Biology. Coprophagous species inhabiting excrements of various herbivorous mammals.

Distribution. Widespread throughout the Oriental Region from Nepal and Sri Lanka through India, whole continental SE Asia and some of the islands of Sundaland (Sumatra, Sumba). Records are surprisingly missing for whole lowland northern part of India (and *P. nigrovittatum* seems therefore be absent from semidesert areas) and from many islands of Sundaland (in this case most probably because of the collecting bias).

***Pachysternum rugosum* sp.nov.**

(Figs. 10, 14, 19, 64)

Type locality. China, Gansu province, Lazikou valley, 34°09.9'N 103°51.9'E, 2120 m a.s.l.

Type material: Holotype: 1 female (NMPC): “CHINA: Gansu province / Lazikou valley, 2120 m, / 34°09.9'N 103°51.9'E / (GPS), 28.VI.2005 / J. Hájek, D. Král & / J. Růžička leg. (Ch 8) // baited pitfall traps (fish / meat + cheese); / vegetation along the / meadow on a bank of the / stream close to margin of / a mixed groove”. Paratypes: **CHINA: Gansu Prov.:** 1 female (SYSU): same data as holotype; 1 female (NMPC): “CHINA: Gansu province / Lazikou valley, 2120–2510 m / 34°09.9–10.1'N 103°49.2–51.9'E / 28.VI.2005 / J. Hájek, D. Král & J. Růžička leg.”. **Shaanxi Prov.:** 1 female (NHMW): “Central China / Mt. TAI BEN SHAN / SHAANXI province / 33 35 N, 107 43 E // H=1300–1500m / 10.VIII–4.IX.1998 / leg. V. Murzin & V. Sinaev // Collection / Andreas Pütz / Eisenhüttenstadt”.

Differential diagnosis. Very easily recognizable from all other Oriental *Pachysternum* by the combination of large and wide body, continually arcuate outer margin of anterior tibia (Fig. 47), lack of any pale spots on the head, pronotum and elytra (Fig. 64), and very coarse punctation of dorsal body surface (Fig. 14). It may resemble dark specimens of *P. stevensi*, which, however, differ by sinuate outer margin of the anterior tibia. By the large and wide body it resembles *P. cardoni*, which differs in the presence of pale spots on pronotum and elytra, slightly sinuate outer margin of anterior tibiae, and much finer punctation of pronotum and elytra.

Description. Body widely oval, female without pronounced humeral portion of elytra (males unknown, but sexual dimorphism in body shape probably absent). Body length 3.3–3.8 mm (holotype: 3.3 mm); body width 2.3–2.6 mm (holotype 2.3 mm).

Coloration. Head black, only with slightly paler transverse ridge between clypeus and frons. Pronotum black, lateral margins vaguely paler, brown. Elytron slightly paler than pronotum, dark brown, with lateral and apical portions slightly paler than the disc; sharply delimited pale elytral spots absent. Ventral surface black, posterior portions of abdominal ventrites 1–4 and whole ventrite 5 brown. Femora dark brown, tibiae and tarsi brown.

External morphology. Clypeus with coarse and dense punctation consisting of uniform-sized closely punctures divided by interstices ca. as wide as puncture diameter. Frons with slightly coarser punctation than on clypeus, punctures nearly uniform-sized, divided by interstices much narrower than puncture diameter. Interstices on the head without microsculpture. Larger punctures on pronotum rounded, much larger than small punctures, small punctures nearly ring-like in shape. Pronotal interstices without microsculpture. Prosternum with rather indistinct median carina. Elytral series consisting of large, very shallow punctures; interval punctation consisting of rather large nearly ring-like punctures; all interval punctures of the same size, setiferous punctures as large as surrounding punctation; interstices without microsculpture mesally, with slightly developed microsculpture laterally. Elytral series indistinctly impressed, not very apparent. Preepisternal elevation of mesothorax without posterolateral pits. Femoral lines on metaventrite very distinctly angulate; median portion of metaventrite bearing large and dense punctation, interstices without microsculpture; lateral portions with very coarse and dense, densely pubescent punctation. Outer margin of anterior tibia continually arcuate, outer series of spines not interrupted.

Male genitalia. Unknown.

Variation. None observed.

Etymology. *Rugosum* (Latin) means shriveled, referring to the extremely coarse and dense punctation of the dorsal surface characteristic for this species.



FIGURE 64. *Pachysternum rugosum*, general habitus (a: dorsal view, b: laterodorsal view). Locality of the specimens: a-b: China, Gansu (paratype, female).

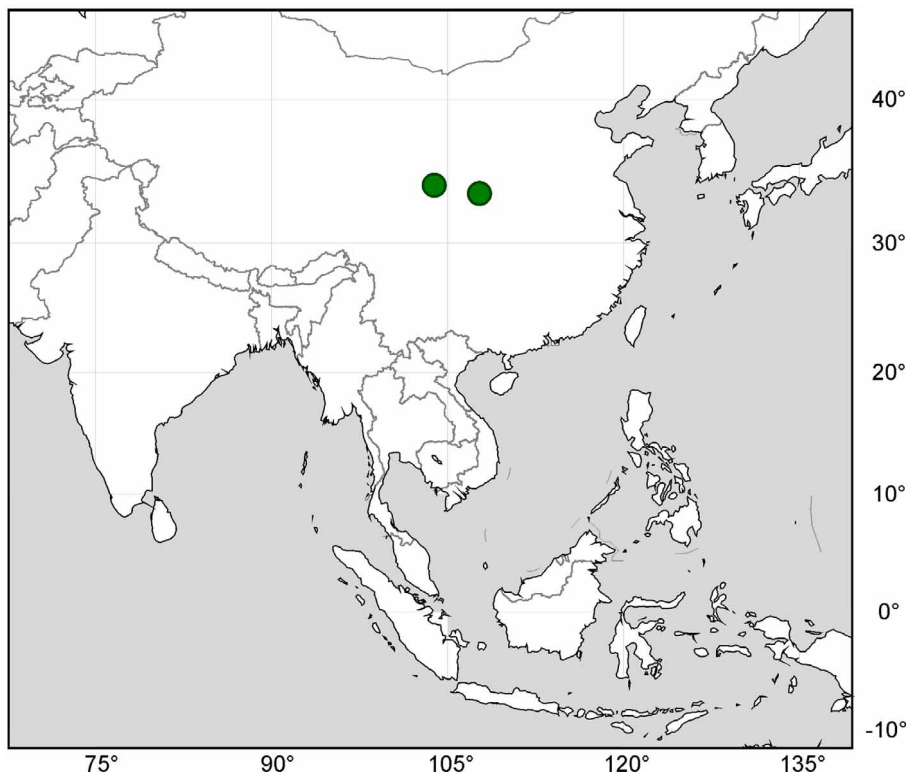


FIGURE 65. Known distribution of *Pachysternum rugosum*.

Biology. The holotype and one paratype were collected in pitfall trap baited with fish meat and cheese.

Distribution. Known from the mountains in southern Gansu and southern Shaanxi in China.

***Pachysternum sandacanam* sp. nov.**

(Figs. 38, 41, 66)

Type locality. Malaysia, Borneo, Sabah state, 8 km S Gunung Trus Madi, 549 m a.s.l., [coordinates ca. 5°28'29"N, 116°31'6"E].

Type material. Holotype: male (BMNH): "SABAH: 5 m. S. / Mt. Trus Madi, / 1800 ft. / 18–28.vi.1977 // rotten tapioca / skins // M. E. Bacchus / B.M. 1978–48". Paratypes: 17 spec. (BMNH, NMPC, NHMW, NHMB): same label data as the holotype; 1 male, 6 spec. (BMNH, KSEM): "SABAH: 200 ft. / R. Karamuak, 7m / SSE. Telupid / 1–7.ix.1977 // Native vegetable / garden refuse // M. E. Bacchus / B.M. 1978–48"; 1 female (BMNH): "SABAH: 250 ft. / 30mls. Sandakan / -Keningan Rd. / 19.x.1977 // leaf litter // M. E. Bacchus / B.M. 1978–48"; 1 male (BMNH): "SARAWAK, C. J. Brooks".

Differential diagnosis. Based on the general appearance and coloration in combination with continually arcuate outer margin of anterior tibiae, *P. sandacanam* is very similar to *P. curvatum*, *P. coomani* and typically colored specimens of *P. apicatum*. From *P. coomani*, it may be distinguished according to the shape of the median lobe (wide and nearly parallel-sided throughout in *P. coomani* (Fig. 30), distinctly narrowed into narrow apical fourth in *P. sandacanam* (Fig. 38)), clearly defined yellowish apical spot on elytra (the elytra are gradually getting paler posteriad in *P. coomani*, Fig. 54) and in much finer punctuation of elytral intervals (punctuation is rather coarse and dense in *P. coomani*). Distinguishing of *P. sandacanam* from *P. curvatum* and the polymorphic *P. apicatum* may be rather difficult, but is clearly possible on the basis of the morphology of the median lobe of the aedeagus (distinctly narrowed in apical fourth in *P. sandacanam*, gradually narrowing apicad in *P. curvatum* and *P. apicatum*) and partly also on the basis of the body size (specimens of *P. sandacanam* are usually distinctly smaller than those of *P. apicatum* and *P. curvatum*). However, the identification of *P. sandacanam* is easy when the distributional data are taken into account: the species co-occurs only with *P. apicatum* on the island of Borneo and may be easily distinguished from the Bornean form of *P. apicatum* according to the elytra coloration (with large yellow spot at apex in *P. sandacanam*, entirely reddish brown to brown in Bornean *P. apicatum* (Figs. 50h–j)) and according to the shape of the anterior tibia (continually arcuate on outer margin in *P. sandacanam* (Fig. 41), but distinctly bisinuate in Bornean *P. apicatum* (Fig. 39b)). *Pachysternum sandacanam* does not co-occur with *P. coomani* and *P. curvatum*, which are absent from the island of Borneo.

Description. Body oval, shape of elytra slightly sexually dimorphic, female with indistinctly pronounced humeral portion of elytra. Body length 2.3–3.1 mm (holotype: 2.6 mm); body width 1.6–2.0 mm (holotype 1.8 mm).

Coloration. Frons brown with median portion indistinctly paler, clypeus reddish brown. Pronotum brown with vaguely pale reddish anterolateral corners. Elytral uniformly brown, with large vaguely limited yellow apical spot reaching apical 0.5–0.3 on intervals 2–7 and ca. apical eighth on intervals 8–10. Ventral surface of head and prothorax reddish brown, meso- and metaventrite brown, abdominal ventrites 1–4 brown with pale lateral spots, ventrite 5 entirely pale, legs pale reddish.

External morphology. Clypeus with moderately coarse and rather dense punctuation consisting of uniformly-sized rounded punctures separated from each other by ca. 1–2× puncture diameter. Punctuation of frons similar to that on clypeus, but consisting of punctures of two slightly different sizes. Interstices on head without microsculpture. Larger punctures on pronotum rounded, shallow, much larger than small punctures; small punctures scar-like, divided from each other by ca. 1–3× puncture width. Pronotal interstices without microsculpture. Prosternum with distinct median carina. Elytral series consisting of large, shallow punctures; interval punctuation with rather fine semicircular punctures much smaller than serial ones, with sparsely intermixed slightly larger setiferous punctures of the same shape; interstices without microsculpture. Elytral series weakly impressed. Preepisternal elevation of mesothorax with posterolateral pits. Femoral lines on metaventrite indistinctly angulate, median portion of metaventrite bearing moderately coarse but sparse setiferous punctuation, interstices without microsculpture; lateral portions with very coarse and dense, densely pubescent punctuation. Anterior tibia rather wide, outer margin continually arcuate, outer series of spines not interrupted.

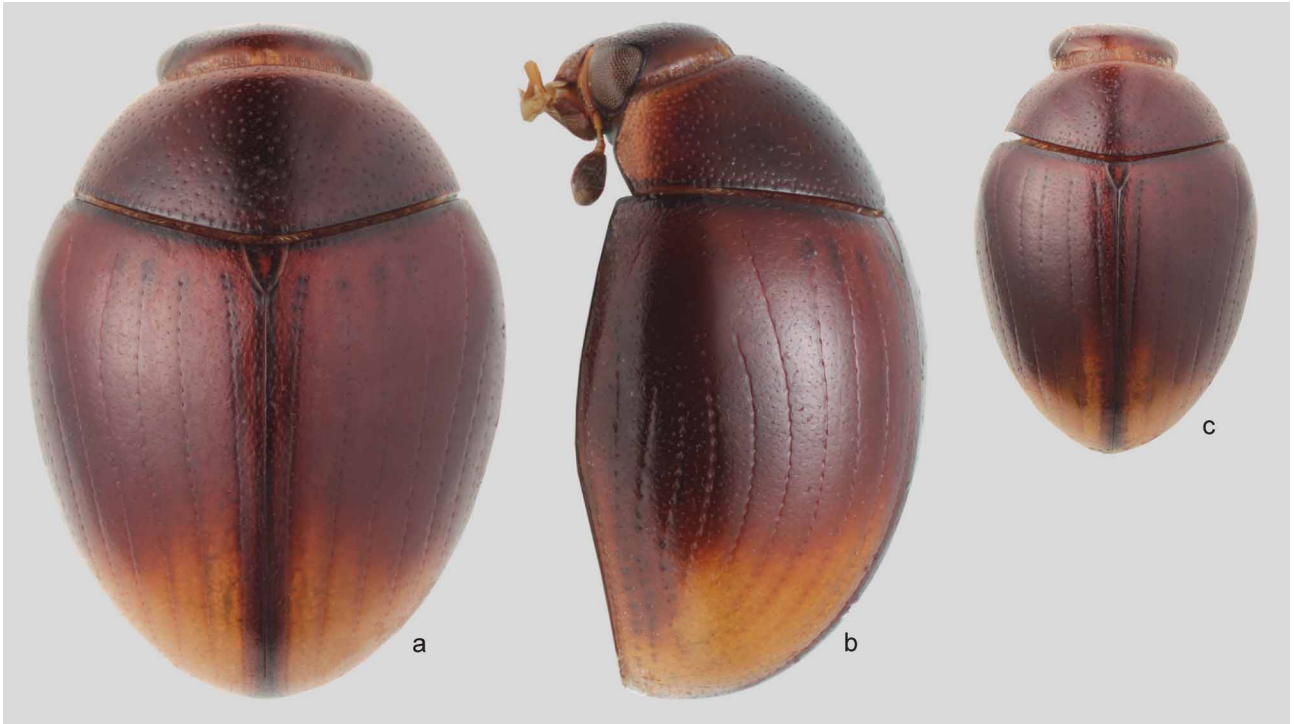


FIGURE 66. *Pachysternum sandacanam*, general habitus (a, c: dorsal view, b: dorsolateral view). Localities of the specimens: a–c: Borneo, Sabah, Trus Madi Mt. (paratypes, males).

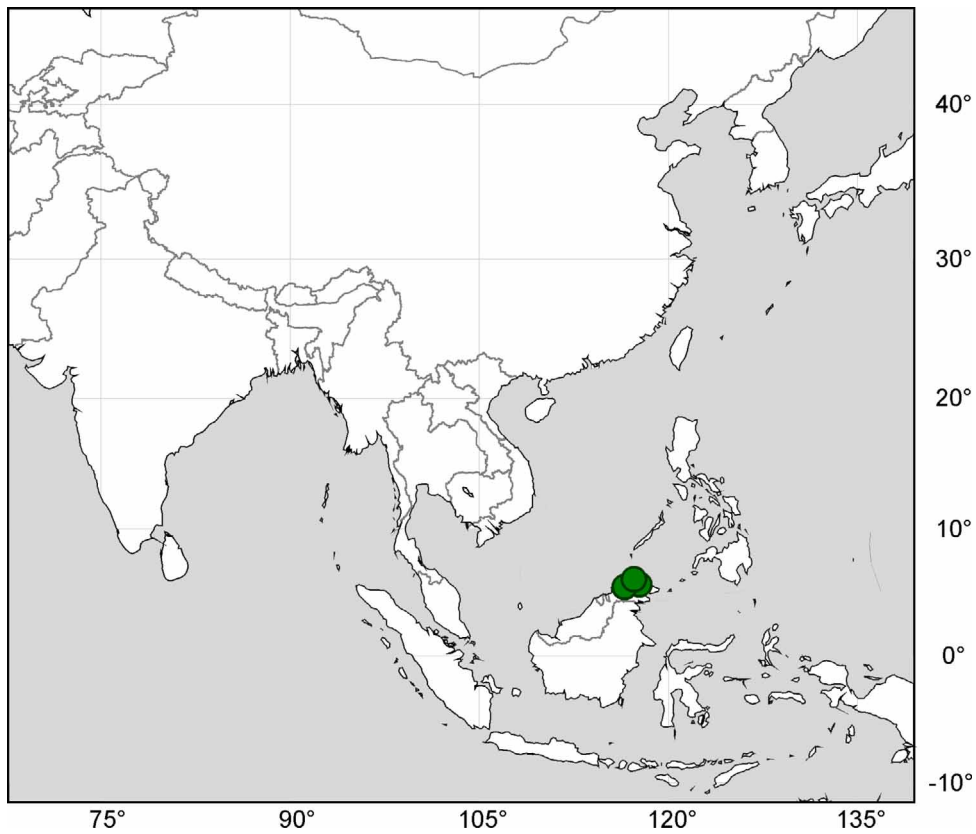


FIGURE 67. Known distribution of *Pachysternum sandacanam*.

Male genitalia (Fig. 38). Tegmen 1.1 mm long, median lobe 1.1 mm long. Phallobase ca. 2× as long as parameres, bearing small, slightly asymmetrical and indistinctly detached basal manubrium. Median lobe rather wide in basal three fourths, distinctly narrowed at apical fourth and then gradually narrowing to widely triangular apical portion, blunt at very apex; lateral pubescent lobes very distinct subapically. Sternite 9 with large V-shaped apical emargination.

Variation. A very low variation was observed in the coloration of elytra (concerning the extent and distinctness of the apical elytral yellow spot, Fig. 66) and body size (see description). Otherwise the examined specimens are very constant in all characters of taxonomic importance including of the morphology of the male genitalia.

Etymology. Named after Sandakan Division in Sabah, in which two localities of this new species are located.

Biology. Specimens examined were collected from various kinds of rotting plant matter (cassava skins, vegetable garden refuse and leaf litter).

Distribution. Known from three close localities in central Sabah in northern Borneo.

Discussion. *Pachysternum sandacatum* seems to belong to the *P. apicatum* complex (based on the presence of deep pits on preepisternal elevation of mesothorax) whose taxonomy is not completely resolved in this paper, mainly because of *P. apicatum* is here understood as a polymorphic species but may actually consist of several species/subspecies. Following this concept, *Pachysternum sandacatum* may seem to be a part of the widely understood *P. apicatum* on the first view. However, its syntopic co-occurrence with the Bornean form of *P. apicatum* (uniformly reddish brown to brown in coloration, with rather deeply bisinuate anterior tibia, but with the male genitalia identical with the typical *P. apicatum*), supports the separate status of *P. sandacatum*. Separate status is also supported by the morphology of the median lobe which clearly differs from both *P. apicatum* and *P. curvatum*.

***Pachysternum stevensi* Orchymont, 1926**

(Figs. 34, 48, 68)

Pachysternum Stevensi Orchymont, 1926a: 220.

Pachysternum stevensi: Orchymont (1928: 84, catalogue); Satô (1979: 50, faunistics); Biswas & Mukopadhyay (1995: 154, faunistics); Hansen (1999: 307, catalogue); Hebauer (2002b: 57, faunistics); Hansen (2004: 66, catalogue); Hebauer & Ryndevich (2005: 50, faunistics – based on incorrectly identified specimen of *P. coomani*).

Pachysternum nigratum Jia, Wu & Pu, 1998: 125. **Syn. nov.**

Pachysternum nigratum: Jia (1996: 91, unpublished English description); Hansen (1999: 307, catalogue); Hansen (2004: 66, catalogue).

Type localities. *P. stevensi*: India, Shempagonur [= Tamil Nadu: Shenbaganur, 6 km of Kodaikanal, coordinates ca. 10°14'N, 77°30'E]. *P. nigratum*: China, Guangdong province, Fengkai.

Type material examined. *P. stevensi*: **Paratypes**: 1 male, 1 female, 1 spec. (BMNH, IRSNB): “Gopaldhara / Br. Sikkim / H. Stevens // Andrewes / Bequest. / B.M. 1922–221 // A. d’Orchymont / Pachysternum / Stevensi / n. sp. / Cotype”; 2 males (IRSNB): “Hoa Binh / Tonkin / de Cooman”. [Note. The holotype was not found in the Orchymont collection in IRSNB – it may be lost or was possibly returned to the collection of the Zoological Survey in Kolkata, India which would mean it is inaccessible and possibly damaged. As the original Orchymont’s understanding of this species is clear and not problematic, we refrain from designating the neotype at the moment].

P. nigratum: **Holotype**: male (SYSU): “[Chinese text: China, Guangdong, Fengkai, 6.7.1986, lgt. Wu Wu] / *P. nigratum*”. **Allotype**: female (SYSU): same label data as the holotype. **Paratypes**: 1 male, 1 female (NMPC), 38 spec. (SYSU): same label data as the holotype; 1 male (SYSU): “[Chinese text: China, Guangdong, Xinyi, 5.9.1986, lgt. Wu Wu] / *P. nigratum*”; 1 male, 1 female, 34 spec. (SYSU): “[Chinese text: China, Guangxi, Wuzhou, 8.1986, lgt. Wu Wu] / *P. nigratum*”.

Additional material examined. **CHINA: Fujian**: 1 spec. (IRSNB): Shaowu, Fukien, elev. 500 m [coordinates ca. 27°20'30"N 117°29'30"E], 30.x.1937, lgt. Klapperich; 15 spec. (SYSU): Nanjing County, Hexi town (cow dung), 13.vii.2010, lgt. F. L. Jia. **Jiangxi**: 6 spec (SYSU): Jinggangshan Mts., Jingzhushan, 26°31'N 114°05.9'E, 19.ix.2010, lgt. Shuang Zhao; 109 spec. (SYSU): same locality, 4.x.2010, lgt. Fenglong Jia; 5 spec. (NMPC): same locality, 25.iv.2011, lgt. Fikáček, Hájek, Jia & Song; 2 spec. (NMPC): Jinggangshan Mts., Xiping, elev. 915 m, 26°33.7'N 114°12.2'E, lgt. Fikáček, Hájek, Jia & Song; 1 spec. (NMPC): Jinggangshan Mts., Dabali env., elev. 1200 m, 26°29.3'N 114°08.1'E, lgt. Fikáček & Hájek. **Guangdong**: 1 male (NMPC): Datian Ding Mt., elev. 1200–

1600 m, 22°16'N 111°13'E, 5–6.v.2002, lgt. Fencľ; 1 male, 4 spec. (NMPC): same locality and collector, but 6–7.v.2002; 2 spec. (SYSU): Xingning County, Luofu Mt. and Huangmaozhang Mt., 2.vii.2004, lgt. F. L. Jia. **Guangxi**: 7 spec. (NHMW): 10 km N Luizhou, 24°19'N 109°19'E, 10.xi.1993, lgt. H. Schillhammer (17a); 2 spec. (BMNH): Bama [coordinates ca. 24°10'14"N 107°14'56"E], i.1988, without collector; 5 spec. (HHCR): Guigang City, Mt. Zhanlongshan [29°5'24"N, 109°9'0"E], elev. 1140 m, 1–15.v.2009, lgt. Jingke Li. **INDIA: Arunachal Pradesh**: 1 spec. (BMNH): “Burma, Mishmi hills” [coordinates ca. 27°51'N 96°34'E, currently situated in India], 1935, lgt. M. Steele; 4 spec. (BMNH): Dirang env, elev. 1700–1900 m, 27°21'N, 92°13'E, 8–22.v.2006, lgt. P. Pacholátko; 1 spec. (BMNH): same locality and date, L. Dembický lgt. **Meghalaya**: 1 spec. (NHMW): Garo Hills, Nokrek National Park, elev. 1150 m, 25°25'N 90°20'E, 13–22.xii.1997, lgt. V. Sinaev & M. Murzin. **Sikkim**: 1 spec. (ASKC): Pemayangtse env., elev. 1900–2080 m, 27°18'16"N 88°15'10"E, 15–17.v.1998, lgt. Fabrizi & Ahrens. **Tamil Nadu**: 2 spec. (NMPC): Nilgiri Hills, 11 km SE Kotagiri, elev. 1100 m, 11°24'N 76°56'E, 3–15.v.2002, lgt. P. Pacholátko; 18 spec. (NHMW, NMPC): Nilgiri Hills, Kunjappanai, elev. 900 m, 11°22'N, 76°56'E, 24.i.1999, lgt. D. S. Boukal (83). **Uttarakhand**: 8 spec. (BMNH): W. Almora, [coordinates ca. 29°36'N 79°34'E], without date, lgt. H. G. Champion. **LAOS: Houaphan**: 1 spec. (NMPC): Ban Salusi, Phu Phan Mt., elev. 1500–2000 m, 20°15'N 104°2'E, 26.iv.–11.v.2001, lgt. J. Bezděk; 2 spec. (NMPC): Phou Pane Mt., 20°13'09–19"N 103°59'54"–104°00'03", 1–16.vi.2009, lgt. V. Kubáň. **Xiangkhouang**: 1 male, 1 spec. (NMPC): Phou Sane Mt., 30 km NE of Phonsavan, elev. 1420 m, 19°38.20'N 103°20.20'E, 10.–30.v.2009, lgt. V. Kubáň. **NEPAL: Bagmati**: 1 male (NHMW): Godavari [coordinates 27°36'N 85°24'E], 3.vi.1996, lgt. Probst. **Dhawalagiri**: 1 male (NHMW): Myagdi, Beni-Kusma, Gandaki-Khola, elev. 800–1000 m [coordinates ca. 28°14'N 83°41'E], 30.vi.1986, lgt. Probst; 1 spec. (Erfurt): Kali Gandaki valley, Tatopani (=Bhurung), elev. 1100–1400 m, 28°27'29"N 83°37'39"E, 14–17.vi.1986, lgt. C. Holzshuh; 2 spec. (BMNH): Gandaki, Bakhri Kharka, elev. 1676 m [coordinates ca. 28°22'N 84°7'E], 24.iv.1954, lgt. J. Quinlan; 1 spec. (FHGC): Buri Gandaki Maccha Khola village, elev. 870 m [coordinates ca. 28°13'N 84°52'E], 15.v.1996, lgt. Ahrens, Kulbe & Rulik; 1 female (NHMW): Gorkha, Lobubesi-Maccha Khola [coordinates ca. 28°10'N 24°53'E], 15.vi.1993, lgt. Probst (N15). **Janakpur**: 1 spec. (FHGC): Ramechap, Bhandar, elev. 2000 m [coordinates ca. 27°34.6'N 86°20.6'E], 8.v.1997, lgt. W. Schawaller. **VIETNAM: Bac Thai**: 2 spec. (NMPC): Tam Dao [National Park, ca. 21°38'N, 105°30'E], without date, lgt. P. Marhoul. **Gia Lai**: 27 spec. (NHMW, NMPC): 40 km NW An Khe, Buon Luoi, elev. 620–750 m, 14°10'N 108°30'E, 28.iii.–12.iv.1995, lgt. Pacholátko & Dembický. **Hoa Binh**: 4 spec. (IRSNB): Hoa Binh [coordinates ca. 20°50'N, 105°20'E], without date, lgt. A. de Cooman. **Lam Dong**: 3 males (NHMW): 12 km N of Dalat, Lang Bian, 11°55'N, 108°18'E, 28–30.iv.1994, lgt. Pacholátko & Dembický.

Published records. INDIA: Tamil Nadu: Shempagonur [=Shenbaganur, 6 km of Kodaikanal, coordinates ca. 10°14'N 77°30'E], depository unknown (holotype of *P. stevensi*) (Orchymont 1926a). **West Bengal**: Kalimpong env. [27°3'N 88°28'2 0"E], coll. NHMB (Satô 1979).

Differential diagnosis. Pale specimens of this species may be easily distinguished by the combination of uniformly dark pronotal disc with widely pale lateral margins, elytra with distinct subbasal pale spots on intervals 2–5(-6), pale apical portion of elytra and slightly but distinctly bisinuate outer margin of anterior tibia (Fig. 48). These specimens of *P. stevensi* may resemble dark specimens of *P. cardoni* (which may be distinguished mainly by larger and wider body form, pale median portion of frons and in some cases also by partly reduced microsculpture of elytra) and *P. kubani* (for diagnostic characters see couplet 12 of the identification key). Uniformly colored specimens of *P. stevensi* (i.e. those without clearly defined pale spots on elytra) are characterized by the combination of bisinuate outer margin of anterior tibia and strong microsculpture of elytra. These specimens may resemble *P. rugosum* by their coloration (outer margin of anterior tibia is continually arcuate in *P. rugosum*, bisinuate in *P. stevensi*), *P. coomani* by the general coloration (outer margin of anterior tibia is continually arcuate in *P. coomani* which also has wide median lobe of the aedeagus nearly parallel-sided throughout, tibiae are bisinuate and the median lobe gradually narrowing apicad in *P. stevensi*), and some morphotypes of *P. apicatum* (these may vary in the characters above, but their elytral interstices lack microsculpture, whereas microsculpture is very strong in *P. stevensi*).

Redescription. Body widely oval, shape of elytra sexually dimorphic, female with distinctly pronounced humeral portion of elytra. Body length 2.1–3.3 mm; body width 1.4–2.1 mm.

Coloration. Head uniformly black, only with pale reddish transverse ridge. Pronotum black, with widely pale reddish lateral margins, pale area widest anteriorly, narrowest at posterolateral corner. General coloration of elytral black; interval 1 black throughout, intervals 2–5 with large vaguely defined pale reddish spots subbasally, apical third of elytra pale yellowish, lateral margin of elytron more or less pale throughout. Ventral surface of head dark brown, thoracic sclerites black, abdominal ventrites 1–4 reddish brown in posterior portion, entire ventrite 5 pale, legs pale reddish.

External morphology. Clypeus with moderately coarse dense punctation consisting of uniformly-sized rounded punctures separated from each other by ca. 1–2× puncture diameter. Punctation of frons similar to that on clypeus. Interstices on head without microsculpture. Larger punctures on pronotum rounded, shallow, much larger than small punctures; small punctures scar-like, divided from each other by ca. 1–1.5× puncture width. Pronotal interstices without microsculpture. Prosternum with very distinct median carina. Elytral series consisting of large, shallow punctures; interval punctation with rather fine semicircular punctures much smaller than serial ones, with sparsely intermixed slightly larger setiferous punctures of the same shape; interstices with strong mesh-like microsculpture. Elytral series weakly impressed. Preepisternal elevation of mesothorax without posterolateral pits. Femoral lines on metaventrite indistinctly angulate, median portion of metaventrite bearing fine, moderately dense setiferous punctation, interstices without microsculpture; lateral portions with very coarse and dense, densely pubescent punctation. Anterior tibia rather wide, outer margin distinctly bisinuate, outer series of spines slightly interrupted.

Male genitalia (Fig. 34). Tegmen 1.2 mm long, median lobe 1.2 mm long. Phallobase 2× as long as parameres, bearing large, slightly to strongly asymmetrical and distinctly detached basal manubrium. Median lobe rather narrow, widest in basal third, weakly narrowing apicad, apex narrowly rounded; gonopore subapical, rather indistinct; lateral pubescent lobes indistinct even subapically. Sternite 9 entire or with moderately large V-shaped apical emargination (see Variation).

Variation. Dorsal coloration varies considerably in the distinctiveness of the elytral pale basal as well as apical spots. Typically, the basal spots merge in one triangular, more or less sharply delimited subbasal reddish spot and the elytral apex is yellowish (Figs. 68a–f). In many specimens both basal and apical spots are more vaguely delimited and not so distinct, and in extreme cases the elytra are uniformly brown without any trace of paler spots (this extreme kind of coloration bear the types of *P. nigratum* examined, Fig. 68h). Similar variability concerns the pale areas on lateral margins of pronotum, but even in the specimens with uniformly colored elytra the sides of pronotum are still distinctly and rather widely paler, even though the pale spot is very vaguely delimited from the dark brown pronotal disc. Very apparent variation surprisingly concerns the shape of the median portion of male sternite 9, which may vary from deeply emarginated (Fig. 34d) through shallowly emarginated to entirely rounded apically (Fig. 34e). The shape varies even between the specimens from the same region (e.g., Guangdong province in China: the examined paratype of *P. nigratum* has entire, but the specimen from Datian Ding Mt. deeply emarginate median lobe of sternite 9) or in the specimens from the single collecting event (the sternite 9 varies from entirely rounded to deeply emarginate in specimens from Vietnam: Buon Luoi). The shape of the sternite 9 varies irrespectively to the coloration variability. As we failed to find any other morphological differences between the specimens with different shape of sternite 9 and as the intermediate shapes also occur, we consider this variation as intraspecific. No males were examined from the type locality in the Tamil Nadu state in India, but all dissected males from Kunjappanai (Nilgiri Hills) have deeply emarginate sternite 9.

Following the above variation patterns of *P. stevensi*, *P. nigratum* is clearly only a variation of *P. stevensi* without distinct spots and has to be therefore consider as a junior synonym of the latter species. Except of the difference in coloration and the shape of male sternite 9, both paratypes of *P. nigratum* completely correspond with other specimens of *P. stevensi* examined for this study.

Biology. A portion of the specimens examined were collected in cow excrements, no habitat data are provided for remaining material used for this study.

Distribution. Known from Himalaya, southern China and continental SE Asia (but not reaching Malayan peninsula). An isolated population seems to exist in southern India (Tamil Nadu), and no records are available from the rest of Indian subcontinent including the lowland northern India.



FIGURE 68. *Pachysternum stevensi*, general habitus (a, c–h: dorsal view, b: dorsolateral view). Localities of the specimens: a–b: Vietnam, Buon Luoi; c, e–f: India, Tamil Nadu; d: India, Almora; g: China, Guigang City; h: China, Fengkai (paratype of *P. nigratum*, male).

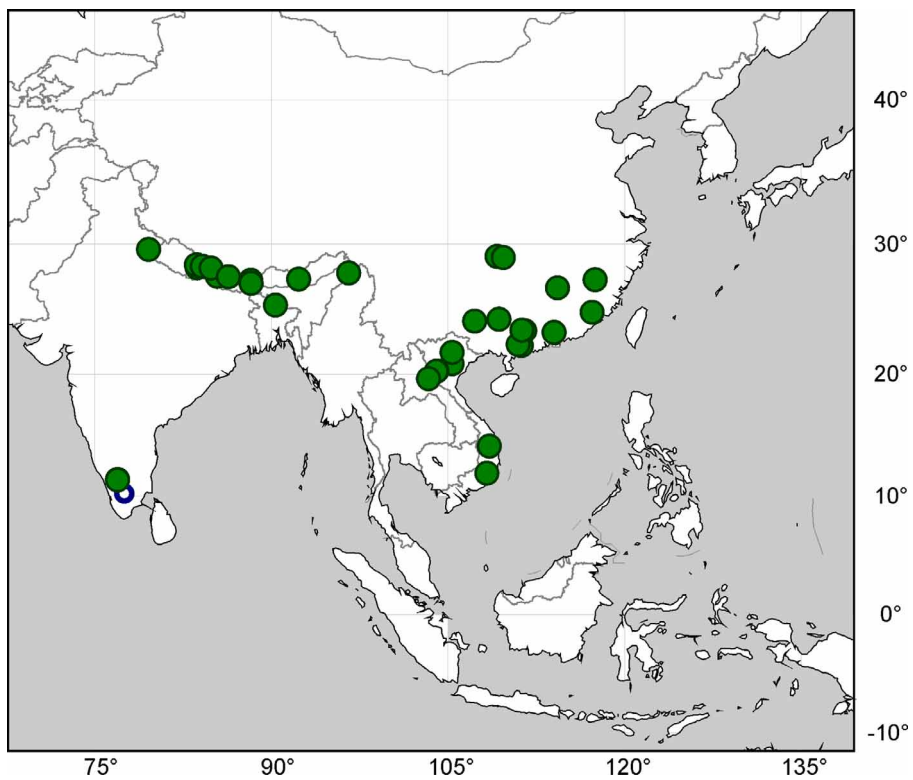


FIGURE 69. Known distribution of *Pachysternum stevensi* (green dots: examined material; blue circles: published data, not examined).

***Pachysternum sulawesicum* Fikáček, 2006**

(Figs. 11, 17, 35, 70)

Pachysternum sulawesicum Fikáček, 2006: 152.

Pachysternum sulawesicum: Short & Fikáček (2011: 113, catalogue).

Type locality. Indonesia, Sulawesi, Malino env., E of Ujung Pandang [coordinates ca. 5°16'31"S, 119°50'59"E].

Type material examined: Holotype: male (NHMW): "S-SULAWESI 1992 / Umg. Malino (27) / E Ujung Pandang / leg. Jäch 29.IV.". Paratypes: 2 spec. (NMPC): "S-SULAWESI 92 / Umg. Malino (27) / leg. Schödl 29.4."; 1 male (NHMW): "N-SULAWESI 1992 / Umg. Modindingo / NÖ Kotamobagu (12) / leg. Schödl 19.IV.".

Additional material examined. INDONESIA: Sulawesi: 1 spec. (ASKC): 5 km SE Batu Putih, 250 m a.s.l., 1°32'43"N 125°7'29"E, 18.ii.2009, lgt. A. Skale.

Differential diagnosis. *Pachysternum sulawesicum* may be easily distinguished from other species by the coloration of elytra (which typically bears large apical horse shoe-shaped pale spot and small humeral pale spot), continually arcuate outer margin of anterior tibia and entirely dark pronotal disc. Pale specimens of *P. sulawesicum* may resemble dark specimens of *P. nigrovittatum* by the elytral pattern, but may be easily distinguished by the shape of anterior tibiae and coloration of pronotum mentioned above (anterior tibiae are distinctly bisinuate on outer margin and pronotum is pale with large M-shape spot in *P. nigrovittatum*). Dark specimens of *P. sulawesicum* are rather similar to dark specimens of *P. kubani*, but may be distinguished from the latter by uniformly arcuate anterior tibia (deeply sinuate in *P. kubani*). Distinct (but vaguely limited) humeral spot along with pale apical portion of elytra is rarely present also in the specimens of *P. apicatum*, which may be distinguished by at least slightly angulate outer margin of anterior tibia and by the shape of the median lobe (wide in basal third and then narrowing apicad in *P. apicatum*, nearly parallel-sided throughout in *P. sulawesicum*).

Redescription. Body widely oval, shape of elytra slightly sexually dimorphic, female with distinctly pronounced humeral portion of elytra. Body length 2.5–3.6 mm (holotype: 2.6 mm); body width 1.5–2.2 mm (holotype 1.9 mm).

Coloration. Clypeus and median portion of frons pale reddish, lateral portions of frons dark brown. Pronotum dark brown with widely reddish anterolateral corners and median portion of anterior margin. Elytron dark brown with sharply delimited pale reddish spot at the base of elytral interval 5, small pale reddish spot in anterolateral corner, and large horseshoe-shaped pale reddish spot at apex; the apical spot reaching more anteriorly on intervals 2, 5–7 and 10. Ventral surface of head brown, thoracic sclerites dark brown, legs and abdominal ventrite 5 pale reddish.

External morphology. Clypeus with moderately coarse and rather sparse punctation consisting of nearly uniform-sized punctures divided by ca. 2–3× of puncture diameter. Frons with slightly coarser punctation than on clypeus, consisting of punctures of two slightly different sizes separated by ca. by 1.5–3× of puncture diameter. Interstices without microsculpture. Larger punctures on pronotum rounded, much larger than small punctures, small punctures scar-like, divided by ca. 2–3× of puncture width. Pronotal interstices without microsculpture. Prosternum with weak or nearly indistinct median carina. Elytral series consisting of large, shallow punctures; interval punctation with moderately large semicircular punctures much smaller than serial ones, interval punctation consisting of two slightly different sizes of punctures, larger punctures setiferous; interstices with moderately developed mesh-like microsculpture. Elytral series indistinctly impressed. Preepisternal elevation of mesothorax without posterolateral pits. Femoral lines on metaventrite slightly angulate; median portion of metaventrite bearing moderately large and dense setiferous punctation, interstices without microsculpture; lateral portions with very coarse and dense, densely pubescent punctation. Outer margin of anterior tibia very slightly bisinuate, outer series of spines not interrupted.

Male genitalia (Fig. 35). Tegmen and median lobe 1.3 mm long. Phallobase ca. twice as long as parameres, slightly asymmetrical basally, without distinctly detached manubrium. Median lobe widest at midlength, weakly narrowing apicad, apex narrowly rounded; gonopore subapical, rather indistinct; lateral pubescent lobes narrow, developed only subapically. Median projection of sternite 9 with deep V-shaped emargination apically.

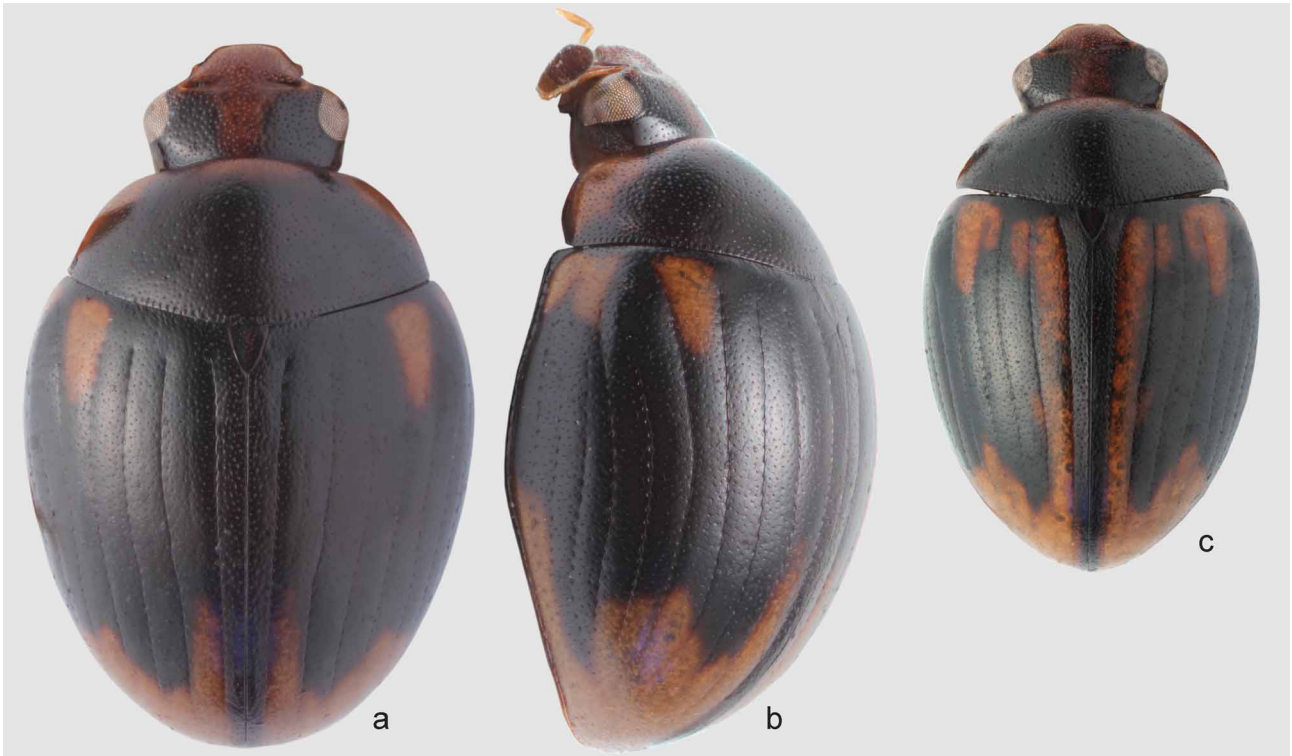


FIGURE 70. *Pachysternum sulawesicum*, general habitus (a, c: dorsal view, b: dorsolateral view). Localities of the specimens: a–b: Sulawesi, Malino env. (holotype, male); c: Sulawesi, SE of Batu Putih.

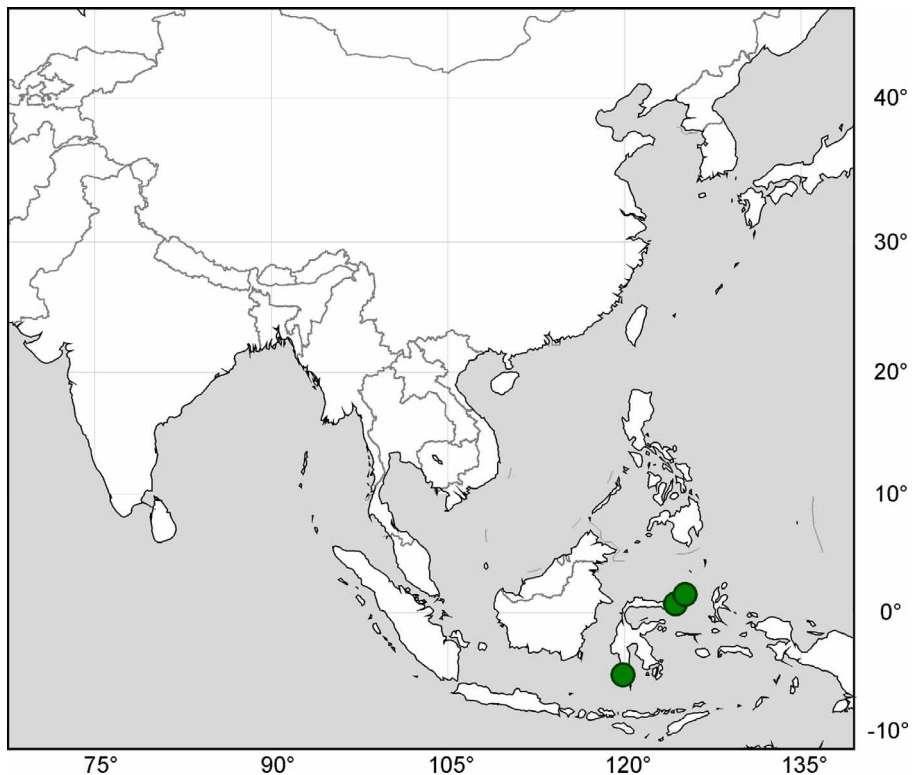


FIGURE 71. Known distribution of *Pachysternum sulawesicum*.

Variation. Rather variable species, the variability concerns the coloration, dorsal microsculpture and the height of median carina of the prosternal plate. The additional specimen examined (Batu Putih env.) has the pale spots of elytra much more extended than the type specimens redescribed above, with the elytron colored as follows

(Fig. 70c): interval 1 black, whole interval 2 pale reddish, basal pale spots present on intervals 2–4 and 7–10; basal spot similar to type specimens, but reaching more anteriorly on intervals 3–6; lateral margin of elytron widely pale reddish throughout. The coloration of the pronotum and the head of this specimen corresponds with the type specimens redescribed above. Dorsal microsculpture of elytral intervals varies from moderately distinct (in the holotype and the additional specimen from Batu Putih env.) to rather indistinct (in some paratypes). Median carina of prosternal plate is rather obsolete in some specimens and therefore seemingly absent, but it may be still detected on SEM micrographs of these specimens.

Biology. Unknown.

Distribution. Known from two localities in northernmost Sulawesi and one locality in southern Sulawesi. Most probably widely distributed throughout the island.

Taxonomic changes outside *Pachysternum*

Australocyon keralensis (Hebauer, 2002), comb. nov.

Pachysternum keralense Hebauer, 2002a: 16.

Pachysternum keralense: Short & Hebauer (2006: 349, catalogue).

Type material examined. Paratype: 1 spec. (NMPC): “INDIEN: Kerala / Thekkady, Peryar W. L. S. / 2. 9. 1989 / leg. A. Riedel”

Taxonomic note. The species bears all diagnostic characters of the *Australocyon pilocnemoides* species group mentioned by Hansen (2003), and moreover differs from *Pachysternum* species by the antennal grooves not reaching the lateral margin of hypomerion, and metaventrite lacking any trace of the femoral lines. Morphology of its genitalia (see Hebauer 2002a, Fig. 22) also do not correspond with the *Pachysternum* species, but largely agree with those illustrated by Hansen (2003, Figs. 18–21) for the species of the *Australocyon pilocnemoides* group. For that reason, the species is transferred here to the genus *Australocyon*.

Australocyon keralensis may be diagnosed as follows: dorsal surface uniformly dark brown; antennal club unicolorous; pronotum without sublateral depressions; posterolateral corners of pronotum bluntly rounded; pronotal punctation moderately coarse but sparse, consisting of punctures of two slightly different sizes; pronotal interstices bearing strong mesh-like microsculpture; elytra evenly convex, not humpy in humeral areas. Based on the key provided by Hansen (2003), the species seems to be very similar especially to *A. pilocnemoides* Hansen, 2003 and *A. puncticollis* Hansen, 2003.

Megasternum japonicum Shatrovskiy, 1989, stat. restit.

Megasternum gibbulum auctt. nec Motschulsky, 1866: Sharp (1874: 420); Knisch (1924: 158); Nakane (1966: 55); Satô (1985: 211).

Megasternum japonicum Shatrovskiy, 1989: 286.

Megasternum japonicum: Shatrovskiy (1992: 368, subsequent more detailed description); Hansen (1999: 305, catalogue); Hoshina & Satô (2005: 13, incorrectly synonymized with *M. gibbulum*).

Material examined. **JAPAN: Tochigi:** 8 spec. (PJWP, NMPC): Nikko City env. [coordinates ca. 36°43'N 139°42'E], 23.ix.2006, lgt. P. Jalszynski. **RUSSIA: Kuril Islands:** 1 spec. (MPU): Kunashir Is., UV okr. oz. Peschanoye (Sernovodsk-Alekhino) [South-East vicinities of Peschanoye lake (Sernovodsk-Alekhino road)], 8.vii.2008, lgt. K. Makarov.

Taxonomic notes. There is a single species of *Megasternum* occurring on the Japanese islands which differs from the continental *M. concinnum* (Marsham, 1803) by finely but distinctly punctate ventrites 2–5 (impunctate in *M. concinnum*). The Japanese species was for the first time recognized and diagnosed as separate from *M. concinnum* by Sharp (1874), who called it *Megasternum gibbulum* Motschulsky, 1866 even though he did not examine the Motschulsky's types and noticed some discordance between his Japanese specimens and Motschulsky's (1866) short description of *M. gibbulum*. Sharp's (1874) interpretation of *M. gibbulum* was followed by all subsequent Japanese authors. While working on the keys to identification of the Hydrophilidae of Russian Far East, A. G. Sha-

trovskiy reexamined the types of *Megasternum gibbulum* in Motschulsky collection, designated the lectotype of this species, correctly recognized that the type specimens do not belong to the genus *Megasternum* but *Pachysternum* and realized that the Japanese species of *Megasternum* is therefore unnamed. For that reason, he described the Japanese species as *Megasternum japonicum* (see Shatrovskiy 1989, 1992). Unfortunately, the transfer of *Megasternum gibbulum* to *Pachysternum*, its synonymization with *P. haemorrhoum* and the designation of its lectotype was never published, and the reasons for describing *Megasternum japonicum* remained therefore unexplained. For that reason, Hoshina & Satô (2005) synonymized *Megasternum japonicum* with *M. gibbulum*, considering some paratypes of *M. japonicum* from the Lewis collection in BMNH as being at the same time syntypes of *M. gibbulum*. All paratypes deposited in BMNH and mentioned by Shatrovskiy (1992) were, however, collected after the description of *M. gibbulum* by Motschulsky (1866) and therefore cannot be syntypes of the latter species. Hoshina & Satô (2005) did not examine the specimens of *M. gibbulum* from the Motschulsky collection deposited in ZMUM, which are all conspecific with *Pachysternum haemorrhoum* (see above under this species). For that reason, the synonymy of *Megasternum japonicum* with *M. gibbulum* proposed by Hoshina & Satô (2005) is incorrect, and *Megasternum japonicum* has to be resurrected as a valid name for the Japanese species of the genus *Megasternum*.

Discussion

All Oriental species of *Pachysternum*, i.e. ten of eleven species treated in this paper, are morphologically very similar and share several unique characters of genitalia and the metaventrite. This could point out to a monophyly of this group. In contrast, the eastern Palaearctic *P. haemorrhoum* lacks these unique characters and its relationship to the Oriental species remains unclear, which challenges the idea of the uniform *P. nigrovittatum* species group containing all Asian *Pachysternum* proposed by Fikáček (2006). We are showing that the only unique character shared by all Asian species of *Pachysternum* is the sexual dimorphism in body shape, which is however very indistinct in some species (e.g., *P. coomani*) and its extent may vary even intraspecifically (e.g., in *P. nigrovittatum*).

The taxonomy of the Oriental *Pachysternum* was found to be rather complicated for several reasons: (i) all species are very similar in external morphology as well as in the morphology of male genitalia, and very few characters can be therefore used for delimiting the species; (ii) many of the characters useful for taxonomic treatment are at the same time rather variable intraspecifically (as e.g. the coloration and the shape of male sternite 9); (iii) few species are widespread on the islands of SE Asia and show considerable geographic variation in most of the characters. For all these reasons, the present morphology-based taxonomic study should be understood as a pilot one, solving basic taxonomy of the group and detecting problems which need to be examined more in detail. Based on our results, at least 10 species of Oriental *Pachysternum* may be distinguished. Most of them are rather widespread, with *P. nigrovittatum* itself covering the distributional areas of all remaining Oriental species combined. Only few species are limited to small areas: this concerns the supposed islands endemics (*P. curvatum* in the Philippines, *P. sandacanam* in northern Borneo, and *P. sulawesicum* in Sulawesi) and *P. rugosum* in the mountains in central China (but collecting bias cannot be excluded in the latter case).

Several of the widespread Asian species (*P. haemorrhoum*, *P. nigrovittatum* and *P. stevensi*) seem to be coprophilous, inhabiting nearly exclusively excrements of herbivorous mammals. This may also be the case for other Oriental species, with the only exception of the *P. apicatum* group. Detailed habitat data are unfortunately missing for these species including e.g. the widespread *P. cardoni*. *Pachysternum rugosum* was collected to baited pitfall traps (with rotten fish as a bait) and some of the specimens of *P. kubani* and *P. cardoni* were collected using flight intercept traps close to cow pastures, which at least does not contradict their supposed coprophily. Different habitat preferences seem to be the case for all three species of the *P. apicatum* group (i.e., *P. apicatum*, *P. curvatum* and *P. sandacanam*), which are mostly collected in various kinds of rotting plant matter (leaf litter, garden compost, rotting figs and durian and *Arthocarpus* fruits) or on bamboo stumps. However, a series of *P. apicatum* was collected using dung baited pitfall traps in Brunei, and few other specimens from Borneo bear the label “on dead pig”.

The *Pachysternum apicatum* group (formed by *P. apicatum*, *P. curvatum* and *P. sandacanam* in our concept) is taxonomically the most complicated group of the Asian *Pachysternum*. Besides the supposedly different habitat requirements mentioned above, the group differs from remaining Asian species at least by one shared character, i.e. the presence of the deep pits in posterolateral corners of the preepisternal plate (Fig. 18), which is unique within *Pachysternum*. The group is distributed exclusively in the mainland SE Asia and on the adjacent Pacific islands west of the Wallace or Sclater line (Fig. 72, depends on whether *P. apicatum* really occurs in Sulawesi). Within this

group, we have found a wide spectrum of morphotypes characterized by different combinations of coloration and morphology of anterior tibia. In contrast, male genitalia are very similar in all morphotypes, with slight differences found only in the specimens from Philippines (treated as *P. curvatum*) and Borneo (treated as *P. sandacatum* sp. nov.). In northern Borneo, two sympatric forms were found, both constant in their external characters and therefore easily diagnosed from each other. Both forms slightly differ even in the morphology of the median lobe of the aedeagus and no intermediates were found, which clearly indicates the presence of two separate species in this region. One form, restricted to northern Borneo in its distribution, is therefore described here as *P. sandacatum* sp. nov.; the second form, widely distributed throughout Borneo, was found to correspond with *P. apicatum* in genital morphology although it differs from remaining island populations assigned to this species by elytral coloration.

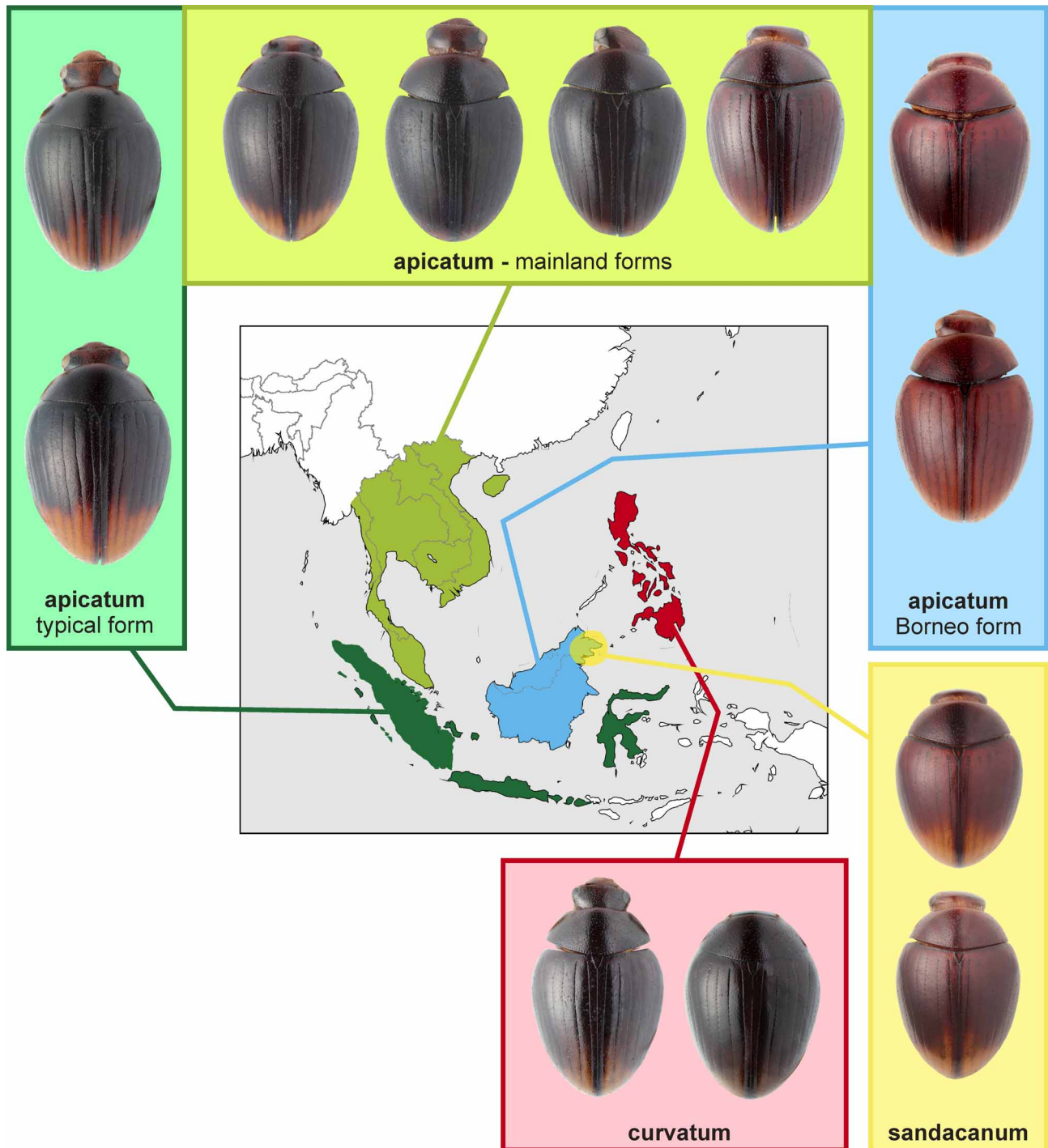


FIGURE 72. Distribution and geography-based color variation of the species of the *Pachysternum apicatum* complex.

Pachysternum apicatum is a highly variable taxon which may in fact consist of several sibling species. However, we failed to find any characters strictly correlating with the distribution and reliably indicating that any form may represent a separate species. For that reason, we assigned all these forms to the polytypic *P. apicatum* and left them unnamed. The situation seems to be rather clear on the islands (Fig. 72): the unicolored form occurs in Borneo whereas the typical (i.e. corresponding with the lectotype of *P. apicatum*) dark form with large apical elytral spots inhabits the island chain from Sumatra to Lombok and probably also Sulawesi (only one historical specimen is known from there, however). Surprisingly, a more complex situation was found in mainland SE Asia, where both color forms occur including their intermediates (the unicolour form dominates in Malay peninsula, whereas the typical form in northern Thailand and Laos). Besides, some additional morphotypes were found in mainland SE Asia, e.g. the specimens with typical coloration but deeply bisinuate anterior tibiae. Even in these cases, intermediates to other forms were found. The seemingly chaotic situation in mainland SE Asia prevented us from recognizing any form as a separate species at present. Future studies, containing more material from both mainland and insular SE Asia and applying molecular data may be helpful for understanding the taxonomy of these beetles more in detail, reliable delimitation of the species and their morphological characterization.

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