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Review of the Gymnopleurini (Coleoptera: Scarabaeidae: Scarabaeinae). III. Asian species of Garreta Janssens

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Review of the Gymnopleurini (Coleoptera: Scarabaeidae: Scarabaeinae).
III. Asian species of *Garreta* Janssens

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Abstract. The genus *Garreta* Janssens (Coleoptera: Scarabaeidae: Scarabaeinae) is defined and a checklist of and a key to the Asian species-group taxa are presented.

Key Words. Definition, distribution, Asia, checklist, key.

Introduction

Janssens (1940) revised the tribe Gymnopleurini, divided the then-single genus *Gymnopleurus* into four genera (*Gymnopleurus* Illiger, *Allogymnopleurus* Janssens, *Paragymnopleurus* Shipp and *Garreta* Janssens), provided keys and synonymies for each genus and species, and placed 19 species in *Garreta*. Only three species of *Garreta* have been described since 1940: *G. basilewskyi* Balthasar, *G. sylvestris* Mittal and *G. zumpti* Frey. The genus presently contains 14 Afrotropical and 10 Oriental species, with a few crossing from the Oriental region into the southeastern Palearctic. Mittal (2011) and Chandra and Gupta (2014) treated the eight Indian species, and Davis et al. (2008a) commented on distributions, ecology and taxonomy of the Afrotropical species. Most recently, Moretto and Génier (2015) revised a majority of the Afrotropical species and designated *Gymnopleurus laetus* Hope as the type species of *Garreta*.

Garreta differs from the other three gymnopleurine genera in the characters shown in Table 1.

Table 1. Characters of gymnopleurine genera.

	<i>Gymnopleurus</i>	<i>Allogymnopleurus</i>	<i>Paragymnopleurus</i>	<i>Garreta</i>
Clypeus	2-dentate or 4-dentate	4-dentate or 6-dentate	2-dentate or weakly 4-dentate	4-dentate
Clypeus / gena transition	excised	shallowly U/V-shaped	straight or nearly straight	obtusely V-shaped
Metepimeron / 1st ventrite boundary	invisible or a faint impression	distinct suture	distinct suture	distinct suture
Number of mesotibial spurs	1	1	1 or 2	2

The number of clypeal teeth alone distinguishes *Garreta* only from *Paragymnopleurus* (except *P. martinezi*), reliable separation from the other genera requires checking more than one character. The discrete suture between the metepimeron and the first ventrite, and the two mesotibial spurs distinguish *Garreta* from *Gymnopleurus*, but examination of the spurs in multiple specimens is advised because the smaller second spur is articulated and therefore more prone to accidental loss. Separation of *Garreta* from *Allogymnopleurus* can become equivocal (unless the clypeus happens to be sexdentate) because it hinges on the completeness of the mesotibia (one vs. two spurs) and on the clypeus / gena transition, which is rather similar in the two genera. This ambiguity caused Janssens (1940: 32) to mistakenly synonymize *Gymnopleurus splendidus* Bertoloni with *Garreta nitens* (Olivier) and to subsequently (Janssens 1943) revalidate and reassign the species to *Allogymnopleurus* (for further details see Pokorný and Zidek 2009: 144).

Most of *Paragymnopleurus* species with two mesotibial spurs have the clypeus bidentate, and most of those with a weakly quadridentate clypeus have only one mesotibial spur. The only exception is *Paragymnopleurus martinezi* Balthasar that has both a weakly quadridentate clypeus and two mesotibial spurs, and may thus be interpreted as a *Garreta*. A case in point is an old NMPC female specimen labeled “*Garreta* sp. n. / det. G. Frey 1956 // En-Lo 1908 // Indo China / Coll. Dussault”, which differs from the holotype of *Gymnopleurus* (*P.*) *martinezi* Balthasar (NMPC, 14 mm long male from “Nitou-Tatsienlu”, Sichuan, China) only in size (18 mm) and is in our opinion the second known specimen of this species. We followed Balthasar (1955) in treating the species as *Paragymnopleurus* (Pokorný and Zídek 2014) because the second pair of clypeal teeth is only incipient, but the decision is admittedly arbitrary.

The genus *Garreta* ranges throughout Africa and in Asia north up to at least the 35th parallel (northwest India) and south to Sri Lanka between the 6th and 10th parallels. The known southeastern limit is in Thailand (*G. gilleti* and *G. ruficornis*) and the genus appears not to occur in Indonesia. The Balthasar collection at NMPC contains an old unidentified specimen labeled “Java”, but it definitely is a case of mistaken provenience as comparison with Afrotropical species shows it to be *Garreta crenulatus* (Kolbe) native to the Rift Valley region (Rwanda, Uganda, DRC).

Some of the *Garreta* species are metallic, ranging from shades of green through coppery to blue, which has led to the naming of subspecies and varieties. In the Asian taxa, those described as varieties must be regarded as subspecies due to their pre-1961 vintage (ICZN 1999, Article 45.6.4). We treat them here as synonyms of the nominotypical taxa, however, because they concern iridescent species in which temperature-induced changes in ultrastructure of the exocuticle result in altered reflected colors, generally bluish in cooler, greenish in warmer, and coppery in intermediate conditions (Davis et al. 2008b and references therein). The polychromaticity is not accompanied by any other discernible morphological changes and is not strictly clinal either, because altitude, exposure, year-to-year temperature variation and perhaps other factors are involved.

Since there is no overlap between the African and Asian species, we find it practical to treat them separately. Dorsal habitus and the enlarged metasternal process of the valid species are illustrated, and figures are cited in the checklist. Full ventral views have been omitted because they are not necessary for identifications and would unduly increase the number of figures. Invalid names in the checklist are offset by emdashes.

Materials and Methods

Collections housing type and other specimens pertinent to this study are given in the checklist below by the following codens (chiefly after Arnett et al. 1993):

BMNH	Natural History Museum, London, UK;
INPC	National Pusa Collections, New Delhi, India;
ISNB	Institut Royal des Sciences Naturelles, Brussels, Belgium;
MNHN	Muséum National d'Histoire Naturelle, Paris, France;
NHMW	Naturhistorisches Museum, Vienna, Austria;
NMPC	National Museum (Natural History), Prague, Czech Republic;
OXUM	Oxford University Museum of Natural History, UK;
SPPC	S. Pokorný, Prague, Czech Republic;
ZMHB	Museum für Naturkunde der Humboldt Universität, Berlin, Germany;
ZMUH	Zoologisches Institut und Museum Universität Hamburg, Germany;
ZMUM	Zoological Museum of Moscow University, Russia.

Checklist of Asian Species

–*capicola* (Castelnau, 1840: 70) (*Gymnopleurus*); MNHN, OXUM [Hope Coll.]; = *mundus dejeanii* (Castelnau, 1840: 70) (*Gymnopleurus*); MNHN? (type not found, see Arrow 1931: 59 and Mit-tal 2011: 297); India (Chhattisgarh, Himachal Pradesh, Kerala, Madhya Pradesh, Maharashtra, Tamil Nadu). **Fig. 1, 12, 18**

- gilleti* (Garreta, 1914: 412) (*Gymnopleurus*); MNHN; India (Uttar Pradesh), Thailand, Vietnam. **Fig. 2, 19, 27**
- inconspicuus* (Waterhouse, 1890: 371) (*Gymnopleurus*); BMNH; = *dejeanii*
- mombelgi* (Boucomont, 1929: 760) (*Gymnopleurus*); MNHN; China (Sichuan, Yunnan). **Fig. 3, 13, 20**
- morosus* (Fairmaire, 1886: 319) (*Gymnopleurus*); MNHN; China (Sichuan, Yunnan). **Fig. 4, 14, 21**
- mundus* (Wiedemann, 1819: 162) (*Gymnopleurus*); formerly ZMUH (type destroyed during WW2, see Mittal 2011: 297); sw. China, India (Bihar, Chhattisgarh, Madhya Pradesh). **Fig. 5, 22**
- opacus* (Kollar and Redtenbacher, 1844: 516) (*Gymnopleurus*); NHMW? (type not found, see Mittal 2011: 297); India (Himachal Pradesh, Jammu and Kashmir, Uttarakhand), Nepal. **Fig. 6, 15, 23**
- ruficornis* (Motschulsky, 1854: 63) (*Gymnopleurus*); ZMUM; Afghanistan, China (Shanghai, Yunnan), India (Assam, Himachal Pradesh), Burma, Thailand. **Fig. 7, 24**
- similaris* Janssens, 1940: 25, 31 (as var. of *Garreta gilleti*); ISNB; = *G. gilleti gilleti*
- smaragdifer* (Walker, 1858: 208) (*Gymnopleurus*); BMNH; India (Chhattisgarh, Madhya Pradesh, s. India), Sri Lanka. **Fig. 8, 16, 25**
- splendens* (Castelnau, 1840: 71) (*Gymnopleurus*); OXUM [Hope Coll.]; = *sumptuosus*
- subtilis* (Waterhouse, 1890: 372) (*Gymnopleurus*); BMNH; = *ruficornis*
- sumptuosus* (Castelnau, 1840: 71) (*Gymnopleurus*); OXUM [ex Gory Coll.]; India (Maharashtra, Tamil Nadu). **Fig. 9, 17, 26**
- sylvestris* Mittal, 2011: 297; INPC; India (Haryana). **Fig. 10–11**

Key to Asian Species

1. Pronotal base with medial pair of elongate impressions **2**
 — Pronotal base without medial pair of impressions **7**
- 2(1). Basal impressions of pronotum faint. Apex of metasternal process forms pronounced, nearly vertical rounded peg delimited against metasternal plate by transverse impression (Fig. 19 and 27). Length 15–22 mm ***G. gilleti* (Garreta)**
 — Basal impressions of pronotum well defined. Apex of metasternum without transverse impression **3**
- 3(2). Pronotum punctate **4**
 — Pronotum granulose **5**
- 4(3). Dorsum shagreened, matte. Length 14–17 mm ***G. mundus* (Wiedemann)**
 — Dorsum glossy, metallic green. Length 14–20 mm ***G. sumptuosus* (Castelnau)**
- 5(3). Metasternal process rounded. Length 13–16 mm ***G. opacus* (Kollar and Redtenbacher)**
 — Metasternal process angular or keeled **6**
- 6(5). Metasternal process keeled. Elytral striae faint, impunctate. Pygidium matte. Length 14–20 mm ***G. dejeanii* (Castelnau)**
 — Metasternal process less pronounced, angular. Elytral striae well defined, finely punctate, especially in 3rd and 4th striae. Pygidium glossy. Length 12–18 mm .. ***G. sylvestris* Mittal**
- 7(1). Metasternal process inconspicuous, rounded **8**
 — Metasternal process well defined, keeled or angular **9**
- 8(7). Tooth on front side of profemur situated at midlength. Pronotum shagreened and weakly asperately punctate. Length 15–22 mm ***G. morosus* (Fairmaire)**
 — Tooth on front side of profemur situated at two-thirds of length. Pronotum very finely shagreened and faintly punctate. Length 16–18 mm ***G. mombelgi* (Boucomont)**

- 9(7). Body matte, dark bronze. Pronotum granulose. Metasternal process tooth-like, delimited against metasternal plate by transverse impression. Length 14–19 mm ***G. ruficornis* (Motschulsky)**
- Body glossy, metallic green or blue. Pronotum sparsely punctate. Metasternal process angular, without transverse impression. Length 17–18 mm ***G. smaragdifer* (Walker)**

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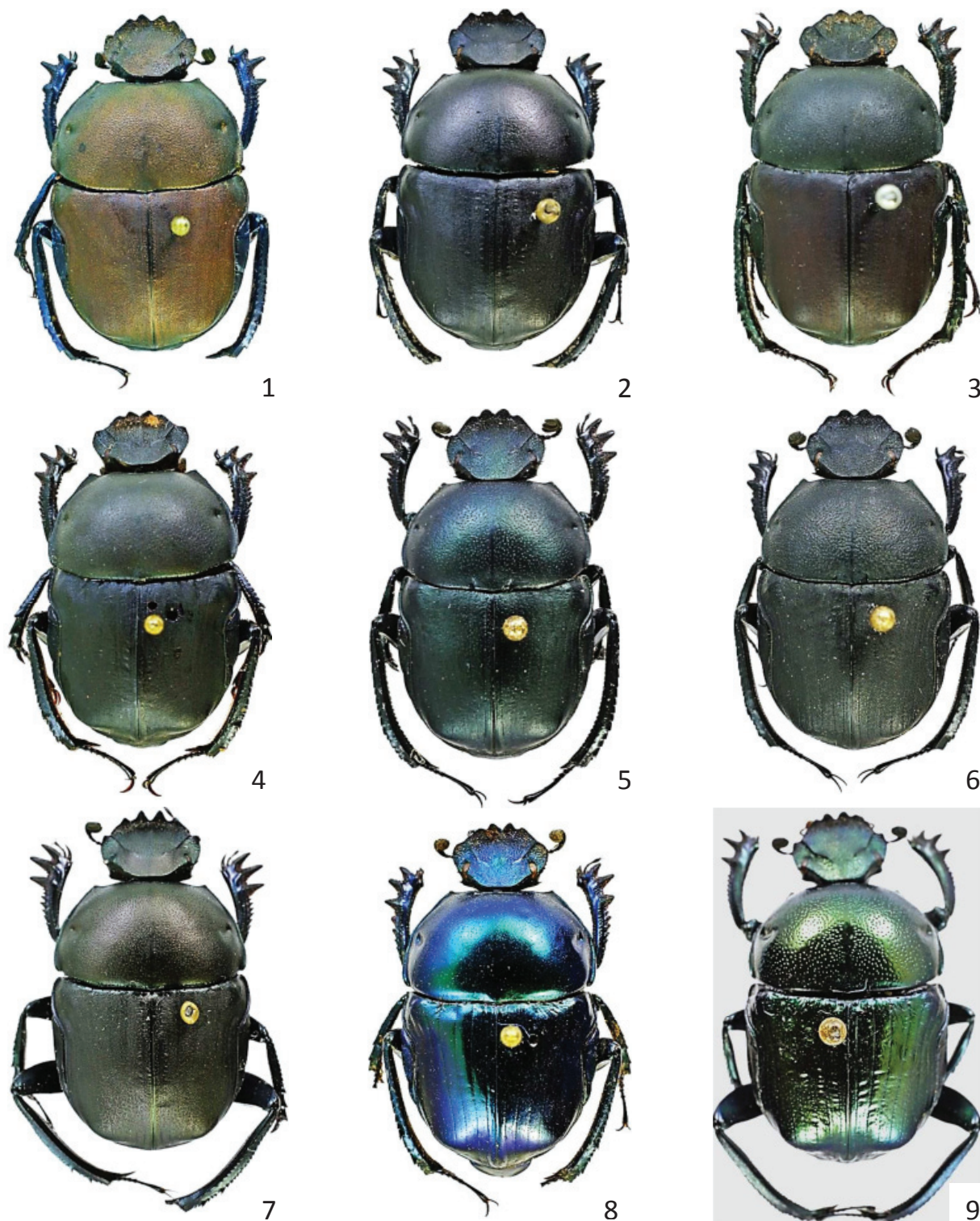
We thank M. Barclay (BMNH), J. Hájek (NMPC) and D. Mann (OXUM) for lending us the material of *Garreta* in their care, I. C. Mittal (Kurukshetra University, Haryana, India) for photos of the holotype and allotype of *Garreta sylvestris*, and A. Bezděk (Czech Academy of Sciences, České Budějovice) and S. Ziani (Imola, BO, Italy) for critically reading the manuscript.

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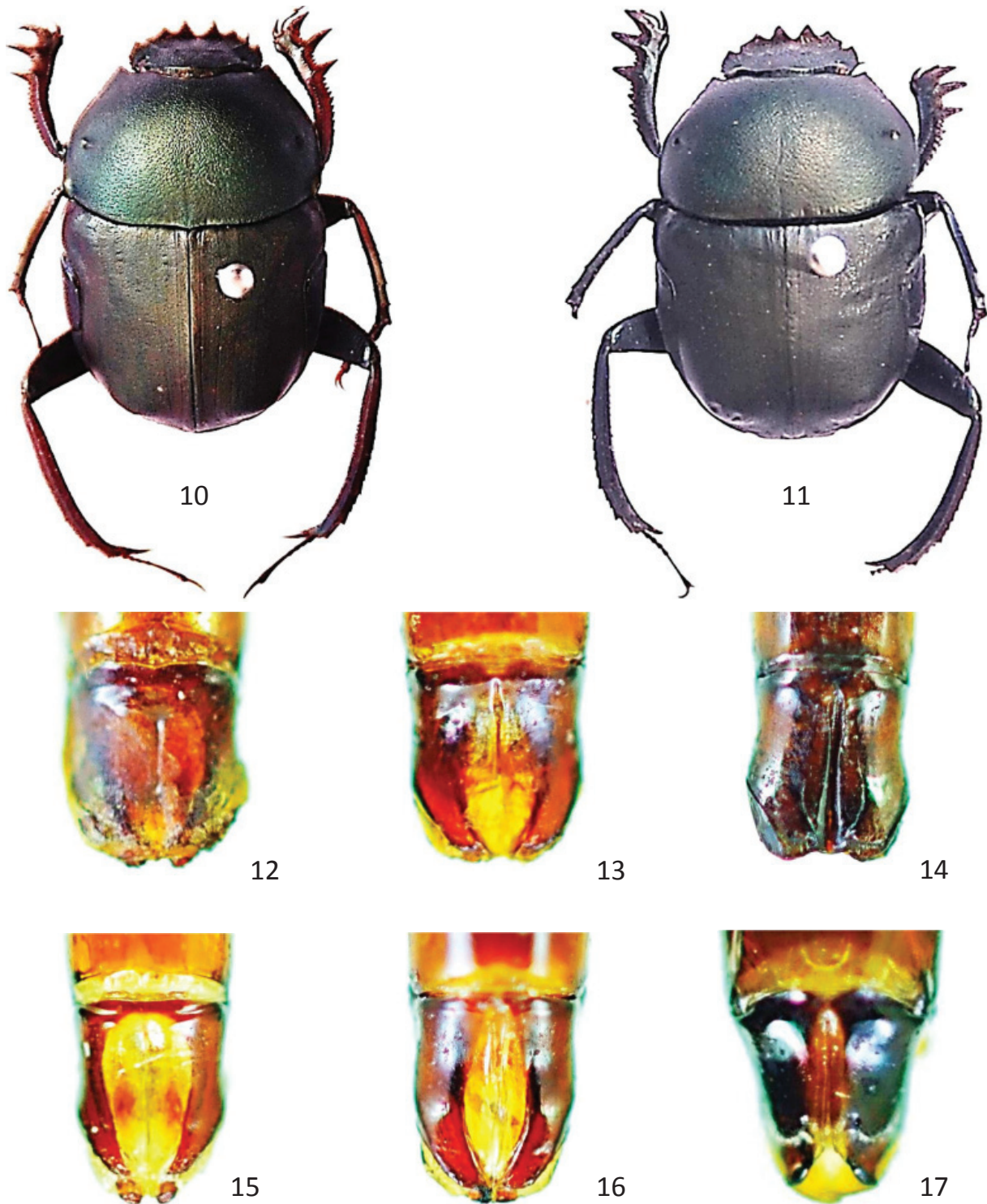
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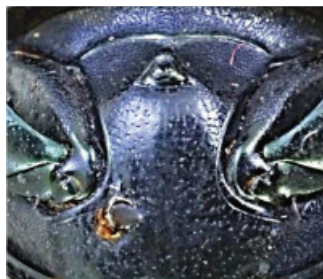
Figures 1–9. Asian *Garreta* spp., dorsal habitus. 1) *G. dejeanii* (Castelnau), male, 21 mm. 2) *G. gilleti* (Garreta), female, 18 mm. 3) *G. mombelgi* (Boucomont), male, 17.5 mm. 4) *G. morosus* (Fairmaire), female, 16 mm. 5) *G. mundus* (Wiedemann), female, 16 mm. 6) *G. opacus* (Kollar and Redtenbacher), female, 14 mm. 7) *G. ruficornis* (Motschulsky), male, 19.5 mm. 8) *G. smaragdifer* (Walker), male, 20 mm. 9) *G. sumptuosus* (Castelnau), male, 18.5 mm.



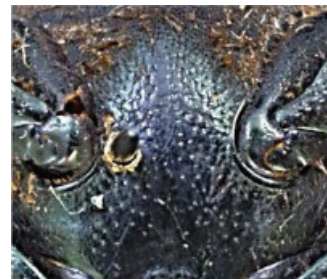
Figures 10–17. Asian *Garreta* spp., dorsal habitus (10–11) and parameres (12–17). *Garreta sylvestris* Mittal, **10**) holotype male and **11**) allotype female. Photos courtesy of I. C. Mittal. **12**) *G. dejeanii* (Castelnau). **13**) *G. mombelgi* (Boucomont). **14**) *G. morosus* (Fairmaire). **15**) *G. opacus* (Kollar and Redtenbacher). **16**) *G. smaragdifer* (Walker). **17**) *G. sumptuosus* (Castelnau).



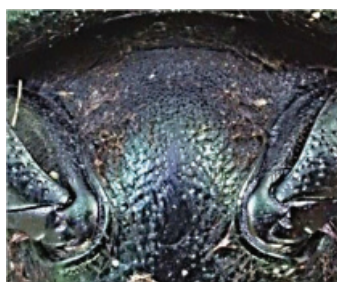
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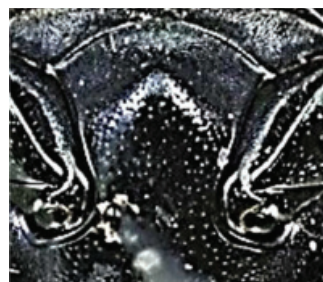
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Figures 18–27. Asian *Garreta* spp., metasternal process and meso-metasternal suture. **18)** *G. dejeanii* (Castelnau). **19)** *G. gilleti* (Garreta) (see also Fig. 27). **20)** *G. mombelgi* (Boucomont). **21)** *G. morosus* (Fairmaire). **22)** *G. mundus* (Wiedemann). **23)** *G. opacus* (Kollar and Redtenbacher). **24)** *G. ruficornis* (Motschulsky). **25)** *G. smaragdifer* (Walker). **26)** *G. sumptuosus* (Castelnau). **27)** *G. gilleti*, ventrolateral view of metasternal peg-like tip.