

Ganganomala Saltini Ratcliffe, Jameson, and Zorn, a New Genus and Species of Anomalini (Coleoptera: Scarabaeidae: Rutelinae) from Bangladesh and Nepal, with a Revised Circumscription of the Tribe

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GANGANOMALA SALTINI RATCLIFFE, JAMESON, AND ZORN, A NEW GENUS AND SPECIES OF ANOMALINI (COLEOPTERA: SCARABAEIDAE: RUTELINAE) FROM BANGLADESH AND NEPAL, WITH A REVISED CIRCUMSCRIPTION OF THE TRIBE

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ABSTRACT

Ganganomala saltini Ratcliffe, Jameson, and Zorn, a **new genus** and **new species** of Anomalini (subtribe Anomalina), is described from Bangladesh and Nepal. To place the new genus within the context of the tribe and subtribe, we provide a key to the four subtribes of world Anomalini, a list of comparative characters and character states for diagnosis and classification of Old World Anomalina, and comparative diagnostic characters for genera of Old World Anomalina. Circumscription, description, diagnosis, and illustrations for the new genus and species are provided. As a result of this research, the Anomalina includes 50 genera and subgenera, and advances our understanding of global anomaline biodiversity.

Key Words: scarab beetle, leaf chafer, taxonomy, Anomalina, South Asia

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The leaf chafer tribe Anomalini, with over 2,000 species, includes one of the largest animal genera, *Anomala* Samouelle (Krajčič 2007). The group is economically important and includes species that cause damage to food and horticultural crops and are occasionally invasive in regions where they have been transported (Jackson and Klein 2006). Our understanding of the biodiversity of New World genera in the tribe has grown steadily since the beginning of the 21st century. Phylogenetic analyses provide evidence for relationship of the Anomalini to the Dynastinae plus Adoretini (Rutelinae) (Ahrens *et al.* 2014; Sípek *et al.* 2016) and information about relationships among the genera (Ramírez-Ponce and Morón 2009 [*Anomala* Samouelle]; Filippini *et al.* 2015 [*Callistethus* Blanchard]; Paucar-Cabrera 2003 [*Epectinaspis* Blanchard]). Systematic treatments of New World anomaline groups provide keys to genera

(Jameson *et al.* 2003; Morón and Ramírez-Ponce 2012) and identification of regional faunas (Filippini *et al.* 2016). In comparison with the research conducted in the New World, little synthetic research has been done in the Old World. The *Catalog of Palaearctic Coleoptera* (Zorn 2004; Löbl and Smetana 2006; Löbl and Löbl 2016) provides a nomenclatural foundation for the Anomalini of the Palearctic region, but other Old World regions are lacking in taxonomic resources. To better understand the biodiversity of this ecologically and economically important group, a global foundation for the Anomalini is essential. The work presented herein provides one step towards unifying the global taxonomy of the Anomalina and developing a useful foundation for a broader work of world genera of Anomalini.

Our research was initiated due to peculiar scarab specimens from Bangladesh and Nepal (Figs. 1–4,

7–9, 11–12, 14–21, 24–27, 31–32, 36) that posed difficulties for their placement in the subfamily Dynastinae or Rutelinae. Overlap of characters used for identifying ruteline and dynastine taxa has resulted in unstable classification and vacillation of some taxa between subfamilies (Endrödi 1960, 1985; Jameson *et al.* 2002). Endrödi (1960) noted that the “simplest members of the Rutelinae are so similar [to dynastines] that, in some cases, it is not easy to decide whether a form is a dynastine or a ruteline” [translated from German]. This uncertainty highlights the need for continued research on scarabaeoid phylogenetic relationships and comparative morphology.

Because of unusual character states, these specimens first required identification at the subfamily and tribal levels. Based on male character states, we reviewed the body of taxonomic literature on Old World Dynastinae (Arrow 1917, 1925; Carne 1957a; Endrödi 1985). Female character states led us to review the body of taxonomic literature on Old World Rutelinae (*e.g.*, Arrow 1917; Machatschke 1957; Carne 1957b, 1958; Paulian 1959; Baraud 1985; Chandra 1991; Prokofiev 2014). We also considered that some specimens may have been transported to Bangladesh and that their associated locality data were incorrect or otherwise misleading, so we examined the global literature to identify the unusual specimens. Overall resemblance of the specimens with *Anomala dorsalis* Fabricius (Figs. 5–6; formerly in the *Anomala* subgenus *Rhinoplia* Burmeister) resulted in taxonomic confusion that required unraveling. Finally, after much study, we determined that the peculiar specimens represent a new genus and species of Anomalini (subtribe Anomalina), both of which we describe here.

MATERIAL AND METHODS

The generic and species-level characters and terminology are based on Jameson *et al.* (2003), Ramírez-Ponce and Morón (2009), and Filippini *et al.* (2015). Body measurements are based on length as measured from the apex of the clypeus to the apex of the elytra. Interocular width is defined as the number of transverse eye diameters across the frons. Body width was measured at mid-elytra. Puncture density was considered “dense” if punctures were nearly confluent to less than two puncture diameters apart, “moderately dense” if punctures were from two to six puncture diameters apart, and “sparse” if punctures were separated by more than six puncture diameters. Puncture size was defined as “small” if punctures were 0.02 mm or smaller, “moderate” if 0.02–0.07 mm, “moderately large” if

0.07–0.12 mm, and “large” if 0.12 mm or larger. Setae were defined as “moderately dense” if the surface was visible but with many setae, and “sparse” if there were few setae.

Distribution of *Anomalina* genera (Table 1) is based on the literature and the zoogeographical regions as defined by Löbl and Löbl (2016) who considered Nepal and northern India (Arunachal Pradesh, Uttarakhand, Uttar Pradesh, Himachal Pradesh, Jammu and Kashmir) as part of the Palearctic region. Bangladesh was considered part of the Oriental region by Löbl and Löbl (2016).

To assist in unifying the systematic treatment of world Anomalini, we use the diagnostic characters developed for New World anomaline genera (Morón and Ramírez-Ponce 2012) (Table 2). We note discrepancies in the character states, and we include additional comparative characters. This list provides a much-needed foundation for comparison and diagnosis of world genera of Anomalini.

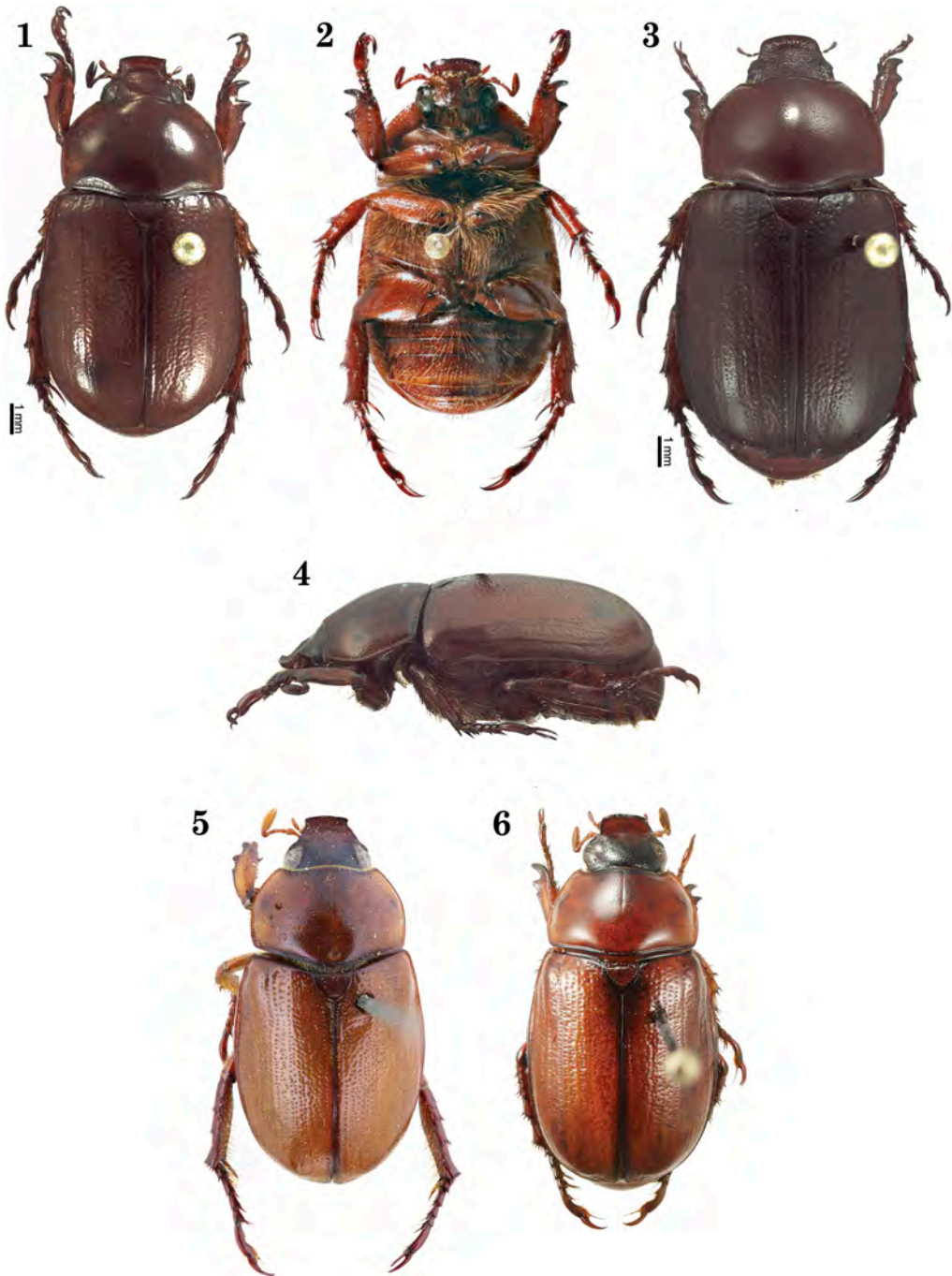
Type specimens are deposited at the following institutions and collections: University of Nebraska State Museum, Lincoln, NE, USA (UNSM); Institut Royal des Sciences Naturelles de Belgique, Brussels, Belgium (IRSNB); Naturkundemuseum Erfurt, Germany (NMEG); Jochen Saltin Collection, Dornum, Middelsbur, Germany (JPSC); Mary Liz Jameson Collection, Wichita, KS, USA (MLJC); Carsten Zorn Collection, Gnoien, Germany (CCZ).

We use the phylogenetic species concept as outlined by Wheeler and Platnick (2000). This concept defines species as the smallest aggregation of (sexual) populations diagnosable by a unique combination of character states.

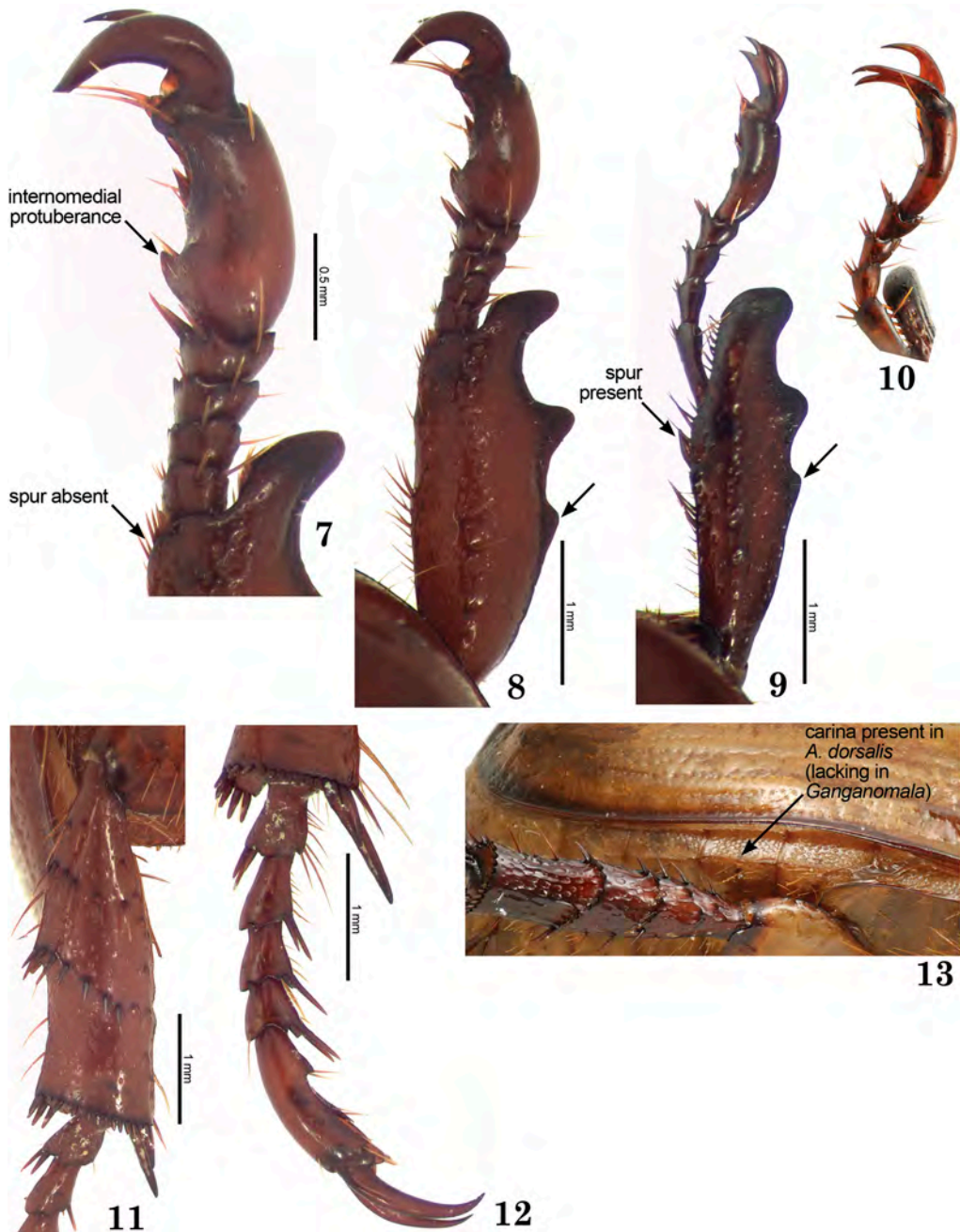
CLASSIFICATION OF WORLD ANOMALINI

There are discrepancies regarding the number of world genera of Anomalini. According to Morón and Ramírez-Ponce (2012), there are 53 Anomalini genera worldwide, with 14 genera known in Mesoamerica. According to Filippini *et al.* (2015) (citing Krajčák 2007), the tribe Anomalini includes 65 genera, 15 of which are known from the Neotropics. Neither of these publications discussed the subtribal framework of the tribe or assigned genera to subtribes of Anomalini. The number of world genera continues to grow unabated without a well-founded taxonomic framework or synthesis (*e.g.*, Uliana and Sabatinelli 2017).

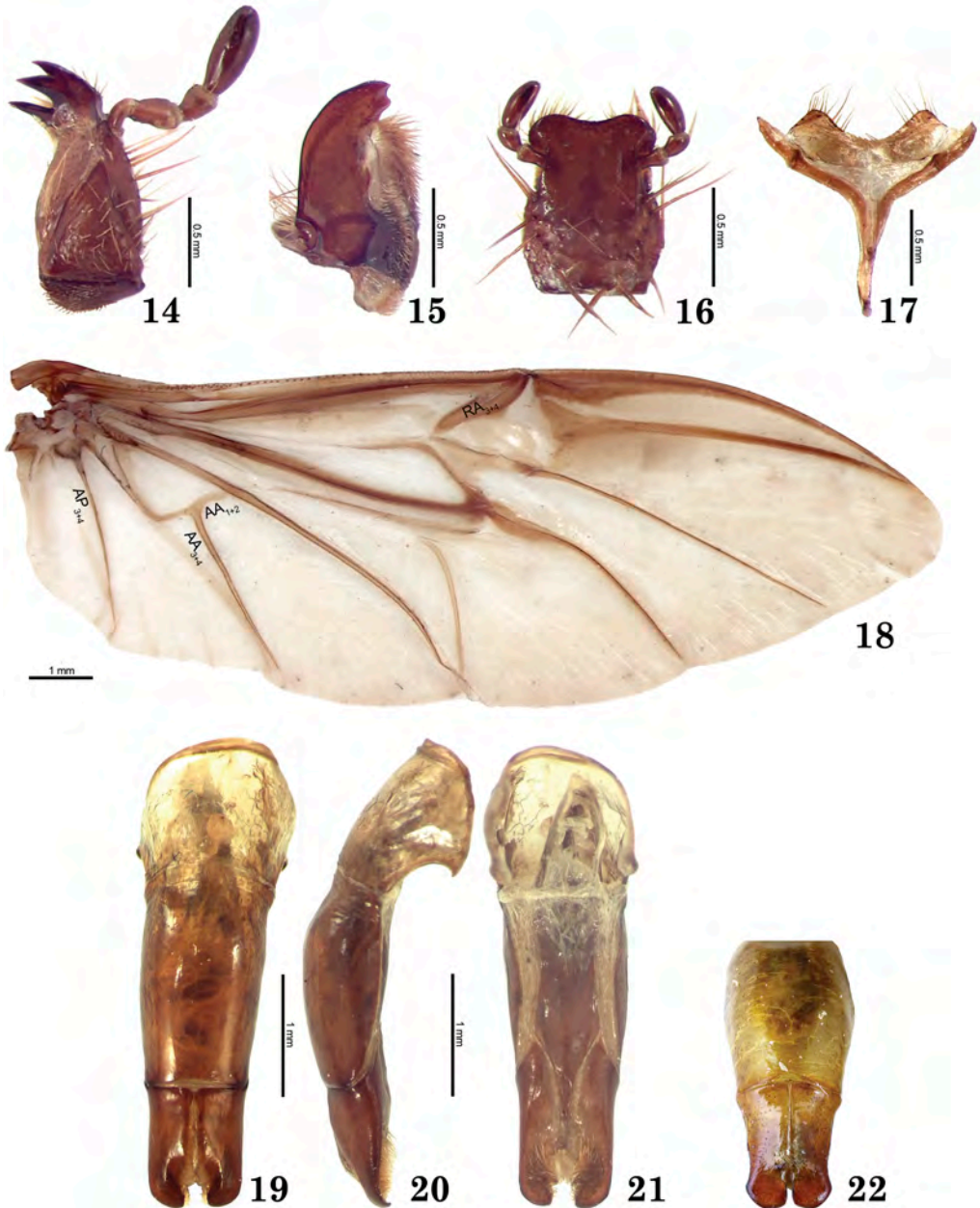
Anomalini include four subtribes: *Anomalina* Streubel, 1839; *Anisopliina* Burmeister, 1844; *Isopliina* Péringuey, 1902; and *Popilliina* Ohaus, 1918 (Smith 2006; Ramírez-Ponce and Morón 2009). Based on phylogenetic analysis, the genus *Leptohoplia* Saylor, 1935 (subtribe *Leptohopliina*



Figs. 1–6. Habitus of *Ganganomala saltini* in comparison with *Anomala dorsalis*. **1)** *G. saltini*, male holotype, dorsal view; **2)** *G. saltini*, male holotype, ventral view; **3)** *G. saltini*, female allotype, dorsal view; **4)** *G. saltini*, male paratype, lateral view; **5)** *A. dorsalis*, male, dorsal view (syntype of *Anomala fraterna*, MLUH); **6)** *A. dorsalis*, female, dorsal view.



Figs. 7–13. Comparative characters of *Ganganomala saltini* and *Anomala dorsalis*. **7)** *G. saltini*, male, greatly enlarged protarsus 5, well-developed internomedial protuberance, simple claws, and protibial spur lacking; **8)** *G. saltini*, male, external margin of protibia with three well-developed teeth; **9)** *G. saltini*, female, protibial spur, claw split, and tibia with three external teeth; **10)** *A. dorsalis*, female, protarsus similar to that of female *G. saltini*; **11)** *G. saltini*, male, metatibial apex and metatarsomere 1; **12)** *G. saltini*, male, moderately developed, internomedial protuberance on metatarsomere 5 and simple claws; **13)** *A. dorsalis*, lateral ventrites with well-defined carina.



Figs. 14–22. Morphological characters for *Ganganomala saltini* and *Anomala dorsalis*. *G. saltini*: **14**) Left maxilla, ventral view; **15**) Left mandible, dorsal view; **16**) Mentum, ventral view; **17**) Spiculum gastrale and associated sclerites; **18**) Hind wing, ventral view; **19**) Parameres, dorsal view; **20**) Parameres, lateral view; **21**) Parameres, ventral view. **22**) *A. dorsalis* (syntype of *A. fraterna*, MLUH), parameres, dorsal view.

Potts, 1974) was synonymized with the genus *Anomala*, thus resulting in the synonymy of the subtribe Leptohoplina with the subtribe Anomalina (Ramírez-Ponce and Morón 2009).

Identification of the four recognized subtribes of Anomalini assists in creating a unified taxonomic concept for the group and aids in the recognition of our new taxa.



Fig. 23. Distribution of *Ganganomala saltini* in relation to the Ganges River Basin and locations in Nepal and Bangladesh. Map courtesy of A. Smith.

**KEY TO THE SUBTRIBES OF THE TRIBE
ANOMALINI (SCARABAEIDAE: RUTELINAE)**
(modified from Ohaus 1934)

1. Pronotal base anterior to scutellum emarginate anterioriad **subtribe Popilliina**
- 1'. Pronotal base anterior to scutellum evenly rounded, never emarginate anterioriad 2
2. Labrum projects anteriorly beyond anterior margin of clypeus in dorsal view. Anterior coxae longitudinal. All claws unclleft. South Africa **subtribe Isopliina**
- 2'. Labrum more or less hidden beneath anterior margin of clypeus in dorsal view. Anterior coxae transverse. Claws of pro- and mesotarsi usually incised (metatarsal claws incised or not). South Africa or elsewhere 3
3. Clypeal apex constricted, elongate, attenuate, strongly reflexed (e.g., fig. 7 in Jameson *et al.* 2007) **subtribe Anisopliina**
- 3'. Clypeal apex not (or rarely) constricted, attenuate, and strongly reflexed (instead, clypeus transverse, quadrate, or elliptical) (e.g., figs. 28–29 in Jameson *et al.* 2007) ...
..... **subtribe Anomalina**

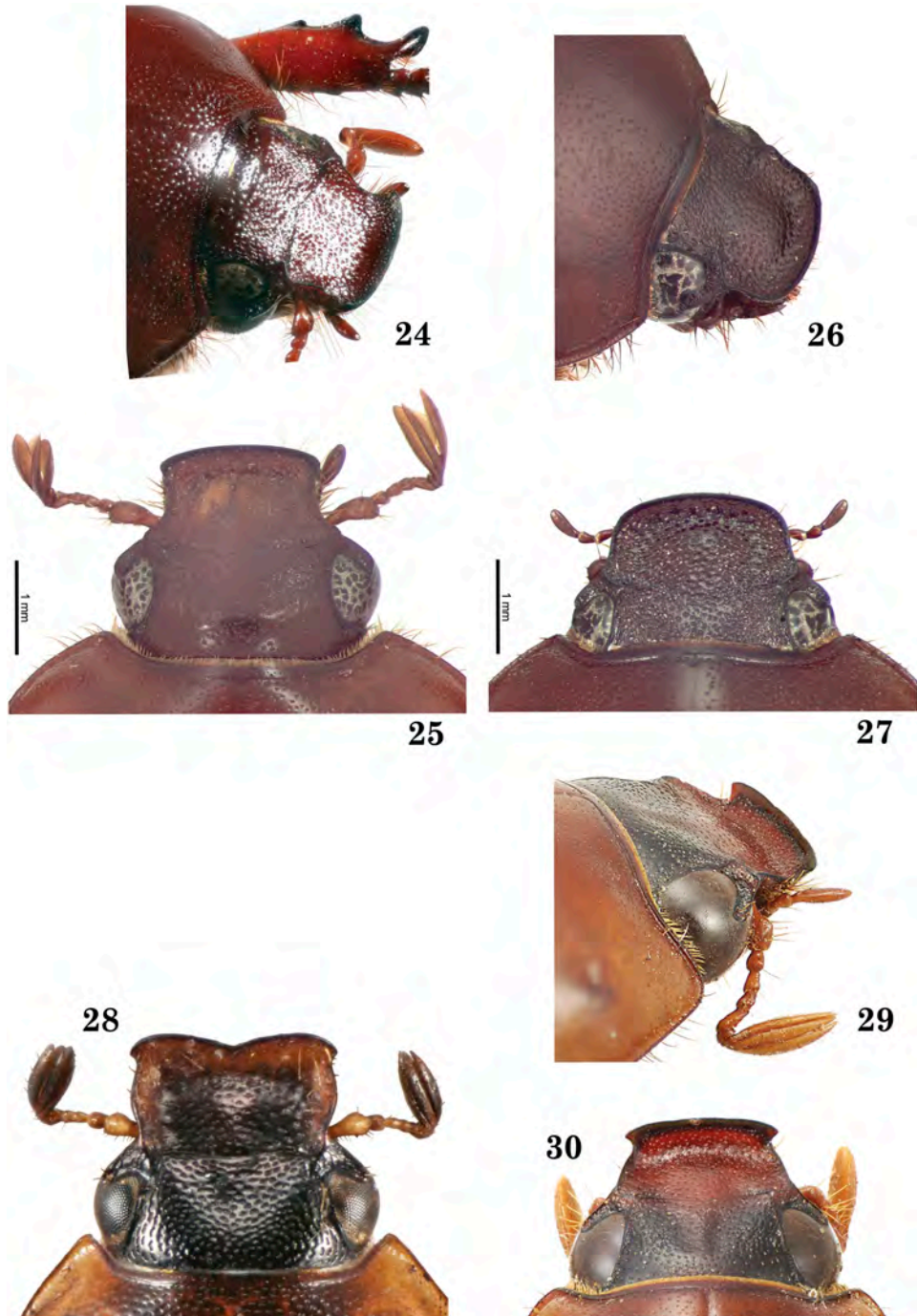
Worldwide, 50 genera and subgenera in the subtribe Anomalina are recognized (Table 1). Biosecurity and knowledge of biodiversity require a global framework for diagnosis and classification of this important group of insects. Synthetic treatments of New World genera have advanced our biodiversity knowledge (e.g., Bader 1992; Jameson *et al.* 2003; Morón and Ramírez-Ponce 2012; Paucar-Cabrera 2003), but few synthetic treatments for Old World genera and subgenera of Anomalina have been published in the past 50 years (Table 1). Dichotomous keys for identification of Old World anomalines (Arrow 1917; Machatschke 1957) are so badly out of date that they are of little utility. Diagnoses and descriptions that lack comparison

with Anomalina genera, lack of adequate illustrations of some genera, and difficulty accessing specimens of some genera prevent us from developing a key to all genera of Anomalina. However, character states that are useful for New World anomaline genera (see Morón and Ramírez-Ponce 2012) provide a useful foundation for a broader work of world genera of Anomalini and diagnosis of our new genus (Table 2). With inclusion of our new genus, the subtribe Anomalina includes 50 genera and subgenera worldwide.

***Ganganomala* Ratcliffe, Jameson, and Zorn,
new genus**

(Figs. 1–4, 7–9, 11–12, 14–21, 23–27, 31–32, 36)
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Description. Form: Elongate oval, robust, apices of elytra broadly rounded, pygidium exposed beyond elytra; dorsum convex, glabrous. Color dark reddish brown. Sexual dimorphism present on clypeus, protibia, and protarsomeres. Length 15.2–16.2 mm; width 8.1–8.4 mm. **Head** (Figs. 1–4, 24–27): Frons flat or weakly concave, lacking tubercles, surface punctate, punctures minute or large. Frontoclypeal suture poorly indicated, obsolete medially, weakly arcuate, reaching each lateral margin near ocular canthus. Clypeus with surface flat or weakly concave, punctate, punctures minute or large; apex of male quadrate, strongly or moderately reflexed with anterolateral angle square; apex of female weakly rounded, moderately reflexed with anterolateral margin rounded; margins of male bowed inward, base slightly wider than apex; margins of female parallel, slightly narrower at apex than at base. Eye canthus planar, not cariniform. Interocular width equals 3.0–5.2 transverse eye diameters. Antenna with 9 antennomeres, club subequal in length to antennomeres 2–6. Labrum quadrate at middle, sides rounded, not visible or weakly visible in dorsal view. Mandible (Fig. 15) rounded externally, dorsal surface flat, inner apex bifid (teeth short, acute), molar region with 12–16 lamellae, scissorial region brush-like (lacking teeth). Maxilla (Fig. 14) with 6 acute teeth, apical tooth and 1 subapical tooth fused with base with 3 equally separated teeth; palpus 4-segmented, terminal segment subequal in length to segments 2–3 combined. Mentum (Fig. 16) with surface flat or weakly convex, apex bisinuate; length subequal to 1.2 times greatest width; terminal segment of palpus subequal in length to segments 1–2 combined. **Pronotum** (Figs. 1, 3–4): Widest at middle, width at base broad (subequal in width to elytral humeri), apical margin membranous, basal margin weakly protuberant posteriorly at middle. Disc evenly



Figs. 24–30. Head comparisons of male and female *Ganganomala saltini* and similar *Anomalina*, dorsal and dorso-oblique views. *G. saltini*: **24–25**) Male, clypeus with apex strongly reflexed and quadrate, anterolateral angles square, margins bowed inward with apex broader than base; **26–27**) Female, clypeus with apex broadly rounded and moderately reflexed, margins subequal or slightly narrower at apex than at base. **28**) *Singhala hindu*, male, clypeal apex strongly reflexed, emarginate at middle; **29–30**) *A. dorsalis*, male, clypeus with apex strongly reflexed and subquadrate, anterolateral angles acute, margins converging from base to apex.



Figs. 31–35. Protibiae of male and female of *Ganganomala saltini*, *Anomala dorsalis*, and *Hoplopus marcens* Peyerimhoff, dorsal views. **31**) *G. saltini*, male, subapical spur lacking, three external teeth; **32**) *G. saltini*, female, subapical spur present, three external teeth; **33**) *A. dorsalis* (syntype of *A. fraternata*, MLUH), male, subapical spur present, three external teeth; **34**) *A. dorsalis*, female, subapical spur present, three external teeth; **35**) *H. marcens*, male, subapical spur lacking, two external teeth, third tooth nearly obsolete.

convex. Marginal bead present apically, laterally, and at base. Surface variably punctate, punctures with or without setae laterally. **Scutellum:** Parabolic, slightly wider than long, base declivous at elytral base. Surface variably punctate. **Mesepimeron:** Base not exposed beyond elytral base in dorsal view. Basal width broader than base of elytron. **Elytra:** Surface with longitudinal, punctate striae, punctures variable. Epipleuron from base to metacoxa rounded, beaded from base to near apex, with transparent membrane from metacoxa to apex. Apex subquadrately rounded. **Propygidium:** Concealed by elytra. **Pygidium:** Width about twice length at middle. Shape subtriangular in caudal view, weakly convex in lateral view. Surface punctate, some punctures setose; setae moderately long, tawny or reddish. Apex and lateral margins beaded. **Venter:** Prosternal process obsolete, not produced ventrally, not produced to trochanter, glabrous (Fig. 2). Mesometasternal region lacking projection; mesocoxae nearly contiguous. Abdominal sternites lacking carinate ridge laterally (compare with Fig. 13 of *A. dorsalis* with carinate ridge). Apex of last abdominal sternite quadrate (male) or weakly rounded (female). **Legs** (Figs. 7–9, 11–12, 31–32, 36): Profemur lacking rounded, dilated apex. Protibia with 3 external teeth, teeth subequally spaced (Figs. 8–9); subapical spur on inner margin lacking (male, Fig. 7–8) or present (female, Fig. 9); spur subequal in length to protarsomere 2; base without protibial notch. Male protarsomere 5 robust (subequal in length to protarsomeres 1–4, width about 1/2 length) with well-developed internomedial protuberance (Fig. 7); female protarsomere 5 normal

(subequal in length to protarsomeres 2–4, width about 1/3 length) with poorly developed internomedial protuberance (Fig. 9). Male inner protarsal claw entire (not split), robust (twice thickness of outer claw), and with inner, minute, apical tooth; female inner protarsal claw split, ventral ramus subequal to dorsal ramus. Unguitractor plate of protarsus produced beyond apex of protarsomere 5, laterally flattened, bisetose. Mesotibia widest at middle, weakly expanded at apex; external margin with 1 weak, oblique carina on basal 1/4 (with 5–7 spines) and 1 moderately developed, oblique carina at middle (with 6–8 spines); apex with 6–8 spines and 2 inner spurs, longer spur produced to near apex of mesotarsomere 2. Meso- and metatarsomeres 5 with moderately developed internomedial protuberance (male) or weakly developed protuberance (female). Male mesotarsus with claws simple, split in female with ventral ramus subequal in width to dorsal ramus. Unguitractor plate of meso- and metatarsi produced beyond apex of tarsomere 5, laterally flattened, bisetose. Metatrochanter with apex not or only weakly produced beyond posterior border of femur. Metatibia (Fig. 11) widest at middle, weakly expanded at apex, external margin carinate with spines, spines on female more elongate than those on male; apex with 15–22 spines and 2 inner spurs, longer spur produced to near apex of metatarsomere 2. Metatarsus (Fig. 12) with claws simple in male and female. **Hind wing:** Apex of AA_{1+2} short, not united with CuA (Fig. 18). AP_{3+4} at base bulbous, with short, dense setae. ScA with reduced membrane and single row of poorly developed pegs. Region anterior to RA_{3+4} lacking

Table 1. Fifty genera and subgenera of world Anomalina (tribe Anomalini) from the Afrotropical Region [AFR], Australian Region [AUR], Nearctic Region [NAR], Neotropical Region [NTR], Oriental Region [ORR], Palaearctic Region [PAL], and Pacific Region [PAC]. Biogeographic regions are based on Löbl and Löbl (2016).

Genus (Subgenus)	Biogeographic region	References
<i>Adoretosoma</i> Blanchard, 1851	PAL, ORR	Machatschke 1955
<i>Anomala</i> Samouelle, 1819 ¹	AFR, AUS, NAR, NTR, ORR, PAC, PAL	Machatschke 1957 Jameson <i>et al.</i> 2003
<i>Anomaliorhina</i> Jameson Paucar-Cabrera, Solís, 2003	NTR	Machatschke 1957
<i>Anoplanomala</i> Arrow, 1917	ORR	Medvedev 1949
<i>Astopertha</i> Medvedev, 1949	PAL	Paucar 2003
<i>Balanogonia</i> Paucar, 2003	NTR	Baraud 1991
<i>Blitopertha</i> Reitter, 1903	NTR, ORR, PAL	Machatschke 1957
<i>Callistethus</i> Blanchard, 1851	NTR	Morón and Nogueira 1998
<i>Cheliabla</i> Morón and Nogueira, 1998 ²	PAL	Kobayashi and Chou 2008
<i>Choumala</i> Kobayashi, 2008	PAL	Reitter 1903
<i>Cyriopertha</i> (<i>Cyriopertha</i> Reitter, 1903)	PAL	Reitter 1903
<i>Cyriopertha</i> (<i>Apleopertha</i> Semenov, 1903)	PAL	Reitter 1903
<i>Cyriopertha</i> (<i>Pleopertha</i> Reitter, 1903)	PAL	Reitter 1903
<i>Dalatomala</i> Prokofiev, 2013	ORR	Prokofiev 2013
<i>Dilophochila</i> Bates, 1888	NTR	Morón and Howden 2001
<i>Epectinaspis</i> Blanchard, 1851	NTR	Paucar 2003; Ramirez-Ponce and Curoe 2014
<i>Exomala</i> (<i>Exomala</i> Reitter, 1903)	NAR, PAC, PAL	Reitter 1903; Baraud 1991; Shokhin 2017
<i>Exomala</i> (<i>Neoblitopertha</i> Baraud, 1991)	PAL	Baraud 1991; Rössner <i>et al.</i> 2009
<i>Exomala</i> (<i>Taxipertha</i> Baraud, 1991)	PAL	Baraud 1991; Shokhin 2017
<i>Exomala</i> (<i>Trichopertha</i> Reitter, 1903)	PAL	Baraud 1991; Shokhin 2017
<i>Ganganomala</i> Ratcliffe, Jameson, and Zorn, 2018	ORR, PAL	This publication
<i>Hontoriella</i> Escalera, 1914	PAL	Escalera 1914
<i>Hoplopus</i> Laporte, 1832	PAL	Baraud 1985
<i>Mazahuapertha</i> Morón and Nogueira, 1998	NTR	Morón and Nogueira 1998
<i>Megapertha</i> Reitter, 1903	PAL	Reitter 1903; Baraud 1991
<i>Melanopopillia</i> Lin, 1980	ORR, PAL	Lin 1980
<i>Micranomala</i> Arrow, 1911	ORR	Arrow 1911
<i>Microlothia</i> Petrovitz, 1967	PAL	Petrovitz 1967; Sabatinelli and Pontuale 1999
<i>Micropertha</i> Baraud, 1991	PAL	Baraud 1991; Shokhin 2017
<i>Mimela</i> Kirby, 1823	AFR, ORR, PAL	Ohaus 1944; Machatschke 1957; Lin 1993
<i>Moroniella</i> Ramirez-Ponce, 2015	NTR	Ramirez-Ponce 2015
<i>Navarita</i> Morón and Nogueira, 1998	NTR	Morón and Nogueira 1998
<i>Nothophanus</i> Heller, 1896	ORR	Machatschke 1957
<i>Pachysythelus</i> Blanchard, 1851	NTR	Ramirez-Ponce and Morón 2009, 2012
<i>Paramomala</i> (<i>Paramomala</i> Casey, 1915) ^{3,4}	NAR, NTR	Morón and Ramirez-Ponce 2012; Ramirez-Ponce <i>et al.</i> 2014; Ramirez-Ponce 2015

Continued on next page

Table 1. Continued.

Genus (Subgenus)	Biogeographic region	References
<i>Paramomala</i> (<i>Bucaphallianus</i> Ramírez-Ponce and Morón, 2012)	NAR, NTR	Ramírez-Ponce and Morón 2012
<i>Pentanomala</i> Ohaus, 1919	AFR	Machatschke 1957
<i>Phyllopertha</i> Stephens, 1830 ⁵	PAL, ORR	Machatschke 1957
<i>Proagopertha</i> Reitter, 1903	PAL	Machatschke 1957
<i>Pseudosinghala</i> Heller, 1891	ORR, PAL	Machatschke 1957; Kobayashi and Fujioka 2013
<i>Pseudotrigonocnemis</i> Kerth, 2007	ORR	Kerth 2007
<i>Rugopertha</i> Machatschke, 1957	NTR	Jameson <i>et al.</i> 2003; Ramírez-Ponce and Morón 2012
<i>Singhala</i> Blanchard, 1851	ORR	Machatschke 1957
<i>Spinanomala</i> Ohaus, 1910	ORR, PAL	Lin 1979; Kobayashi 2012
<i>Strigoderma</i> Burmeister, 1844	NAR, NTR	Bader 1992; Katbeh-Bader 2000; Delgado and Mora-Aguilar 2012; Ramírez-Ponce and Curoe 2014
<i>Stomanomala</i> Kolbe, 1897	AFR, PAL	Machatschke 1957
<i>Trichanomala</i> Arrow, 1917	ORR, PAL	Machatschke 1957; Lin 1979
<i>Trigonocnemis</i> Kraatz, 1894	PAL	Machatschke 1957
<i>Xochicothia</i> Morón and Ramírez-Ponce, 2012 ⁶	NTR	Morón and Ramírez-Ponce 2012; Filippini <i>et al.</i> 2015
<i>Yaaxtumukia</i> Morón and Nogueira, 1998	NTR	Morón and Nogueira 1998; Mico <i>et al.</i> 2006

¹ Ramírez-Ponce and Morón (2009) considered *Leptohoplia* Saylor, 1935 as a member of *Anomala*. This action also resulted in the synonymy of the subtribe *Leptohoplina* with the subtribe *Anomalina*.

² Morón and Ramírez-Ponce (2012) stated that *Chelilabia* was a subgenus of *Paramomala* (also referencing Ramírez-Ponce and Morón 2012), but no taxonomic change has been made. They also stated that *Leptohoplia* was a subgenus of *Paramomala* (also referencing Ramírez-Ponce and Morón 2012), but no taxonomic change has been made.

³ According to Morón and Ramírez-Ponce (2012), *Paramomala* is widely distributed in the Americas, which likely includes many species currently classified as *Anomala*. The authors also include Africa, India, and Southeast Asia in the distributional data of *Paramomala* without further explanation.

⁴ Ramírez-Ponce and Morón (2009) synonymized *Anomalacra* Casey, 1915 with *Paramomala*.

⁵ *Phyllopertha carincolis* Ohaus from Vietnam is the only species of the genus in the Oriental Region and may be incorrectly classified in that genus.

⁶ Although Morón and Ramírez-Ponce (2012) referred to *Xochicothia* as “unpublished”, they provided all requisite information required by ICZN Article 13.1 (type species designation, description, images), thus making this an available name.

Table 2. Comparative characters and character states for Old World Anomalina taxa that possess similar character states.

Taxon	Reflexed male clypeal apex with square anterolateral angles present or absent	Male protarsomere 5 with well-developed internomedial protuberance present or absent		Male protarsal claws entire (not split) or split	Male protibial spur present or absent	Male protarsal claw robust, strongly bent or not
		Protibia tridentate or not tridentate				
<i>Ganganomala</i>	Present (Figs. 24–25)	Tridentate (Figs. 31–32)	Present (Fig. 36)	Entire (Fig. 36)	Absent (Figs. 7, 31)	Robust, strongly bent (Figs. 7, 36)
<i>Anomalina dorsalis</i>	Present (Figs. 29–30)	Tridentate (Figs. 33–34)	Present (Fig. 37)	Split (Fig. 37)	Present (Fig. 33)	Robust, strongly bent (Fig. 37)
<i>Hoplopus</i>	Absent	Tridentate ¹ (Fig. 35)	Absent (Fig. 46)	Entire (Fig. 46)	Absent ² (Figs. 35, 46)	Not robust and strongly bent (Fig. 46)
<i>Anomala</i>	Absent	Tridentate or not tridentate	Present (Figs. 37–40) or absent (Fig. 43)	Entire (Fig. 43) or split (Figs. 38–40) ³	Present (Fig. 38)	Robust, strongly bent (Fig. 38) or not robust and strongly bent (Fig. 40)
<i>Exomala (Trichopertha)</i>	Present	Not tridentate	Absent	Split	Present	Not robust and strongly bent
<i>Singhala</i>	Present (Fig. 28)	Not tridentate	Present ⁴ (Fig. 41)	Split (Fig. 41)	Present or absent (Fig. 41)	Not robust and strongly bent (Fig. 41)
<i>Cyriopertha</i>	Absent	Not tridentate	Absent (Fig. 45)	Entire or split (Fig. 45) ⁵	Absent (Fig. 45)	Not robust and strongly bent (Fig. 45)
<i>Megapertha</i>	Absent	Not tridentate	Absent (Fig. 44)	Entire or split (Fig. 44) ⁶	Present (Fig. 44)	Not robust and strongly bent (Fig. 44)
<i>Proagopertha</i>	Absent	Not tridentate	Absent	Split	Present or absent ⁷	Not robust and strongly bent
<i>Mimela</i>	Absent	Tridentate or not tridentate	Absent (Fig. 42)	Entire (Fig. 42) or split	Absent	Not robust and strongly bent (Fig. 42)
<i>Micranomala</i>	Absent	Tridentate	Absent	Split	Absent	Not robust and strongly bent
<i>Microtontha</i>	Absent	Tridentate	Absent	Entire ⁸	Absent ⁸	Not robust and strongly bent
<i>Pentanomala</i>	Absent	Tridentate	Absent	Split	Absent	Not robust and strongly bent

¹ The third (basal) tooth is weakly developed in *Hoplopus*.

² According to Baraud (1985), the rudimentary spur in *Hoplopus* is sometimes missing in specimens of *Hoplopus bleusei* Chobaut, 1896.

³ Entire (not split) claws in males combined with split pro- and mesotarsal claws in females are present only in the species of the Afrotropical *Anomalina emortualis* species-group and *Anomalina vetula* species-group (Machatschke 1957) as well as several *Anomalina* species from Central Asia and the Himalayas, of which many were previously included in the subgenus *Psammoxaphesus*. In these species, the protarsal claws are always simple, not strongly thickened.

⁴ Males of *Singhala* have thickened protarsomeres 5 and a moderately developed internomedial protuberance.

⁵ The protarsal inner claw of *Cyriopertha* is entire (not split) or with a rudimentary split (scored as entire *or* split).

⁶ The protarsal inner claw of some male specimens of *Megapertha* have a very rudimentary split (scored as entire *or* split).

⁷ *Proagopertha ohbayashii* Nomura, 1965 is unique in the genus due to the presence of a protibial spur, and its classification in this genus requires examination.

⁸ Character state from Petrovitz (1967) and Sabatinelli and Pontuale (1999).

setae (except sparse setae near fold). **Parameres:** Parallel, simple, free (not fused), slightly overlapping at base (Figs. 19–21). **Spiculum gastrale:** Weakly Y-shaped and with moderately developed sclerites (Fig. 17). **Gonocoxites:** Poorly sclerotized, setose at apex.

Type Species. *Ganganomala saltini* Ratcliffe, Jameson, and Zorn by monotypy.

Higher-Level Classification. We place *Ganganomala* in the subtribe Anomalina based on the following characters: 1) pronotal base anterior to scutellum evenly rounded, never emarginate anteriorly (emarginate anteriorly in Popilliina); 2) labrum more or less hidden beneath anterior margin of clypeus in dorsal view (projecting anteriorly beyond margin of clypeus in Isopliina); 3) anterior coxae transverse (longitudinal in Isopliina); 4) clypeus not strongly elongated, constricted, and reflexed (strongly elongated, constricted, and reflexed in Anisopliina).

Generic Diagnosis. The following characters serve to diagnose the genus:

1. Protibia with three well-developed teeth on the external margin (Figs. 8–9) (in most species of Anomalini, the external margin of the protibia has two teeth, although *Anomala* species may have 1–3 teeth, according to Arrow [1917]). Several exceptions to this character state illustrate problems with the current classification (or homoplasy of the character state) and include some species of *Anomala*, a few Asian *Callistethus*, *Hoplopus* Laporte, a few species of *Mimela* Kirby from Sulawesi and Africa, *Micranomala* Arrow, *Microlontha* Petrovitz, *Tribopertha* Reitter, *Rhinyptia* Burmeister (except *Rhinyptia laeviceps* Arrow), and *Pentanomala* Ohaus.

2. Autapomorphic clypeal form in the male. The male clypeal apex is strongly reflexed, quadrate, with square anterolateral angles and the margins bowed inward (broader at apex than base) (Figs. 24–25). The female clypeal apex is broadly rounded, moderately reflexed, with the margins subequal or lightly narrower at the apex than at base (Figs. 26–27) (shared with many Anomalini).

3. Male protarsus 5 greatly enlarged (Figs. 7, 36) (subequal in length to tarsomeres 1–4, widest width half length) and with well-developed internomedial protuberance (autapomorphic for the genus). This compares with male *A. dorsalis* (which is similar to *Ganganomala*) in which the internomedial protuberance is less strongly developed (Fig. 37).

4. All claws entire (simple or not split) in the male (shared with some species of *Anomala*, *Mimela*, and *Cyriopertha* Reitter and all species of *Microlontha* and *Hoplopus*) with the protarsal inner claw thickened (twice thickness of outer claw), strongly curved, and with inner, minute, apical tooth (Fig. 7); inner claws of pro- and mesotarsus split in female,

metatarsal inner claw simple (Fig. 12) (shared with many Anomalini). Old World Anomalina in which all claws are entire (not split) include *Hoplopus* (both sexes), *Anomala calcarata* Arrow (both sexes), *Anomala vittata* Gebler (male), *Anomala errans* (Fabricius) (male), *Anomala oxiana* Semenov (male), *Anomala semenovi* (Medvedev) (male), *A. pallens* (Semenov and Medvedev) (male), *Anomala euops* Arrow (male), *Anomala praenitens* Arrow (male), *Anomala vetula* species-group (male), *Anomala emortalis* species-group (male), *Mimela aurata* (Fabricius) (both sexes), *Mimela junii* Duftschmid (both sexes), *Mimela rugatipennis* Graëlls (both sexes), *Mimela lusitanica* (Ohaus) (probably both sexes, although Branco (2005) noted a slightly cleft protarsal claw on the left side in the only known male), *Mimela holosericea* Matchatschke (both sexes), *Cyriopertha* (*Pleopertha*) *arcuata* Gebler (both sexes), *Megapertha* Reitter (males), and *Microlontha* (males; females unknown).

5. Protibial spur lacking in male (Figs. 7–8). In Anomalina, this character state is shared with species of *Cyriopertha*, *Microlontha*, and some species of *Singhala* Blanchard and *Proagopertha* Reitter. The spur is minute but usually present in *Hoplopus*; present and subapical in female *Ganganomala* (Fig. 9) (shared with many Anomalini).

6. Meso- and metatarsomeres 5 with moderately developed, internomedial protuberance (male) (Fig. 12) or weakly developed protuberance (female) (weakly developed protuberance shared with many Anomalini). In male *A. dorsalis*, the internomedial protuberance is less strongly developed.

7. Sexual dimorphism present (Figs. 1–3, 8–9, 24–27) (shared with some Anomalini).

Remarks. With approximately 1,125 species of *Anomala* in the Old World (P. Limbourg, personal communication, March 2018), very few regional Old World treatises for genera or species, and the lack of a useful dichotomous key to Old World genera (Machatschke's 1957 work is badly out of date), the starting point for an understanding of Anomalina biodiversity is a list of taxa. Löbl and Löbl (2016) listed 19 genera of Anomalina and 294 species and subspecies of *Anomala* that occur in the Asian portion of the Palearctic region (including Nepal but not including Bangladesh). For the Indian subcontinent, the only work that synthesized routine biodiversity was Arrow's (1917) *Fauna of British India*. Even at the time of publication, this work was incomplete because so much of the area had not been adequately explored for scarab beetles, and our knowledge of the fauna there was still rudimentary. More recently, scarab research in the Ganges River basin did not discover *Ganganomala*. A survey of *Anomala* from Buxa Tiger Reserve (West Bengal, India) (Sarkar *et al.* 2017), use of



Figs. 36–46. Comparison of male *Anomalina* protarsomeres showing form of claws, protarsomere 5, apex of protarsomere 4, and relative lengths of protarsomeres 1–5 (see Table 2). Figs. 37–41 show taxa with split claws; Figs. 42–46 show taxa with entire (not split, simple) claws. **36)** *Ganganomala saltini*; **37)** *Anomala dorsalis*; **38)** *Anomala keithi* Zorn; **39)** *Anomala* n. sp.; **40)** *Anomala zornella* Prokofiev; **41)** *Singhala tenella* Blanchard; **42)** *Mimela rugatipennis*; **43)** *Anomala vittata*; **44)** *Megapertha massageta* Kirsch; **45)** *Cyriopertha arcuata*; **46)** *Hoplopus marcens*.

pheromone and light traps in Saharanpur for detection of white grubs associated with sugarcane (Sushil *et al.* 2017), and agricultural pest management reports (Sharma *et al.* 2002) did not, of course, reveal *Ganganomala*.

Ascertaining the classification status of this new taxon was at first perplexing. The taxon strongly resembles some Dynastinae based on male characters (the protarsal claws are unequal in size and entire, and the meso- and metatarsal claws are subequal in size), but it is indicative of Anomalini based on male and female characters (all tarsal claws are independently moveable, and the elytral margins possess a slender membrane) (Machatschke 1957; Jameson *et al.* 2003). Employing the subtribal classification of Anomalini, we place the new taxon in the subtribe Anomalina (see “Classification of World Anomalini” above). Genera in Anomalina share the following character states: the pro- and mesosternal processes are lacking; the base of the pronotum is as broad as the elytra; the mesepimera are hidden at the base of the elytra; and the elytra are longer than broad. Sufficient differences clearly separate the new genus from other genera of Anomalina (see “Diagnosis”): the absence of a protibial spur in the male; the unsplit claws in the male, with the protarsal inner claw strongly thickened and curved (autapomorphic in Anomalini); the greatly enlarged male protarsus 5 with a well-developed internomedial protuberance; and the autapomorphic form of the male clypeus (apex strongly reflexed with square anterolateral angles, margins inward).

We considered that *Ganganomala* might represent a currently named taxon within the Anomalina. All *Anomala* species have a protibial spur present in both sexes, tarsal claws of mostly unequal size on at least the front and middle legs (subequal claws on the middle legs present in several species of the otherwise very different former subgenus *Psammoscaphus* Motschulsky), and at least one claw on the pro- and/or mesotarsus is split at its apex (exceptions are listed in “Generic Diagnosis”). Contrastingly, all the meso- and metatarsal claws on the male of *Ganganomala* are of equal size, and all claws are entire at their apices. We carefully considered similarities of the new taxon with *A. dorsalis* (Figs. 5–6, 10, 13, 22, 29–30, 33–34, 37), formerly in the subgenus *Rhinoplia*. This subgenus was proposed by Burmeister (1844) and included East Indian species with a strongly reflexed clypeal apex and “sharp” lateral corners as well as tridentate protibia. *Anomala dorsalis* is the type of the subgenus, which includes three names that are synonyms of *A. dorsalis* (*Anomala centralis* Nonfried, *Anomala imitatrix* Nonfried, *Anomala fraterna* Burmeister). *Anomala dorsalis* is similar in overall appearance, size, and reflexed clypeal apex in the

male. Females of *G. saltini* and *A. dorsalis* share split pro- and mesotarsal claws (Figs. 9–10) and a protibial spur (spur absent in the male of *G. saltini*). However, the male of *G. saltini* has an entire, strongly thickened and curved protarsal claw (Fig. 7), whereas it is split in *A. dorsalis* (Fig. 37). Additional characters that separate these taxa are: the lateral margins of the abdominal sternites (simple in *G. saltini* but strongly carinate in both sexes of *A. dorsalis* (Fig. 13)); the lateral margins of the male clypeus (concave in *G. saltini* (Fig. 25) but slightly convex in *A. dorsalis* (Fig. 30)); the dorsal coloration (*G. saltini* is a bright, chestnut reddish brown (Figs. 1–3) but usually testaceous to bright reddish brown and with or without black dorsal markings in *A. dorsalis* (Figs. 5–6)); and the body shape (compact and suboval in *G. saltini* (Figs. 1–3) but elongate in *A. dorsalis* (Figs. 5–6)). The peculiar shape of the male protarsus in *G. saltini* (Fig. 7), the form of the claws on all legs (Fig. 12), the absence of a protibial spur in the male (Fig. 7), the simple lateral margins of abdominal sternites (not carinate, compare with Fig. 13), and the form of the parameres (ventrally setose in *G. saltini* (Figs. 20–21) *versus* glabrous ventrally in *A. dorsalis*) demonstrate that this similarity is only superficial and not the result of close taxonomic affinity.

The overall resemblance of *Ganganomala* (Figs. 1–3) and *A. dorsalis* (Figs. 5–6) has resulted in taxonomic confusion. Chandra (1991) attempted to separate *A. dorsalis* from a similar anomaline species, both of which are distributed in Dehradun, India (Chandra 1991). Chandra’s diagnosis of these sympatric species was based on male genitalia, eye size, punctation of the head and pronotum, and color. Description of the form of the claws, protibial teeth, and clypeal form were lacking, and the diagnosis was not based on comparison of type specimens. Chandra proposed that one morphotype was conspecific with *A. dorsalis* and the other morphotype was conspecific with “*A. fraterna*” (Chandra 1991). Chandra proposed renewed species status for “*A. fraterna*”, which was then considered a synonym of *A. dorsalis*. However, examination (by CZ) of Burmeister’s syntypes of *A. fraterna* revealed that the pro- and mesotarsi have split claws (also concurring with Burmeister’s description of *A. fraterna*). Based on the images in Chandra (1991), we suspect that Chandra’s “*A. fraterna*” morphotype may be conspecific with *Ganganomala*.

Distribution. *Ganganomala* is known from Nepal and Bangladesh in the greater Ganges River drainage and the Indo-Gangetic Plain (floodplain of the Indus and Ganga-Brahmaputra River systems) (Fig. 23). Chandra (1991) recorded putative *Ganganomala* (as “*A. fraterna*”) from Dehradun, India, also in the Indo-Gangetic Plain, but examination

of Chandra's specimens would be needed to corroborate an Indian record.

Biology. Adults are attracted to lights at night, but otherwise we know nothing of this seemingly rare scarab beetle.

Etymology. *Ganganomala* is named for the Ganga River (Ganges River) that flows from the Himalayan Mountains, through the Gangetic Plains in India, through Bangladesh, and empties into the Bay of Bengal.

***Ganganomala saltini* Ratcliffe, Jameson,
and Zorn, new species**

(Figs. 1–4, 7–9, 11–12, 14–21, 23–27, 31–32, 36)

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Type Material. Holotype, allotype, and nine paratypes. Holotype male at UNSM and labeled “Bangladesh / Dacca / Juni 76 / leg. M. Dietz // 1984 / Insektenboerse / Frankfurt am Main / von M. Dietz / Coll. J.-P. Saltin”, and with our red holotype label. Allotype female at UNSM and labeled “NEPAL, Prov. Bheri / D: Banke, Nepalganj / Hotel Kitchen Hut // 140m NN, N28°04'97" / E 81°38'56", on light / 23.-25. VI.2011 / leg. M. Hartmann #02 // collection / NATURKUNDE - // MUSEUM ERFURT”, hind wing mounted below specimen and with our red allotype label. Two male paratypes at JPSC with same data as holotype and one with male genitalia, mouthparts, and hind wing mounted below specimen. One male paratype at MLJC with same data as holotype. One male paratype at IRSNB with same data as holotype. One male paratype at NMEG and labeled “Nepal Bheri zone / Nepalgunj 200m / 17.-20.6.95 lg. Ahrens / and Pommeranz”. One male paratype at NMEG and labeled “NEPAL, Prov. Bheri / D: Banke, Nepalganj / Hotel Kitchen Hut // 140m NN, N28°04'97" / E 81°38'56", on light / 23.-25. VI.2011 / leg. M. Hartmann #02 // collection / NATURKUNDE - // MUSEUM ERFURT”. One male paratype at CCZ and labeled “NEPAL centr. // Sauraha 1992 / Igt. Jenis 20-25.5.” One female paratype at CCZ and labeled “NEPAL, Prov. Bheri / Nepalgunj, Hotel / Batika, 28°02,59'N / 81°36,56'E, 230mNN / 18.VI.1999, LF / leg. M. Hartmann”. One male paratype at CCZ and labeled “Nepal Bheri zone / Nepalgunj 200m / 17.-20.6.95 lg. Ahrens / and Pommeranz”, male genitalia mounted below specimen. One female paratype at NMEG and labeled “NEPAL, Prov. Bheri / 28°02'41" N, 81°37'17" E / Nepalganj, Hotel Sneha / 140 m; 13. VI. 2007, LF / leg.: J. Weipert”. All paratypes with our yellow paratype labels.

Description. Holotype Male. Length 16.2 mm; width 8.4 mm. Color entirely bright reddish brown except for castaneous apices of protibial teeth, apices of tarsomeres, and metatibial spinules. **Head**

(Figs. 1, 24–25): Frons densely punctate, some punctures contiguous laterally; punctures moderate in size. Clypeus with apex quadrate, strongly reflexed, anterolateral angles square, densely punctate (disc) and rugopunctate (laterally and at base), punctures moderate in size. Frontoclypeal suture obsolete medially, weakly arcuate, reaching each lateral margin near ocular canthus. Interocular width equals 3.3 transverse eye diameters. Antenna with 9 antennomeres, club subequal in length to antennomeres 2–6. **Pronotum:** Surface with small, moderately dense punctures, punctures slightly denser in anterior and posterior angles, lateral margin on posterior half with a few, long, reddish brown setae. All margins with complete marginal bead. **Elytra:** Surface with poorly defined, longitudinal rows of moderately large, ocellate punctures; 1 row adjacent to suture, 1 pair on disc, 1 pair at humerus, 1 pair laterad of humerus. Intervals with similar moderately dense punctures. **Pygidium:** Surface with moderately large, moderately dense punctures, a few punctures at extreme center apex with long, reddish brown setae; lateral margins weakly scabrous. Surface regularly convex in lateral view. **Venter:** Mentum (Fig. 16) long, subrectangular, disc flat and with long, reddish brown setae, apex broad and slightly emarginate at middle. Prosternal process very small (nearly obsolete), subtriangular, not produced ventrally, not produced to trochanter, glabrous. Metathorax with small, dense, setigerous punctures; setae long, dense, reddish brown. Epipleuron distinct, gradually tapering from base to metacoxa, slender from metacoxa to apex and with transparent membrane. Abdominal sternites 2–4 subequal in length, sternite 5 about 1.3 times length of sternite 4, apical sternite half length of sternite 4 (Fig. 2); apical sternite weakly emarginate at apex, setigerously punctate. Abdominal sternites with transverse, irregular rows of long, reddish brown setae arising from moderately large punctures. **Legs:** Protibia tridentate, teeth subequally spaced (Fig. 8); protibial spur absent (Figs. 7–8). Protarsomere 5 enlarged, with prominent, forward-directed protuberance intermedially (Fig. 7); inner claw robust (subequal in length of tarsomeres 1–4), enlarged, sharply bent, apex entire and with *minute*, inner apical tooth. Metatibia (Fig. 11) ventrally with long, dense, reddish brown setae. Meso- and metatibiae with fringe of long, reddish brown setae on inner margin, each with 2 obliquely transverse rows of small, castaneous spinules at mid-shaft; truncate at apex and with row of small, castaneous spinules: 10 spinules on mesotibia, 14 spinules on metatibia; apex with 2 apical spurs, longer spur produced to near apex of metatarsomere 2. Claws of meso- and metatibiae equal in size, apices entire (Fig. 12).

Parameres: Form short, simple, with short setae on venter (Figs. 19–21).

Allotype. Length 17.8 mm; width 9.2 mm (Fig. 3). As holotype except in the following respects: **Head** (Figs. 26–27): Frons with surface densely, confluent punctate (disc) and rugopunctate (lateral margins and base). Clypeus with surface densely punctate (disc) and rugopunctate (lateral margins and apex); sides weakly convergent toward apex; apex rounded, moderately reflexed. Frontoclypeal suture obsolete medially, weakly arcuate. Interocular width equals 3.6 transverse eye diameters. **Pygidium:** Marginal bead at apex effaced. **Venter:** Sternites slightly convex in lateral view. Abdominal sternite 5 about 1.5 times length of sternite 4, apical sternite 3/4 length of sternite 4. Apical sternite entire at apex, with setose punctures; setae moderately long, reddish brown. **Legs:** Prothibia with subapical spur on inner margin (Fig. 9); spur subequal in length to protarsomere 2. Protarsomere 5 not enlarged, normal (subequal in length to protarsomeres 2–4, width about 1/3 length) with poorly developed internomedial protuberance. Protarsal claw with inner claw split, ventral ramus subequal in size to dorsal ramus (Fig. 9). Mesotibial apex with 8 spinules and 2 spurs; longer spur produced to near apex of mesotarsomere 2. Meso- and metatarsomeres 5 with weakly developed internomedial protuberance. Mesotarsal claw split with ventral ramus subequal in width to dorsal ramus. Metatibial apex with 20 spinules and 2 spurs; longer spur produced to near apex of metatarsomere 2. Metatarsal claws simple.

Variation: Length 16.0–16.6 mm; width 8.0–8.8 mm ($n = 7$ males, 2 females). The nine paratypes are remarkably similar to the holotype and allotype and do not differ significantly.

Etymology. We are pleased to name this new species to recognize Jochen-P. Saltin (Dornum, Middelsbur, Germany) who first brought exemplars of the species to our attention and donated specimens for description.

Distribution. *Ganganomala saltini* is known from three localities in the greater Ganges River drainage (Nepal and Bangladesh) (Fig. 23) and possibly India. In India, Chandra (1991) recorded (as “*A. fraternata*”) putative *G. saltini* from Dehradun Valley. In Nepal, the species is known from the Bheri Zone and the Chitwan District. In the People’s Republic of Bangladesh in southern Asia, the species was collected near Dhaka. Dhaka is on the eastern banks of the Buriganga River and situated on the lower reaches of the Ganges Delta near sea level. Dhaka is a burgeoning city of over seven million people, and there are 18 million people in the greater Dhaka area (Bangladesh Bureau of Statistics 2014). During 1951–1961, there was a 45% increase in urban population, and the total

urban population rose from 1.8 million to 2.6 million during this period. A 138% growth of urban population took place during 1961–1974, due principally to massive rural to urban migration (Mondal 2006). The habitat of the original collecting site (in 1976) for *G. saltini* in Dhaka, indeed much of the regional biodiversity, has undoubtedly been destroyed or altered from its former natural state by urbanization and concomitant pollution since the specimens were collected. One has to wonder, then, if this species continues to exist in that region.

Ganganomala saltini was collected in Nepalgunj in the Bheri Zone in Nepal at 150 m elevation. This area has a subtropical climate similar to that of Dhaka, although Dhaka does not experience the low temperatures of Nepalgunj. Temperatures can exceed 40° C from April to June. The rainy season is June to September. The highest temperature ever recorded in Nepalgunj was 45.0° C in June 1995, while the lowest temperature ever recorded was -0.3° C in January 2013 (Anonymous 2016).

The collector of the Bangladesh specimens, Manfred Dietz, was in Dhaka for four months in 1976, where he collected almost every evening in and around the city (personal communication Dietz to Saltin 2015, 2016 and Saltin to BCR 2016). Mr. Dietz is a well-known lepidopterist, and the scarabs were by-catch since he had no interest in beetles. We are convinced that the collecting data are accurate since we have the personal recollection of the collector. The Bangladesh specimens were obtained at an insect fair, but Dietz’ locality information is reliable.

Temporal Distribution. May (1), June (10).

Biology. Nothing is known of the life history of *G. saltini*. The Bangladesh specimens and at least four of the Nepalese specimens were taken at lights.

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We are grateful to Jochen-P. Saltin (Dornum, Middelsbur, Germany) for bringing these specimens to our attention and for his generosity in donating specimens to the University of Nebraska State Museum. Manfred Dietz (Solms, Germany) collected the specimens (as by-catch to his primary interest of Lepidoptera) near Dhaka in 1976, and Klaus Schurian (Apollo Entomological Society, Frankfurt am Main, Germany) provided invaluable help in tracing the specimens back to Mr. Dietz. Masayuki Fujioka (Tokyo, Japan) and Pol Limbourg (Institut Royal des Sciences Naturelles de Belgique, Brussels, Belgium) shared their impressions with us about the taxonomic status of this species. Matt Moore (University of Florida, Gainesville) gave feedback on character state similarities between Cyclocephalini and Anomalini. Matthias

Hartmann (Naturkundemuseum Erfurt, Erfurt, Germany) donated the allotype to the UNSM. We thank Matthias Seidel (Charles University and National Museum, Prague, Czech Republic) for providing images of *A. fraterna* syntypes that are housed at the Naturwissenschaftlicher Sammlungen der Martin-Luther-Universität (Halle, Germany; MLUH). Dirk Ahrens (Zoologisches Forschungsmuseum Bonn, Germany) entrusted large parts of his Anomalini collection containing several *G. saltini* to CZ.

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