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The world species of *Balcha* Walker (Hymenoptera: Chalcidoidea: Eupelmidae), parasitoids of wood-boring beetles

GARY A. P. GIBSON

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Abstract

The world species of *Balcha* Walker (Hymenoptera: Eupelmidae) are revised, keyed and illustrated. Sixteen species are recognized, including two that are newly classified in the genus, *B. reticulata*

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(Nikol'skaya) n. comb. and *B. splendida* (Girault) n. comb., and eight that are described as new, *B. camptogastra* n. sp., *B. dictyota* n. sp., *B. enoptra* n. sp., *B. eximiassita* n. sp., *B. laciniosa* n. sp., *B. punctiscutum* n. sp., *B. reburra* n. sp., and *B. reticulifrons* n. sp. Evidence for the monophyly of *Balcha* is discussed and the 16 species are segregated into four species groups based on morphological features. *Balcha indica* (Mani & Kaul) is newly recorded from the eastern United States (Maryland, Michigan, Virginia) as an accidental introduction from the Oriental region and as an adventitious parasitoid of the emerald ash borer, *Agrilus planipennis* Fairmaire (Coleoptera: Buprestidae).

Key words: Eupelmidae, Calosotinae, Chalcidoidea, new species, world key, parasitoid

Introduction

Balcha Walker (Hymenoptera: Eupelmidae, Calosotinae) was established by Walker (1862) for *B. cylindrica*, from South Africa. Since then, seven additional species have been described that can be ascribed to the genus, six from the Oriental region (India, Philippines, Sarawak, Taiwan) and one from the Palearctic region (Russian Far East). Gibson (1989) reported the genus only from the Old World, but an unidentified species was collected subsequently in Virginia, USA (Gibson 1997). Specimens of *Balcha* are large, females being about 5–15 mm in length, and often with beautiful conspicuously contrasting patterns of sculpture and colors (Figs. 1–18). Because it is highly unlikely that such large and impressive insects would have been missed by previous collectors, the species collected in Virginia undoubtedly represents a comparatively recent, accidental introduction to North America (Gibson 1997). Gibson (1989) listed the larvae of *Agrilus* Curtis (Coleoptera: Buprestidae) as hosts for *Balcha*. This statement was based on label data from only two specimens, but wood-boring beetles are the inferred hosts of *Balcha* based on known hosts of other phylogenetically related genera of Calosotinae (Gibson 1989). Consequently, it is quite likely that the species was introduced to North America with some unknown exotic wood-boring beetle.

In 2003, I received from two different sources females of the same *Balcha* species as was collected previously in Virginia. The first females had been collected ovipositing into dead *Prunus* (Rosaceae) branches in Maryland. The second set of females was reared from the emerald ash borer, *Agrilus planipennis* Fairmaire (Coleoptera: Buprestidae), in logs of ash (*Fraxinus*) trees in Michigan. The emerald ash borer is an invasive pest of ash introduced from Asia that was discovered in Michigan in 2002 (Wei *et al.* 2004). Consequently, either the same *Balcha* species was introduced at least twice to North America or, more likely, a single introduction had established and spread subsequently throughout Virginia, Maryland and Michigan using more than one wood-boring beetle host. In either instance the parasitoid can be considered a beneficial invasive species.

Several species of *Agrilus* in addition to the emerald ash borer are pests of trees and other plants in North America and throughout the world (Johnson & Lyon 1991). Because

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of the suggested host-parasitoid relationship between *Agrilus* and *Balcha*, knowledge of the identity and distribution of world species of *Balcha* could be valuable for identifying potential biological control agents of pest *Agrilus* species. The primary purpose of this study was to identify the species of *Balcha* found in North America parasitizing the emerald ash borer and to determine its likely region of origin. A revision of the world species of the genus was undertaken in order to provide the systematics knowledge necessary to differentiate and utilize *Balcha* species for control of plant pests. However, the revision undoubtedly does not accurately describe the world fauna or variation for most species because of the lack of comprehensive material. Of the 16 species treated, males are unknown for 9 and only 5 of the species are based on more than 10 specimens. One species is based on three females, two species on two females, and four species on singletons.

Materials and methods

This study is based on 272 specimens deposited in the following 21 collections:

AUWN Agricultural University, Department of Entomology, Wageningen, Netherlands (Yde Jongema).
BMNH Natural History Museum, London, England (John Noyes, Suzanne Lewis).
BPBM Bernice P. Bishop Museum, Honolulu, HI, USA (Keith Arakaki).
CNCI Canadian National Collection of Insects, Ottawa, ON, Canada.
DEIC Deutsches Entomologisches Institut, Eberswalde, Germany (Andreas Taeger).
IFRI Indian Forest Research Institute, Dehra Dun, India (Sudhir Singh).
IZCAS Chinese Academy of Sciences, Institute of Zoology, Beijing, China (Huang Da-Wei, Zhu Chao-Dong).
MCSN Museo Civico di Storia Naturale 'Giacomo Doria', Genoa, Italy (Roberto Poggi).
MCZC Museum of Comparative Zoology, Cambridge, MA, USA (Philip Perkins).
MNHN Museum National d'Histoire Naturelle, Laboratoire d'Entomologie, Paris, France (Claire Villeman).
MRAC Musée Royal de l'Afrique Centrale, Section d'Entomologie, Tervuren, Belgium (Eliane De Coninck).
MSUC Albert J. Cook Arthropod Research Collection, Michigan State University, East Lansing, MI, USA (Gary Parsons).
MZLU Zoological Institute, Lund University, Lund, Sweden (Roy Danielsson).
NHRS Naturhistoriska Riksmuseet, Stockholm, Sweden (Bert Viklund).
QMBA Queensland Museum, Brisbane, QLD, Australia (Chris Burwell).
RCPC Robert Copeland personal collection, Rockville, MD, USA (Robert Copeland).
ROMT Royal Ontario Museum, Toronto, ON, Canada (Chris Darling, Antonia Guidotti).
UCDC University of California, Davis, CA, USA (Steve Heydon).

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UPPC University of the Philippines, Entomological Museum, Laguna Los Banos, Philippines (Clare Baltazar).

USNM National Museum of Natural History, Washington, DC, USA (Eric Grissell, Michael Gates).

ZINR Zoological Institute of Russian Academy of Sciences, St. Petersburg, Russia (Sergey Belokobylskij).

For material examined, additional information that is explanatory for label data is provided in brackets and a "?" indicates questionable data because the label is partially illegible. For holotypes of newly described species a " / " separates information given on separate labels and information on the condition of the holotype is provided following the label data.

All measurements except body length are relative and were taken with a Nikon SMZ-1500 microscope fitted with a 10 mm ocular grid having 100 divisions. Color was described using a single incandescent light source filtered through a thin, translucent, acetate film to reduce glare, which is essential for observation of fine sculpture. Color images are composite serial images taken with a Nikon DXM1200F digital camera, using multiple fiber-optic light sources surrounding the specimen, and combined with Auto-Montage™. These images and scanning electron micrographs were digitally retouched using Adobe Photoshop™ in order to enhance clarity.

Terms for the setal bands and folds of the forewing follow Gibson (2004). Terms for sculpture and structure largely follow Gibson (1995, 1997, 2003) except as clarified below, with new terms in bold font. The acropleuron usually has three regions of differentiated sculpture, including a slender region below the base of the forewing that I call the **subalar region** (Fig. 54, sar) and that typically separates coarser anterior sculpture from finer posterior sculpture (Figs. 53, 54). I call the coarser-sculptured anterior portion the **prealar region** and the variably sculptured region posterior to the subalar region the **postalar region** of the acropleuron. The part of the metanotum lateral to the dorsellum (Fig. 45, dor) is the metanotal panel, which is subdivided into anterior and posterior portions by a transverse crenulate furrow. I call the anterior portion, which is variably setose, the **precrenular region** of the metanotal panel (Fig. 45, pcr). The propodeal callus is composed of the horizontal dorsal and vertical lateral surfaces of the propodeum behind and exterior to the spiracle (Fig. 45, cal), whereas the variably crenulate median part of the propodeum is the plical region (Fig. 45, ppr). The region between the spiracle and plical region is the paraspiracular region (Fig. 45, psr). The callus is always setose, but the paraspiracular and plical regions are only sometimes setose. The mesoscutum is variably conspicuously colored with regions of brighter metallic lusters contrasting with darker regions that are black or coppery to reddish under some angles of light (Figs. 5, 6, 9–18). There is a longitudinal dark region medially (Figs. 5, 6, 9–18), at least anteriorly between the notauli (Fig. 36, not), which is the **notaular band** (Fig. 18, nob). There are also

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paralateral dark regions, the **parapsidal bands** (Fig. 18, ppb). The parapsidal bands sometimes only encompass the parapsidal lines (Fig. 36, pl) anteriorly (Figs. 6, 15, 16), but sometimes extend posteriorly to the scutellum (Figs. 10, 13, 14) or merge posteriorly with the notaular band (Figs. 11, 18). In the latter instance the bands form a Ψ-like pattern (Figs. 11, 18) and the metallic region that separates them anteriorly is called the **paranotaular band** (Fig. 18, pnb).

Balcha Walker

Balcha Walker, 1862: 394. Type species: *Balcha cylindrica* Walker, by monotypy.
Elemba Cameron, 1908: 151. Type species: *Elemba levicollis* Cameron, by monotypy. Synonymy by Hedqvist, 1961: 109.
Sauteria Masi, 1927: 333–334. Type species: *Sauteria eximia* Masi, by original designation. Synonymy by Bouček, 1988: 544.

Diagnosis. Antenna 13-segmented; flagellum with Fl_2 distinctly longer than pedicel and often distinctly longer than clava; clava 3-segmented. Mesoscutum in anterior half with submedian, linear, parallel notauli and similar parapsidal lines paralaterally (Figs. 31–42); usually patterned by comparatively finely sculptured and darker colored regions relative to more grossly sculptured and brilliantly metallic regions (*cf.* Figs. 9–18 and 31–42). Scutellum quadrate, with lateral margin carinate for entire length; axilla elongate-triangular to almost linear along extreme anterolateral corner of scutellum (Figs. 31–38). Prepectus small, the apex distinctly separated from base of tegula even when mesonotum not highly arched and prepectus extended horizontally (Figs. 7, 8, 49, 50). Acropleuron and metapleuron separated by only very slender region dorsally but by triangular, setose, lower mesopleuron ventrally (Figs. 49–54); acropleuron conspicuously punctate-alveolate anteriorly and more finely though variably sculptured posteriorly (Figs. 7, 8, 49–54). Protibia without dorsal spicules. Mesotarsus with single row of pegs along both ventral edges. Gaster with Gt_7 and Gt_8 fused into syntergum.

Distribution. *Balcha* occurs naturally in the Afrotropical, Australasian, Oriental and Palearctic regions. Although *B. indica* (Mani & Kaul) is present in the Nearctic region, this is presumed to have resulted from accidental introduction (see species discussion). Species are not known from Australia, but species diversity is greatest in the Australasian and Oriental regions, particularly southeast Asia to Papua New Guinea. The most northern record is for *B. reticulata* (Nikol'skaya) from the Russian Far East, near Vladivostok.

Remarks. *Balcha* can be distinguished from other genera of Calosotinae using the key to world genera and generic description given in Gibson (1989), and from other eupelmid genera in North America using the key of Gibson (1997). The genus has been treated as a synonym of *Eusandalum* Ratzeburg (Ashmead 1904; Risbec 1952; Hedqvist 1961), *Polymoria* Förster (Hedqvist 1970) and *Calosota* (Bouček 1988), but was reestablished as

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a valid genus by Gibson (1989). Gibson (1989) supported monophyly of the genus by a single putative autapomorphy, the unique mesoscutal color and sculpture pattern of individuals. All species then known shared a mesoscutum that was conspicuously patterned by grossly umbilicate and brilliantly colored regions contrasting with more reticulate-punctate, darkly colored regions. However, the newly described species *B. punctiscutum* has the mesoscutum entirely punctate (Figs. 32, 49) even though it has a characteristic bicolored color pattern (Fig. 5). Gibson (1989) hypothesized that *Balcha* is most closely related to *Calosota* Curtis and *Tanythorax* Gibson based on shared presence of parallel notauli [Gibson (1989), state 7(4)], an entirely carinate lateral margin of the scutellum [state 21(2)], a mesopleuron composed of an almost completely enlarged acropleuron and a convex mesepimeron on the same plane as the acropleuron [state 3(3b)], and possibly by presence of a 3-segmented clava [state 2(3)], though polarity of the latter character is ambiguous. *Balcha* and *Tanythorax* differ from *Calosota* by having a small prepectus that does not extend to the tegula (Figs. 7, 8, 49, 50), which could support a sister-group relationship between the two taxa (Gibson 1989, fig. 1a). However, a small prepectus is possessed also in Calosotinae by *Chirolophus* Haliday, *Licrooides* Gibson and some *Eusandalum* (Gibson 1989). Members of these last three genera have V-shaped notauli (Gibson, 1989, figs. 67, 68; tables 1, 2) and a reduced prepectus likely was derived at least twice in Calosotinae based on postulated relationships among the genera (Gibson 1989, fig. 1). Although Gibson (1989) suggested that both *Balcha* and *Tanythorax* likely are monophyletic, he stated that *Calosota* could be paraphyletic relative to one or both taxa. If anything, results of this study further suggest the possible paraphyly of *Calosota* relative to *Balcha* (see below). However, *Balcha* comprises a relatively speciose group of at least 16 species that can be differentiated from *Calosota* based on a small prepectus and from *Tanythorax* based on coarse mesosomal sculpture. Until exact relationships among the species of the taxa can be demonstrated I prefer to treat the assemblages as separate genera.

Species groups. The 16 recognized world species of *Balcha* are subdivided into four species groups based on structural and setal features to facilitate species comparisons. The *cylindrica*-group, composed of *B. cylindrica*, *B. indica* and *B. reburra* n. sp., may comprise a monophyletic assemblage based on shared presence of setae on the posterior, coriaceous surface of the dorsellum (Fig. 48), though this group likely renders the *laciniosa*-group paraphyletic (see below). The *anemeta* group consists of *B. anemeta* (Walker), *B. levicollis*, *B. punctiscutum* n. sp. and *B. reticulifrons* n. sp., and is also distinguished by a unique feature within the genus, the presence of a thin dorsellum (Figs. 43, 44). Other species in the genus have a thick dorsellum because dorsally there is a short, horizontal, crenulate surface (Figs. 45–48). However, the thin dorsellar structure that characterizes the *anemeta*-group is almost certainly symplesiomorphic rather than synapomorphic because this structure is shared also with species of *Calosota* and *Tanythorax* (Gibson 1989, figs. 53, 57). Females of *B. punctiscutum* have a uniformly

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punctate mesoscutum (Fig. 32) rather than the partly alveolate or punctate-alveolate mesoscutum that characterizes other members of *Balcha* (Figs. 31, 33–42), as well as having a comparatively less enlarged acropleuron relative to other *Balcha* species (*cf.* Figs. 49, 50–54). Furthermore, *B. reticulifrons* has the face reticulate (Fig. 4) rather than punctate to punctate-alveolate as for other members of the genus (Figs. 1–3, 19–30). A less enlarged acropleuron is hypothesized as plesiomorphic within Eupelmidae and Calosotinae (Gibson 1989), but a uniformly punctate mesoscutum or a reticulate face could either represent autapomorphies within *Balcha* or uniquely retained symplesiomorphies inherited from some *Calosota*-like ancestor. The remaining species of the genus are divided into two species groups based on setal patterns of the propodeal paraspiracular region. The *elegans* group is composed of *B. dictyota* n. sp., *B. elegans* (Masi), *B. eximia* and *B. eximiassita* n. sp., and is distinguished by a setose paraspiracular region (Figs. 46, 47), whereas the *laciniosa* group, composed of *B. camptogastra* n. sp., *B. enoptra* n. sp., *B. laciniosa* n. sp., *B. reticulata* and *B. splendida* (Girault), is distinguished by a bare paraspiracular region excluding any setae along its anterior margin (Fig. 45). Within the *anemeta*-group, females of *B. anemeta* and *B. levicollis* share a setose paraspiracular region with *elegans*-group species, whereas *B. punctiscutum* and *B. reticulifrons* share a bare paraspiracular region with *cylindrica*- and *laciniosa*-group species. Known *Tanythorax* have a bare paraspiracular region, but the groundplan state for *Balcha* is uncertain because both states occur in *Calosota*. The presence of both propodeal setal states in the *anemeta*-group as well as the other features discussed above suggest that the *anemeta*-group likely comprises a basal, paraphyletic group within *Balcha*. Furthermore, although *B. splendida* always lack setae from the posterior surface of the dorsellum (Fig. 40), some females have a seta dorsolaterally on the carinate edge that distinguishes the dorsal surface from the posterior surface of the dorsellum. Although in only some females, presence of the seta might indicate that *B. splendida* is the basal clade of the *cylindrica*-group and is incorrectly included within the *laciniosa*-group from a phylogenetic perspective. *Balcha indica* is also very similar to *B. laciniosa* except for the presence of dorsellar setae, which might also indicate that these two species are closely related and further suggests that the defined species-groups are not phylogenetically significant.

Key to world species of *Balcha* Walker

1 Dorsellum thin and in single subvertical plane, coriaceous to punctate (Fig. 43) or with fine longitudinal rugae (Fig. 44), but entirely bare...*anemeta* species-group 2

– Dorsellum thick, with short dorsal crenulate band at abrupt angle to more vertical, posterior coriaceous surface (Figs. 45–48), the coriaceous surface sometimes setose (Fig. 48)..... 5

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2(1) *Both sexes*: propodeum with plical region setose (Fig. 43); scutellum variably punctate-coriaceous to rugulose and often with sculpture more or less aligned into longitudinal rugae anteriorly (Fig. 31)..... 3

– *Female only known*: propodeum with plical region bare (Fig. 44); scutellum uniformly punctate, the subcircular punctures separated by mostly shiny interstices (Fig. 32).....4

3(2) Acropleuron posterior to subalar region finely, longitudinally coriaceous-aciculate, the surface appearing as if scratched with a pin (Fig. 53) ....*B. anemeta* (Walker)

– Acropleuron posterior to subalar region punctate-reticulate, the surface distinctly sculptured except near posterior margin (Fig. 54).....*B. levicollis* (Cameron)

4(2) Head with parascrobal region reticulate, the multisided cells shallow and delineated by linear ridges (Fig. 4); mesoscutum reticulate-alveolate to reticulate; syntergum short, only slightly longer than basal width and evenly tapered to apex; petiole almost smooth posterior to anterior carina, much smoother than sculptured part of propodeal plical region (*cf.* Fig. 45).....*B. reticulifrons* n. sp.

– Head with parascrobal region punctate, the subcircular punctures separated by flat interstices; mesoscutum punctate to punctulate (Fig. 32); syntergum elongate and with submedial lateral notch differentiating basal section surrounding ovipositor sheaths from slender apical portion lying above sheaths (Figs. 56, 57); petiole strongly crenulate, similar to propodeal plical region (Fig. 44) ....*B. punctiscutum* n. sp.

5(1) *Both sexes*: propodeum with paraspiracular region setose (Figs. 46, 47). *Female*: petiole sometimes distinctly crenulate similar to propodeal plical region (Figs. 37, 47) .....*elegans* species-group . . . 6

– *Both sexes*: propodeum with paraspiracular region bare, except sometimes for line of setae along anterior margin (Fig. 45). *Female*: petiole sometimes with median ridge, but otherwise much smoother than crenulate plical region of propodeum (Figs. 33, 35, 45)..... 9

6(5) Mesoscutum partly grossly umbilicate but parapsidal and notaular bands with distinctly smaller punctures and forming Ψ-like pattern, at least in female (Fig. 11); face with punctures on parascrobal region brightly colored in contrast to dark or coppery interstices (*cf.* Fig. 2); petiole not longitudinally crenulate (Fig. 46) .....*B. elegans* (Masi)

– Mesoscutum comparatively uniformly reticulate and parapsidal bands separate from notaular band (Figs. 13, 15) and/or extending posteriorly to scutellum at inner angle of axilla if separate for only about two-thirds length of mesoscutum (Fig. 14); face with punctures and interstices the same color (Fig. 1); petiole variably conspicuously longitudinally crenulate (Figs. 37, 47)..... 7

7(6) *Female only known*: mesoscutum dorsally with comparatively indistinct dark

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bands, the parapsidal bands extending only about half length of mesoscutum and not joining notaular band, and notaular band extending only very narrowly to scutellum (Fig. 15); lower face reticulate-punctate or rugulose towards oral margin; scrobal channel punctulate-reticulate; scutellum reticulate (*cf.* Fig. 38)..... ..... *B. dictyota* n. sp.

– *Both sexes*: mesoscutum dorsally with distinct black bands, the parapsidal bands extending posteriorly to scutellum and notaular band posteriorly occupying width of scutellum (Figs. 13, 14); lower face with distinct subcircular punctures, even near oral margin (Figs. 1, 20); scrobal channel at most finely coriaceous excluding setiferous pores; scutellum with tiny setiferous punctures overlying coriaceous subsculpture (Fig. 37) 8

8(7) *Both sexes*: mesoscutum with lateral margins of notaular band uniformly concave and parapsidal bands separate from notaular band virtually to posterior margin (Fig. 13); propodeal callus with lateral, vertical surface smooth and shiny except for setal pores, the sculpture obviously different from that of metapleuron (*cf.* Fig. 53); scutellum greenish medially and bluish laterally (Fig. 13). *Female*: gaster in dorsal view uniformly dark brown ..... *B. eximia* (Masi)

– *Female only known*: mesoscutum with lateral margins of notaular band abruptly recurved in about posterior quarter to third and merged with parapsidal bands to form subparallel, longitudinal sides for short distance anterior to scutellum (Fig. 14); propodeal callus with lateral, vertical surface extensively micropunctate over coriaceous subsculpture, the sculpture adjacent to metapleuron similar to metapleuron (Fig. 52); scutellum usually with conspicuous median coppery band (Fig. 14); gaster in dorsal view with penultimate tergum bright greenish to partly blue, contrasting distinctly with other dark brown terga ..... *B. eximiassita* n. sp.

9(5) Dorsellum with posterior surface variably setose (Fig. 48)..... ..... *cylindrica* species-group . . . 10

– Dorsellum with posterior surface bare (Figs. 43–47) or at most with single seta projecting paralaterally from carinate dorsal margin... *laciniosa* species-group ...12

10(9) Upper parascrobal region with low convex, longitudinal bare region of slightly transverse, reticulate-punctulate sculpture between lines of setae along scrobal depression and inner orbit (Figs. 29, 30); acropleuron with postalar region extensively and conspicuously sculptured, reticulate-punctate (Fig. 39)..... ..... *B. cylindrica* Walker

– Upper parascrobal region with flat to slightly concave dorsal region of coriaceous to reticulate-rugulose sculpture and entirely setiferous (Fig. 21); acropleuron with postalar region often only finely coriaceous-aciculate (Fig. 50) 11

11(10) *Female only known*: metanotal panel with precrenular region entirely setose (Fig. 46); syntergum conspicuously elongate, at least 10 x as long as wide and subequal in length to combined length of head and mesosoma..... *B. reburra* n. sp.

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– *Both sexes*: metanotal panel with single line of setae near anterior margin of precrenular region (Figs. 45, 48, 50); syntergum obviously shorter than above, shorter than length of mesosoma ..... *B. indica* (Mani & Kaul)

12(9) Female 13

– Male 17

13(12) Syntergum short and stubby, and with dorsal surface smooth, shiny and bare posterior to short basal setose band (Fig. 55) ..... *B. enoptra* n. sp.

– Syntergum variably elongate and narrow but at least uniformly sculptured and setose 14

14(13) Gaster with conspicuously elongate-slender syntergum recurved dorsally relative to rest of gaster (Fig. 58), the syntergum subdivided submedially by lateral notch differentiating basal portion surrounding ovipositor sheaths from slender apical portion lying above ovipositor sheaths (Fig. 59) ..... *B. camptogastra* n. sp.

– Gaster with dorsal surface at most slightly concave in lateral view, the syntergum variable in length but consisting of undifferentiated tergum surrounding all but apex of ovipositor sheaths 15

15(14) Mesoscutum with brownish, unmodified, hairlike setae; mesonotum with Ψ-shaped dark region extending posteriorly as broad median band that usually also extends, more or less distinctly, over about anterior half of scutellum medially (Fig. 18); forewing with mediocubital fold brownish beyond basal cell..... ..... *B. splendida* (Girault)

– Mesoscutum with white, flattened, lanceolate setae dorsally, at least laterally anterior to level of tegula (Fig. 9); mesonotum with color pattern variable, but at least medial dark band not continued posteriorly as similar band onto scutellum (Figs. 9, 16); forewing hyaline 16

16(15) Mesoscutum with white lanceolate setae only laterally in region anterior to level of tegula and with parapsidal and notaular bands forming 3 separate bands (Fig. 16); scutellum reticulate (Fig. 38)..... *B. reticulata* (Nikol'skaya)

– Mesoscutum with white lanceolate setae within notaular band and with parapsidal and notaular bands forming Ψ-like pattern (Fig. 9); scutellum with sculpture aligned into longitudinal rugae at least anteriorly (Fig. 36) ..... *B. laciniosa* n. sp.

17(12) Mesoscutum with brownish, unmodified, hairlike setae; scutellum variably coriaceous-reticulate to completely reticulate (Fig. 40) ..... *B. splendida* (Girault)

– Mesoscutum with white lanceolate setae within notaular band and laterally in region anterior to tegula; scutellum with sculpture aligned into longitudinal rugae at least anteriorly (Fig. 36)..... *B. laciniosa* n. sp.

***Balcha anemeta* (Walker) (Figs. 17, 19, 31, 53)**

Calosoter Anemetus Walker, 1846: 52, 94. Type data: Philippine Isles, from Mr. Wood's collection.

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Holotype female by monotypy (BMNH type no. 5.951, examined).
Calosota anemetus; Baltazar, 1966: 129. Change of combination.
Balcha anemeta; Gibson, 1989: 67. Change of combination.

Additional material examined. AUSTRALASIAN. **PAPUA NEW GUINEA**: Kiunga, Fly River, 5-7.VIII.1919, Wm.W. Brandt (1♀ BPBM). ORIENTAL. **PHILIPPINES**: Mindanao, Dapitan, 13893 (1♀ BMNH); Illigan, Baker, 13893 (3♀ USNM). Samar Island, Baker (1♀ USNM).

Description. FEMALE. Length, 10–14 mm. Antenna dark except scape usually basally and sometimes almost entirely yellowish-orange; scape oval in cross-section, with outer surface flat at least apically and bare medially or basomedially; Fl_1 about as long as apical width and half as long as pedicel; Fl_2 about 1.4–1.6 x as long as clava. Head with punctures and interstices on parascrobal region not contrasting distinctly in color, the face sometimes variably blue to green under some angles of light, but usually dark purple except clypeus and interantennal region more distinctly green and upper parascrobal region partly black adjacent to scrobal channel; ocellar region and vertex dark except variably broadly along upper inner orbit, with dark region usually extending as posteriorly tapered band medially in region between posterior ocelli and laterally behind each ocellus, but posterior surface of head extensively green or blue to purple under some angles of light, particularly on smooth, bare band along outer orbit. Face (Fig. 19) with setiferous punctures, the punctures closely crowded toward, but remaining distinct even near, oral margin, usually more widely separated by variably conspicuously coriaceous interstices on parascrobal region, at least in part, except about dorsal third to half of region flat with crowded and increasingly shallower and/or smaller punctures, being mostly punctulate-reticulate (*cf.* Fig. 20) or rugulose-coriaceous (Fig. 19) except coriaceous near ocelli, and uniformly setose with white to light brown setae. Scrobal depression with scrobes smoothly merging into channel; scrobes smooth and shiny, dark or with blue to purple luster under some angles of light; channel blue to purple ventrally and dorsally dark, coriaceous, and either bare or sparsely setose.

Pronotum dark anteriorly, variably green to blue or purple posteriorly and sometimes violaceous laterally; finely coriaceous to transversely coriaceous-aciculate and shiny. Tegula brown. Mesoscutum varying from mostly dark except for blue to purple paranotaular band and posterior paramedial depression, to extensively bluish or purple with some green luster under some angles of light, but then with dark notaular band extending to and broadly truncate along base of scutellum and with dark parapsidal bands either joining notaular band near midlength to form Ψ-like pattern or remaining separate but always narrowed posteriorly and extending to inner angle of axilla along ridge delineating outer margin of posterior paramedial depression (Fig. 17). Mesoscutum (Fig. 31) alveolate laterally, dorsally the punctures smaller and shallower, particularly between notauli and near parapsidal line; with broad, shallow, longitudinal depression over about posterior half anterior to level of inner margin of axilla, but sculpture not

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differentiated from surrounding cuticle; with quite uniform, white to brownish hairlike setae. Scutellum with lateral and posterior margins variably extensively purple to blue or with some green luster, but with dark band medially (Fig. 17); coriaceous-granular with tiny setiferous punctures to punctate-rugulose with coriaceous subsculpture, and usually with longitudinal interstices more or less distinctly aligned into irregular ridges anteriorly, but at least with a low anteromedial longitudinal ridge (Fig. 31). Metanotum dark purple or with blue or greenish luster under some angles of light, except dorsellum sometimes dark except for brownish-hyaline dorsal margin; dorsellum (Fig. 31) thin, in single vertical plane, coriaceous to coriaceous-reticulate with a few longitudinal rugae ventrolaterally, and bare; precrenular region of panel uniformly setose (*cf.* Fig. 43). Acropleuron with distinct, elongate-ovate, rugulose-coriaceous subalar region separating punctate-alveolate prealar region from finely coriaceous-aciculate postalar region (Fig. 53); uniformly purple or with punctures violaceous under some angles of light, except subalar region usually dark. Lower mesepimeron punctate-reticulate to reticulate-rugulose. Metapleuron coriaceous dorsally to extensively reticulate-rugulose over distinct coriaceous subsculpture and with crenulate furrow along posterior margin. Propodeum purple to partly green under some angles of light; paraspiracular region setose (*cf*. Fig. 46); callus comparatively smooth and shiny dorsolaterally but laterally with distinct setiferous punctures (*cf.* Fig. 43) or sometimes rugulose-punctate adjacent to metapleuron; plical region setose, with carinate margin of foramen distinctly Λ-like recurved to anterior margin of propodeum and inclined or almost vertical medially as short, high median carina, the region lateral to carina deeply concave and strongly crenulate (*cf*. Fig. 43). Forewing with vannal area brownish at least along posterior margin and basal cell sometimes closed posteriorly by brownish mediocubital fold; vannal area with subcubital line of setae extending over about apical half. Legs beyond coxae varying from uniformly yellowish-orange to darker orange-brown with tibia dark brown.

Petiole composed almost entirely of vertically raised, smooth and shiny rim (Fig. 31). Gaster in dorsal view dark brown or with slight purple luster, in lateral view all terga except syntergum with more conspicuous purple luster under some angles of light; about 1.3–1.7 x as long as head and mesosoma combined. Syntergum variably long, about one-to two-thirds as long as remaining gaster and in lateral view about 2.5–7.5 x as long as high; uniformly setose, sculptured and tapered posteriorly, with cercus at basal margin.

MALE. Unknown.

Biology. Unknown.

Discussion. The female from Papua New Guinea has the parapsidal and notaular bands completely separated by a longitudinal metallic blue to green band (Fig. 17), the face brighter green to purple than in other specimens, the upper parascrobal region distinctly punctulate-reticulate (*cf.* Fig. 20), the legs entirely yellowish-orange, the basal cell closed posteriorly by a brownish mediocubital fold, and the shortest syntergum of all the specimens. However, females from the Philippines vary in color, with one having

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uniformly orange legs and a paranotaular band that is almost continuous with a similar metallic region in the posterior paramedial depression. Females from the Philippines also have the syntergum variable in length, although this does not appear to be strongly correlated with body length, unlike some other species. I currently consider the differences between the female from Papua New Guinea and those from the Philippines to represent intraspecific variation, but additional specimens are necessary to evaluate the species status more definitively.

B. anemeta is included in the *anemeta*-group along with *B. levicollis*, *B. punctiscutum* and *B. reticulifrons* because all four species have a thin dorsellum, but it certainly is more closely related to *B. levicollis* based on shared presence of setae on the propodeal plical region (Fig. 43), which is unique for the two species in *Balcha*. The most conspicuous difference between females of the two species is sculpture pattern of the postalar region of the acropleuron, which is finely coriaceous-aciculate in *B. anemeta* (Fig. 53) and punctulate-reticulate in *B. levicollis* (Fig. 54). Although males of *B. anemeta* are unknown, they probably are similar to *B. levicollis* males except for the same sculptural difference.

***Balcha camptogastra* n. sp. (Figs. 2, 25, 41, 58, 59)**

Type material. Holotype (♀, BMNH): "**BRUNEI**: Labi lowland forest, VIII.79, I. Gauld / CNCI JDR-specm 2004-126 / Holotype *Balcha camptogastra* Gibson"; glued laterally on card rectangle, entire.

Paratypes: ORIENTAL. **BRUNEI**: Bukit Sulang, Nr. Lamunin, 20.VIII-10.IX.1982, N.E. Stork, B.M. 1982 - 388, CNCI JDR-SEM 2004-054 (1♀ BMNH). **MALAYSIA**: [Sabah], Borneo, Sandakan, Baker (1♀ USNM).

Etymology. Formed from the Greek words *kamptos* (bent or flexible) and *gaster* (stomach), in reference to the conspicuously recurved gaster of females (Fig. 58); a noun in apposition.

Description. FEMALE. Length, 6.5–8 mm. Antenna dark brown except scape and sometimes pedicel and Fl_1 yellow to yellowish-brown; scape widened apically but spindlelike and with outer surface uniformly setose; Fl_1 slightly longer than apical width and about half as long as pedicel; Fl_2 subequal in length to clava. Head with punctures green to blue or purple in contrast to dark or coppery interstices at least on parascrobal region (Fig. 2), the lower face more uniformly green to blue under some angles of light, and upper parascrobal region with large green to blue spot in coriaceous-punctulate region (*cf.* Fig. 12); ocellar region and about anterior half of vertex posterior to ocelli dark with coppery luster under some angles of light, the dark or coppery region tapered posteriorly into mostly green to blue or purple occiput medially in region between posterior ocelli and laterally in region between posterior ocellus and inner orbit. Face with setiferous punctures

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(Fig. 25), the punctures closely crowded near oral margin but elsewhere separated by flat, coriaceous interstices, except about dorsal third of parascrobal region flat with punctures increasingly smaller and shallowed into coriaceous sculpture adjacent to ocelli, and uniformly setose with white setae. Scrobal depression with scrobes dark or with slight purple or violaceous luster under some angles of light, and transversely reticulate-strigose dorsally; channel transversely reticulate-strigose ventrally to coriaceous and setose dorsally (Fig. 25), and with two bright green to blue bands, a transverse band ventrally and a more dorsal V-like band formed by paramedial spots, the region between the bands and below anterior ocellus dark or with slight coppery luster under some angles of light (Fig. 2).

Pronotum dark with coppery luster anteriorly, but posteriorly and laterally greenish to blue; distinctly coriaceous to transversely coriaceous-aciculate. Tegula yellowish. Mesoscutum green laterally and posterodorsally except for at least a small purple region anterior to axilla, with dark notaular and parapsidal bands having distinct coppery to slightly reddish luster forming a somewhat T-like pattern, the bands broadly contiguous over about anterior half of mesoscutum except separated posteriorly by slender paranotaular band, the parapsidal band extending for only short distance posterior to parapsidal line but broadened laterally near apex of parapsidal band, and with notaular band medially about one-third width of scutellar-axillar complex and widened posteriorly to extend across width of scutellum. Mesoscutum (Fig. 41) alveolate laterally, dorsally the punctures smaller, distinctly reticulate-punctulate posterolaterally in small region anterior to axilla, between notauli, and near parapsidal line; without distinct depression anterior to level of inner margin of axilla; laterally with white, slightly lanceolate setae and dorsally with mixture of brownish to white, but more hairlike setae. Scutellum dark with coppery to reddish luster except narrowly greenish to blue along sides; reticulate with longitudinal interstices not aligned into rugae (Fig. 41). Metanotum green or with dorsellum purple under some angles of light; dorsellum thick, with crenulate dorsal surface and coriaceous, bare, posterior surface; precrenular region of panel sparsely setose, the setae indistinctly aligned into 2 rows. Acropleuron with elongate-slender, minutely coriaceous subalar region separating punctate-alveolate prealar region from finely coriaceous-aciculate postalar region; prealar region green anteriorly, violaceous medially and bluish to green posteriorly, but subalar region usually dark and postalar region dark with violaceous to greenish-blue luster under some angles of light. Lower mesepimeron coriaceous to shallowly punctate-reticulate. Metapleuron coriaceous-reticulate to scabrous, with distinct crenulate furrow along posterior margin but uniformly sculptured anteriorly. Propodeum mostly green dorsally but vertical surface of callus purple; paraspiracular region bare, the setae anterior to spiracle extending mesally only to about level of inner margin of spiracle; callus virtually smooth between setal pores; plical region bare, with carinate margin of foramen Λ-like recurved to anterior margin of propodeum as fine median carina similar in appearance to crenulae lateral to median carina. Forewing hyaline; vannal area with

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subcubital setal line extending over about apical half. Legs yellowish beyond coxae except outer and dorsal surfaces of profemur apically and protibia extensively brown.

Petiole composed of anterior carina and slightly wrinkled but quite shiny lunate horizontal surface (Fig. 41). Gaster in dorsal view dark brown except syntergum with greenish luster under some angles of light, in lateral view all terga green to blue dorsally and purple to violaceous ventrally under some angles of light; about twice as long as head and mesosoma combined with about posterior half, consisting of penultimate tergum and syntergum, variably strongly recurved dorsally to anterodorsally (Fig. 58). Syntergum about 0.75–0.8 x as long as remaining gaster, with about basal third comprising larger region surrounding ovipositor sheaths and having cercus at base, and about apical two-thirds forming slender, convex surface above ovipositor sheaths (Fig. 59); uniformly setose and sculptured.

MALE. Unknown.

Biology. Unknown.

Discussion. *Balcha camptogastra* is known only from the island of Borneo. Females are readily differentiated from other *laciniosa*-group species by their conspicuously curved gaster (Fig. 58) and elongate syntergum that is differentiated into a basal portion that surrounds the ovipositor sheaths and a slender dorsoapical portion that lies above the ovipositor sheaths (Fig. 59). The unknown males likely most closely resemble *B. laciniosa* males. All males identified as *B. laciniosa* have some conspicuous, white, lanceolate setae interspersed with hairlike setae posteriorly on the mesoscutum, even through the notaular band (Fig. 9), which *B. camptogastra* males probably lack. Males of *B. camptogastra* may also have a flatter and more distinctly reticulate scutellum than *B. laciniosa* males, if scutellar structure and sculpture in males is similar to females (*cf.* Figs. 36, 41).

Balcha cylindrica Walker (Figs. 10, 29, 30, 39)

Balcha cylindrica Walker, 1862: 395. Type data: [South Africa], Port Natal, discovered by M. Gueinzius. Lectotype female designated by Bouček, 1976: 351 (BMNH type no. 5.953, examined).

Eusandalum cylindrica; Hedqvist, 1961: 109. Change of combination by inference through synonymy of *Balcha* Walker with *Eusandalum* Ratzeburg.

Calosota rugosopunctata Hedqvist, 1970: 417–418. Type data: [South Africa], Cape Pr., Pondoland, Port St. Johns, 6-25 Febr. 1924, Leg. R.E. Turner (Brit. Mus. 1924-136). Holotype male by original designation (BMNH type no. 5.2145, examined). Synonymy by Bouček, 1976: 351.

Polymoria cylindrica; Hedqvist, 1970: 441. Change of combination.

Balcha cylindrica; Gibson, 1989: 67. Combination reestablished.

Additional material examined. AFROTROPICAL. **KENYA**: Eastern Prov. Kibwesi Forest, 2°27'.90'S 37°54.91'E, 7-12.VIII.1999 (1♀ RCPC), 4-11.IX.1999 (1♂ RCPC), R. Copeland. **SOUTH AFRICA**: E. Trans. Guernsey Farm, 15 km. E. Klaserie, 19.XII.1985,

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M. Sanborne (5♀ CNCI). Port St. John, Pondoland, I.1924 (11♀, 8♂ BMNH), 29.I.-5.II.1924 (2♀, 12♂ BMNH), 6-25.II.1924 (5♀, 3♂ BMNH), 1-17.III.1924 (2♀ BMNH), R.E. Turner. Willowmore, Capland, [?] 15 11 99, Dr. R. Brauns (1♂ MCZC). **TANZANIA**: Zanzibar, nr. Mnazi Moja, 20.VIII-24.IX, H.J. Snell (1♂ BMNH). **ZAIRE**: Yangambi, I.1960, J. Decelle (1♀ MRAC). **ZAMBIA**: Kitwe, Chati, 30.VII.1979 (1♀ BMNH, 1♀ NHRS), 14.V.1980 (1♀ BMNH), K. Löyttyniemi.

Description. FEMALE. Length, 5.5–9 mm. Antenna dark except scape, pedicel, Fl_1 and usually base of Fl_2 yellowish; scape widened apically but spindlelike and with outer surface uniformly setose; Fl_1 about 1.4–1.6 x as long as apical width and about 0.5–0.7 x as long as pedicel; Fl_2 about 1.3–1.7 x as long as clava. Head with punctures on parascrobal region green to blue or purple in contrast to dark, coppery or reddish interstices (*cf.* Fig. 2), the lower face more uniformly green to purple under some angles of light, at least near oral margin; ocellar region and vertex dark with coppery to reddish luster under most angles of light, and posterior surface of head usually dark except occiput and along outer orbit with green to blue luster under some angles of light. Face with setiferous punctures (Figs. 29, 30), the punctures on lower face shallow, closely crowded and with distinct granular to reticulate-punctulate subsculpture so as to appear more or less rugulose toward oral margin, but more widely separated by punctulate-reticulate to slightly cristate interstices on parascrobal region at least near torulus, this sculpture more dorsally comprising a variably long and distinct, low convex, bare region between band of setiferous punctures along scrobal depression and single, often obscure line of setiferous punctures along inner orbit (Figs. 29, 30). Scrobal depression with scrobes smoothly merging into channel; scrobes shiny and dark; channel dorsally often narrowly dark or with slight coppery or greenish luster adjacent to anterior ocellus, but at least with similar colored, broader band medially separating more distinctly green to blue dorsal and ventral regions, mostly smooth and shiny to distinctly rugulose-punctate and at least sparsely setose near anterior ocelli.

Pronotum dark anteriorly and green posteriorly and laterally; distinctly coriaceous to coriaceous-reticulate. Tegula yellowish to brown. Mesoscutum green to purple laterally and posterodorsally, but otherwise extensively dark or with variably bright reddish-coppery luster except for green band between notauli and line of green to bluish punctures partly or completely separating notaular and parapsidal bands, the parapsidal band extending towards margin of mesoscutum lateral to parapsidal line and tapered posteriorly to extend to or almost to inner angle of axilla, and with notaular band extending broadly to base of scutellum (Fig. 10). Mesoscutum (Fig. 39) alveolate laterally, dorsally the punctures smaller, particularly between notauli and near parapsidal line; without distinct depression anterior to level of inner margin of axilla; with white to brownish hairlike setae dorsally as well as more conspicuous, slightly lanceolate white setae dorsomedially within notaular band and laterally along margin of mesoscutum. Scutellum dark green or purple to mostly reddish-coppery under different angles of light, but without well delineated dark

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and bright metallic regions (Fig. 10); reticulate, the longitudinal interstices sometimes partly aligned anteriorly but not forming evident rugae (Fig. 39). Metanotum dark with green to purple luster under some angles of light; dorsellum thick, with crenulate dorsal surface (Fig. 39) and coriaceous, setose, posterior surface (*cf.* Fig. 48); precrenular region of panel with single line of setae near anterior margin. Acropleuron (Fig. 39) punctate-alveolate anteriorly, the punctures becoming smaller posteriorly toward minutely coriaceous-granular subalar region, and postalar region extensively punctulate between subalar region and variably broad coriaceous-aciculate band along posterior margin; variably green to purple, usually most distinctly blue to purple below acropleural sulcus and in postalar region, but also under some angles of light anterodorsally and often mesally in prealar region. Lower mesepimeron coriaceous to shallowly punctate-reticulate. Metapleuron distinctly coriaceous except for crenulate posterior margin and narrowly rugulose along anterior margin ventrally. Propodeum green to purple except plical region dark or with coppery luster under some angles of light; paraspiracular region bare, the setae anterior to spiracle extending mesally only to about level of inner margin of spiracle; callus with fine coriaceous subsculpture between setal pores; plical region bare, with carinate margin of foramen Λ-like recurved to anterior margin of propodeum as variably distinct median carina, the region lateral to median carina also with variably distinct and extensive crenulae. Forewing always hyaline behind marginal vein to level about equal with apex of marginal vein, but often with at least slight brownish infusion in region behind stigmal vein and sometimes with more distinct brownish band narrowed from uncus and postmarginal vein beyond stigmal vein toward medial vein at level equal to about base of marginal vein, and with medial fold sometimes also brownish; vannal area with subcubital setal line extending over about apical half. Legs variably extensively dark brown beyond coxae, but at least with knees, apex of protibia, meso- and metatibia medially, and tarsi lighter-colored to white, often with trochanters and bases of meso- and metafemur also lighter colored, and sometimes meso- and metatibiae entirely light-colored except for narrow subbasal dark band.

Petiole (Fig. 39) composed almost entirely of vertically raised, smooth and shiny rim. Gaster in dorsal view mostly dark brown or with coppery or reddish luster under some angles of light, with syntergum and penultimate tergum sometimes bright coppery to variably extensively greenish, and in lateral view all terga with at least some metallic green to purple and often coppery lusters; about 1.3–1.5 x as long as head and mesosoma combined. Syntergum only about 0.2–0.25 x as long as remaining gaster and in lateral view about 2.5–3.3 x as long as high; uniformly setose, sculptured and tapered posteriorly, with cercus at basal margin.

MALE. Similar to female except as follows: length 4.5–7.5 mm; petiole and propodeal plical region longer, the plical region with inverted Y-shaped median carina and obliquely angled, irregular carinae extending anteriorly from carina along foramen.

Biology. Unknown.

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Discussion. *Balcha cylindrica* is the only species of the genus known from mainland Africa, though I have seen a male of *B. elegans* from the island of Zanzibar. Both sexes are distinguished from all other species of the genus by the unique sculpture pattern of the parascrobal region, which dorsally has a slightly convex, though variably large and conspicuous reticulate-punctate bare region between lines of setiferous punctures (Figs. 29, 30). The differentiated region is superficially similar to the upper parascrobal region of some *Archaeopelma* Gibson (Gibson 1989, figs. 3, 4) and *Eusandalum*.

***Balcha dictyota* n. sp. (Fig. 15)**

Type material. Holotype (♀, IZCAS): [**CHINA**] "Peiping [Beijing], 13.III'35 / CNCI JDR-specm 2004-124 / Holotype *Balcha dictyota* Gibson"; mounted by pin through right side of scutellum, right antenna with Fl_8 and clava, and right foreleg beyond trochanter missing.

Etymology. Formed from the Greek word *diktyotos* (reticulate), in reference to the largely reticulate mesoscutum and scutellum.

Description. FEMALE. Length, 8 mm. Antenna with scape yellow, pedicel brown and flagellum dark brown; scape widened apically but spindlelike and with outer surface uniformly setose; Fl_1 about 1.25 x as long as apical width and about 0.6 x as long as pedicel; Fl_2 about 1.2 x as long as clava. Head with punctures and interstices not contrasting distinctly in color, the face variably green to purple under different angles of light except parascrobal region with two dark regions having slight coppery luster under some angles of light, one ventrally between torulus and inner orbit and one dorsally between scrobal channel and inner orbit at juncture of punctate and more finely sculpture region; ocellar region and about anterior half of vertex posterior to ocelli dark, but occiput and outer orbit green to purple under some angles of light. Face (*cf.* Fig. 22) with setiferous punctures, the punctures on lower face and in dark region of lower parascrobal region shallower and closely crowded with mostly linear interstices so as to appear irregularly punctate-reticulate or rugulose, but medially on parascrobal region with distinct punctures separated by flat, finely coriaceous interstices and with about dorsal third of parascrobal region having very shallow, irregular, contiguous punctures so as to appear finely rugulose, and uniformly setose with white setae. Scrobal depression with channel and scrobes differentiated by transverse smooth band having slight greenish to purple luster under some angles of light, but otherwise dark or with slight coppery luster and punctate-reticulate ventrally to reticulate-coriaceous dorsally, with channel setose dorsally.

Pronotum dark with slight greenish luster anteriorly and more distinctly violaceous to purple posteriorly and laterally under some angles of light; coriaceous to coriaceous-aciculate. Tegula yellow. Mesoscutum purple laterally, dorsally with separate parapsidal and notaular bands not contrasting distinctly with brighter metallic regions (Fig. 15), the

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notaular band inconspicuously Y-like because of slight greenish luster between notauli and extending very narrowly to scutellum with brighter green band on either side, and with longitudinal parapsidal band extending about half length of mesoscutum surrounded by slender green region that is separated from notaular band by purple band extending posteriorly within very slightly concave paramedial depression. Mesoscutum (*cf.* Fig. 38) punctate-alveolate laterally, dorsally the punctures shallower so as to be more reticulate and much smaller in region between notauli and near parapsidal line so as to be more punctulate-reticulate; with very shallow, obscure longitudinal depression anterior to level of inner margin of axilla, but sculpture not differentiated from surrounding cuticle; with white hairlike setae, the setae somewhat longer laterally and posteriorly but not distinctly lanceolate. Scutellum (Fig. 15) green; shallowly, irregularly reticulate, the sculpture slightly shallower anteromedially. Metanotum dark with green or purple luster under some angles of light; dorsellum thick, with crenulate dorsal surface and coriaceous, bare, posterior surface; precrenular region of panel with single line of setae near anterior margin. Acropleuron with minutely and very finely coriaceous, inconspicuous subalar region separating punctate-alveolate prealar region from finely coriaceous-aciculate postalar region; with prealar region purple to green and subalar and postalar regions dark with purple luster under some angles of light. Lower mesepimeron punctate-reticulate. Metapleuron reticulate-rugulose over distinct coriaceous subsculpture. Propodeum mostly purple except plical region dark and vertical surface of callus bluish-green under some angles of light; paraspiracular region setose; callus dorsally comparatively smooth and shiny between setal pores but vertical surface punctate-reticulate, similar to sculpture of metapleuron; plical region bare, with carinate margin of foramen raised into flat, transverse posterior surface not distinctly Λ-like recurved to anterior margin of propodeum, but with strong median carina similar in appearance to lateral crenulae. Forewing hyaline; vannal area with subcubital line of setae extending over about apical half. Legs mostly yellowish-orange beyond coxae, but about apical half of outer surface of protibia brown, and meso- and metatibia except for bases and apices more distinctly yellow.

Petiole composed of vertically raised anterior rim and longitudinally crenulate, lunate, horizontal surface about as long as propodeum medially, with distance between the crenulae distinctly greater than length of ridges or distance between propodeal plical crenulae. Gaster in dorsal view dark brown, and in lateral view with only obscure metallic lusters under some angles of light; about 1.75 x as long as head and mesosoma combined. Syntergum slightly more than one-third length of remaining gaster and in lateral view about 3.8 x as long as high; uniformly setose, sculptured and tapered posteriorly, with cercus at basal margin.

MALE. Unknown.

Biology. Unknown.

Discussion. *Balcha dictyota* is assigned to the *elegans* species-group as discussed

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under *B. eximia*, and may be the sister group of *B. eximia* + *B. eximiassita* based on shared presence of a crenulate petiole (Fig. 47), though females of *B. punctiscutum* also have a crenulate petiole (Fig. 44). Although a member of the *elegans*-group, females of *B. dictyota* most closely resemble those of *B. reticulata* in mesoscutal color pattern (Fig. 16) and mesonotal sculpture (Fig. 38), as discussed under the latter species.

Balcha elegans (Masi) (Figs. 11, 26, 35, 46)

Sauteria elegans Masi, 1927: 338–340. Type data: [Taiwan], Kankau [Koshun], 22.IV.1912, H. Sauter. Holotype female by monotypy (DEIC, examined).
Balcha elegans; Gibson, 1989: 67. Change of combination.
Balcha indica; Mani & Kaul, 1973 (in part). Misidentification.

Additional material examined. AFROTROPICAL. **TANZANIA**: Zanzibar: nr. Mnazi Moja, 20.VIII-IX.24, H.J. Snell (1♂ BMNH). ORIENTAL. **BRUNEI**: Bukit Sulang nr Lamunin, 20.VIII-10.IX.1982, N.E. Stork (1♀ BMNH). **INDIA**: [Himachal Pradesh] U.P. [Uttar Pradesh], Dehra Dun, F. Ent. Coll., 19.IV.1929, *Thaumasura* det. Mani (allotype ♀, *B. indica*, USNM); 4, 9, 12.IV.1929, R.R.D. 892, B.C.R. 287, Cage 703, *ex. Kydia calycina* (3♀ IFRI); 2.XI.1924, M. Bhatia, R.R.D. 305, B.C.R. 262, Cage 318, *ex. Ficus bengalensis* (2♂ IFRI). Dehra Dun, Lachiwala, F. Ent., 3.IV.1929 (paratype ♂, *B. indica*, USNM), 12.IV.1929 (1♀ IFRI), R.R.D. 892, BCR 287, Cage 703, *ex. Kydia calycina*. [Madhya Pradesh], Kanha, Banjar, Mandla, C.P., 20.IV.1927 (1♂ IFRI), 21.IV.1927 (paratype ♂, *B. indica*, USNM), 30.IV.1927 (♀ incorrectly labelled as paratype, *B. indica*, USNM), R.R.D. 660, B.C.R. 16, Cage 654, *ex. Pterocarpus marsupium*. [Karnataka], S. Coorg., Ammatti, V.1951, P.S. Nathan (1♀, 1♂ CNCI). **INDONESIA**: E. Kalimantan, Kac. Pujungan, Kavan-Mentarang Nat. Res., VI.1993, D.C. Darling & Rosichon (1♀ ROMT). Java, Roban, F. Muir (1♀, MCZC), VI.1907, F. Muir (1♀, 1♂ BPBM); [?]Pasoeroean, IV.1914 (1♀ BPBM). **MALAYSIA**: [Malaya] Johore, S. Seluyut, 17.III.1973, K.M. Guichard (1♀ BMNH); Selangor, F.M.S., Kuala Lumpur, 11.IX.1922, H.M. Pendlebury (1♀ BMNH); Penang [George Town], Batu Ferringhi catchment area, 15.X.1957, H.T. Pagden (1♂, BMNH). [Sabah] N. Borneo, Bettotan, nr. Sandakan, [?]21.VIII.1927 (1♀ BMNH). Sabah, Sipitang, Mendolong, T4/R, 28.IV.1988, S. Adebratt (1♂ MZLU). Sarawak, Sarikei Dist., Rejang Delta, 15-26.VII.1958, T.C. Maa (1♀ BPBM). **PHILIPPINES**: Basilan, Baker (1♂ USNM). Mindanao, Baker (1♀ USNM); Butuan, Baker (1♂ USNM). **THAILAND**: N.W., Chiangmai, Fang, 500 m., 15.IV.1958, T.C. Maa (1♀, 1♂ BPBM).

Description. FEMALE. Length, 6.5–13 mm. Antenna dark except scape yellowish-orange and often pedicel and sometimes Fl_1 and base of Fl_2 yellowish-orange or at least lighter brown than remaining flagellum; scape widened apically but spindlelike and with outer surface uniformly setose; Fl_1 slightly transverse to about 1.5 x as long as wide and

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about 0.4–0.5 x as long as pedicel; Fl_2 about 1.2–1.4 x as long as clava. Head with punctures of face green to blue or purple in contrast to dark or coppery to violaceous interstices (*cf*. Fig. 2), and with coriaceous dorsal part of parascrobal region variably extensively green or blue; ocellar region, vertex and occiput dark except usually with slender green to bluish spot or band behind posterior ocellus, and sometimes narrowly green to bluish along upper and outer orbit under some angles of light. Face with setiferous punctures, the punctures closely crowded on lower face but deep and distinct even near oral margin (Fig. 26), dorsally more widely separated by flat, coriaceous interstices, except about dorsal quarter to third of parascrobal region uniformly setose with white setae and usually abruptly flat and coriaceous, though sometimes coriaceous-roughened because of very shallow, small, crowded punctures with coriaceous subsculpture. Scrobal depression with channel and scrobes differentiated by variably conspicuous, usually green to blue or purple undulation, but otherwise dark or channel with slight coppery luster under some angles of light; scrobes smooth and shiny to slightly transversely strigose; channel coriaceous and setose dorsally.

Pronotum dark anteriorly, but posteriorly and laterally green to blue or purple; coriaceous to coriaceous-aciculate. Tegula yellowish-brown to dark brown. Mesoscutum mostly green to purple laterally and posterodorsally, but at least with small purple to brown region anterior to axilla and dorsally with notaular and parapsidal bands forming Ψ-like pattern (Fig. 11), the parapsidal band only very rarely extending posteriorly to unite with dark region anterior to axilla and notaular band often either quite narrow behind parapsidal bands or sometimes irregularly dark and bright metallic so as not to form a continuous band, but at least widened posteriorly to extend broadly across base of scutellum. Mesoscutum (Fig. 35) alveolate laterally, dorsally the punctures smaller and shallower in dark regions, particularly within notaular band and near parapsidal line; without distinct depression anterior to level of inner angle of axilla; with white to brownish setae dorsally and white setae laterally, the setae slightly longer posteriorly and laterally but at most only very slightly lanceolate and not contrasting distinctly with mostly hairlike dorsal setae. Scutellum same color as notaular band (Fig. 11) except sometimes sides, usually very narrowly, and/or mediolongitudinal line green to blue; reticulate- or coriaceous-punctate posteriorly but anteriorly sculpture aligned into variably distinct longitudinal, setiferous furrows and slightly sinuous ridgelike interstices, including usually higher and more conspicuous median coriaceous ridge or carina (Fig. 35). Metanotum green or dorsellum purple under some angles of light; dorsellum thick, with crenulate dorsal surface and coriaceous, bare, posterior surface; precrenular region of panel uniformly setose. Acropleuron with slender, minutely and very finely coriaceous to smooth and shiny subalar region separating punctate-alveolate prealar region from finely coriaceous-aciculate or smooth and shiny postalar region; prealar region dark to greenish anteriorly and violaceous posteriorly, or violaceous medially and more blue posteriorly, but with subalar region dark or with slight coppery luster and postalar region

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dark or blue to violaceous under some angles of light. Lower mesepimeron sometimes coriaceous anteriorly or dorsally, but usually extensively punctate-reticulate. Metapleuron distinctly coriaceous to very shallowly reticulate over distinct coriaceous subsculpture, except for crenulate posterior margin and variably extensively rugulose along ventral margin and anterior margin ventrally. Propodeum green except vertical surface of callus purple and plical region sometimes dark; paraspiracular region setose; callus often smooth between setal pores dorsally, but laterally finely coriaceous at least near metapleuron; plical region bare, with carinate margin of foramen Λ-like recurved to anterior margin of propodeum as variably distinct median carina, the region lateral to median carina also with variably distinct and extensive crenulae (Fig. 35). Forewing hyaline or with cubital fold and vannal area sometimes with slight brownish infusion; vannal area with subcubital setal line extending over about apical half. Legs variable in color beyond coxae, sometimes extensively yellowish-orange except metatibia medially always broadly lighter, yellowish-white, and often with at least profemur, rarely all femora, and sometimes protibia yellowish-brown to dark brown.

Petiole composed of anterior carina and slightly wrinkled but quite shiny lunate horizontal surface (Fig. 35). Gaster in dorsal view with at least basal 5 terga dark brown and in lateral view purple to green, with penultimate tergum usually bright green in lateral view and under some angles of light often entirely green to coppery dorsally except usually along midline, and syntergum sometimes with slight greenish luster; about 1.6–2 x as long as head and mesosoma combined. Syntergum variably long, about 0.3–0.7 x as long as remaining gaster and in lateral view about 2.7–9 x as long as high; uniformly setose, sculptured and tapered posteriorly, with cercus at basal margin.

MALE. Length, 3.5–7 mm. Usually similar to female in color pattern, but rarely notaular and parapsidal bands forming T-like rather than Ψ-like pattern because parapsidal band linearly separated from notaular band posteriorly and notaular band almost as wide as scutellum; structure similar to female except petiole and propodeal plical region longer; plical region variable, always with inverted Y-shaped median carina and sometimes with distinct W-shaped median area delimited by median carina and strong, entire, obliquely angled paraspiracular furrow and carina, with surface between carinae smooth and shiny or only finely coriaceous, but sometimes W-shape less obvious because median area with 2 or more additional irregular, longitudinally or obliquely angled carinae on either side of median carina and surface often distinctly coriaceous.

Biology. Hosts unknown, but reared from the Banyan tree, *Ficus bengalensis* L. (Moraceae), Kino tree, *Pterocarpus marsupium* Roxb. (Fabaceae), and *Kydia calycina* Roxb. (Malvaceae) (Mani & Kaul 1973).

Discussion. Three of five specimens originally included in the type series of *B. indica* belong to *B. elegans*, as does one other broken female in the USNM that is labelled as a paratype of *B. indica*, but which is not listed in the original description. Both sexes of *B. elegans* are superficially most similar to, and can be easily misidentified as, *B. laciniosa*

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if the paraspiracular setae are abraded or concealed under the wings. However, individuals of *B. laciniosa* have quite distinct white lanceolate setae interspersed with hairlike setae posterodorsally on the mesoscutum (Fig. 9), which *B. elegans* lack (Fig. 11), as well as a more rugulose-roughened lower face because of less distinctly delineated punctures (*cf.* Figs. 26, 27), a less setose metanotal precrenular region, and usually slightly different color patterns in the scrobal channel and on the middle legs, as detailed in the respective descriptions. Females of *B. laciniosa* also have the petiole more strongly reduced, composed merely of a vertical flange, and usually have a shorter syntergum than do females of *B. elegans*. Other than *B. cylindrica*, this is the only species of *Balcha* known from the Afrotropical region. The record is based on a single male from the island of Zanzibar and it remains to be determined whether the species occurs on continental Africa.

***Balcha enoptra* n. sp. (Figs. 6, 23, 42, 45, 55)**

Type material. Holotype (♀, IZCAS): [**CHINA**] "Yunnan, 20 km. S.W. Cheli [Yunjinghong], 650 m., 9.IV.1957, D. Panfilov [two identical labels, upper in Russian and lower in Chinese] / CNCI JDR-SEM 2004-068"; glued to point, Fl_8 and clava of right antenna, right wings except for about basal quarter of forewing, and left metatarsus missing.

Etymology. Formed from the Greek word *enoptron* (mirror), in reference to the dorsally smooth and shiny syntergum of females of this species (Fig. 55).

Description. FEMALE. Length, 7 mm. Antenna dark except scape, pedicel and Fl_1 yellowish-orange; scape widened apically but spindlelike and with outer surface uniformly setose; Fl_1 about as long as apical width and half as long as pedicel; Fl_2 very slightly longer than clava. Head with punctures of lower face green and those of parascrobal region blue to purple under most angles of light in contrast to dark or slightly coppery interstices (*cf.* Fig. 2), and with vertex and posterior surface of head mostly dark but occiput dorsally with green to bluish band in line with posterior ocellus and with upper outer orbit narrowly bluish to green. Face (Fig. 23) with setiferous punctures separated by distinctly coriaceous interstices, the punctures on lower face shallower and more closely crowded with mostly ridgelike interstices compared to more widely separated punctures over about ventral two-thirds of parascrobal region, except about dorsal third of parascrobal region quite abruptly coriaceous with only tiny, shallow setiferous depressions so as to be flat and uniformly setose with dark setae. Scrobal depression with scrobes transversely strigose and dark to purple under different angles of light; channel smooth, shiny, and dorsally setose, with two bright metallic bands or paramedial spots, a purple to green transverse band ventrally and paramedial green spots subdorsally, the region between the bands and below anterior ocellus dark with slight coppery luster under some angles of light (*cf.* Fig. 2).

Pronotum dark anteriorly, but posteriorly and laterally green to purple under some

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angles of light; distinctly coriaceous. Tegula yellowish-brown. Mesoscutum with green to blue punctures and dark interstices under most angles of light except anteriorly for dark notaular and parapsidal bands, the notaular band slightly greenish between notauli under some angles of light and parapsidal band extending only about half length of mesoscutum, with notaular and parapsidal bands only obscurely separated by slightly greenish band of punctures under some angles of light and notaular band only obscurely extending to scutellum (Fig. 6). Mesoscutum (Fig. 42) alveolate laterally and dorsally posterior to level of notauli, with punctures slightly transverse between notaulus and parapsidal line, and distinctly smaller, more reticulate-punctate, between notauli; without distinct depression anterior to level of inner margin of axilla; with brownish hairlike setae dorsally but laterally with slightly longer, white but not distinctly lanceolate setae. Scutellum (Fig. 6) dark with violaceous luster or slight greenish tinge under some angles of light; coriaceous-granular with tiny setiferous punctures near posterior margin, but sculpture mostly aligned into shallow, setiferous furrows and irregular, low, rounded longitudinal ridges, without a differentiated mediolongitudinal ridge (Fig. 42). Metanotum dark with green to bluish luster under some angles of light; dorsellum thick, with crenulate dorsal surface and coriaceous, bare, posterior surface; precrenular region of panel with single row of setae near anterior margin (Fig. 45). Acropleuron with slender, minutely and very finely coriaceous subalar region separating punctate-alveolate prealar region from finely coriaceous-aciculate postalar region; prealar region with punctures green to violaceous or blue compared to darker interstices under most angles of light, but subalar and postalar regions dark or with slight violaceous luster. Lower mesepimeron shallowly punctate-reticulate. Metapleuron extensively punctate- or reticulate-rugulose over distinct coriaceous subsculpture except more uniformly coriaceous dorsally and with crenulate furrow along posterior margin and anterior margin ventrally. Propodeum (Fig. 45) mostly green dorsally but callus purple to violaceous under different angles of light; paraspiracular region bare, the setae anterior to spiracle extending mesally only to about level of inner margin of spiracle; callus at most finely coriaceous between setal pores; plical region bare, with carinate margin of foramen Λ-like recurved to anterior margin of propodeum as median carina similar in appearance to crenulae lateral to median carina (Fig. 45). Forewing hyaline; vannal area with subcubital setal line extending over about apical half. Legs mostly yellowish-orange, but profemur dark brown with slight green luster under some angles of light and meso- and metatibiae more distinctly yellowish apically.

Petiole (Fig. 45) composed almost entirely of vertically raised, smooth and shiny rim. Gaster in dorsal view dark brown, in lateral view with quite distinct green to violaceous luster on Gt_1 but only very obscure metallic luster on remaining terga; about 1.1 x as long as head and mesosoma combined. Syntergum (Fig. 55) only about 0.2 x as long as remaining gaster and in lateral view about as long as high; in lateral view uniformly setose, but in dorsal view with low convex, smooth and shiny bare region about 2.5 x as long as

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wide posterior to transverse setose band [in holotype, setose band posterior to bare, coriaceous region normally overlain by posterior margin of penultimate tergum, see below].

MALE. Unknown.

Biology. Unknown.

Discussion. The unique female has the apex of the penultimate gastral tergum retracted from the syntergum so that the base of the syntergum is exposed (Fig. 55), unnaturally. The base of any gastral tergum normally is overlain by an apical portion of the preceding tergum, with the overlain portion being bare so that the surfaces slide easily. Consequently, the bare basal portion of the syntergum seen in the holotype (Fig. 55) probably will not be visible for all females. Relative length of the syntergum given in the description was measured from the anterior margin of the setose band to the posterior margin of the syntergum. The mirrorlike dorsal surface of the short syntergum (Fig. 55) uniquely distinguishes females of *B. enoptra* from those of other *Balcha*. It is unknown whether males have a similar syntergal structure. Females of *B. enoptra* also have the mesoscutum comparatively uniformly alveolate posterior to the parapsidal and notaular bands, the punctures dorsally being quite similar in size and depth compared to the punctures laterally (Fig. 42).

Balcha eximia (Masi) (Figs. 1, 13, 20, 47)

Sauteria eximia Masi, 1927: 334–338. Type data: [Taiwan], Kankau (Koshun), VI.1912, H. Sauter (1♀ DEIC, 1♀ MCSN). Kosempo, IV.1912, H. Sauter (1♀ DEIC). Taihorin, V.11 (1♂ MCSN), 7.VIII.1911 (1♂ DEIC), H. Sauter. Syntypes, examined.
Balcha exima (!); Gibson, 1989: 67. Change of combination.

Additional material examined. ORIENTAL. **TAIWAN**: Hualien Pref., Liyuchih, 22.VI.1968, K. Tsuneki (1♀ USNM). Taihorin, V.1910 (1♀ BMNH).

Description. FEMALE. Length, 11–15 mm. Antenna dark except scape and sometimes pedicel yellowish-orange to orange; scape widened apically but spindlelike and with outer surface uniformly setose; Fl_1 about 1.1–1.25 x as long as wide and about 0.5–0.6 x as long as pedicel; Fl_2 about 1.4–1.7 x as long as clava. Head with punctures and interstices not contrasting in color on face, the lower face and parascrobal region partly green, but interantennal region, lower parascrobal region variably extensively to about level of apex of interantennal region and upper parascrobal region near ocelli purple (Fig. 1), and upper parascrobal region along margin of scrobal channel narrowly dark or with slightly coppery luster; ocellar region and about anterior half of vertex posterior to ocelli dark, but green to blue along upper inner orbit from about level of posterior ocellus and more extensively blue to purple on occiput and behind outer orbit. Face with setiferous punctures (Fig. 20), the punctures more closely crowded on lower face but deep and

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distinct even near oral margin, more widely separated by flat, finely but quite distinctly coriaceous interstices on parascrobal region, except about dorsal quarter to third of region uniformly setose, flat and punctulate-coriaceous, the punctures much smaller, shallower, crowded and with distinct coriaceous subsculpture. Scrobal depression with scrobes dark, smooth and shiny ventrally and distinctly punctate-reticulate dorsally; channel smooth and shiny with green to blue or purple luster ventrally, but dorsally dark or with slight coppery luster and finely coriaceous and setose toward anterior ocellus.

Pronotum dark anteriorly, but posteriorly and laterally blue to purple; only very finely coriaceous-aciculate between setal pores. Tegula yellow. Mesoscutum narrowly purple laterally along margin and green between purple and parapsidal band, dorsally with notaular and parapsidal bands extending posteriorly to scutellum and either separate or only indistinctly joined near scutellum (Fig. 13), the notaular band with slightly concave sides so posteriorly widening uniformly and extending across width of scutellum, and parapsidal band widest near apex of parapsidal line and narrowed posteriorly to extend linearly to inner angle of axilla, the bands separated by distinct greenish-blue paranotaular band (Fig. 13). Mesoscutum (*cf.* Fig. 37) punctate-alveolate laterally, dorsally the punctures shallower so as to be more reticulate, particularly between notauli and near parapsidal line; without distinct depression anterior to level of inner angle of axilla; with white to brownish hairlike setae. Scutellum (Fig. 13) purple laterally and variably widely green medially; sculpture sometimes aligned into variably distinct longitudinal setiferous furrows and slightly sinuous ridgelike interstices, or varying from punctate-coriaceous to extensively coriaceous with tiny setiferous pits, but with mediolongitudinal bare coriaceous band, when evident (*cf.* Fig. 37), not raised above height of other sculpture. Metanotum green to purple under different angles of light; dorsellum thick, with crenulate dorsal surface and coriaceous, bare, posterior surface; precrenular region of panel with 1 or 2 rows of setae (Fig. 47). Acropleuron with slender, minutely coriaceous-aciculate subalar region separating punctate-alveolate prealar region from finely coriaceous-aciculate postalar region; prealar region dark to greenish anteriorly, but usually more coppery or violaceous to purple posteriorly, and subalar and postalar regions violaceous to purple or green. Lower mesepimeron shallowly punctate-reticulate. Metapleuron punctate-rugulose over distinct coriaceous subsculpture except for crenulate furrow along posterior margin and anterior margin ventrally. Propodeum dorsally green to blue or purple under different angles of light except plical region dark and vertical surface of callus more uniformly purple; paraspiracular region setose; callus smooth between setal pores, the surface laterally adjacent to metapleuron obviously different from metapleural sculpture (Fig. 47); plical region bare, with carinate margin of foramen Λ-like recurved to anterior margin of propodeum as strong median carina similar in appearance to crenulae lateral to median carina (Fig. 47). Forewing hyaline; vannal area with subcubital setal line extending over about apical half. Legs entirely yellowish beyond coxae except metatibia usually broadly lighter, more yellowish white, medially.

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Petiole composed of anterior carina and lunate horizontal surface obviously longer medially than propodeum, the surface longitudinally crenulate but crenulae either distinctly weaker or more widely spaced than on propodeal plical region (Fig. 47). Gaster in dorsal view dark brown or penultimate tergum at most with very faint greenish luster and not contrasting distinctly in color with other terga, in lateral view all terga except syntergum greenish dorsally to blue or purple ventrally; about twice as long as head and mesosoma combined. Syntergum about 0.7–0.8 x as long as remaining gaster and in lateral view about 7.5–9 x as long as high; uniformly setose, sculptured and tapered posteriorly, with cercus at basal margin.

MALE. Similar to female except as follows: length, 7 mm; petiole and propodeal plical region longer; petiole with median carina and at most a few inconspicuous crenulae laterally; plical region with inverted Y-shaped median carina and about 3 strong, irregular carinae between median carina and deep paraspiracular furrow.

Biology. Unknown.

Discussion. Females, and likely males of *B. eximia*, are very similar to those of *B. eximiassita*, as discussed under the latter species.

Balcha eximiassita n. sp. (Figs. 14, 37, 52)

Type material. Holotype (♀, USNM): "**THAILAND**, Nkn. Ratcha. [Nakhon Ratchasima] Prov., Kakhon Ratchasima, 60 km. S., 2-4.III.1971, P. & P. Spangler / Sakaerat Expt. Sta., 14°30'N 101°55'E, 300-600 meters / collected in Malaise Trap / CNCI JDR-SEM 2004-060 / Holotype *Balcha eximiassita* Gibson"; pinned through posterior of mesoscutum, entire but right hind wing glued to top label.

Paratypes: ORIENTAL. **INDIA**: Mahé, Malabar, 1919, J. de Gaulle (1♀ MNHN). **VIETNAM**: Tonkin, Hoa-Binh, III.1937, A. de Cooman (3♀ IZCAS), VIII.1918, R.V. de Salvaza (1♀ BMNH).

Etymology. Formed from the species name *eximia* (exceptional or extraordinary) and the Latin word *assitus* (near), in reference to the morphological similarity of females of the two putative species.

Description. FEMALE. Length, 12–16 mm. Antenna dark except scape usually orange; scape widened apically but spindlelike and with outer surface uniformly setose; Fl_1 quadrate to slightly transverse and about half as long as pedicel; Fl_2 about 1.5–1.7 x as long as clava. Head with punctures and interstices not contrasting in color on face, the face mostly green or more bluish-purple ventrally under some angles of light, except interantennal region and usually lower parascrobal region narrowly purple or dark along scrobes, and upper parascrobal region often with slender region of bright-coppery luster along margin of scrobal channel; ocellar region and about anterior half of vertex posterior to ocelli dark or coppery, but green to blue along upper inner orbit from about level of

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posterior ocellus, and more extensively blue to purple on occiput and behind outer orbit. Face with setiferous punctures (*cf.* Fig. 20), the punctures more closely crowded on lower face but deep and distinct even near oral margin, more widely separated by flat, smooth or only very finely and inconspicuously coriaceous interstices on parascrobal region, except about dorsal quarter to third of region uniformly setose, flat and punctulate-coriaceous, the punctures much smaller, shallower, crowded and with distinct coriaceous subsculpture (*cf.* Fig. 20). Scrobal depression with scrobes dark, smooth and shiny ventrally but distinctly punctate-reticulate dorsally; channel smooth and shiny with green to blue or purple luster ventrally, but dorsally dark or with slight coppery luster and finely coriaceous and setose toward anterior ocellus.

Pronotum dark anteriorly, but posteriorly and laterally blue to purple; only very finely coriaceous-aciculate between setal pores. Tegula yellow. Mesoscutum laterally narrowly purple along margin and green between purple region and parapsidal band, dorsally with notaular and parapsidal bands extending to scutellum, the bands joined distinctly anterior to scutellum and with notaular band having concave sides abruptly widened in about posterior third or quarter to form parallel longitudinal margins anterior to scutellum (Fig. 14), and with greenish paranotaular band obviously separated from scutellum. Mesoscutum (Fig. 37) punctate-alveolate laterally, dorsally the punctures shallower so as to be more reticulate; without distinct depression anterior to level of inner angle of axilla; with white to brownish hairlike setae. Scutellum (Fig. 14) usually with bright coppery mediolongitudinal band and progressively green to purple laterally, though sometimes medial band green with only limited coppery luster; sculpture sometimes aligned into variably distinct longitudinal setiferous furrows and slightly sinuous ridgelike interstices, or varying from punctate-coriaceous to extensively coriaceous with tiny setiferous pits, but with distinct, bare, mediolongitudinal coriaceous band slightly raised above height of other sculpture as low rounded ridge (Fig. 37). Metanotum green to purple under different angles of light; dorsellum thick, with crenulate dorsal surface and coriaceous, bare, posterior surface; precrenular region of panel with 1 or 2 rows of setae (*cf.* Fig. 47). Acropleuron with slender, smooth and shiny subalar region separating punctate-alveolate prealar region from very finely coriaceous-aciculate or smooth and shiny postalar region; prealar region dark or with some greenish or violaceous to purple luster, subalar region dark or with coppery-greenish luster, and postalar region blue to purple or green. Lower mesepimeron punctate-reticulate. Metapleuron punctate-rugulose over distinct coriaceous to coriaceous-granular subsculpture, except for crenulate furrow along posterior margin and anterior margin ventrally. Propodeum dorsally green to blue or purple under different angles of light except plical region dark and vertical surface of callus more uniformly purple; paraspiracular region setose; callus smooth between setal pores dorsolaterally, but adjacent to metapleuron roughened, punctulate-coriaceous, similar to sculpture of metapleuron (Fig. 52); plical region bare, with carinate margin of foramen Λ-like recurved to anterior margin of propodeum as strong median carina similar in appearance to crenulae

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lateral to median carina. Forewing hyaline; vannal area with subcubital setal line extending over about apical half. Legs entirely yellowish beyond coxae except metatibia usually broadly lighter, more yellowish white, medially.

Petiole composed of anterior carina and lunate horizontal surface obviously longer medially than propodeum, the surface longitudinally crenulate but crenulae either distinctly weaker or more widely spaced than on propodeal plical region (*cf.* Fig. 47). Gaster in dorsal view with penultimate tergum bright green to partly blue, contrasting distinctly in color with other dark brown terga, and in lateral view all terga except syntergum greenish dorsally to blue or purple ventrally; about twice as long as head and mesosoma combined. Syntergum about 0.75–0.85 x as long as remaining gaster and in lateral view about 8–9 x as long as high; uniformly setose, sculptured and tapered posteriorly, with cercus at or near basal margin.

MALE. Unknown

Biology. Unknown.

Discussion. Females of *B. eximiassita* differ from those of *B. eximia* only in comparatively minor color differences and one sculptural difference. Color pattern of the mesoscutum is the most conspicuous color difference, which results primarily from the shape of the notaular band posteriorly (*cf.* Figs. 13, 14). However, females of *B. eximiassita* also lack the distinct blue band from the parascrobal region lateral to the torulus, which characterizes *B. eximia* females (Fig. 1), they have the penultimate gastral tergum mostly bright green, and they usually have a distinct mediolongitudinal coppery band on the scutellum (Fig. 14). The only significant sculptural difference is that in *B. eximiassita* the lateral surface of the callus is roughened (Fig. 52, *cf.* Fig. 43) similar to the metapleuron, whereas it is uniformly smooth and shiny in *B. eximia* (Fig. 47). *Balcha eximiassita* is known from southeast Asia, whereas *B. eximia* currently is known only from Taiwan. Additional collecting from other areas may show the differences are variable and simply opposite extremes of intraspecific variation.

Balcha indica (Mani & Kaul) (Figs. 8, 12, 21, 33, 34, 48, 50, 51)

Thaumasura indica Mani & Kaul, 1973: 57–60. Type data: [INDIA], U.P. [Uttar Pradesh], Dehra Dun, 3.IV.1933, M. Bose, *ex. Albizzia* sp. (dead). Holotype female *nec* male, by original designation (USNM type no. 76264, examined; originally stated to be mounted on pin, now glued to card rectangle).

Thaumasura indica; Bouček *et al.*, 1979: 459 (stated as possibly belonging to Eupelmidae); Farooqi & Subba Rao, 1986: 306 (unplaced species).

Balcha indica; Gibson, 1989: 67. Change of combination.

Additional material examined. NEARCTIC. **USA**: *Maryland*: Montgomery Co., 4 mi. southwest Ashton, 39°06'30"N 77°01'30"W, on dead *Prunus* infested with scolytids/ cerambycids, 16.VIII.2003 (1♀ CNCI, 2♀ USNM), 24.VIII.2003 (4♀ CNCI, 4♀ USNM),

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E. Grissell; 17.VIII.2003 (2♀ CNCI, 2♀ USNM), G.F. Hevel; 19.VIII.2003 (3♀ CNCI, 5♀ USNM), 24.VIII.03 (2♀ USNM), Gates/Hevel; 10.VI.2004, G. Gibson (1♀ CNCI). *Michigan*: Wayne Co., Livonia, 21.II.2003, from I-9-8, SELIS Lot# 0309518, H-P. Liu (1♀ MSUC); 27.II.2004, H-P. Liu (1♀ CNCI); 31.III.2003, from H-2, H.-P. Liu (1♀ USNM); 2.IV.2003, from II-21-7, *ex.* Ash logs infested with *Agrilus planipennis*, scolytids & cestodes, H-P. Liu (1♀ MSUC); 17.XI.2003, J. Gould, ectoparasitoid of *Agrilus planipennis* on *Fraxinus*, SELIS Lot 0400458, RN1 (1♀ USNM), RN2 (1♀ USNM). Livonia, Bicentennial Park, 21.VII.2004, H-P. Liu (1♀ CNCI); 42°25.77N 83°23.71W, 237 m, 29.VI.04 (1♀ CNCI, 2♀ USNM), 30.VI.04 (5♀ CNCI, 2♀ USNM), on dying ash tree, M. Gates/G. Gibson. Novi, Maybury State Park, 21.VII.2004 H-P. Liu (1♀ MSUC). Novi, Rotary City State Park, 20.VII.2004, H-P. Liu (1♀ MSUC). *Virginia*: Clarke Co., Univ. Va. Blandy Exptl. Farm, 2 mi. S. Boyce, 4-15.IV.1994 (1♀ CNCI, 1♀ USNM), 19.VIII-2.IX.1994 (3♀ CNCI, 3♀ USNM), 3-21.IX.1994 (4♀ CNCI, 3♀ USNM), 22.IX-17.X.1994 (1♀ CNCI, 2♀ USNM), 3-19.IV.1995 (1♀ CNCI), 25.VII-8.VIII.1995 (1♀ USNM), D.R. Smith, Malaise trap. Warren Co., 1.5 mi. N. Linden, 1000 ft., 15.IV.95, L. Masner (1♀ CNCI). ORIENTAL. **BURMA**: Maymyo, 17.III.1948, on wing, Chief Conservator of Forests (1♀ BMNH). **INDIA**: [Nagaland], Nichugod [Nichugaurd], Naga Hills, 3.IV.1929, R.R.D. 215, B.C.R. Cage 10, S.N. Chatterjee (♀ *nec* ♂ paratype). [Tamil Nadu], Yercaud nr. Salem, 4500', 12.IV.1962, G.J. Spencer (1♀ CNCI). **THAILAND**: (NW), Chiangmai, Fang, 500 m., 15.IV.1958, dead tree (1♀ BPBM). **VIETNAM**: Tonkin, Hoa-Binh, A. de. Cooman (11♀, 1♂ IZCAS), 1929 (1♀ MNHN), III.1937 (2♀ IZCAS), VIII.39 (3♀ IZCAS).

Description. FEMALE. Length, 3–9 mm. Antenna dark except scape, often pedicel and sometimes Fl_1 orange-brown to yellowish-orange, scape widened apically but spindlelike and with outer surface uniformly setose; Fl_1 quadrate to about 1.3 x as long as apical width and about 0.4–0.55 x as long as pedicel; Fl_2 about 0.8–1.5 x as long as clava. Head with punctures on parascrobal region green to blue or purple in contrast to dark, coppery or reddish interstices (*cf.* Fig. 2), the lower face usually more uniformly green under some angles of light, at least near oral margin, and parascrobal region dorsally usually with green spot on coriaceous region (Fig. 12); ocellar region, vertex and occiput dark or with slight coppery to reddish luster, except usually with green to bluish spot or band in line with posterior ocellus, the two sometimes joined as V-like mark behind ocelli, and outer orbits usually at least narrowly green to bluish under some angle of light. Face with setiferous punctures (Fig. 21), the punctures on lower face closely crowded, finely coriaceous, and with more distinct coriaceous to slightly reticulate interstices so as to appear somewhat rugulose toward oral margin, but parascrobal region with distinct punctures separated by flat, coriaceous interstices except about dorsal quarter quite abruptly coriaceous or with only very tiny, shallow setiferous punctures, flat, and uniformly setose with white to dark setae. Scrobal depression with scrobes dark or with purple luster under some angles of light and dorsally punctate-reticulate to transversely

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strigose; channel smooth, shiny, setose dorsally, and under most angles of light with two bright violaceous to purple or blue bands, a transverse or V-like band ventrally and a V-like band or paramedial spot subdorsally, with the region between the bands and below anterior ocellus dark or with coppery or slight yellowish-green luster under some angles of light (*cf*. Fig. 2).

Pronotum dark or with coppery luster anteriorly, but posteriorly and laterally green or with purple or bluish luster under some angles of light; distinctly coriaceous. Tegula yellow to dark brown. Mesoscutum greenish at least anterolaterally and along parapsidal band, but usually darker or with purple or violaceous luster posterolaterally, and dark or purple posterodorsally, anterodorsally either with continuous broad dark region comprised of united parapsidal and notaular bands or with Ψ-like pattern because of variably distinct greenish paranotaular band, but parapsidal band extending only about half length of mesoscutum and notaular band variably broad and extending partly or entirely to posterior margin (Fig. 12). Mesoscutum almost uniformly alveolate laterally and dorsally posterior to anteromedial dark region (Fig. 33), or dorsally with narrow medial band of much smaller, more reticulate-punctate sculpture extending to scutellum (Fig. 34), the band posterior to parapsidal bands conspicuously narrower than dark region between paranotaular bands; without distinct impression anterior to level of inner margin of axilla; with slightly lanceolate white setae at least laterally anterior to tegula (Figs. 8, 12), dorsally with dark hairlike setae or with scattered white lanceolate setae interspersed with dark setae. Scutellum mostly dark or with slight coppery or violaceous to reddish luster under some angles of light (Fig. 12); variably extensively reticulate posteriorly, but sculpture anteriorly usually more or less distinctly aligned into longitudinal, coriaceous, setiferous furrows and irregular ridgelike interstices, and usually with a higher, more distinct mediolongitudinal carina (Figs. 33, 34). Metanotum dark or with green to bluish lusters under some angles of light; dorsellum thick, with crenulate dorsal surface and coriaceous posterior surface, the posterior surface often extensively setose (Fig. 48) but at least with 2 setae on either side dorsally. Acropleuron with slender, minutely coriaceous subalar region separating punctate-alveolate prealar region from variably sculptured postalar region, the postalar region entirely coriaceous-aciculate or variably extensively and conspicuously punctate-reticulate with elongate, longitudinally aligned punctures; prealar region usually mostly green but often with some purple or violaceous luster (Fig. 8), subalar region often having slight coppery luster, and postalar region dark with green to purple or violaceous luster under some angles of light. Lower mesepimeron variably coriaceous to shallowly punctate-reticulate at least ventrally. Metapleuron distinctly coriaceous except for usually crenulate furrow along posterior margin and anterior margin ventrally. Propodeum mostly green except plical region dark and vertical surface of callus purple to violaceous; paraspiracular region bare, the setae anterior to spiracle extending mesally only to about level of inner margin of spiracle; callus smooth and shiny between setal pores or at most very finely coriaceous laterally near metapleuron;

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plical region bare, with carinate margin of foramen Λ-like recurved to anterior margin of propodeum as fine median carina similar in appearance to crenulae lateral to median carina (Fig. 48). Forewing hyaline or rarely with slight brownish infusion on one or more of mediocubital fold, vannal fold, and membrane behind stigmal and postmarginal veins anterior to medial fold; vannal area with subcubital line of setae extending over about apical third to half. Front leg with tarsus yellowish but at least femur and tibia extensively brownish to dark brown with green luster; middle leg at least with trochantellus and tarsus yellowish and with brown region subapically on femur and subbasally on tibia so as to form dark band when tibia appressed to femur, but sometimes mesotrochanter, mesofemur and mesotibia more extensively brown, sometimes with only knee and about apical half of mesotibia yellowish to more orange apically; hind leg sometimes almost entirely yellowish beyond coxae, but usually with at least short subapical brownish region on femur and/or subbasal brownish region on tibia, and sometimes metafemur and metatibia more extensively dark brown similar to middle leg.

Petiole composed almost entirely of vertically raised, smooth and shiny rim (Fig. 33). Gaster in dorsal view dark brown or with coppery luster, in lateral view terga usually with green to blue or purple lusters under different angles of light, except syntergum and often penultimate tergum more uniformly green or with coppery luster; about 1.1–1.5 x as long as head and mesosoma combined. Syntergum highly variable in length, about 0.15–0.35 x as long as remaining gaster and in lateral view only about as long as basal height to about 4 x as long as high; uniformly setose, sculptured and tapered posteriorly, with cercus at basal margin.

MALE. Similar to female except as follows: length, 6 mm; mesoscutum without a distinctly differentiated reticulate-punctate notaular band posterior to the parapsidal bands and with a few white lanceolate setae posteromedially, acropleuron with postalar region finely coriaceous-aciculate, and middle and hind legs mostly yellowish beyond coxae, but petiole and propodeal plical region longer; plical region without complete median carina, coriaceous with several irregular carinae radiating anteriorly from carina along foramen.

Biology. A solitary ectoparasitoid of *Agrilus planipennis* in *Fraxinus* spp. (Bauer *et al.* 2004) and undoubtedly of at least one other wood-boring coleopteran host in North America. More than one host in North America is indicated by specimens being collected initially in Virginia prior to known establishment of the emerald ash borer in Michigan, the rearing of specimens from *Prunus* in Maryland, and probably by the conspicuous size difference among females, as discussed below.

Discussion. Of the five specimens listed originally as constituting the type series of *B. indica*, the holotype and one paratype, stated as males, are females. The other female (originally designated as allotype) and two males are correctly sexed but belong to *B. elegans*. The smaller size of the holotype and paratype female relative to the larger female designated as allotype likely contributed to the erroneous sex identification. All the associated plant-host data listed in the original description of *B. indica* refer to *B. elegans*.

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Although individuals of *B. indica* are superficially similar to *B. elegans*, they are readily distinguished by their bare paraspiracular region and by having at least a few setae dorsally on the posterior surface of the dorsellum (Fig. 48). Individuals of *B. indica* are probably more likely to be misidentified as *B. laciniosa* if the dorsellar setae are abraded or not visible, but are distinguished by a combination of mesoscutal features, as discussed under the latter species. The similarity between *B. indica* and *B. laciniosa* could indicate a close relationship, even though they are assigned to different species groups based on setal pattern of the dorsellum.

Females in North America vary conspicuously in length from about 3–9 mm, but most comprise two largely discrete size classes rather than varying continuously in length. The conspicuously different body sizes may result from parasitism of different host species having two quite different-sized larvae or from parasitism of different-sized larval instars of the same species. Either instance would provide a different amount of host resource for parasitoid larval development. The specimens from Virginia collected by D. R. Smith are all quite small, perhaps indicating a host with comparatively small larval instars, whereas some specimens reared from *Prunus* and collected on dying ash in Michigan are large and others are very small, indicating two or more host species or a single host species with substantially different-sized larval instars. Correlated with the size difference is a different syntergal structure. Smaller females have a very short and stubby syntergum, whereas larger females have a conspicuously more elongate-tapered syntergum.

The single male from Vietnam is sufficient to demonstrate that males possess all the principal diagnostic features of females, but insufficient to assess the possible range of variation of propodeal sculpture or other features that are variable for females, as discussed below. The lack of any reared or collected males in North America, as well as the lack of any significant color or sculpture variation in females, suggests that a parthenogenetic form likely was introduced. *Eriotremex formosanus* (Matsumura) (Hymenoptera: Siricidae), an invasive wood-boring pest of deciduous trees in eastern North America, was also introduced from Asia and is parthenogenetic in North America (Smith 1996). Parthenogenesis undoubtedly aids in the establishment and rate of dispersal of accidentally introduced alien species. *Eriotremex formosanus* is known from Japan, Laos, Taiwan and Vietnam in Asia, and Smith (1996) suggested that the species was introduced to North America with military traffic because some of the earliest records are from near military bases in Alabama and Georgia. The first collection records of *B. indica* in North America, although not from coastal localities, were from eastern Virginia near military and other shipping ports. The collection of the species in Michigan only eight years after its discovery in Virginia suggests that it may have been introduced quite some time prior to the 1995 earliest collection record. Although North American specimens differ conspicuously in leg color from specimens from Vietnam, they are more similar in sculpture and setal pattern to these than to the type specimens from India. Consequently, it is possible that the North American population of *B. indica* was established from a single

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female brought from Vietnam or another country in southeast Asia in military traffic during or after the Vietnam war.

The Nearctic specimens I identify as *B. indica* differ conspicuously from the holotype and paratype in color, sculpture and setal patterns. The two type specimens of *B. indica*, from northern India, have the mesofemur largely and the metafemur entirely yellowish, a narrow black longitudinal band medially on the mesoscutum that has comparatively minute punctate-reticulate sculpture (Fig. 39), the scutellum anteriorly has aligned reticulations but not distinct longitudinal rugae (Fig. 39), and there are no white lanceolate setae on the mesoscutum anterior to the base of the scutellum. The postalar region of the acropleuron is also partly reticulate, much more extensively so in the holotype (Fig. 51) than in the paratype. Nearctic specimens have dark femora, the mesoscutum dorsally much more uniformly punctate-alveolate (Fig. 33) even though there is a dark notaular band that extends to the scutellum (Fig. 12), the scutellum usually has quite conspicuous rugae anteriorly (Figs. 33, 50), the mesoscutum sometimes has a few white lanceolate setae interspersed with the dark hairlike setae posteromedially, and the postalar region of the acropleuron is entirely coriaceous-aciculate (Fig. 50). The female from Thailand is similar to the holotype in all described features. The female from southern India (Yercaud) has a small region of reticulate sculpture in the postalar region most similar to the paratype, but it is more similar to Nearctic specimens in leg color and mesoscutal and scutellar sculpture, and has scattered white lanceolate setae posteromedially on the mesoscutum. The females from Burma and the females and male from Vietnam have comparatively light-colored legs similar to all Old World specimens other than the Yercaud specimen, scattered white lanceolate setae posterodorsally on the mesoscutum similar to the Yercaud and some Nearctic specimens, and the mesoscutum, scutellum and acropleuron sculptured similar to Nearctic specimens. I interpret all observed differences as intraspecific variation, but molecular analyses of specimens from the different populations compared to those of similar but more definitely distinct species, such as *B. laciniosa*, *B. cylindrica* and *B. reburra*, might provide more definitive information.

Balcha laciniosa n. sp. (Figs. 9, 27, 36)

Type material. Holotype (♀, USNM): [**INDONESIA**] “Pemalang, Java / Fr. A. Th. H. Verbeek coll., Aug. 14, ‘29 / Ex lar. *Agrilus kalshoveni* O. / 5444 Hm / CNCI JDR-specm 2004-121 / Holotype *Balcha laciniosa* Gibson”; glued to point, left hind tarsus missing.

Paratypes: AUSTRALASIAN. **INDONESIA**: [Irian Jaya], Nabire, 5-50 m., 25.VIII-2.IX.1962, J. Sedlacek (1♀ BPBM). ORIENTAL. **INDONESIA**: Java (1♀, 1♂ AUWN); same data as holotype (1♂ USNM); Roban, VI.1907, F. Muir (1♀ BPBM); [?]Walikoekoen, Res. Semanang, 40 M., Manggar, 14.VII.1928, Fr. A. Th. H. Verbeek (1♀ AUWN). **MALAYSIA**: [Malaya] Penang [George Town], Batu Ferringhi catchment area, 14.VII.1958, H.T. Pagden (1♀ BMNH). [Sabah] Borneo, Sandakan, Baker (1♀ USNM);

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Buttun Point [Tanjong], 300 ft., VI.1937, K.M. Walsh (1♀ BMNH). Sarawak, Gunong Mulu Natn. Park, X.1977, trap, D. Hollis (1♂ BMNH); SW Gunung Buda, 64 km. S. Limbang, 4° 13'N 114° 66'E, 16-21.XI.1996, S.L. Heydon & S. Fung (1♀ UCDC); Kuching, J.H., 12, P. Cameron Coll. (1♀ BMNH, labelled "Type, *Trigonoderus trilobatius* Cam.", a manuscript name). **PHILIPPINES**: Kolambugan, 1.15, Böttcher (1♀ BMNH). Mindanao, Davao, Baker, 13904 (2♀ USNM); Iligan, Baker (2♂ USNM). Sibuyan, Baker (1♀ USNM). Tawi Tawi, Tarawakan north of Batu Batu, 13.XI.1961, Noona Dan Exp. 61-62 (1♂ NHRS). **VIETNAM**: Tonkin, Hoa-Binh, III.1937, A. de Cooman (2♀ IZCAS).

Etymology. Formed from the Latin word *laciniosus* (full of flaps), in reference to the spatulate white setae that are interspersed with hairlike setae on the mesoscutum of individuals.

Description. FEMALE. Length, 4.5–9 mm. Antenna dark except scape yellowish-orange and often pedicel, and sometimes Fl_1 and base of Fl_2, yellowish-orange or at least lighter brown than remaining flagellum; scape widened apically but spindlelike and with outer surface uniformly setose; Fl_1 quadrate to about 1.25 x as long as wide and almost half as long as pedicel; Fl_2 about 0.9–1.6 x as long as clava. Head with punctures on parascrobal region green to blue or purple in contrast to dark or coppery interstices (*cf.* Fig. 2), the lower face usually more uniformly green to blue at least toward oral margin, and with coriaceous dorsal part of parascrobal region variably extensively green or blue; ocellar region, vertex and usually occiput dark except often with green to bluish spot or band behind each posterior ocellus, the two sometimes joined as V-like mark behind ocelli or rarely as anterior projections of uniformly brightly colored occiput, and variously extensively green to bluish along upper and outer orbits under some angles of light. Face with setiferous punctures, the punctures on lower face closely crowded, finely coriaceous, and with more distinct coriaceous to slightly reticulate interstices so as to appear somewhat rugulose toward oral margin (Fig. 27), but parascrobal region with distinct punctures separated by flat, coriaceous interstices except about dorsal quarter to third abruptly flat, coriaceous, and uniformly setose with white setae. Scrobal depression with scrobes dark or with purple luster under some angles of light and dorsally punctate-reticulate to transversely strigose; channel smooth, shiny, setose dorsally, and with two bright green to blue or purple bands, a transverse or V-like band ventrally and a V-like band or paramedial spots subdorsally, with region between bands and below anterior ocellus dark or with coppery luster under some angles of light (*cf.* Fig. 2).

Pronotum dark anteriorly, but posteriorly and laterally green to blue or purple; distinctly coriaceous. Tegula yellow or brown. Mesoscutum mostly green to purple laterally and posterodorsally, but at least with small purple to brown region anterior to axilla, and dorsally with notaular and parapsidal bands either forming distinct Ψ-like pattern or parapsidal band separated posteriorly from notaular band by single row of colored punctures (Fig. 9), with the parapsidal band often extending posteriorly as narrow band or line of dark punctures partly or entirely to anterior margin of scutellum whether

medially united with notaular band or not, and with the dark notaular band extending broadly to base of scutellum, at least as wide posterior to parapsidal band as anteriorly between paranotaular bands (Fig. 9). Mesoscutum grossly alveolate laterally and dorsally in region near juncture of parapsidal and notaular bands, but with distinctly smaller, more reticulate-punctate sculpture in broad notaular band and near parapsidal bands (Fig. 36); without distinct depression anterior to level of inner angle of axilla; with distinct, white, lanceolate setae laterally and dorsomedially within notaular band, the lanceolate setae dorsally interspersed with white to brownish hairlike setae (Fig. 9). Scutellum (Fig. 9) same color as notaular band or with violaceous luster and sometimes lateral margins green to blue; variably extensively reticulate posteriorly, but anteriorly sculpture more or less distinctly aligned into longitudinal, coriaceous, setiferous furrows and irregular ridgelike interstices, and with more distinct mediolongitudinal coriaceous ridge or carina. Metanotum green or dorsellum purple under some angles of light; dorsellum thick, with crenulate dorsal surface and coriaceous, bare, posterior surface; precrenular region of panel with single line of setae near anterior margin or, rarely, with setae in 2 or 3 rows near dorsellum. Acropleuron with slender, minutely coriaceous subalar region separating punctate-alveolate prealar region from usually finely coriaceous-aciculate postalar region (*cf.* Fig. 53), but rarely postalar region partly punctate-reticulate with elongate, longitudinally aligned punctures (*cf.* Fig. 54); prealar region usually green or partly purple or violaceous, but subalar region dark or with coppery or other metallic lusters and postalar region dark or green, blue or violaceous under some angles of light. Lower mesepimeron variably coriaceous to shallowly punctate-reticulate at least ventrally. Metapleuron distinctly coriaceous except for crenulate furrow along posterior margin and anterior margin ventrally. Propodeum usually green or rarely blue but lateral surface of callus purple and plical region sometimes dark; paraspiracular region bare, the setae anterior to spiracle extending mesally only to about level of inner margin of spiracle; callus often smooth between setal pores, but laterally finely coriaceous to very shallowly coriaceous-reticulate at least near metapleuron; plical region bare, with carinate margin of foramen Λ-like recurved to anterior margin of propodeum as variably distinct median carina, the region lateral to median carina also with variably distinct and extensive crenulae. Forewing hyaline; vannal area with subcubital setal line extending over about apical half. Legs variable in color beyond coxae, sometimes extensively yellowish-orange except usually mesofemur with subapical and mesotibia with subbasal brown regions forming band when tibia appressed to femur, the mesofemur sometimes more extensively brown and metatibia usually variably conspicuously lighter in color medially, and sometimes with profemur and protibia brownish to dark brown.

Petiole transverse, composed almost entirely of vertically raised, smooth and shiny rim. Gaster in dorsal view with all terga except syntergum brown dorsally and purple to green laterally under different angles of light, the syntergum usually greenish; about 1.1–1.5 x as long as head and mesosoma combined. Syntergum only about 0.2–0.3 x as long as

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remaining gaster and in lateral view about 2–3 x as long as high; uniformly setose, sculptured and tapered posteriorly, with cercus at or near basal margin.

MALE. Similar to female except as follows: length, 3.5–6 mm; petiole and propodeal plical region longer; plical region with inverted Y-shaped median carina and at least one, usually more, irregular, longitudinally or obliquely angled carinae between median carina and variably distinct paraspiracular furrow, with surface between carinae variably distinctly coriaceous.

Biology. Reared from larvae of *Agrilus kalshoveni* Obenberger.

Discussion. Within the *elegans* species-group, *B. laciniosa* is most similar to *B. elegans*, but is distinguished by the features given in the discussion under the latter species. Individuals superficially most closely resemble those *B. indica* that have only a few inconspicuous setae on the dorsellum and a distinctly differentiated, reticulate-punctate notaular band posterior to the parapsidal bands (*cf.* Figs. 34, 36). However, the few *B. indica* seen with a reticulate-punctate notaular band extending to the posterior margin of the mesoscutum have this region very slender medially posterior to the parapsidal bands (Fig. 34), conspicuously narrower than the notaular band anteriorly (Fig. 12), if the notaular and parapsidal bands are even separated anteriorly. Individuals of *B. laciniosa* always have the parapsidal and notaular bands separated anteriorly and forming a distinct Ψ-like pattern because of bright paranotaular bands (Fig. 9), and the reticulate-punctate region posterior to the parapsidal bands is at least as wide as the notaular band anteriorly between the paranotaular bands (Figs. 9, 36). Furthermore, those *B. indica* with a differentiated reticulate-punctate notaular band lack lanceolate white setae from the mesoscutum posteromedially, in contrast to *B. laciniosa* where the setae are present (Fig. 9). *Balcha laciniosa* and *B. indica* are also similar in that both species have the postalar region of the acropleuron variably sculptured. Of 16 females of *B. laciniosa* examined, two (Kolambugan, Sibuyan) have the postalar region partly punctate-reticulate rather than coriaceous-aciculate. All five males examined have the postalar region coriaceous-aciculate, but too few males were seen to predict whether this feature is variable only for females.

Balcha levicollis (Cameron) (Figs. 43, 54)

Elemba levicollis Cameron, 1908: 151–152. Type data: [Malaysia], Borneo, Kuching, October 1906, John Hewitt. Holotype female by monotypy (BMNH type no. 5.952, examined).
Eusandalum levicollis; Hedqvist, 1961: 109. Change of combination by inference through synonymy of *Elemba* Cameron with *Eusandalum* Ratzeburg.
Balcha levicollis; Gibson, 1989: 67. Change of combination.

Additional material examined. ORIENTAL. **MALAYSIA**: [Malaya] Singapore (1♀ BMNH). [Sabah] Borneo, Sandakan (2♀, 1♂ USNM); Buttun Point [Tanjong], 300ft., VI.1937, K.M. Walsh (1♀ BMNH). Sarawak, Mt. Matang, 15.XII.1913 (1♀ BMNH),

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23.I.1914, 2000 ft. (1♀ BMNH), G.E. Bryant.

Description. FEMALE. Length, 15–16 mm. Antenna dark except scape sometimes partly to almost entirely yellowish-orange; scape oval in cross-section and with outer surface flat at least apically and bare medially or basomedially; Fl_1 slightly shorter than apical width and slightly less than half as long as pedicel; Fl_2 about 1.2–1.5 x as long as clava. Head with punctures and interstices on parascrobal region not contrasting distinctly in color, the face usually dark purple or sometimes with blue to green luster under some angles of light and clypeus and interantennal region sometimes with greenish luster; ocellar region and vertex dark except variably broadly along upper inner orbit, with dark region extending as posteriorly tapered band medially in region between posterior ocelli and laterally behind each ocellus, but posterior surface of head usually extensively purple to blue under some angles of light, particularly on smooth, bare band along outer orbit. Face with setiferous punctures (*cf.* Fig. 19), the punctures closely crowded toward, but remaining distinct even near, oral margin, dorsally usually at least partly more widely separated by smooth or virtually smooth interstices, except about dorsal third to half of parascrobal region flat with more crowded and increasingly shallower and/or smaller punctures, being mostly punctulate-reticulate (*cf.* Fig. 20) or rugulose-coriaceous (Fig. 19) except coriaceous near ocelli, and uniformly setose with white to light brown setae. Scrobal depression with scrobes smoothly merging into channel; scrobes smooth and shiny, dark or with purple luster under some angles of light; channel purple ventrally and dorsally dark, coriaceous and sparsely setose.

Pronotum dark anteriorly and purple posteriorly and laterally; finely coriaceous to transversely coriaceous-aciculate and quite shiny. Tegula yellow to brown. Mesoscutum purple with variably distinct notaular and parapsidal bands, the bands either separate, and sometimes extending distinctly only about half length of mesoscutum, or forming Ψ-like pattern and then with parapsidal band narrowed posteriorly to extend linearly to inner angle of axilla and with notaular band broadly truncate along base of scutellum (*cf.* Fig. 17). Mesoscutum (*cf.* Fig. 31) alveolate laterally, dorsally the punctures smaller and shallower, particularly between notauli and near parapsidal line; with broad, shallow, longitudinal depression over about posterior half anterior to level of inner margin of axilla, but sculpture not differentiated from surrounding cuticle; with quite uniform, white to brownish hairlike setae. Scutellum with dark band medially (*cf.* Fig. 17), to entirely purple or with some bluish luster under some angles of light; rugulose-coriaceous to more distinctly punctate with coriaceous subsculpture and with low median ridge (*cf.* Fig. 31), but sculpture at most obscurely aligned into irregular rugae. Metanotum purple except for brownish-hyaline dorsal margin of dorsellum; dorsellum (Fig. 43) thin, in single vertical plane, coriaceous to coriaceous-reticulate with a few longitudinal rugae ventrolaterally, and bare; precrenular region of panel with 2 rows of seta at least near dorsellum. Acropleuron with distinct, elongate-ovate, rugulose-coriaceous subalar region separating punctate-alveolate prealar region from postalar region having longitudinally aligned

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reticulate-punctate sculpture (Fig. 54); uniformly purple or with punctures violaceous under some angles of light and subalar region often dark. Lower mesepimeron punctate-reticulate to reticulate-rugulose. Metapleuron coriaceous dorsally to extensively reticulate-rugulose over distinct coriaceous subsculpture except for crenulate furrow along posterior margin. Propodeum purple or paraspiracular region more commonly with blue luster under some angles of light; paraspiracular region setose; callus comparatively smooth and shiny dorsally but with vertical lateral surface entirely, irregularly punctate-rugulose (Figs. 43, 54); plical region setose, carinate margin of foramen distinctly, Λ-like recurved to anterior margin of propodeum and inclined or almost vertical medially as short, high median carina, the region lateral to carina variably deeply concave and strongly crenulate (Fig. 43). Forewing with vannal area and cubital area both brownish, and medial fold sometimes obscurely brownish beyond basal cell; vannal area with subcubital line of setae extending over about apical half. Legs uniformly yellowish-orange to dark brown.

Petiole composed almost entirely of vertically raised, smooth and shiny rim (Fig. 43). Gaster in dorsal view dark brown or with slight purple luster, in lateral view all terga except syntergum with variably conspicuous purple luster; slightly more than twice length of head and mesosoma combined. Syntergum about two-thirds as long as remaining gaster and in lateral view about 9–11 x as long as high; uniformly setose, sculptured and tapered posteriorly, with cercus at basal margin.

MALE. Length, 7.3 mm. Similar to female in sculpture and setal pattern; structure similar to female except as follows: propodeum longer with plical region delimited by a W-like carinal complex formed by strong, sinuous plical carinae and inverted Y-shaped median carina; petiole larger, in posterior view almost semicircular, smooth and shiny; gaster pedunculate, with Gt_1 and Gt_2 comparatively narrow, smooth and shiny, and subsequent terga conspicuously coriaceous, uniformly setose and increased in width to Gt_5. See discussion for color.

Biology. Unknown.

Discussion. The pedunculate shape of the gaster of the only known male likely is an artifact of preservation rather than diagnostic of males of the species, but additional specimens are required to confirm this. The male also has the head and mesosoma mostly bright green with purple restricted primarily to the acropleuron anteriorly and to the metapleuron. The distinct parapsidal and notaular bands are black with limited coppery luster under some angles of light, and although the parapsidal bands curve toward the notaular band they remain separated posteriorly, the tegula and legs are yellowish, and only the vannal area of the forewing is partly brownish. Additional males are necessary to determine whether some exhibit color patterns more similar to known females or whether males of both *B. levicollis* and *B. anemeta* might be much more brightly metallic than are females. Both sexes of *B. levicollis* are distinguished from all other species by the combination of a thin dorsellum, setose plical region of the propodeum, and reticulate-punctate postalar region of the acropleuron. Females, at least, are most similar to those of

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B. anemeta except for the different sculpture pattern of the acropleuron (*cf.* Figs. 53, 54). Insufficient females of both species have been seen to determine whether other minor differences detailed in the descriptions are also diagnostic.

Balcha punctiscutum n. sp. (Figs. 3, 5, 7, 28, 32, 44, 49, 56, 57)

Type material. Holotype (♀, USNM): [**PHILIPPINES**] "Island of Basilan, Baker / Cleonymini Gen. A, Balt. '58 [folded label] / CNCI JDR-SEM 2004-053 / Holotype *Balcha punctiscutum* Gibson"; glued to point, right antenna missing beyond Fl_6, left middle leg detached and glued to point.

Paratype: ORIENTAL. [**MALAYSIA**]: Sarawak, Gunong Mulu Natn. Park, V-VIII.1978, P.M. Hammond, S. Marshall (1♀ BMNH, labelled "*Balcha carinaspis*, det. Z. Bouček, 1984", a manuscript name).

Etymology. Formed from the Latin words *punctum* (small hole) and *scutum* (shield), in reference to the punctate mesoscutum that in part differentiates this species; a noun in apposition.

Description. FEMALE. Length, 13.5 mm. Antenna dark with scape yellowish-orange; scape widened apically but spindlelike and with outer surface uniformly setose; Fl_1 slightly longer than apical width and about two-thirds as long as pedicel; Fl_2 about 1.3–1.4 x as long as clava. Head with punctures and interstices not contrasting distinctly in color, the face varying from green to blue under some angles of light except upper parascrobal region with dark region adjacent to scrobal channel extending dorsally to dark ocellar region and vertex (Fig. 3), the posterior surface green to blue under most angles of light except dark region of vertex extending as posteriorly tapered band medially in region between posterior ocelli and laterally behind each ocellus. Face with setiferous punctures (Fig. 28), the punctures more closely crowded on lower face but deep and distinct even near oral margin, dorsally more widely separated by smooth and shiny interstices, except near ocelli abruptly coriaceous-rugulose and evenly setose with brownish setae. Scrobal depression with scrobes delimited from channel by transverse ridge and channel with 2 or 3 additional transverse ridges, otherwise smooth, shiny and dark or with green to blue luster under some angles of light, and either bare or with only very few setae dorsomedially near anterior ocellus.

Pronotum dark anteriorly, but posteriorly and laterally green to blue under most angles of light (Fig. 5); transversely strigose anteriorly, but dorsal surface posteriorly with distinct though variably crowded setiferous punctures (Fig. 32). Tegula yellow. Mesoscutum green or blue to partly violaceous under some angles of light, with notaular and parapsidal bands variably distinct but not abruptly differentiated by well delimited margins or continuous to posterior margin of mesoscutum (Fig. 5). Mesoscutum (Fig. 32) uniformly closely punctate with linear interstices variably conspicuously coriaceous, except posteriorly with transverse-crenulate furrow anterior to level of inner angle of axilla, the furrow narrowed

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anteriorly into line of irregular punctures extending to anterior margin adjacent to notaulus; with white hairlike setae, the setae laterally and posteriorly somewhat longer but not distinctly lanceolate. Scutellum (Fig. 5) similar in color to metallic regions of mesoscutum; closely punctate similar to mesoscutum, but with low mediolongitudinal ridge at least posteriorly (Fig. 32). Metanotum green to blue except for brownish-hyaline dorsal margin of dorsellum; dorsellum (Fig. 44) thin, in single vertical plane, with irregular longitudinal rugae over almost entire height, and bare; precrenular region of panel with single row of setae near anterior margin. Acropleuron (Figs. 7, 49) with only very obscurely differentiated subalar region but with small pit or depression posteromedially in smoother region, extensively punctate-alveolate anteriorly and quite abruptly, very finely coriaceous-aciculate posteriorly; sculptured region extensively green or bluish-green posteriorly, distinctly violaceous or purple anteriorly, or medially if darker or with slight greenish luster anteriorly, and with smoother surface dark with coppery to violaceous or green luster under some angles of light (Fig. 7). Lower mesepimeron and metapleuron similarly, closely punctate. Propodeum green or vertical surface of callus and plical region partly blue to purple under some angles of light; paraspiracular region bare excluding setae anterior to spiracle and one to several seta anterolaterally near plical region (Fig. 44); callus uniformly closely punctate; plical region bare, with carinate margin of foramen not distinctly raised or Λ-like incurved to anterior margin of propodeum but surface irregularly crenulate (Fig. 44). Forewing hyaline except medial fold slightly brownish; vannal area bare except for 2 widely spaced setae medially. Legs uniformly yellowish to yellowish-orange beyond coxae.

Petiole composed of anterior carina and longitudinally crenulate, lunate, horizontal surface of similar length and appearance as propodeal plical region (Fig. 44). Gaster in dorsal view dark brown, but in lateral view all terga except syntergum green to purple; about 2.3 x as long as head and mesosoma combined. Syntergum elongate (Fig. 56) and differentiated by submedial lateral notch into large basal portion surrounding ovipositor sheaths and slender, convex apical portion above sheaths, with cercus at about midlength of basal portion (Fig. 57); uniformly setose and sculptured.

MALE. Unknown.

Biology. Unknown.

Discussion. The paratype is broken and lacks its syntergum and ovipositor, but presumably the missing structures were similar to those described for the holotype because otherwise the paratype and holotype are quite similar in structure, sculpture and setal patterns. The holotype mesoscutum is largely greenish with limited violaceous luster under some angles of light and with only quite poorly delimited notaular and parapsidal bands (Fig. 5), the mesoscutum being dark with a slight coppery luster between the notauli for about half its length and in diffuse regions on either side of quite distinct parapsidal lines near the apex of each line. The notaular band is separated from the parapsidal band by a green, slightly effaced line of punctures that expand posteriorly into a deeper,

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transversely crenulate furrow anterior to the inner margin of the axilla (Fig. 32). Although superficially appearing as notauli, anteriorly the sinuous lines of differentiated sculpture are immediately lateral to obscure, coriaceous-punctulate lines, which are the true notauli. The mesoscutum of the paratype is much more extensively dark with violaceous luster, except being greenish to blue anteriorly lateral to the parapsidal line and posterodorsally lateral to the notaulus. However, the paratype female is quite dirty, which may affect observed color, and additional specimens are required before an accurate color description is possible for the species. The paratype also differs slightly in propodeal setal pattern. There is a complete line of setae along the anterior margin of the callus mesally to the plical region, including a few setae forming a small setal patch adjacent to the crenulate furrow that differentiates the callus and plical region. The callus of the holotype has only a single line of sparse, long setae along its anterior margin mesally to the plical region (Fig. 44). Of the species having a bare paraspiracular region, *B. punctiscutum* is the only one having setae extending along its anterior margin distinctly beyond the level of the inner margin of the spiracle to the plical region.

The uniformly coarsely punctate mesoscutum (Fig. 32) differentiates females of *B. punctiscutum* from all other species of the genus, which have an alveolate to reticulate-alveolate mesoscutum (Figs. 31, 33–42). Females are also differentiated by their elongate, subdivided syntergum (Fig. 56) that, although somewhat similar to the syntergum of *B. camptogastra* females (Fig. 59), is unique in having the cercus conspicuously displaced from the base of the syntergum (Fig. 57). *Balcha punctiscutum* is assigned to the *anemeta*-group based on the presence of a thin dorsellum. Because of its bare plical region, morphologically it is most similar to *B. reticulifrons* within the *anemeta*-group, but the only shared feature that may support a close relationship is the largely bare forewing vannal area.

Balcha reburra n. sp.

Type material. Holotype (♀, BMNH): [**MALAYSIA**, Malaya] “PAHANG, F.M.S., Cameron Highlands, 5000–5500ft., 12.6.1935 / Holotype *Balcha reburra* Gibson”; mounted on rectangular block by pin through posterior of mesoscutum anterior to scutellum, scutellum with small hole, and right antenna, left antenna beyond Fl_1, and left hind wing missing.

Etymology. Formed from the Latin word *reburrus* (one with bristling hair), in reference to the setation of the metanotal lateral panel, which differentiates this species from other *cylindrica*-group species.

Description. FEMALE. Length, 12.2 mm. Antenna with scape yellowish-orange, pedicel, Fl_1 and undoubtedly remaining flagellum dark brown; scape widened apically but spindlelike and with outer surface uniformly setose; Fl_1 with dorsal length about as long as

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apical width and half as long as pedicel. Head with punctures greenish to blue in contrast to dark or coppery to reddish interstices at least on parascrobal region (*cf.* Fig. 2), the lower face more uniformly green under some angles of light and parascrobal region dorsally with large green spot covering most of coriaceous region; ocellar region, vertex and occiput dark or with coppery to reddish luster under some angles of light, but more distinctly green to purple along outer orbit. Face with setiferous punctures (*cf.* Fig. 21), the punctures on lower face closely crowded and finely coriaceous similar to interstices, but distinct even near oral margin, dorsally more widely separated by mostly flat, finely coriaceous interstices, except about dorsal third of parascrobal region quite abruptly flat, coriaceous, and uniformly setose with white setae. Scrobal depression with low, V-shaped greenish-blue ridge separating scrobes from channel; scrobes purple, shiny and only obscurely transversely sculptured; channel with coppery to reddish luster above ridge and setose dorsally.

Pronotum dark anteriorly and green posteriorly to blue or violaceous laterally under some angles of light; finely coriaceous to coriaceous-aciculate. Tegula yellow. Mesoscutum mostly green laterally but violaceous to brown dorsolaterally anterior to axilla and with broad, dark to reddish-violaceous parapsidal and notaular bands forming distinct Ψ-like pattern, the bands separated anteriorly by green paranotaular band, the parapsidal band angulate posteriorly so as to extend narrowly toward violaceous region anterior to axilla, and notaular band apparently extending broadly to base of scutellum. Mesoscutum alveolate laterally, the punctures dorsally somewhat smaller and shallower, particularly between notauli and near parapsidal lines; pin obliterating sculpture and setal pattern posteromedially, but probably without depression anterior to axilla and apparently with white to brownish hairlike setae, the setae slightly longer and more distinctly white laterally but not lanceolate. Scutellum reddish-violaceous to green depending on angle of light but without well defined pattern; reticulate-coriaceous, the reticulations aligned into longitudinal concentric pattern but without distinct rugae. Metanotum green; dorsellum thick, with crenulate dorsal surface and coriaceous, entirely setose posterior surface (cf. Fig. 48); precrenular region of panel uniformly setose. Acropleuron with obscure, minutely coriaceous subalar region separating extensively punctate-alveolate prealar region from finely coriaceous-aciculate postalar region (*cf.* Fig. 50); prealar region graduating from purple anteriorly to greenish medially and violaceous posteriorly, and subalar and postalar regions greenish-blue with violaceous luster under some angles of light (*cf.* Fig. 8). Lower mesepimeron punctate-reticulate. Metapleuron distinctly coriaceous except about ventral third reticulate-rugulose and with crenulate furrow along posterior margin and anterior margin ventrally. Propodeum dorsally green except for dark plical region and with paraspiracular area partly and vertical surface of callus more distinctly purple; postspiracular region bare, the setae anterior to spiracle extending mesally only to about inner margin of spiracle; callus with fine, coriaceous subsculpture between setal pores, most distinctly laterally toward metapleuron; plical region bare, with

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carinate margin of foramen Λ-like recurved to anterior margin of propodeum as median carina similar in appearance to crenulae lateral to median carina. Forewing hyaline; vannal area with subcubital setal line extending over about apical half. Legs uniformly yellowish-orange beyond coxae.

Petiole composed of anterior carina and slightly granular though quite shiny lunate horizontal surface. Gaster in dorsal view dark brown, but in lateral view all terga except syntergum green dorsally to violaceous ventrally under some angles of light; about 2.5 x as long as combined length of head and mesosoma. Syntergum elongate-slender, in lateral view about 0.7 x length of remaining gaster and 10 x as long as greatest height; uniformly setose, sculptured and tapered posteriorly, with cercus at basal margin.

MALE. Unknown.

Biology. Unknown.

Discussion. Females of *B. reburra* are distinguished from the other two members of the *cylindrica*-group, *B. cylindrica* and *B. indica*, by their entirely setose metanotal precrenular region. Females are superficially more similar to *B. indica* because of similarly sculptured parascrobal regions (Fig. 21), but the syntergum of the single *B. reburra* female is much longer than for known *B. indica* females, the lower face has more distinctly delimited punctures, and although the measured difference is slight, the scutellum is distinctly longer than wide as opposed to quadrate to slightly wider than long in *B. indica* (Figs. 33, 34). The latter two features may also assist in differentiating males of *B. reburra* from those of *B. indica*.

Balcha reticulata (Nikol'skaya) n. comb. (Figs. 16, 22, 38)

Calosota reticulata Nikol'skaya, 1952: 480. Type data: USSR, Maritime Territory. Syntypes (2♀ ZINR), see Material examined and Discussion.
Sauteria reticulata; Kalina, 1984: 11. Change of combination.

Material examined. [**RUSSIA**] "Vinogradovka, Ussur. Kr., 20.VII, Kirichenko, 929 / *Calosoter reticulata* sp. n., typ. ♀, M. Nikolsky / Holotypus". "Nikolsk.-Ussur. [Ussuriysk], Primorskiy Kray [= Maritime Province], A. Richter, 20.VII-IX.37 / *Sauteria reticulata* (Nik.) ♀, Zd. Bouček det. 1968 / Paratypus *Calosota reticulata*".

Description. FEMALE. Length, 4.5–5.2 mm. Antenna dark except scape variably extensively yellowish basally; scape widened apically but spindlelike and with outer surface uniformly setose; Fl_1 about 1.2–1.3 x as long as apical width and about 0.4 x as long as pedicel; Fl_2 only about 0.75–0.8 x as long as clava. Head with punctures on parascrobal region green to blue in contrast to dark or coppery interstices (*cf.* Fig. 2), but lower face more uniformly green and coriaceous part of upper parascrobal region bluish-green to level of anterior margin of posterior ocellus except for variably distinct purple spot; ocellar region, vertex and posterior surface of head variably distinctly greenish to purple except for coppery band behind anterior ocellus and around posterior ocellus. Face

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with setiferous punctures (Fig. 22), the punctures on lower face closely crowded, very shallow and coriaceous so as to appear coriaceous-rugulose toward oral margin, but parascrobal region with distinct punctures separated by flat, coriaceous interstices except almost dorsal half abruptly coriaceous or with only very tiny, shallow setiferous punctures, flat, and uniformly setose with white to brownish setae. Scrobal depression with scrobes violaceous and transversely reticulate-strigose; channel coriaceous and setose at least near anterior ocellus but variably distinctly, transversely strigose medially or ventrally, and with two bright greenish to blue bands or paramedial spots, one ventrally and one subdorsally, with intervening region and region below anterior ocellus dark (*cf*. Fig. 2).

Pronotum dark with slight coppery luster anteriorly, but posteriorly and laterally greenish to purple under different angles of light; conspicuously coriaceous and setose. Tegula brown. Mesoscutum purple laterally to more distinctly greenish-blue dorsally except for three separate longitudinal bands with variably distinct coppery luster, the notaular band extending for length of mesoscutum and parapsidal band extending about half length of mesoscutum (Fig. 16). Mesoscutum alveolate laterally, dorsally the punctures becoming smaller and shallower, more distinctly reticulate toward midline in posterior half and in region between notauli and near parapsidal bands more reticulate-punctate (Fig. 38); without distinct depression anterior to level of inner margin of axilla; with brownish hairlike setae dorsally, but laterally with longer and more conspicuous, slightly lanceolate white setae. Scutellum (Fig. 16) greenish with variably distinct coppery luster except posterior margin blue to purple; reticulate except with inconspicuous anteromedial ridge extending only about one-third length (Fig. 38). Metanotum green or dorsellum variably distinctly purple; dorsellum thick, with crenulate dorsal surface and coriaceous, bare, posterior surface; precrenular region of panel with single line of setae near anterior margin. Acropleuron with minutely but distinctly coriaceous subalar region separating punctate-alveolate prealar region from finely coriaceous-aciculate postalar region; prealar region graduating from purple anteriorly to green medially and violaceous posteriorly, subalar region sometimes partly coppery or greenish, but postalar region usually dark or with purple to violaceous luster. Lower mesepimeron partly coriaceous to shallowly punctate-reticulate. Metapleuron extensively coriaceous, to somewhat reticulate-punctate over distinct coriaceous subsculpture ventrally, except for crenulate furrow along posterior margin. Propodeum green dorsally except plical region dark or with only slight green luster under some angles of light and vertical surface of callus partly violaceous; paraspiracular region bare, the setae anterior to spiracle extending mesally only to about level of inner margin of spiracle; callus finely coriaceous between setal pores; plical region bare, with carinate margin of foramen Λ-like recurved to anterior margin of propodeum as fine median carina similar in appearance to crenulae lateral to median carina. Forewing hyaline; vannal area with subcubital line of setae extending over about apical half. Legs with trochanters, femora and tibiae basally dark brown, but knees, apex of protibia, about apical two-thirds of meso- and metatibiae, and tarsi yellow.

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Petiole composed almost entirely of vertically raised, smooth and shiny rim (Fig. 38). Gaster in dorsal view dark brown except Gt_1 with variably distinct greenish luster under some angles of light, and in lateral view terga with variably distinct green luster dorsally and blue to purple lusters ventrally under different angles of light; about 1.4–1.5 x as long as head and mesosoma combined. Syntergum only about 0.2–0.25 x length of remaining gaster and in lateral view about 1.75–2 x as long as high; uniformly setose, sculptured and tapered posteriorly, with cercus at basal margin.

MALE. Unknown.

Biology. Unknown.

Discussion. Label data given above for the type material is transliterated from Russian. Nikol'skaya (1952, p. 480) did not state the number of specimens on which the species was established, but did state "length of ♀ 5–6 mm", which indicates more than one specimen and describes quite accurately the size difference between the two females labelled as types. Although the female from Vinogradovka bears an original label designating it as "type", no holotype was designated in the original description and I treat the two specimens as syntypes. Because both females belong to the same species there is no present need to designate a lectotype.

Although unstated, Nikol'skaya (1952) undoubtedly named the species *B. reticulata* because of its reticulate mesoscutal sculpture; however, *B. dictyota* females have the mesoscutum even more distinctly reticulate because the punctures are somewhat smaller and shallower than in *B. reticulata* (*cf.* Figs. 15, 16). The color pattern of the mesoscutum is also very similar in *B. dictyota* and *B. reticulata* (*cf.* Figs. 15, 16), but female *B. reticulata* are readily distinguished by their bare paraspiracular region, basally dark femora and tibiae, contrasting punctures and interstices of the parascrobal region, and non-crenulate, rimlike petiole. The color pattern of the legs of female *B. reticulata* is similar to that of North American specimens of *B. indica*. The darker legs of the two species might be correlated with a northern distribution. *Balcha reticulata* is the most northern of all known Old World species, at about 43°N in easternmost Russia, a latitude similar to that of *B. indica* in North America. Both Hedqvist (1956) and Erdös (1960) included *B. reticulata* in their keys to the Palearctic species of *Calosota*.

Balcha reticulifrons n. sp. (Fig. 4)

Type material. Holotype (♀, BMNH): [**SRI LANKA**] "Kandy, 10.02 / CEYLON [hand printed over Assam], R. Turner, 1905 – 125 / CNCI JDR-specm 2004-127 / Holotype *Balcha reticulifrons* Gibson"; mounted by pin through scutellum to card, right antenna beyond Fl_5 missing and right forewing glued to card, otherwise entire, but dirty.

Etymology. Formed from the Latin words *reticulatus* (netlike) and *frons* (brow), in reference to the reticulate sculpture of the face (Fig. 4), which is unique for this species of *Balcha*; a noun in apposition.

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Description. FEMALE. Length, 5.8 mm. Antenna dark with scape and pedicel yellowish to yellowish-orange; scape widened apically but spindlelike and with outer surface uniformly setose; Fl_1 about 1.25 x as long as apical width and about 0.6 x as long as pedicel; Fl_2 only about 0.9 x as long as clava. Head with face (Fig. 4) mostly green but interstices coppery to reddish under some angles of light and parascrobal region near dorsal limit of scrobal depression with transverse dark band not quite extending to inner orbit; ocellar region and about anterior half of vertex posterior to ocelli dark, the dark region extending only slightly more posteriorly medially behind posterior ocelli and laterally along upper inner orbit, with occiput and along outer orbit greenish. Face with lower face and parascrobal region almost uniformly reticulate, the cells multisided and with ridgelike interstices, except about dorsal quarter of parascrobal region with distinctly smaller reticulations and uniformly setose with brownish setae. Scrobal depression with scrobes and about ventral half of channel transversely strigose-rugulose and green to purple under some angles of light except for more violaceous transverse band ventrally in channel, but channel dorsally dark, coriaceous-reticulate and setose.

Pronotum dark anteriorly and posteriorly bright green; smooth and shiny between setal pores. Tegula yellow. Mesoscutum primarily green with interstices of punctures coppery to slightly reddish, except for broad dark region anteromedially, the notaular and parapsidal bands apparently contiguous and extending only about half length of mesoscutum. Mesoscutum almost uniformly reticulate-alveolate except punctures slightly shallower in dark regions; with relatively deep and narrow longitudinal furrow over about posterior half anterior to level of inner angle of axilla; with white to brownish setae, the setae longer and slightly lanceolate laterally. Scutellum darker than mesoscutum posteriorly, the punctures dark and interstices greenish under some angles of light (see discussion); coarsely punctate, the punctures more circular to oval but interstices about same width as on mesoscutum. Metanotum green except for brownish-hyaline dorsal margin of dorsellum; dorsellum thin, in single vertical plane, punctulate-rugulose, and bare; precrenular region of panel with single row of setae near anterior margin. Acropleuron with at most an obscure, minutely and very finely coriaceous subalar region, but punctate-alveolate anterior to, and smooth and shiny posterior to, an imaginary oblique line drawn between base of tegula and anterolateral corner of mesocoxa; punctured region violaceous or coppery under some angles of light and smooth region dark with purple or violaceous luster under some angles of light. Lower mesepimeron and metapleuron punctulate-reticulate to rugulose. Propodeum green except vertical surface of callus purple; paraspiracular region bare, the setae anterior to spiracle extending mesally only to about level of inner margin of spiracle; callus comparatively smooth and shiny dorsally but laterally reticulate-rugulose; plical region bare, with carinate margin of foramen Λ-like recurved to anterior margin of propodeum as fine median carina similar in appearance to crenulae lateral to median carina. Forewing hyaline; vannal area with 2 widely spaced setae within about apical third. Legs with trochanters, femora except extreme apices, and protibia medially brown, otherwise yellow.

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Petiole composed of anterior carina and lunate, horizontal surface with median carina but otherwise quite shiny without evident crenulae. Gaster in dorsal view dark, in lateral view terga with greenish luster dorsally and distinct violaceous luster ventrally; about 1.2 x as long as head and mesosoma combined. Syntergum short and stubby, only about 0.2 x as long as remaining gaster and in lateral view about 1.5 x as long as high, with cercus at basal margin; uniformly setose and sculptured.

MALE. Unknown.

Biology. Unknown.

Discussion. The unique female of *B. reticulifrons* is quite dirty and for this reason the described color probably is not entirely accurate for the species, but females are uniquely distinguished by having the face almost uniformly reticulate with linear interstices. Furthermore, the facial setae arise virtually from the interstices forming the reticulations. Other known species of *Balcha* have at least the parascrobal region punctate or punctate-alveolate with flat interstices and the facial setae arising variably distinctly closer to the middle of the punctures. It is also the only species other than *B. punctiscutum* that has a distinct furrow on the mesoscutum anterior to the inner margin of the axilla.

Balcha splendida (Girault) n. comb. (Figs. 18, 24, 40)

Calosota splendida Girault, 1927[415]: 553. Type data: Philippines, Cuernos Mountains, Occidental Negros, Negros, 24160, Baker. Holotype female by monotypy (QMBA), see Discussion.

Calosota splendida; Girault, 1928[425]: 449 (additional specimens); Narendran, 1996: 79 (comparison).

Additional material examined. ORIENTAL. **MALAYSIA**: [Sabah], Sandakan, Baker, 13904 (1♀ USNM). **PHILIPPINES**: Arorog, Masbate, 7.17, Böttcher (2♀ BMNH); Biliran, Baker (1♀ USNM). Luzon, Limay (1♂ NHRS); Kolambugan, 1.15, Böttcher (1♀ BMNH); Mt. Makiling, Baker, 6348 (1♀ USNM), 6352 (1♂ USNM); Port Banga, 12.14, Böttcher (1♀, 1♂ BMNH); Puting Lupa, Calamba, 23.VIII.1986, C.L. Habito (1♀ UPPC). Mindanao, Dapitan, Baker, 13895 (1♀ USNM); Mati, Davao, P. [?]I. 13.VI.1927, R.C. McGregor (1♀ USNM); Surigao (1♀ NHRS); Zamboanga, Baker (1♀, 1♂ USNM). Negros, Cuernos Mts., Baker (1♀ BMNH; 4♀, 1♂ USNM), 24160 (1♀ USNM). Negros Oriental, Camp Lookout nr Valencia, 16 km. W. Dumaquete, 14-16.V.87, D.C. Darling (1♀ ROMT). Panay, N.W., Baker (1♀ USNM). Samar, Baker (1♀ USNM), 24237 (2♀ USNM), 24238 (2♀ USNM, one labelled as “cotype”). Sibuyan, Baker (1♀ USNM).

Description. FEMALE. Length, 7–14 mm. Antenna usually dark except scape variably extensively yellowish basally and sometimes pedicel and base of flagellum light brown to yellowish; scape widened apically but spindlelike and with outer surface uniformly setose; Fl_1 about 1.8–2.0 x as long as wide and about 0.75 x length of pedicel;

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Fl_2 about 5.5–6.0 x as long as wide and about 1.6–2.2 x as long as clava. Head with punctures and interstices not contrasting distinctly in color, the face bright green to bluish or purple under some angles of light; ocellar region and vertex medially in region behind ocelli dark, but upper inner orbit, occiput and along outer orbit bright metallic, varying from greenish-blue to purple under different angles of light. Face with setiferous punctures (Fig. 24), the punctures on lower face crowded and irregular or with granular- to reticulate-coriaceous interstices so as to appear reticulate-rugulose toward oral margin, but punctures more distinct with variably distinct coriaceous interstices on parascrobal region, except about dorsal quarter to third of region abruptly flat, distinctly coriaceous, and uniformly setose with white to light brown setae. Scrobal depression with scrobes transversely strigose to reticulate and dark; channel ventrally with smooth and shiny, transverse or V-like green to purple band, otherwise dark or with slight coppery luster and increasingly distinctly coriaceous and setose dorsally.

Pronotum (Fig. 18) variably purple to green under some angles of light; shiny but very finely coriaceous to coriaceous-aciculate. Tegula brown to yellowish-brown, with inner margin sometimes having metallic luster. Mesoscutum variably bright green to bluish laterally, dorsally with black or coppery parapsidal and notaular bands forming Ψ-like (Fig. 18) or more obscurely T-like pattern, the bands usually united posteriorly but sometimes green to blue paranotaular band continued posteriorly as single line of metallic punctures, but parapsidal band not extending posterior of junction with notaular band toward inner angle of axilla and notaular band extending to and broadly truncate along base of scutellum. Mesoscutum (Fig. 40) alveolate laterally, dorsally the punctures much smaller and shallower; without evident depression anterior to level of inner margin of axilla; with brown, quite uniform hairlike setae. Scutellum (Fig. 18) mostly green to blue but with variably distinct median dark band over about anterior half, the dark region often having coppery to violaceous luster under some angles of light; usually coriaceous with scattered setiferous punctures but if shallowly reticulate then reticulations not distinctly aligned longitudinally (Fig. 40). Metanotum green to purple, with posterior surface of dorsellum usually purple; dorsellum thick, with crenulate dorsal surface and coriaceous posterior surface, the coriaceous region bare but sometimes with single seta projecting from dorsal carinate margin paralaterally; precrenular region of panel with single line of setae near anterior margin. Acropleuron with distinct, coriaceous-granular subalar region separating punctate-alveolate prealar region from variably sculptured postalar region, the postalar region having at least some longitudinally aligned punctate-reticulate sculpture ventrally (*cf.* Fig. 51) and sometimes extensively punctate-reticulate (*cf.* Fig. 54); prealar region with at least ventral half dark or with slight greenish luster and separated from dorsal-most blue to bright green region by oblique violaceous to purple band, with subalar area dark or variably violaceous to purple or green similar to postalar region. Lower mesepimeron variably extensively coriaceous, but at least distinctly punctate-reticulate ventrally. Metapleuron distinctly coriaceous to shallowly coriaceous-reticulate, except for

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crenulate furrow along posterior margin and anterior margin ventrally. Propodeum green to blue or purple except plical region usually dark and vertical surface of callus usually violaceous under some angles of light; paraspiracular region bare, the setae anterior to spiracle extending mesally at most about half way to plical region in single line along anterior margin; callus shiny and smooth between setal pores or vertical surface sometimes with fine, usually inconspicuous coriaceous sculpture; plical region bare, with carinate margin of foramen Λ-like recurved to anterior margin of propodeum as variably strong median carina similar in appearance to crenulae lateral to median carina. Forewing with vannal area and medial fold beyond basal cell variably distinctly brownish; vannal area with subcubital setal line extending almost to base. Legs uniformly yellowish to orange beyond coxae.

Petiole composed of anterior carina and smooth and shiny or only finely sculptured lunate horizontal surface (Fig. 40). Gaster in dorsal view dark with slight coppery to purple luster, in lateral view all terga except syntergum bright green to blue dorsally and blue to purple ventrally; length of gaster and syntergum highly variable depending on size, the gaster about 1.3–1.8 x combined length head and mesosoma and syntergum in lateral view about 0.25–0.65 x as long as remaining gaster and 2.3–6.5 x as long as high, but syntergum uniformly setose, sculptured and tapered posteriorly, with cercus at basal margin.

MALE. Similar to female except as follows: length, 5–8.3 mm; black regions dorsally on mesonotum not as distinctly delimited, the parapsidal and notaular bands separated posteriorly by slender paranotaular band, similar to some females, but notaular band often indistinct posteriorly on mesoscutum and on scutellum; tegula often more distinctly yellowish; dorsellum without dorsolateral setae; acropleuron posteriorly sometimes more extensively and strongly reticulate; propodeum longer, the plical region with an inverted Y-shaped median carina and somewhat sinuous to obliquely angled paramedial carinae; petiole longer, lunate to almost semicircular; gaster with Gt_1 and Gt_2 smooth and shiny, subsequent terga finely coriaceous and comparatively sparsely setose, with Gt_5 and posterior half of Gt_4 bare medially.

Biology. Unknown.

Discussion. In the introduction of his paper, Girault (1927) stated that specimens of the species described therein were received from C. F. Baker and that types of the species were in the Queensland Museum. The USNM has additional specimens that, based on label data, were collected as part of the same series as the QMBA specimen, plus a female from Samar labelled as “cotype”, which possibly is the female designated as “cotype” by Girault (1928). However, the females from Samar and Sibuyan that Girault (1928) listed as cotypes were designated subsequent to the original description without any evidence that he had these specimens at the time of the original description. The original description of *B. splendida* states “a” female and I therefore consider the single female labelled as “type” in the QMBA to be the holotype.

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Smaller females tend to have the scutellum more reticulate than coriaceous, similar to most males, which are also comparatively small. Length of the female gaster and syntergum appears to be correlated with specimen size, i.e. larger females have a longer gaster and more elongate-slender syntergum compared to small females, as for most other species of the genus for which longer series are known. All observed males have the dorsellum completely bare, but too few have been seen to assess whether the presence of a single paralateral seta dorsally is variable in both sexes or is characteristic only of some females. Despite the presence of at most two setae on the dorsellum, I include *B. splendida* in the *laciniosa*-group. Individuals are most readily distinguished from other *laciniosa*-group species by their unique mesonotal color pattern, the only species having the dark notaular band extending also onto the scutellum (Fig. 18). Some *B. indica* have only a very few dorsellar setae but have a different mesonotal color pattern (Fig. 12) as well as distinctly contrasting punctures and interstices on the face (*cf.* Fig. 2) and a rimlike rather than lunate petiole.

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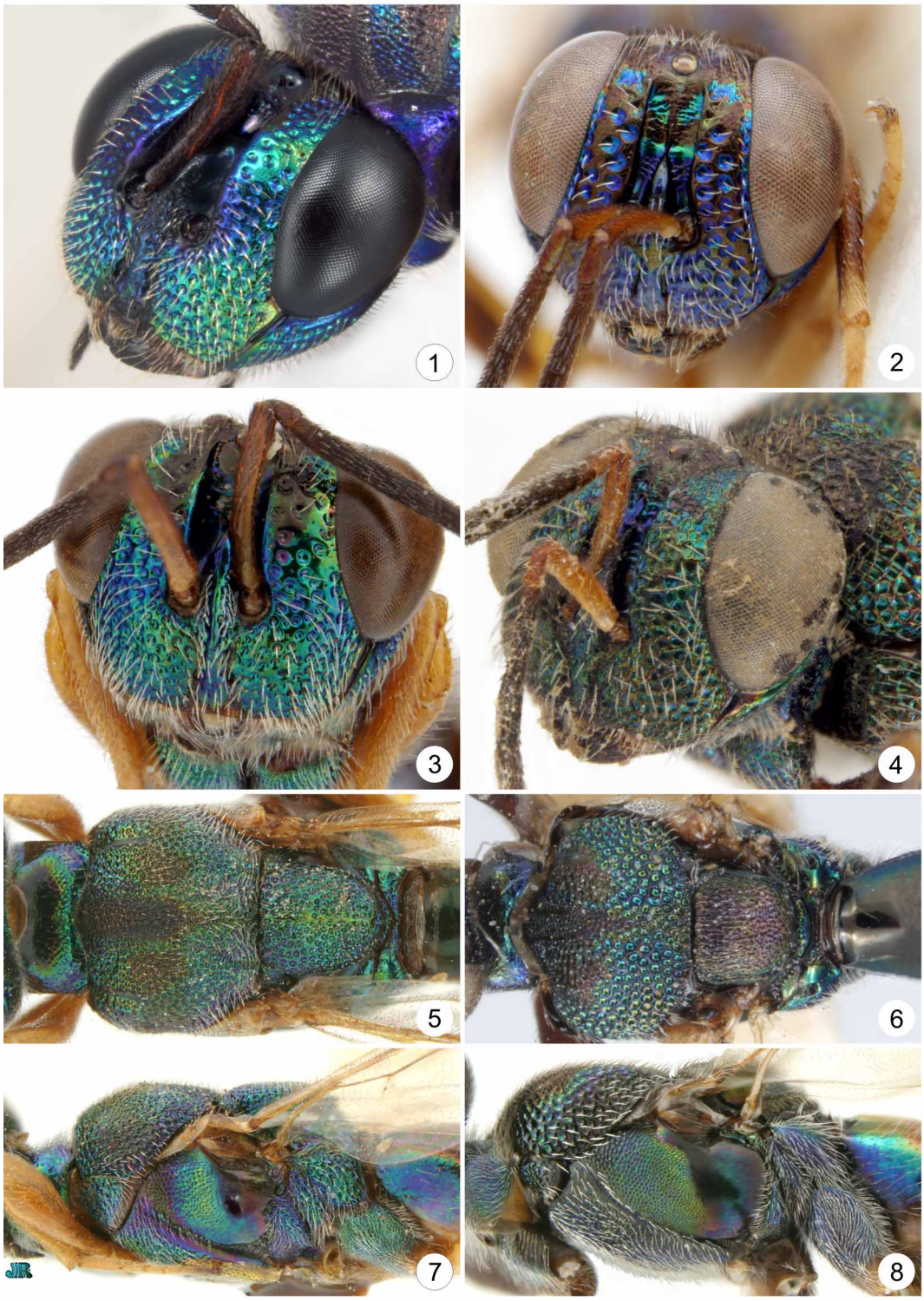

FIGURES 1–8. 1–4. Head: 1, *Balcha eximia*; 2, *B. camptogastra*; 3, *B. punctiscutum*; 4, *B. reticulifrons*. **5 and 6.** Mesosoma, dorsal: 5, *B. punctiscutum*; 6, *B. enoptra*. **7 and 8.** Mesosoma, lateral: 7, *B. punctiscutum*; 8, *B. indica*.

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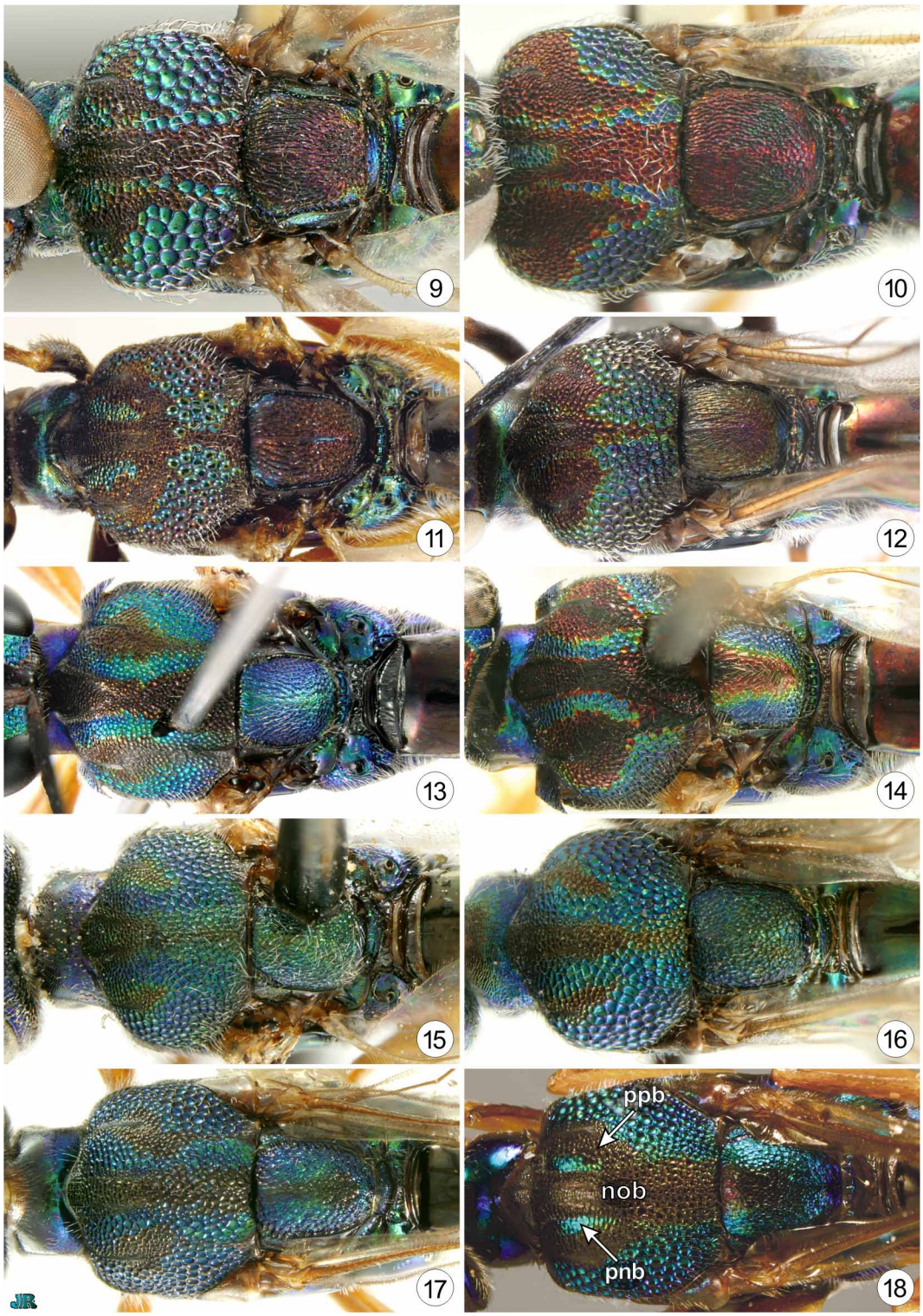

FIGURES 9–18. Mesosoma dorsal: 9, *Balcha laciniosa*; 10, *B. cylindrica*; 11, *B. elegans*; 12, *B. indica* (N. Am.); 13, *B. eximia*; 14, *B. eximiassita*; 15, *B. dictyota*; 16, *B. reticulata*; 17, *B. anemeta*; 18, *B. splendida* (nob = notaular band, pnb = paranotaular band, ppb = parapsidal band).

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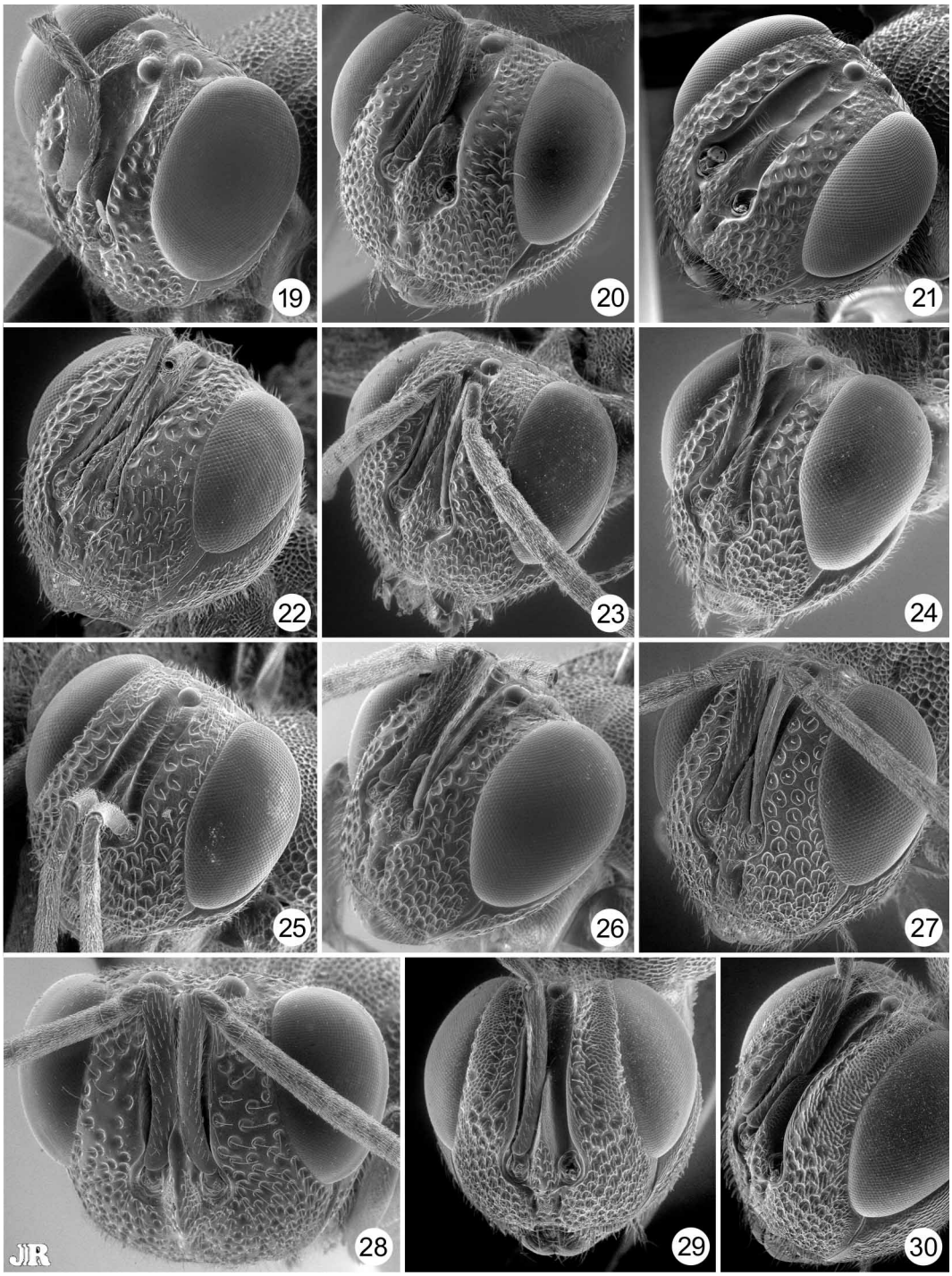

FIGURES 19–30. Head: 19, *Balcha anemeta*; 20, *B. eximia*; 21, *B. indica* (N. Am.); 22, *B. reticulata;* 23, *B. enoptra*; 24, *B. splendida*; 25, *B. camptogastra*; 26, *B. elegans*; 27, *B. laciniosa*; 28, *B. punctiscutum*; 29 and 30, *B. cylindrica*.

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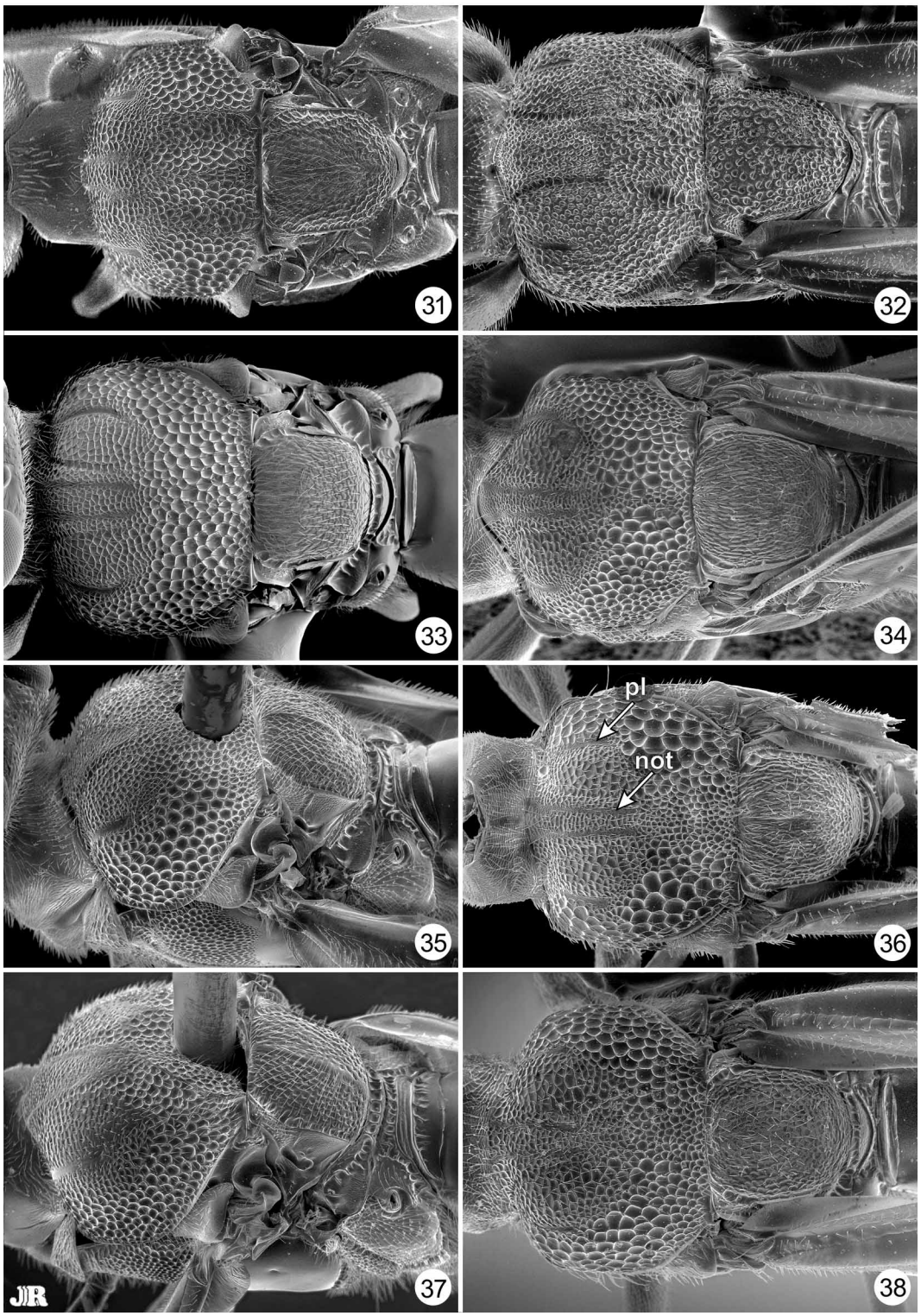

FIGURES 31–38. Mesosoma dorsal: 31, *Balcha anemeta*; 32, *B. punctiscutum*; 33, *B. indica* (N. Am.); 34, *B. indica* (holotype); 35, *B. elegans*; 36, *B. laciniosa* (not = notaulus, pl = parapsidal line); 37, *B. eximiassita*; 38, *B. reticulata.*

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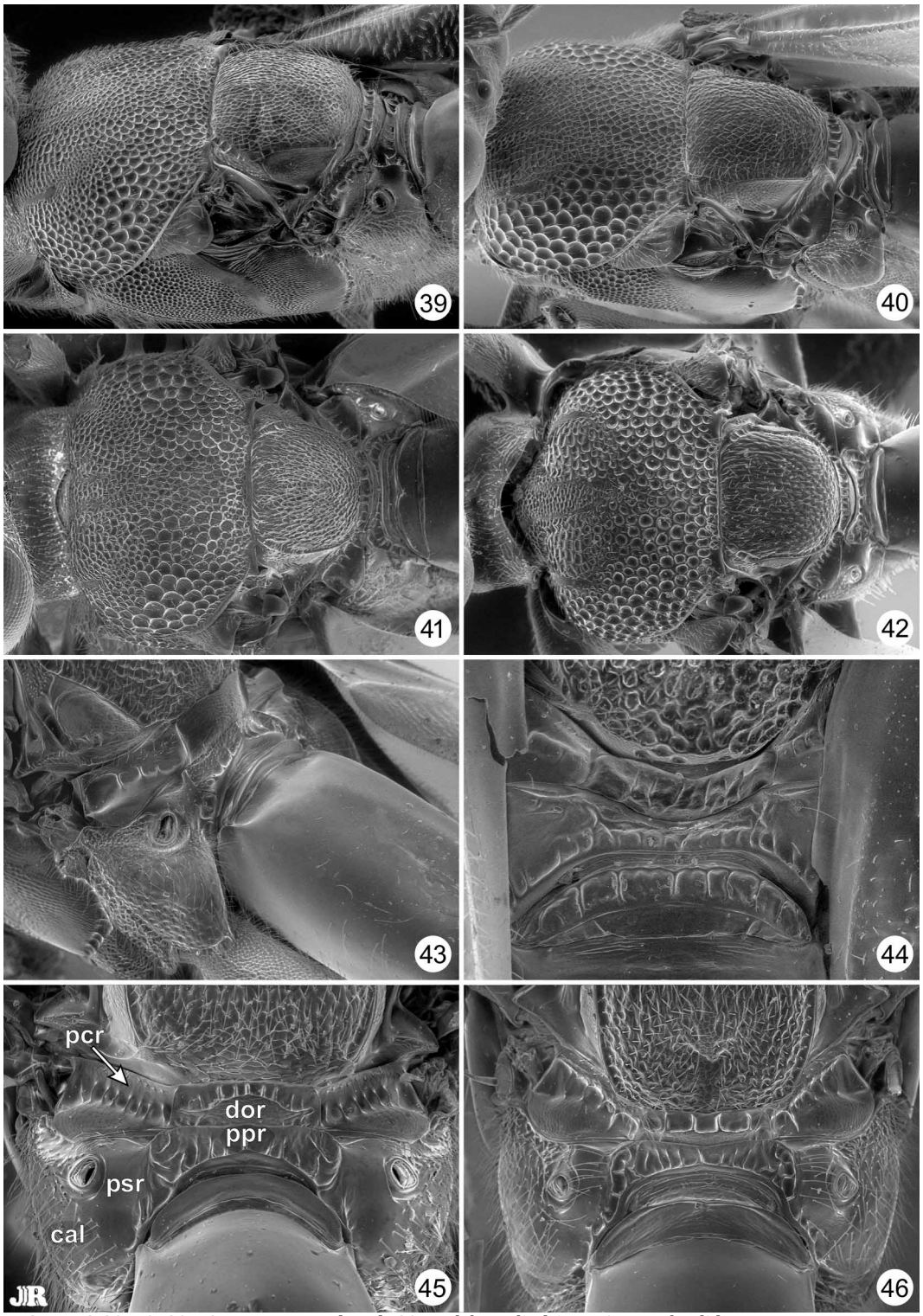

FIGURES 39–46. 39–42. Mesosoma, dorsal: 39, *Balcha cylindrica*; 40, *B. splendida*; 41, *B. camptogastra*; 42, *B. enoptra*. **43–46.** Metanotum and propodeum: 43, *B. levicollis*; 44, *B. punctiscutum*; 45, *B. enoptra* (cal = callus, dor = dorsellum, pcr = precrenular region of metanotal panel, ppr = propodeal plical region, psr = paraspiracular region); 46, *B. elegans*.

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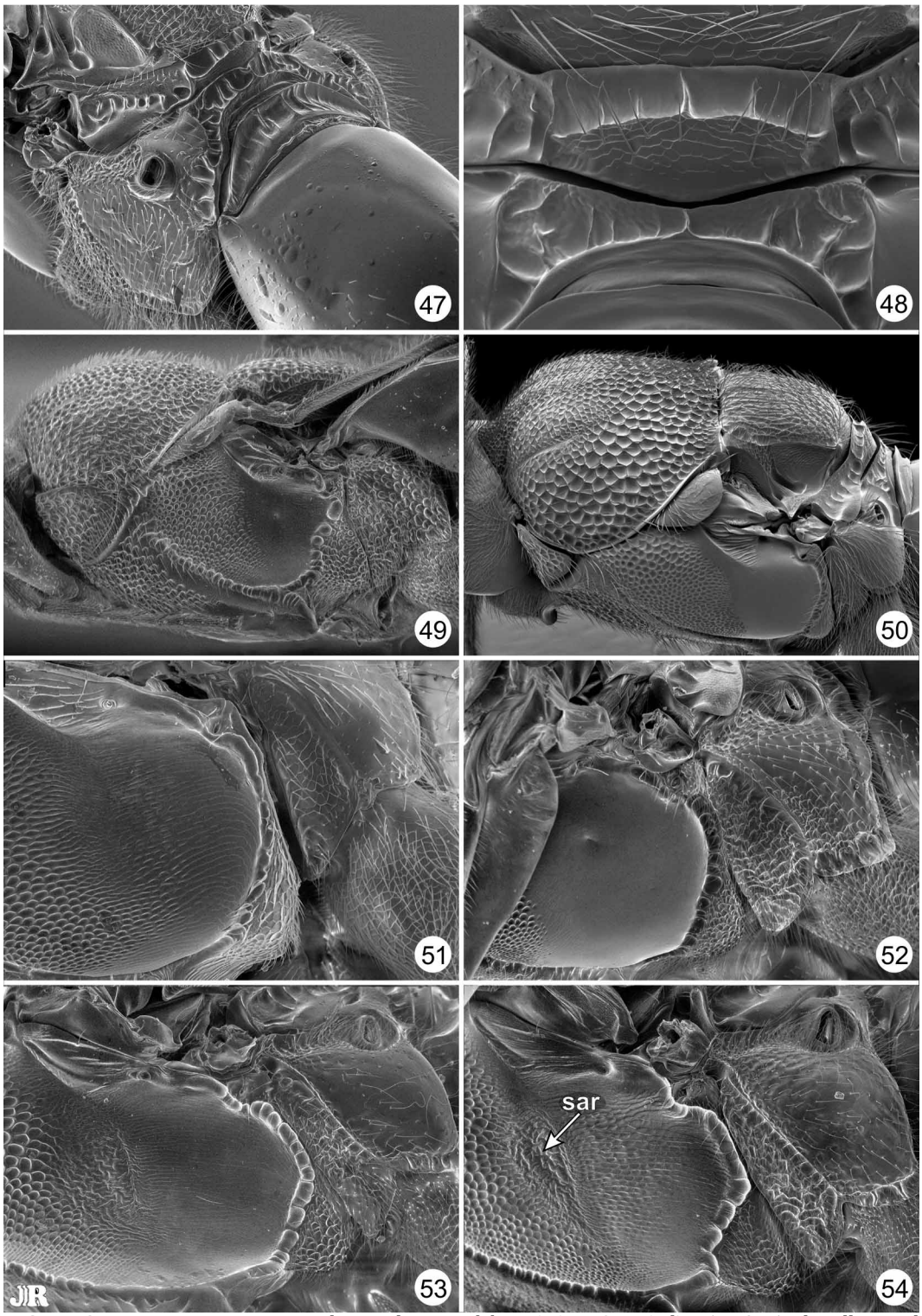

FIGURES 47–54. 47. Metanotum and propodeum: *Balcha eximia*. **48.** *B. indica* (N. Am.): dorsellum and propodeal plical region. **49 and 50.** Mesosoma, lateral: 49, *B. punctiscutum*; 50, *B. indica* (N. Am.). **51–54.** Posterior half of acropleuron: 51, *B. indica* (holotype); 52, *B. eximiassita*; 53, *B. anemeta*; 54, *B. levicollis* (sar = subalar region of acropleuron).

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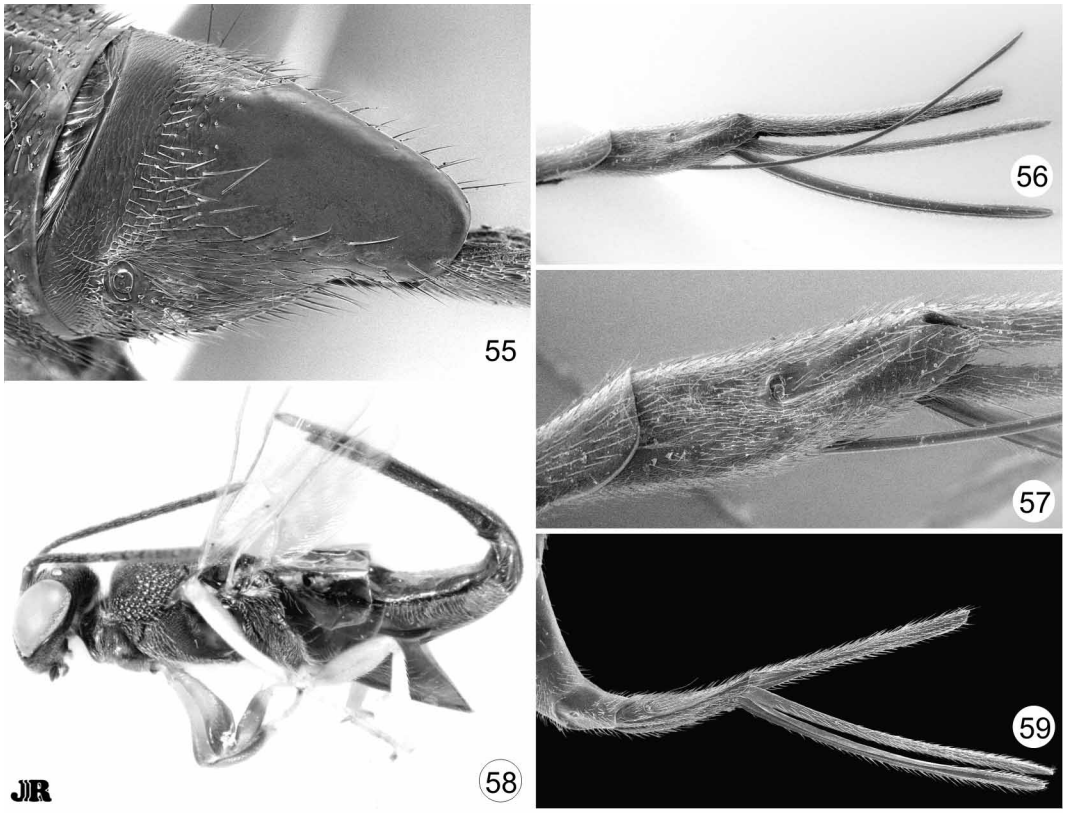

FIGURES 55–59. 55. *Balcha enoptra*: syntergum. **56 and 57.** *B. punctiscutum*: 56, syntergum; 57, base of syntergum. **58 and 59.** *B. camptogastra*: 58, lateral habitus; 59, syntergum.

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