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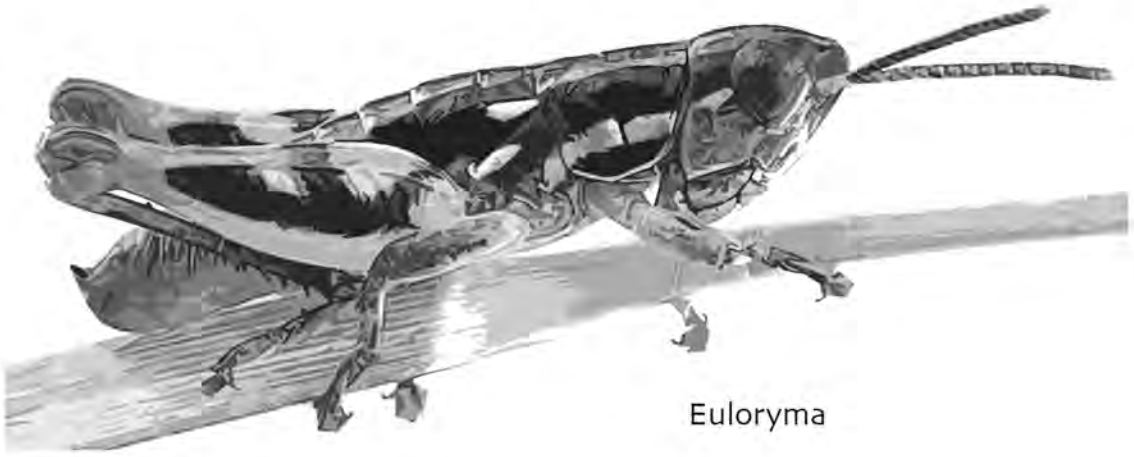

Euloryma

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Taxonomic Revision of the South African Grasshopper Genus *Euloryma* (Orthoptera: Acrididae)

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ABSTRACT

The South African flightless hemiacridine genus *Euloryma* is revised for the first time, with 21 new species described. The genus name *Euloryma* is a *nomen novum*, proposed because the genus *Loryma* Stål, 1878 (Orthoptera: Acrididae) is a junior homonym of the genus *Loryma* Walker, 1859 (Lepidoptera: Pyralidae). A detailed discussion of the rationale for this new name is provided. Species keys, a reference chart of species, extensive photography of external and internal morphology, and distribution maps are provided. Morphology figures labeled with internal and external terminology are included. Two provisional *Euloryma* species-groups are proposed: *karoo* species-group and the *cederbergensis* species-group. The majority of the *karoo* species-group members are found in succulent karoo biome, with one species in the grassland biome, whereas the majority of the *cederbergensis* species-group members are found in the fynbos biome. The new tribe name Dirshacrini is proposed, due to proposed changes in nomenclature; tribe members *Hemiloryma*, *Dirshacris* and *Labidioloryma* are photographed, a list of diagnostic differences is provided, and a key to the genera is given.

The following new species are proposed: *KAROO SPECIES-GROUP*: *ashleyi* sp. nov.; *carolynae* sp. nov.; *magna* sp. nov.; *browni* sp. nov.; *khoi* sp. nov.; *namaqua* sp. nov.; *san* sp. nov.; *mayi* sp. nov.; *zebrata* sp. nov.; *bonteboki* sp. nov.; *karoo* sp. nov.; *CEDERBERGENSIS SPECIES-GROUP*: *mirabunda* sp. nov.; *cederbergensis*, sp. nov.; *lapollai* sp. nov.; *tsitsikamma* sp. nov.; *waboom* sp. nov.; *solveigae* sp. nov.; *larsenorum* sp. nov.; *umoja* sp. nov.; *lyra* sp. nov.; *ottei* sp. nov.

Key words: Acrididae, *Dirshacris*, Hemiacridinae, *Hemiloryma*, *Labioloryma*, *Loryma*, South Africa

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DEDICATION

To my J… and now also my Sam

Acknowledgements

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I gratefully thank the supportive South African National Parks personnel: Dr. Hugo Bezuidenhout, and the park managers, guards and staff of both Mountain Zebra and Bontebok National Parks. I thank the Cape Nature personnel: Deon Hignett, and Cederberg Wilderness Park Manager Donnie Malherbe, and Conservation Manager Rika du Plessis, and the park guards. I also thank the stewards of the following natural history collections for loans and assistance: Dr. George Beccaloni (British Museum), Dawn Larsen (Iziko South African Museum), Margie Cochrane (ISAM), Margaret Kaiser (South African National Collection of Insects, Pretoria), Ros Urban (SANC), and Jason Weintraub (Academy of Natural Sciences). I thank Piotr Naskrecki for his live *Euloryma* photograph. I thank Dr. Michael Samways (Univ. Stellenbosch) and Dr. Simon VanNoort (ISAM) for letters of support regarding funding and permitting.

I thank my dissertation committee (Drs. Michael May, Peter Morin, Rebecca Jordan, Lee-Ann Hayek, and Daniel Otte) for their insight, encouragement and patience. I especially thank my guardian advisor Dr. Michael L. May who's keen eye, bibliographic memory, good humor, support and friendship is a constant commodity. I thank my RU graduate cohort, Dana Price, Jessica Ware, Emilie Stander, Kristen Ross and Polly Hicks. I thank my family who have always encouraged exploration and curiosity and are infinitely supportive in all ways, to the point of discussing the phallic complex at the holiday dinner table. I thank the Entomology Department of America's first natural history museum, the Academy of Natural Sciences, where there are truly no finer people for encouraging future generations of naturalists (Daniel Otte, Jon Gelhaus, Jason Weintraub, and Don Azuma now at the Wagner Free Institute). I thank my husband John LaPolla for sharing his microscope, his lab, for the many months of grueling orthopteroid fieldwork assistance, for years of endless encouragement through the many hurdles and adventures of this life thus far, and for his unending love and support. I wish to give special thanks to my first mentor in the world of evolution and systematics, Daniel Otte, for his years of unyielding mentoring and friendship that changed my life and led me to possibilities and wonderment that I could not have imagined.

INTRODUCTION

Since the South African grasshopper genus *Loryma*, now renamed *Euloryma*, was created in 1878 by Stål, it has received little attention from researchers. These small to mid-sized grasshoppers are found primarily in the fynbos and succulent karoo regions of western South Africa, where they are not frequently encountered during fieldwork. These short-winged grasshoppers are fast, strong jumpers that can still be exceedingly difficult to catch even though they cannot fly (fig.1).

Fieldwork by H. Dick Brown during the late 1950s and 1960s considerably expanded the number of *Euloryma* specimens available for study. Though he did not publish formal taxonomic papers exclusively about *Euloryma*, Brown did describe two members of Dirshacrini, *Dirshacris* and *Hemiloryma*, and Brown's field studies collected many of the undescribed species that are included in this present study. More recent fieldwork (by D. Otte and L. Spearman) revealed in fact that this formerly monotypic genus is far more diverse than previously thought.

This study represents the first taxonomic revision of *Euloryma*. Extensive use of auto-montage pictures provides documentation for the 21 new species of *Euloryma* now known from South Africa. It has become clear in the course of this work that male *Euloryma* genitalic characters are of utmost importance for identifying species. *Euloryma* species display a wide range of genitalic forms. In fact, the quick examination of the cerci of Brown's specimens housed in the National Insect Collection in Pretoria is what made it immediately clear that the genus was far more diverse than initially suspected.

It is difficult to say with completion of this study how many more *Euloryma* species remain to be discovered. Several factors suggest that there are more species to discover. Despite the discovery of 21 new species in the course of this study, these new species are represented by relatively few specimens, suggesting that diversity may be far greater once more specimens are collected. Furthermore, it appears that *Euloryma* species have small ranges, and large areas, particularly in mountains, remain to be surveyed across southern and western South Africa. More survey work, coupled with phylogenetic study, will allow for interesting hypotheses examining *Euloryma* biogeography. Studies are currently underway to elucidate *Euloryma* phylogeny using DNA sequence and morphological data (Spearman and Ware in prep.). *Euloryma* are found in areas that are known to possess high insect species richness and endemism, and can now be identified and included in conservation studies in fynbos and nama karoo where critical management and preservation efforts are being made. It is hoped that this study will provide a comparative framework for future study of this diverse grasshopper genus.

Taxonomic History of the Genus Euloryma *and Putative Relatives*

Tribe Dirshacrini, **nom. nov.**

Dirshacris Brown, 1959 [type species: *Dirshacris aridus* Brown, 1959]

Euloryma, **nom. nov.** [type species: *Platyphyma vittipennis* Stål, 1875, **stat. rev.**]

Hemiloryma Brown, 1973 [type species: *Hemiloryma deserticola* Brown, 1973]

Labidioloryma Grunshaw, 1986 [type species: *Labidioloryma strictoforceps*
Grunshaw, 1986]

Genus excluded from tribe:

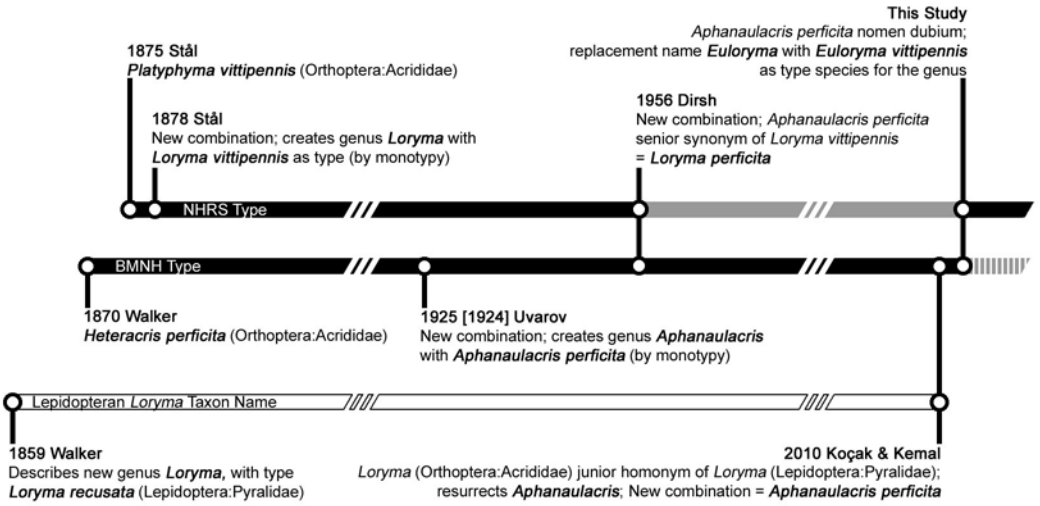
Aphanaulacris Uvarov, 1925, [type species: *Heteracris perficita* (Walker, 1870)]; here considered a ***nomen dubium*** (see below)

The rather complicated taxonomic history of *Euloryma* can be summarized in the diagram at the end of this section (see also Otte 1995; Eades *et al*. 2012). A new genus name, *Euloryma*, is being proposed here. This is because the name *Loryma* Stål, 1878 (Orthoptera: Acrididae) is a junior homonym of the genus *Loryma* Walker, 1859 (Lepidoptera: Pyralidae). The decision to propose a new genus name differs from the recent taxonomic action by Koçak and Kemal (2010), who designated the genus *Aphanaulacris* as the replacement name for *Loryma* Stål, 1878 (Orthoptera: Acrididae). The genus *Loryma* was created by Stål (1878)

Figure 1. Live field photo of *Euloryma* species. Species (probably *E. carolynae*), from Namaqualand, in the Northern Cape Province of South Africa. Photo by P. Naskrecki.

when he transferred *Platyphyma vittipennis* Stål, 1875 to this new, monotypic genus. Dirsh (1956) made two notable taxonomic changes regarding what would become the genus *Euloryma* in this study by first transferring *Aphanaulacris perficita* (Walker, 1870) to *Loryma*. He then considered *Aphanaulacris perficita* (Walker, 1870) a senior synonym of *Loryma vittipennis* Stål, 1875, making the only valid species in the genus *L. perficita*. The taxonomy remained unchanged until Koçak and Kemal (2010) discovered that *Loryma* Stål, 1878 (Orthoptera: Acrididae) was a junior homonym of a pyralid moth genus. However, I consider *Aphanaulacris perficita* (Walker, 1870) a *nomen dubium*, and therefore propose *Euloryma* as the replacement name for the genus. This extends to the synonymy of *Loryma vittipennis*, which Dirsh (1956) considered a junior synonym of *Loryma perficita,* but I here revive *L. vittipennis* from synonymy. The rationale for this decision is based on the fact that neither the description nor the holotype specimen of *Aphanaulacris perficita* allows for the taxon to be identified. The available specimen is a female, which in itself is problematic because females lack the diagnostic features allowing for species level, and to some extent even genus level (at least between *Euloryma* and *Hemiloryma*), diagnosis. But this alone would not be sufficient reason to consider the name a *nomen dubium*. Rather, insufficient and missing details in the written description of Walker (1870), coupled with a holotype that is badly damaged, missing key diagnostic morphological features (an oddly asymmetrical and damaged pronotum, no legs, except for a hind femur with knee apex missing), renders the name a *nomen dubium*. Koçak and Kemal (2010) never examined the type specimens of either *Platyphyma vittipennis* or *Aphanaulacris perficita*, but simply found the homonymy in the literature and proposed the replacement name.

The higher-level classification of *Euloryma* has remained uncertain since the genus was initially described. Dirsh placed the genus within the Hemiacridinae, a subfamily he described based on some of the following characteristics concerning the phallic complex: cingulum well differentiated, strongly sclerotized, with mostly membranous rami, and valves enclosed in sheath of rami (Dirsh 1956). The monophyly of the hemiacridines remains uncertain (Grunshaw 1986; Brown 1973; Otte, pers. comm.), but is likely paraphyletic as presently defined. Putative close relatives of *Euloryma* were described by Brown as *Dirshacris* (Brown 1959) and *Hemiloryma* (Brown 1973). He



considered these three genera the *Loryma* genus-group (here this would be considered the *Euloryma* genus-group). Grunshaw (1986) later described *Labidioloryma*, which he considered part of the *Loryma* genus-group. The main characters that define the genus-group are the reduced to vestigial wings and a spatulate prosternal process. While *Labidioloryma* is known from Malawi, all the other genera are apparently restricted to Namibia and/or South Africa. Otte (1995) considered the genus-group as the tribe Lorymaini, but without further comment. Based on the fact that a replacement name is proposed in this study for the genus *Loryma*, a new tribe name needs to be rendered as well, which would be Dirschacrini. I have listed this name above, but the phylogenetic relationships of the members of this tribe are uncertain. While it seems clear that *Euloryma* and *Hemiloryma* are close relatives (putatively sister to each other), the relationship to the other genera remains unclear. Additionally, more recently, fieldwork in South Africa has discovered a possible new genus that is likely the sister group to either *Euloryma* and/or *Hemiloryma*. Preliminary examination of the females of this possible new genus shows very similar morphological features to *Euloryma* and *Hemiloryma* although the males have distinct and different genitalic features (Spearman in prep.). Molecular work should provide critical insight into the relationships within and between the tribe members. Therefore, the use of a tribal name should not be viewed as an explicit statement affirming the close relationship of these genera, but rather simply a matter of taxonomic necessity, pending further investigation of the phylogenetic relationships of the constituent genera.

Diagram of taxonomic history of *Euloryma*: From the top down, the first line represents the type described and deposited in the Swedish Museum of Natural History in Stockholm by Stål (NHRS Type). The second line represents the type described and deposited in the British Museum of Natural History in London by Walker (BMNH Type). The third line represents the Lepidopteran type species deposited in the BMNH by Walker. A blackened line represents a type specimen that is accepted as the type species for the genus, a grey line represents a type specimen designated as a synonym, and *nomen dubium* is represented by a line with grey vertical stripes. Orthoptera Species File was used to retrieve taxonomic references and track nomenclatural changes (Otte 1995; Eades *et al*. 2012).

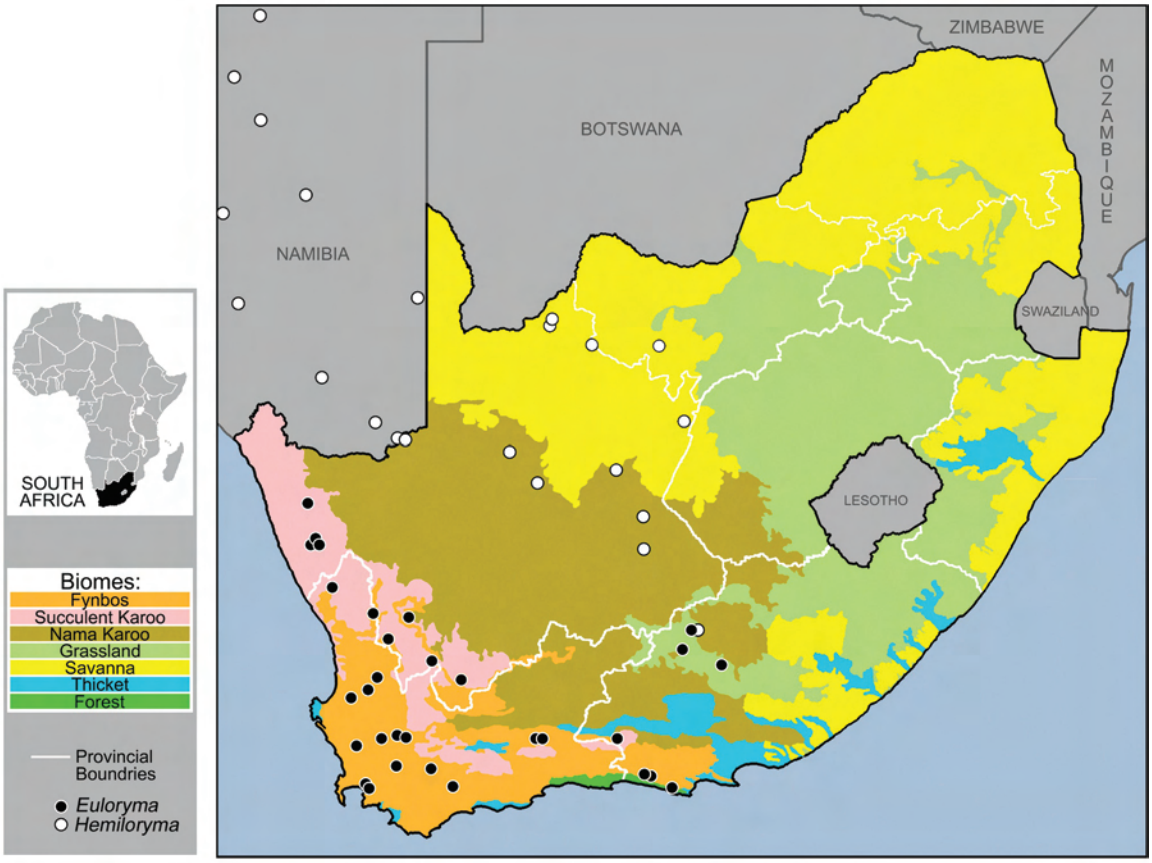


Figure 2. Map of South Africa with illustrated biomes, and *Euloryma* and *Hemiloryma* distributions. *Euloryma* distribution based on this study, *Hemiloryma* distribution is modified from Brown (1973). Biome distribution modified from van Wyk and Smith (2001). Naming, scale, biomes, borders and topography modified from Breedlove & Fraser (2000), GoogleMaps (2009) and Walton (1994).

Overview of Natural History and Geographic Range

Euloryma biology, behavior and ecology are not fully documented. It has been inferred that *Euloryma* is univoltine, because adults have primarily been collected during the South African spring (September-December). Though it was originally thought to be a nearly exclusive fynbos biome genus (Brown 1973), we can now document species from the fynbos (≈10 spp.), succulent karoo (≈11 spp.) and grassland biomes (1 sp.) (fig. 2) (approximate species numbers are given for biome distribution because multiple species were found in one biome, but in close proximity to another biome or transitional area). Of the two species-groups proposed in this work, the *karoo* species-group and *cederbergensis* species-group, most of the *karoo* species-group have been found in the succulent karoo and grassland biomes, whereas the *cederbergensis* species-group appears to inhabit primarily the fynbos biome. The interesting distribution of species-group members can be seen in figures 3, 4 and 5. The fynbos biome (or Cape Floristic region) receives winter rains, while the succulent karoo receives sporadic

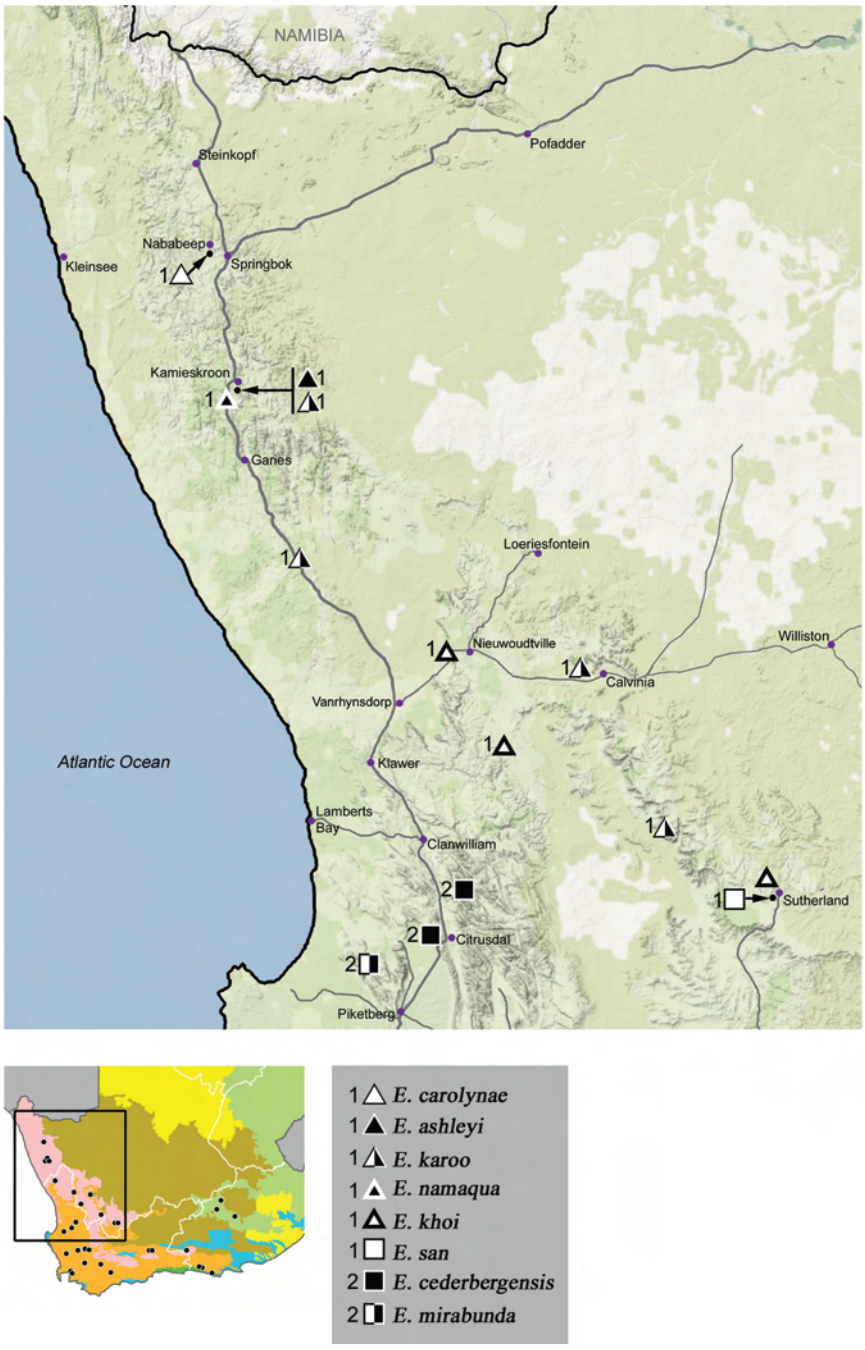


Figure 3. Map depicts *Euloryma* species distribution known from NW South Africa. Number 1 = *karoo* species-group; Number 2 = *cederbergensis* species-group. Map extends from Namaqualand in the N, to the Cederberg Wilderness in the SW and Roggeveld Mountains in the SE. *Euloryma* distribution is based on this study. Naming, scale, biomes, borders and topography modified from Breedlove & Fraser (2000), GoogleMaps (2009) and Walton (1994).

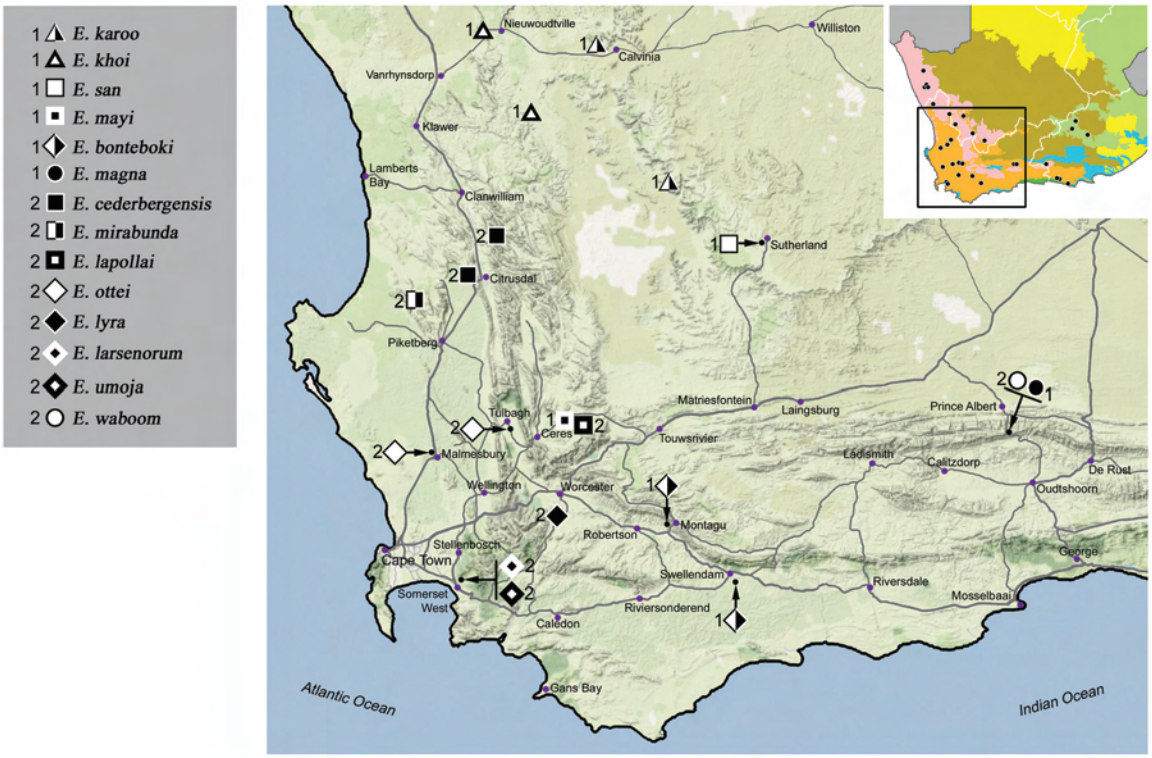


Figure 4. Map depicts *Euloryma* species distribution known from SW South Africa. Number 1 = *karoo* species-group; Number 2 = *cederbergensis* species-group. Map extends from the Cederberg Wilderness in the NW, Roggeveld Mountains in the NE, the SW Cape and the Langeberge and Klein Swartberge in the E. *Euloryma* distribution is based on this study. Naming, scale, biomes, borders and topography modified from Breedlove & Fraser (2000), GoogleMaps (2009) and Walton (1994).

winter and summer rains. Such a strong correlation between morphological differences and the various biomes suggests an interesting phylogenetic and biogeographic history that warrants further study (Spearman in prep.).

Materials and Methods

Sources of Material

Specimens examined for this study are deposited in the following institutions:

ANSP: Academy of Natural Sciences, Philadelphia, Pennsylvania, USA
BMNH: Natural History Museum, London, United Kingdom
SAMC: Iziko South African Museum, Cape Town, South Africa
SANC: South African National Collection of Insects, Pretoria, South Africa

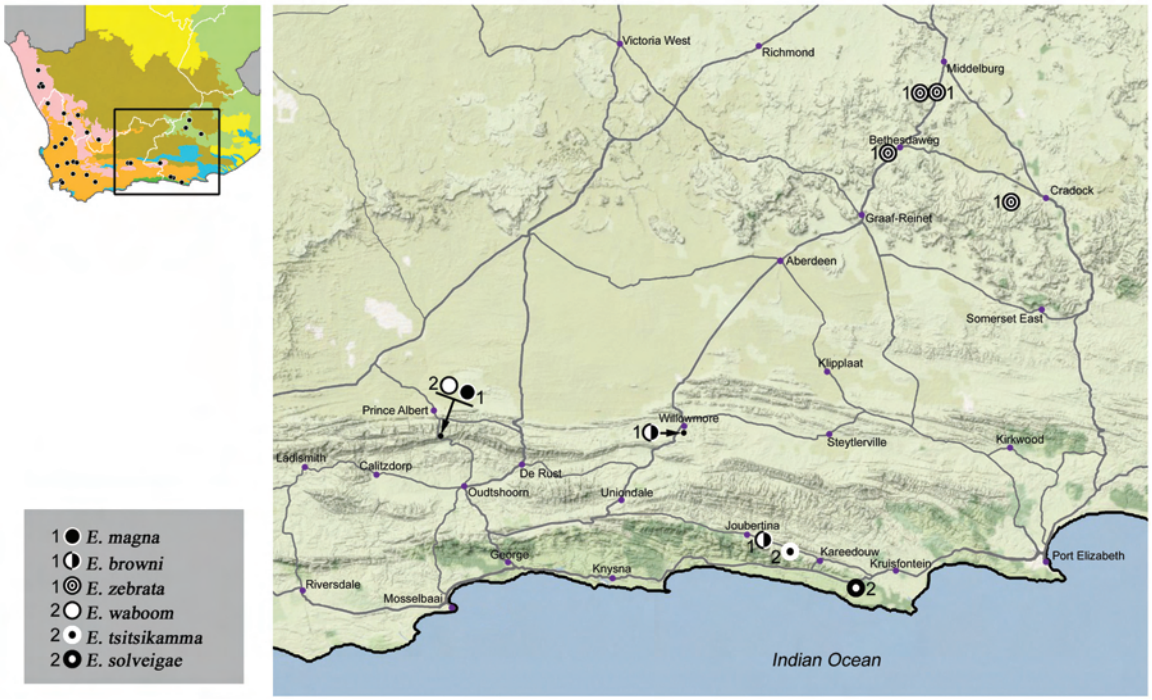


Figure 5. Map depicts *Euloryma* species distribution known from SE South Africa. Number 1 = *karoo* species-group; Number 2 = *cederbergensis* species-group. Map extends from the Langeberge and Klein Swartberge in the W, to the Coetzeesberge and Mountain Zebra National Park in the NE. *Euloryma* distribution is based on this study. Naming, scale, biomes, borders and topography modified from Breedlove & Fraser (2000), GoogleMaps (2009) and Walton (1994).

Analysis of Morphology

Various morphological features are diagrammed in figures 6-15. Morphological terminology follows various sources: Uvarov (1966), Vickery and Kevan (1983), Snodgrass (1935), Roberts (1941), Dirsh (1956), Grunshaw (1986), and Otte (pers. comm.). In this study I define the shoulders of cerci as the anteriodorsal angle of the base of the cerci projecting from beneath tergite-X (examples of no shoulder: *E. ottei*, fig. 57 F; low shoulder: *E. umoja*, fig. 53 F; and pronounced shoulder: *E. zebrata*, fig. 33 F).

Coloration. Most of the material examined for this revision was either dry-collected by Dick Brown between 1958-1972 and deposited in the SANC, or was collected by D. Otte of the ANSP in 2005-2007 and placed temporarily in 95% ethanol in anticipation of extracting DNA at a later time. Some of the older material has darkened significantly, partially due to time but also perhaps partly because most material was not gutted before being deposited. For this reason, coloration of head, pronotum and abdomen of the older material can appear deceivingly dark. The younger material that was temporarily preserved in ethanol was partially bleached of color. Field photography demonstrates how much pigmentation can and has been lost with age, lack of specimen gutting, and temporary ethanol storage. Coloration is addressed in species descriptions using all information possible, but color is never the exclusive feature used in species diagnosis. I strongly suggest that during future field work on *Euloryma*, specimens are photographed alive to record their true coloration (and variation of coloration within populations), gutted as soon

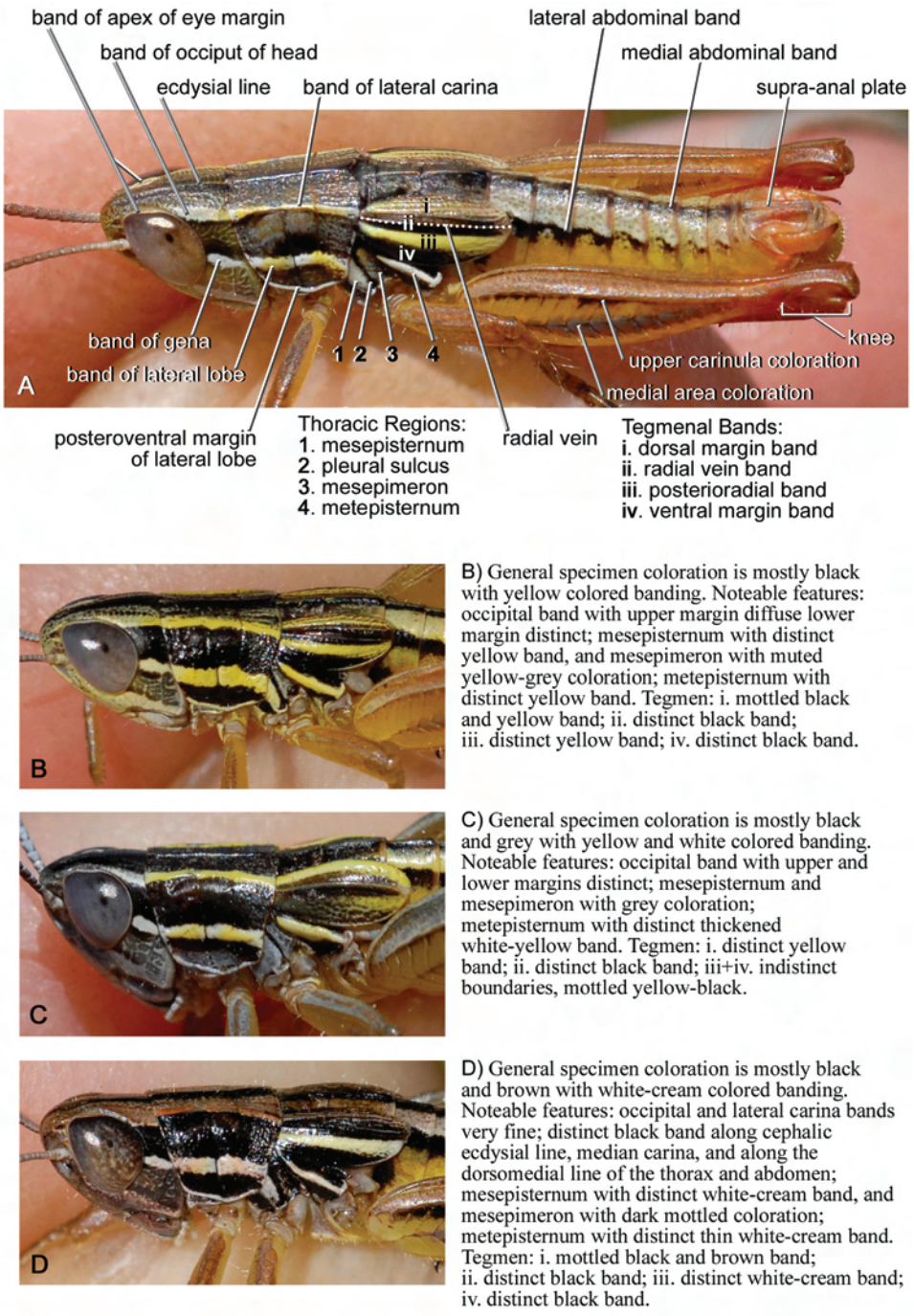


Figure 6. Morphological features associated with coloration of adult male *Euloryma* (A-D). A) Labeled morphological features associated with *Euloryma* coloration. Three live specimen examples (B-D).

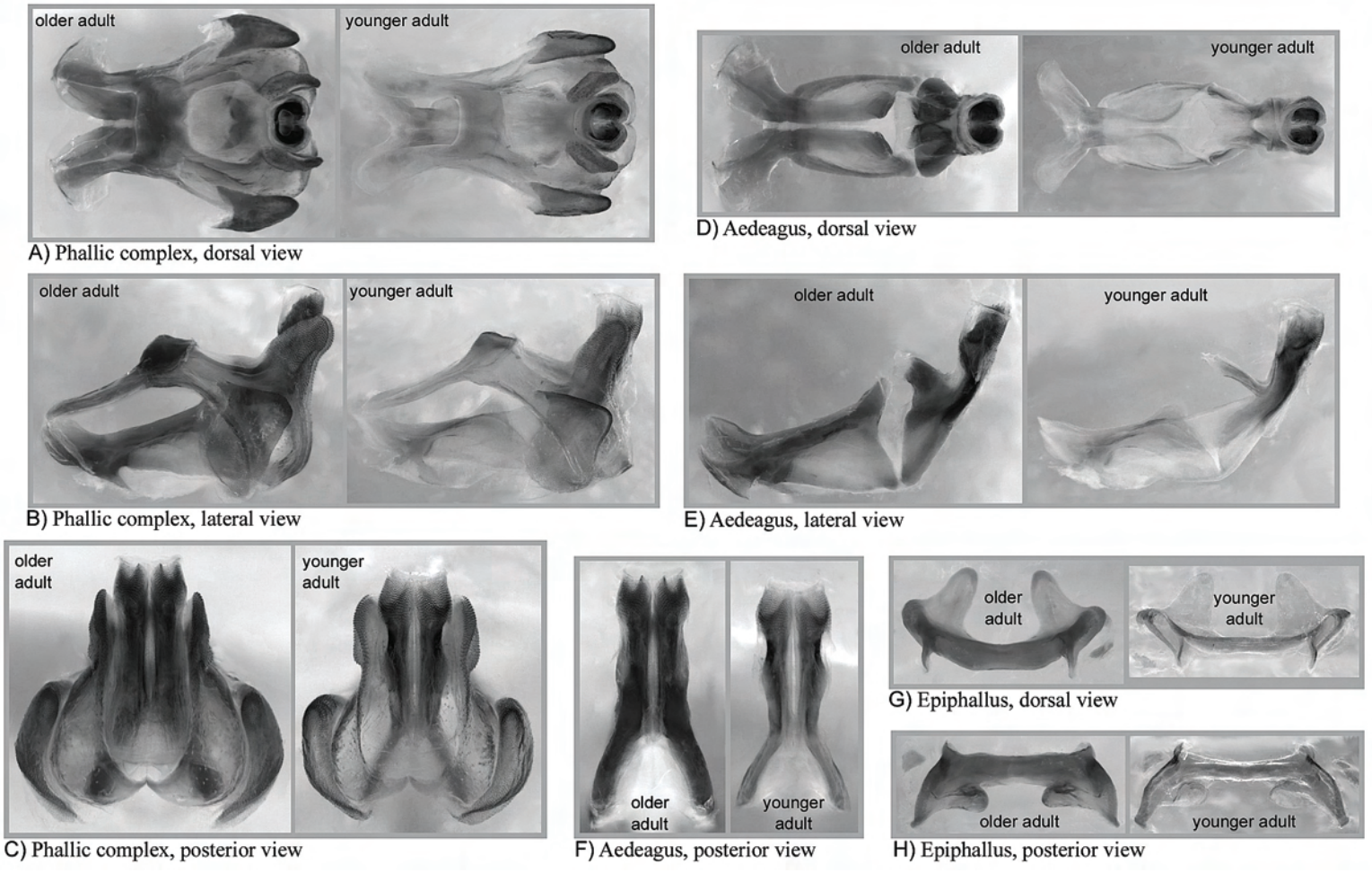


Figure 7. Morphological differences in genitalia of younger and older adult males of the same *Euloryma* species (A-H).

as possible from between the junction of the top of the head and the anterior margin of the pronotum, that only a minor leg is removed for ethanol preservation, and that the material is dried quickly to maximize color preservation. Coloration features of *Euloryma* are diagrammed in figure 6 and field photography is provided in figures 61-65.

Tegmen description. The central, most prominent vein of the reduced wings of *Euloryma* is referred to here as the radial vein, although it is likely that the vein seen is the fusion of multiple veins including the radial vein. For purposes of discussing species-level differences in coloration, tegmen bands are numbered and named for efficiency. Bands are listed in order from the most dorsolateral to ventrolateral margins of the tegmen: i. dorsal margin band, ii. radial vein band, iii. posteroradial band, iv. ventral margin band. It must be noted that the radial vein band (ii.) is so named because the radial vein is most often centered within the black band itself, although the pigmentation is never limited to the radial vein alone. Tegmen coloration features of *Euloryma* are diagrammed in figure 6.

Measurements. All measurements are presented in millimeters. The length of the abdomen of prepared specimens can vary dramatically, so body length is limited to the length from the tip of the vertex of the head to the apex of the folded posterior femur (after Grunshaw 1986). The hind femoral measurement is shown as a ratio of length to width (L/W), where width is the greatest distance between the upper and outer carina. Cerci length is discussed by comparison to that of the supra-anal plate. Cerci of many species curve upward or inward, but the length was always measured parallel to the long body axis from the most anterior point of the cercal articulation to the point of its most posterior extent in dorsal or lateral view and not by measuring the actual curved length of the cerci.

Age of the adult specimens. A thick, rounded shape of the endophallic plate of the aedeagus and the length and thickness of the apodeme of cingulum are quick indicators that the specimen dissected is an older adult male. It is very important, especially when distinguishing between closely related species that the specimens compared are both older adult males. Younger adult males have thinner and shorter endophallic plates and apodemes, and in posterior view, the aedeagus, rami of the cingulum and portions of the aedeagal sheath are not nearly as sclerotized, so that proportions and angles of the structures can appear different. The morphological differences in genitalia of younger and older adult males of the same *Euloryma* species are shown in figure 7.

Documentation tools. Digital color images were created using a Q-Imaging digital camera attached to a Leica MZ16 microscope using Syncroscopy Auto-Montage software (Synoptics, Ltd.). Measurements were made using calipers and Auto-Montage software.

Inference of Species Boundaries

Species boundaries were determined on the basis of finding multiple discrete morphological characters that separated specimens into diagnosable groups based on those characters. These characters are considered to represent morphological support for reproductive isolation of the diagnosed species. Species are primarily based on male genitalia because features of these structures provided a range of morphological variation that was most amenable for providing key diagnostic features. Female *Euloryma* may be of use in determining species boundaries as well, but until more male-female associated specimens are collected, the use of female *Euloryma* morphology in determining species is of limited utility. Where possible, females have been associated with males in this study. In locations where multiple *Euloryma* species were collected, females were successfully associated with the males of their species by matching the leg and wing color patterns, or by collecting a mating pair. Only one species, *E. vittipennis*, the type species for the genus, is known only from the female. Association with a male for this species will require more fieldwork and/or molecular analysis.

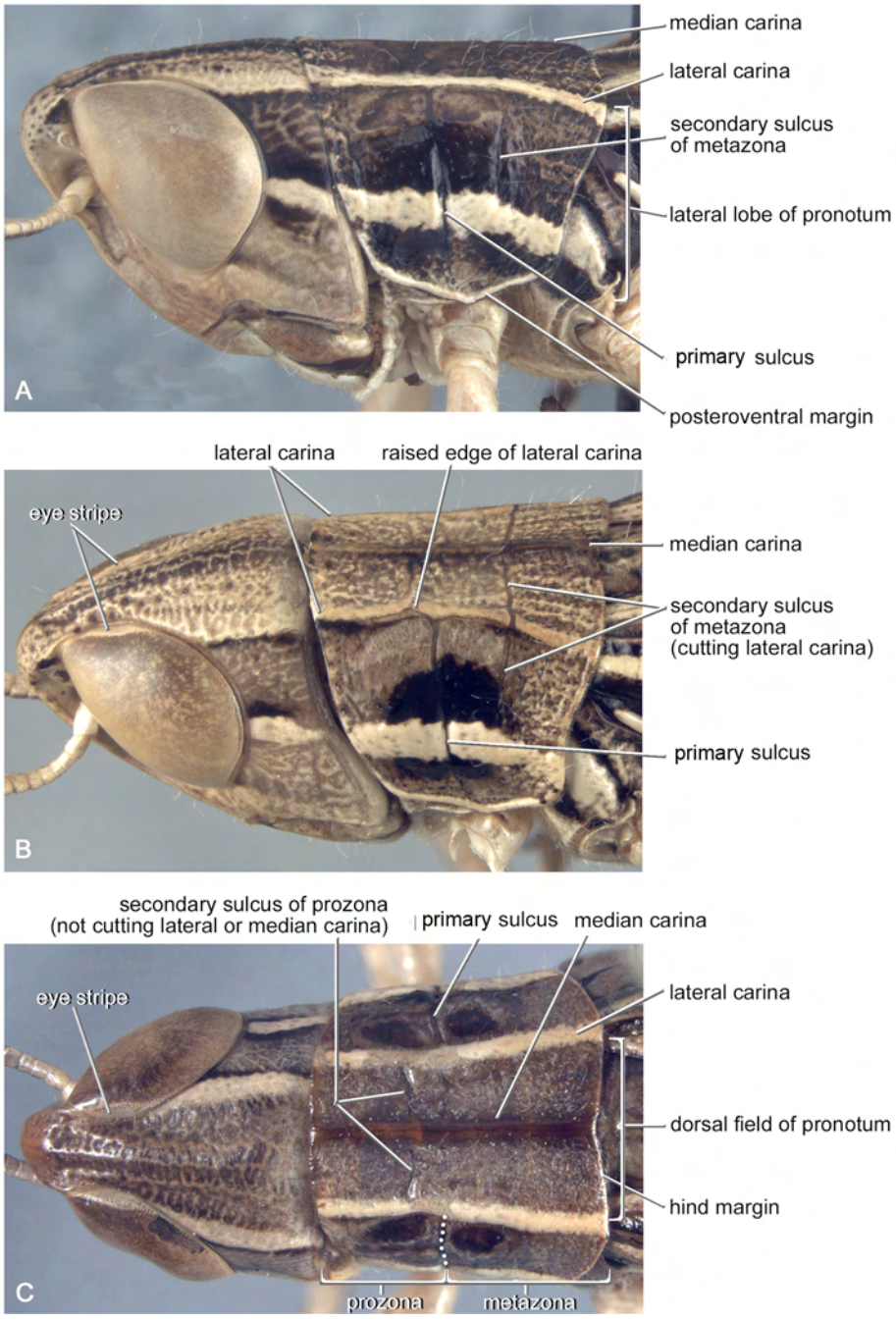


Figure 8. Morphological features and terminology for head and pronotum of *Euloryma* (A-C). Three museum specimen examples A) lateral view; B) three-quarter view; C) dorsal view.

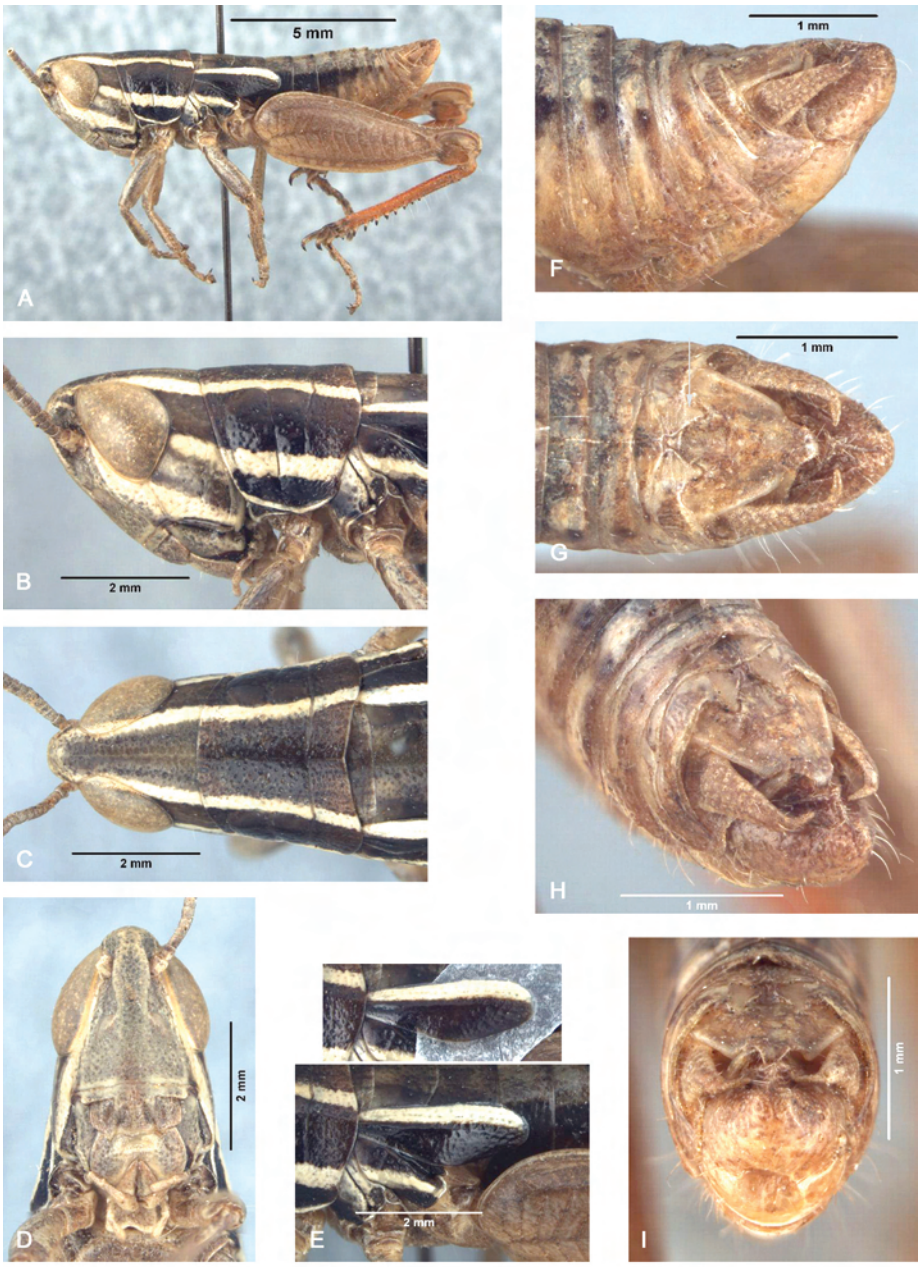


Figure 9. *Hemiloryma* sp. male external morphology (A-I). A) body lateral; B) head and pronotum lateral; C) head and pronotum dorsal; D) head front; E) tegmen. Cerci views F-I: F) lateral; G) dorsal; H) three-quarter; I) posterior.

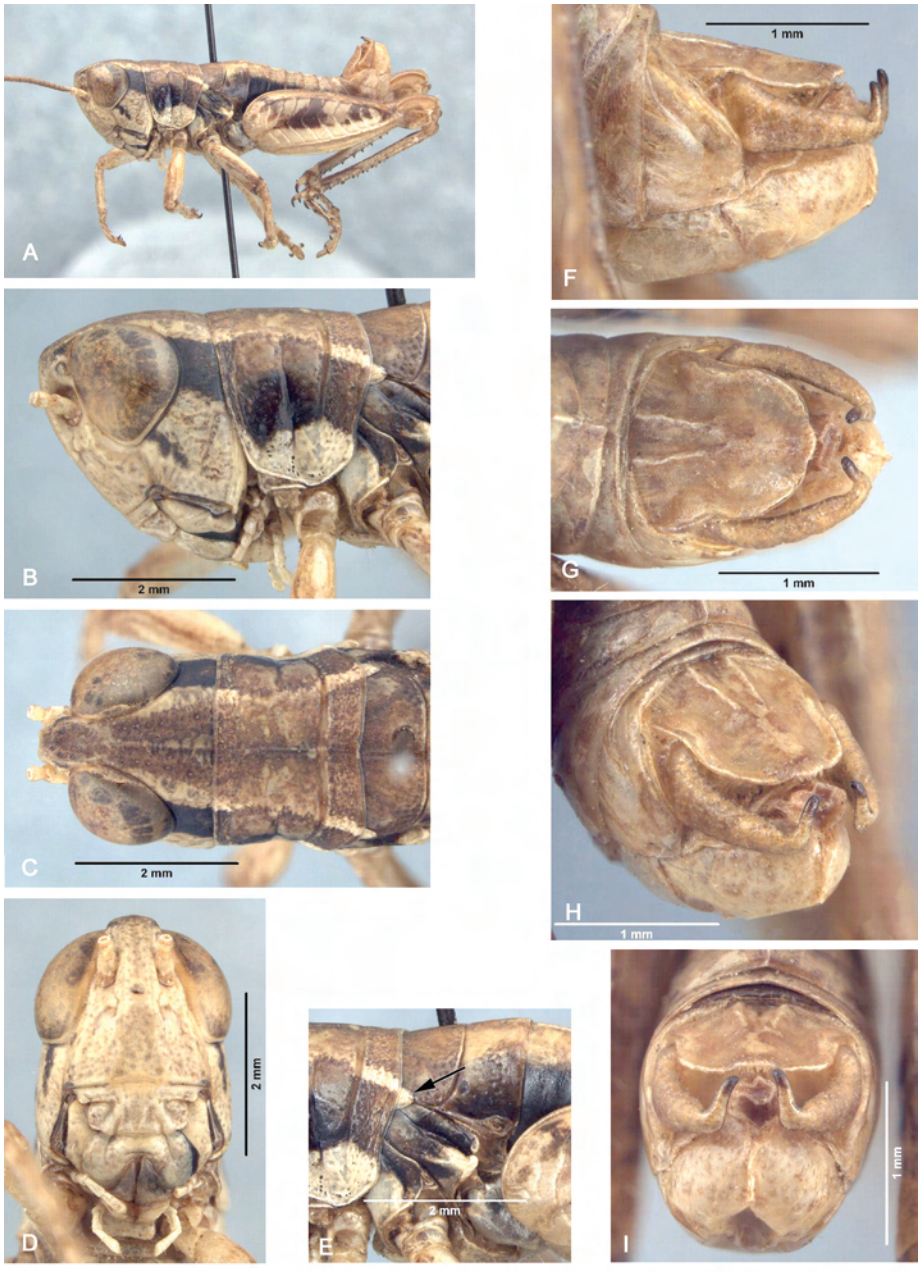


Figure 10. *Dirshacris* sp. male external morphology (A-H). A) body lateral; B) head and pronotum lateral; C) head and pronotum dorsal; D) head front; E) vestigial tegmen (arrow). Cerci views F-I: F) lateral; G) dorsal; H) three-quarter; I) posterior.

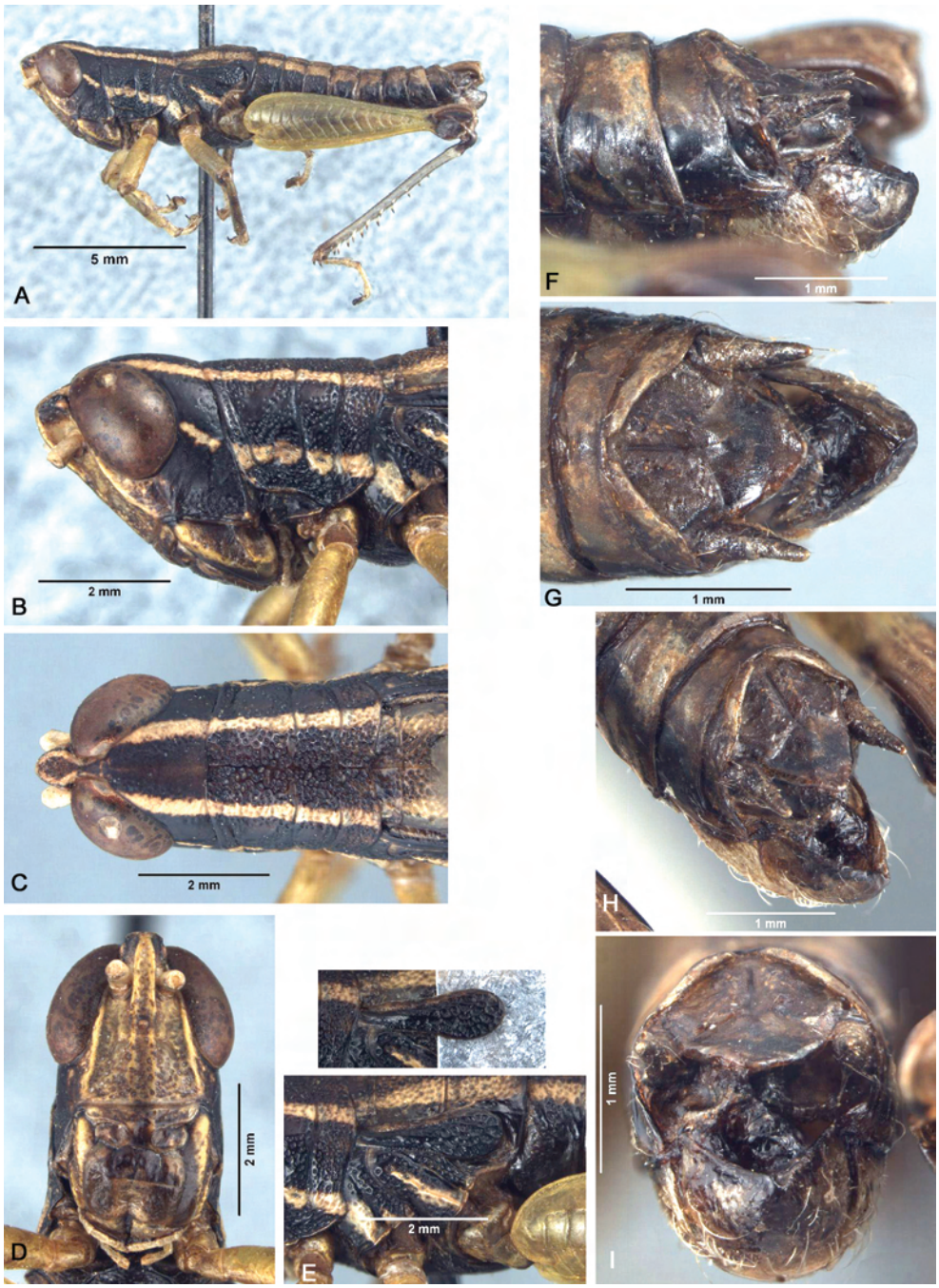


Figure 11. *Labioloryma strictoforceps* holotype male external morphology (A-I). A) body lateral; B) head and pronotum lateral; C) head and pronotum dorsal; D) head front; E) tegmen. Cerci views F-I: F) lateral; G) dorsal; H) three-quarter; I) posterior.

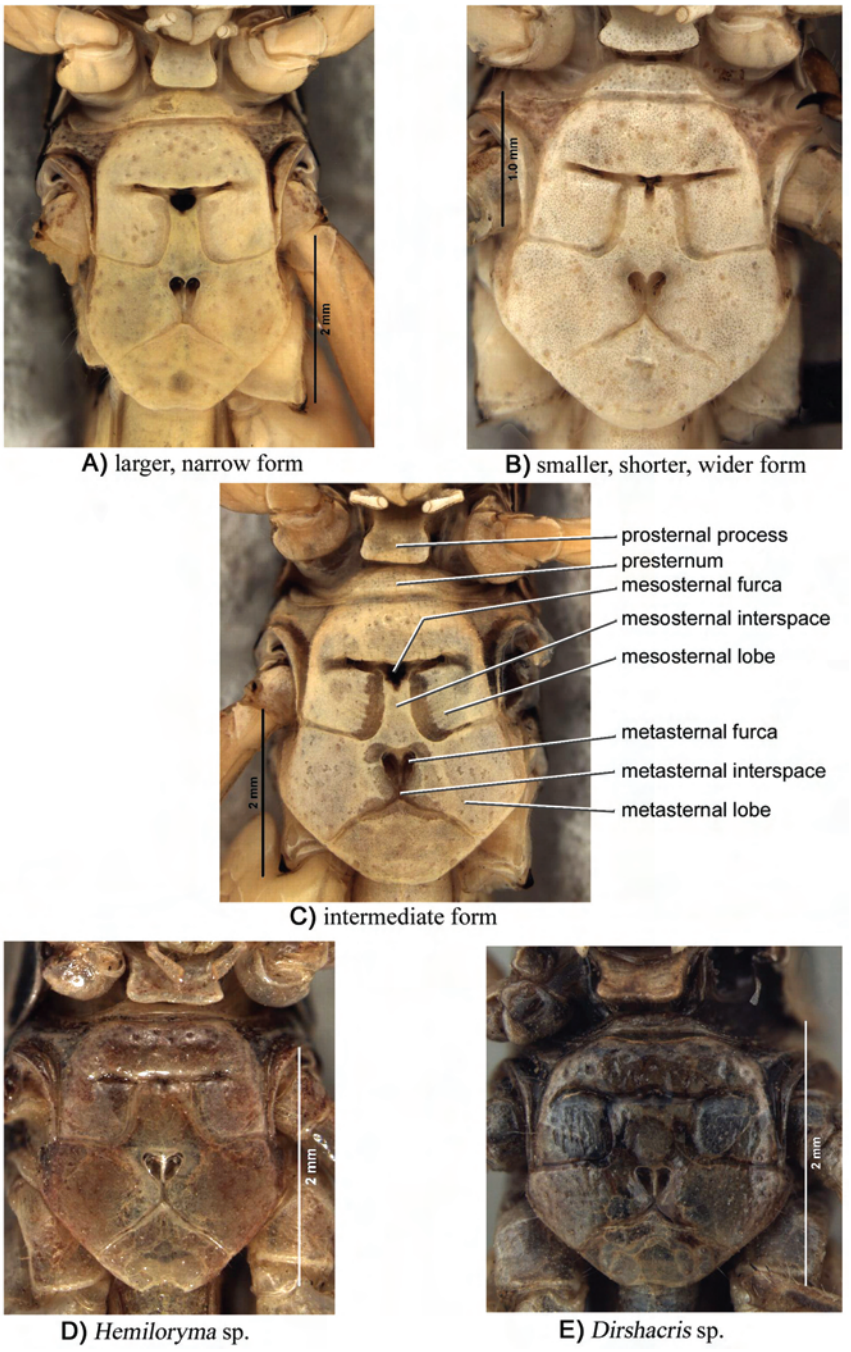


Figure 12. Morphological features, terminology and examples of range of size and shape variation for sternum of thorax of *Euloryma* (A-C), and presumed closest relatives *Hemiloryma* (D) and *Dirshacris* (E).

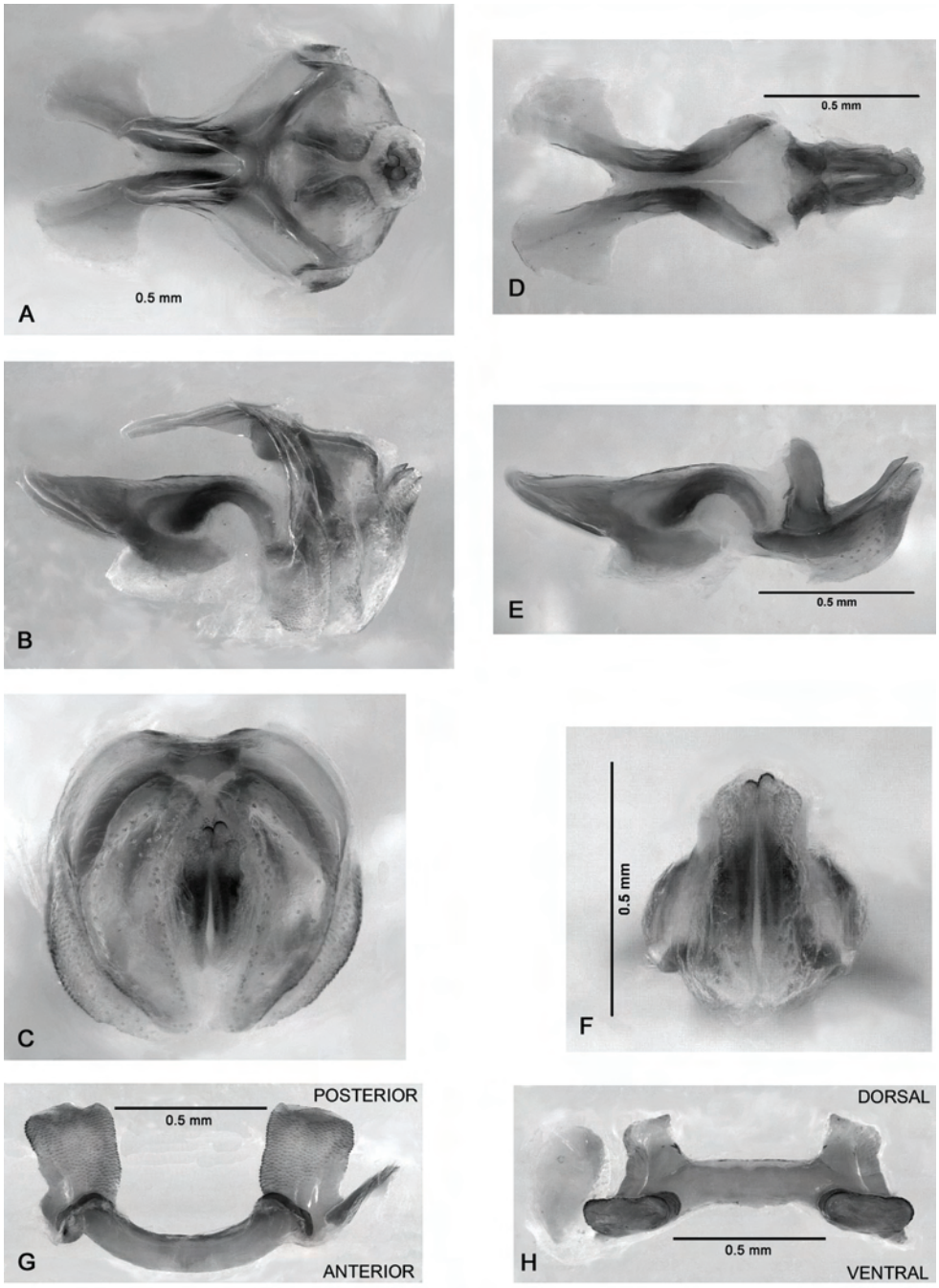


Figure 13. *Hemiloryma* sp. male genitalia (A-H). Phallic complex views (cingulum atop aedeagus, with lateral sclerites): A) dorsal; B) lateral; C) posterior. Aedeagus views: D) dorsal; E) lateral; F) posterior. Epiphallus views: G) dorsal; H) posterior.

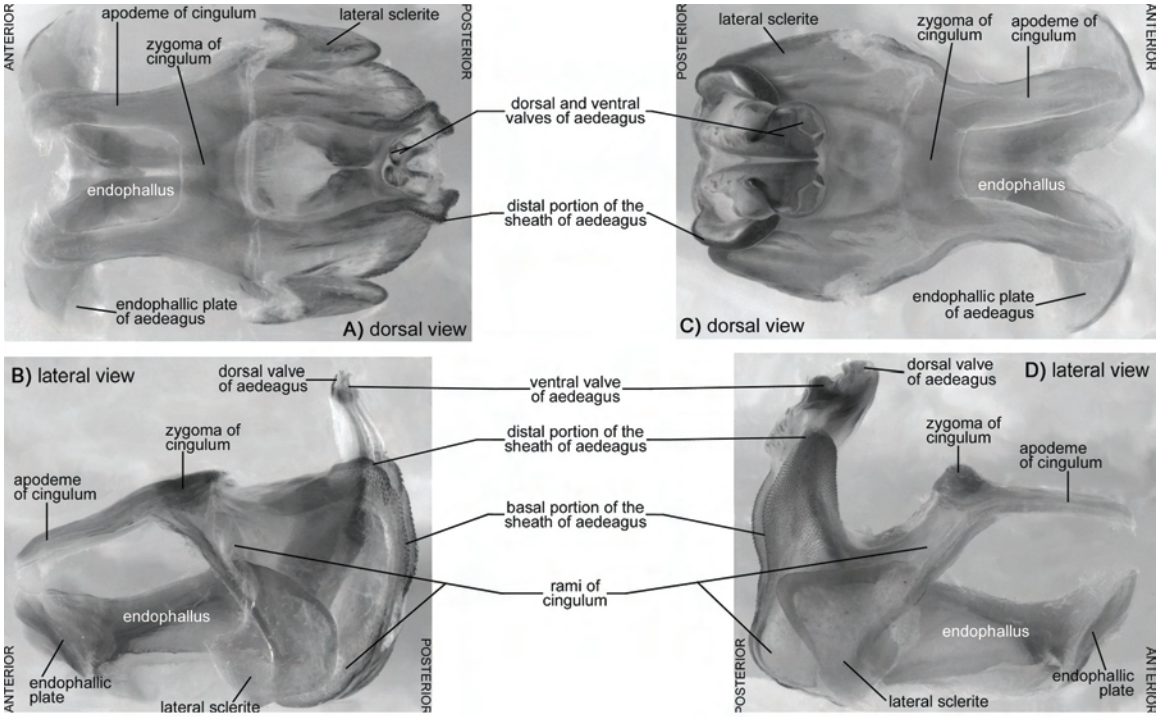


Figure 14. Morphological features associated with the phallic complex of *Euloryma* (A-D). Species from the *karoo* species-group species (A-B). Species from the *cederbergensis* species-group species (C-D).

Description of the Genus *Euloryma*

General body shape and body coloration.— Body length ranges (vertex of head to posterior apex of hind femur): male size range 12.62 mm – 24.42 mm; female size range 14.03 mm – 37.94 mm. Male general body shape, and in particular the head itself, is bullet-like. Females, with their larger size and girth have proportionately wider heads and bodies and are more barrel shaped. The general body coloration is of contrasting stripes which can be quite distinct, with white, cream or yellow colored stripes contrasted against the darker coloration of the remainder of the body in shades of black, brown or gray. Various examples of color variation are shown with field photography in figures 61-65. Paired longitudinal stripes (medial and lateral) extended along the top and sides of the head, pronotum, portions of the thorax (mesepisternum occasionally, mesepimeron and metepisternum always), tegmina, and along the length of the abdomen (to the supra-anal plate).

Head and pronotum.— Antennal segments compressed, i.e. length equal to or less than width, and uniform in shape. Antennal length not exceeding combined length of head and pronotum. Head conical. Strength of banding of head variable, sometimes distinct at one place, diffuse at another. Eyes always with small band of coloration across apex of dorsal margin that meets occipital band of head and then pronotal band of lateral carinae. Genal band meeting pronotal lateral band of lateral lobe. Pronotum with distinct primary sulcus interrupting color of lateral band of lateral lobe. Number and placement of secondary sulci of pronotum varies by species. Lateral carinae strongly developed, some species with lateral carinae with minute elevated edge. Posterior margin of dorsal field weakly, moderately or strongly emarginate medially (figure examples of weakly emarginate: *E. tsitsikamma*, fig. 45 C; moderately emarginate: *E. san*, fig. 29 C; and strongly emarginated: *E. ashleyi*, fig. 17 C).

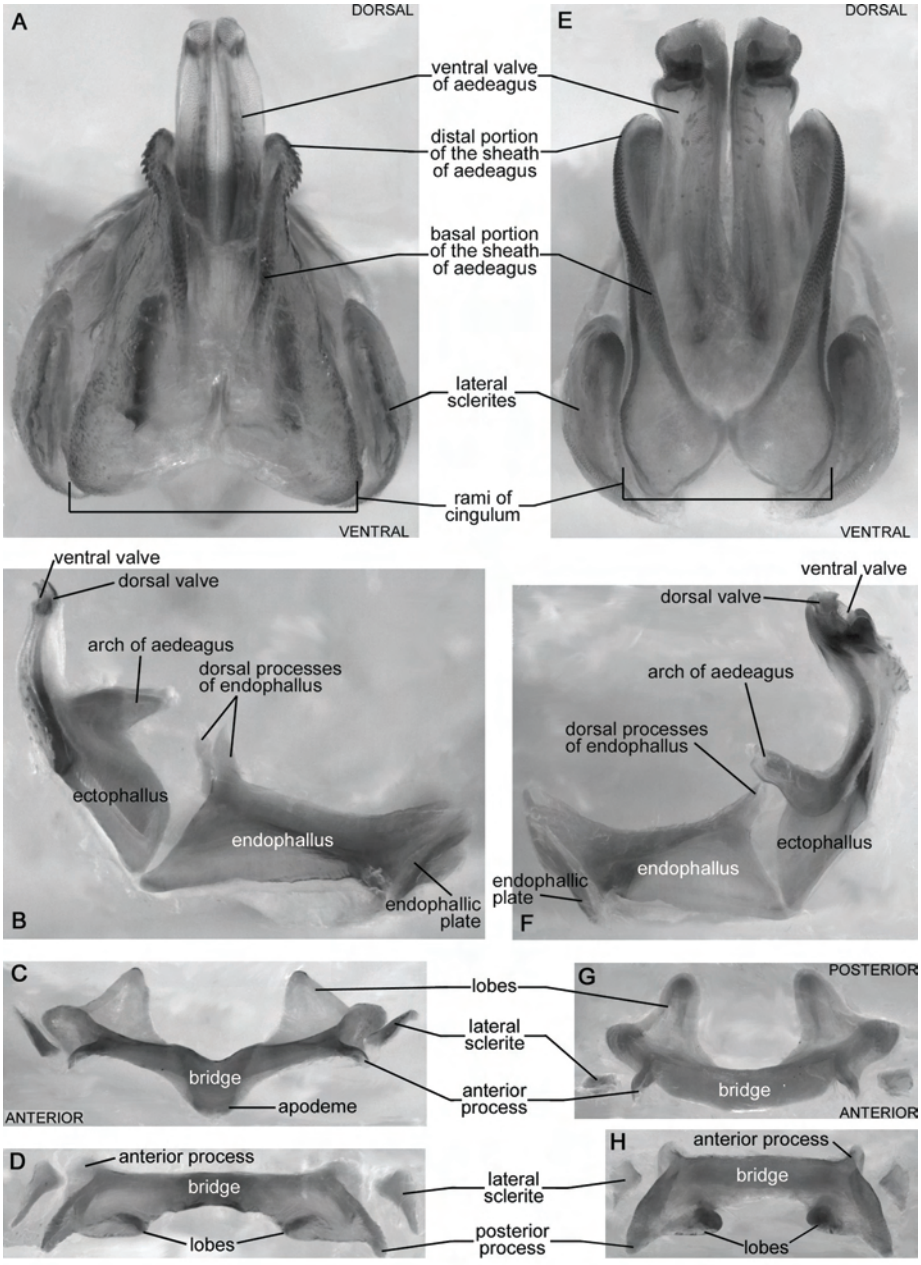


Figure 15. Morphological features associated with internal genitalia of *Euloryma* males (A-H). Posterior view of phallic complex (A,E); lateral view of aedeagus (cingulum and lateral sclerites removed) (B,F); epiphallus dorsal (C,G) and posterior views (D,H). Species from the *karoo* species-group (A-D). Species from the *cederbergensis* species-group (E-H).

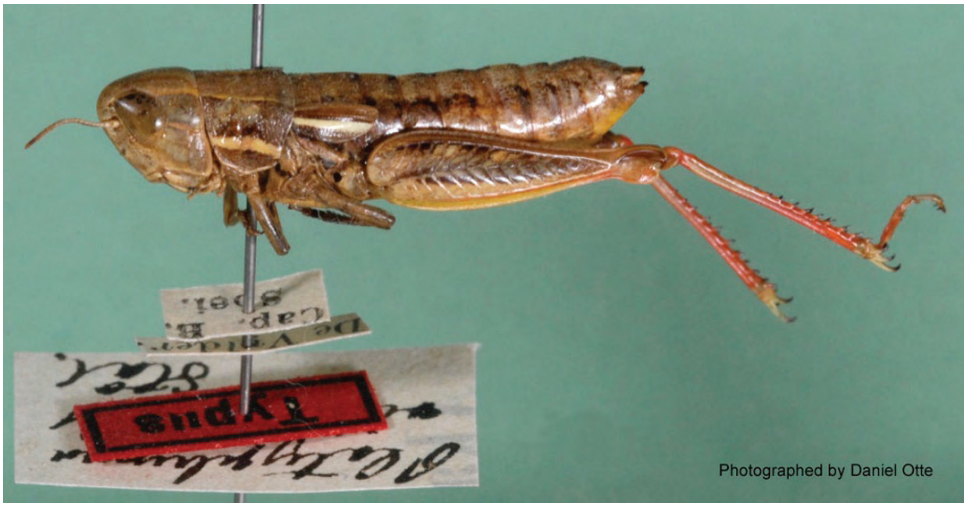


Figure 16. *Euloryma vittipennis* (Stål) holotype female.

Mesothorax and Metathorax.—Prosternal process spatulate, curved, full structure nearly rectangular with rounded edges, narrowed slightly at mid-length but widened terminally. Mesosternal interspace at least twice as long as wide (longitudinally rectangular). Metasternal interspace reduced to short sulcus where metasternal furca and the metasternal lobes converge. Posterior margin of sternal plate excurved posteriorly.

Tegmen.—Tegmina reduced, sometimes nearly ovoid, fully covering large, open tympanum. Each tegmen banded, most often with 4 regions of color, occasionally with 2 adjacent regions indistinguishable, creating 3 regions of coloration, very rarely with tegmenal banding reduced to black with small rounded area, triangle or stripe of white to yellow.

Legs.—Hind femora in males with ratio of length to width of 3.23 in smallest species (*E. carolynae*), and 4.08 in largest species (*E. magna*). Upper carinula and medial area with mottled black coloration, variable between and, less extensively, within species. Margin of lower carinula rarely blackened and weakly developed if present. Posterior femur, tibia and tarsus coloration variable between and possibly within species. In some species, the posterior femur and/or knee reddish or orange. Tibia and tarsi reddish, orange, bluish-black, blackish or with muted yellow to cream color. Leg coloration often faded in poorly preserved older specimens or those preserved in ethanol. Outer and inner posterior tibial spine counts range from 9 to 11. Tibial spines with black pigmented tips.

Male external and internal genitalia.—Cerci well developed, highly modified and species specific. Most flattened lateromedially, incurved at apices, extending beyond posterior margin of subgenital plate. Most species with cerci that widen apically (gently to strongly). Cerci of a few species not extending beyond margin of subgenital plate, and either not incurved but rather dramatically flattened and spatulate or with hook-like cerci curling dorsally in lateral view. In a few species, apical margins of cerci accented by black pigmentation.

Phallic complex and epiphallus also highly modified and species specific. Bridge of epiphallus either strongly thickened and curved or with medial apodeme, but not both. Epiphallic lobes and lateral sclerites of the cingulum both variable from distinctly triangular to more rounded. Ectophallus and endophallus joined by moveable hinged connection. Dorsal and lateral valves of aedeagus narrow with smaller apical openings, or wide and thickened with similarly wide open valves. Distal and basal portions of aedeagal sheath significantly sclerotized with either continuous or separated areas of spines and papillae. Most ventral portion of rami

of cingulum wider than or as narrow as most distal portion of aedeagal sheath.

Female ovipositor.—Ovipositor valves short with weakly recurved apices, most species with valves black to brown on apices (Grunshaw 1986).

Differentiating Euloryma *from putative relatives*

Euloryma can be differentiated from the other genera of the Dirshacrini by the following combinations of morphological characteristics, modified from Grunshaw (1986). Asterisks (*) indicate putative synapomorphies for *Euloryma*.

1) *Euloryma* are found in the fynbos, succulent karoo and grassland biomes of South Africa (fig. 2); *Hemiloryma* (fig. 2) and *Dirshacris* are found in the desert, nama karoo and savanna biomes of South Africa and Namibia; *Labidioloryma* is found in forest canopy openings in Malawi.

2) Antennae of *Euloryma*, *Hemiloryma* and *Dirshacris* with more compressed segments (width of segment larger than length) and length is shorter than the combined length of the head and pronotum; antennae of *Labidioloryma* with slightly inflated segments in apical two-thirds, and length is longer than combined lengths of head and pronotum.

3) Pronotum of *Euloryma* with strongly developed lateral carinae* (fig. 8); pronotum of *Hemiloryma* (fig. 9), *Dirshacris* (fig. 10) and *Labidioloryma* (fig. 11) without lateral carinae.

4) Mesosternal interspace about half as broad as long, widening posteriorly, each mesosternal lobe having larger area than the mesosternal interspace* in *Euloryma* (fig. 12); mesosternal interspace about as broad as long, widening posteriorly (trapezoidal), with each mesosternal lobe about equal in area compared to mesosternal interspace in *Hemiloryma* (fig. 12); mesosternal interspace slightly broader than long, lateral and posterior margins of mesosternal lobes oriented at right-angles to each other, each mesosternal lobe having equivalent area as mesosternal interspace in *Dirshacris* (fig. 12); mesosternal interspace about as broad as long, widening posteriorly, each mesosternal lobe about half the area as mesosternal interspace in *Labidioloryma* (Grunshaw 1986).

5) Prosternal process spatulate, lamelliform, length greater than width, narrowing mid-length in *Euloryma* (fig. 12); "prosternal process spatulate, sloping backwards and with weakly bilobate apex" in *Hemiloryma* (fig. 12; Brown 1973), "prosternal process transverse, lamelliform, square-shaped and sloping backwards" in *Dirshacris* (fig. 12; Brown 1959); no prosternal process in *Labidioloryma*, instead area appears "collar-like with raised medial hump" (Grunshaw 1986).

6) Furcula of last abdominal tergite absent in *Euloryma*, *Dirshacris* and *Labidioloryma*; furcula present in *Hemiloryma* (fig. 9).

7) Cerci of *Euloryma* highly modified*, with expanded or tapered apices, inturned medially at apices or flat for entire length in some species; cerci of *Hemiloryma* (fig. 9) incurved with acute apices, cercal apices dorsoventrally orientated; cerci of *Dirshacris* (fig. 10) incurved with acute apices, cercal apices more lateromedially orientated; cerci of *Labidoloryma* (fig. 11) conical, straight and unmodified.

8) Ovipositor valves in female short and recurved in *Euloryma*, *Hemiloryma* and *Dirshacris*; ovipositor valves straight, very elongate in *Labidioloryma* (Grunshaw 1986).

9) Phallic complex of *Euloryma* with highly modified, highly sclerotized aedeagal sheath aedeagal valves and rami or cingulum*, aedeagal sheath expanding broadly with sclerotized spines or papillae, aedeagal valves can appear short with tapered apices to being long with wide open apices, the rami can appear wider or smaller than the width of the apices of the aedeagal sheath.

10) Ectophallus and endophallus of *Euloryma* joined by flexible hinge-like connection*, the two structures oriented at a roughly 135° angle; ectophallus and endophallus of *Hemiloryma* (fig. 13; Brown 1973) and *Dirshacris* (Grunshaw 1986) not joined by flexible connection, both somewhat dorsoventrally flattened and narrowed (most noticeable in lateral view); connection of ectophallus and endophallus of *Labidioloryma* not known (Grunshaw 1986).

11) Bridge of epiphallus of *Euloryma* evenly curved without medial apodeme or angled with a medial apodeme, the lobes moderately sclerotized and rounded or triangular, lateral sclerites ranging from very small to moderate in size and rounded to elongate; bridge of epiphallus of *Hemiloryma* evenly curved without medial apodeme, lobes strong, thick, sclerotized, and textured with papillae, approximately square, lateral sclerites very large, rounded and flattened; bridge of epiphallus of *Dirshacris* angled, lobes moderately sclerotized and more triangular in form; bridge of epiphallus of *Labioloryma* angled, lobes square but angled outward laterally with most posterior portion of apices bearing an additional apodeme (lateral sclerites unknown).

Key to the Males of the Dirshacrini

1. Tegmina vestigial; tympanum closed . . . . . ***Dirshacris***
— Tegmina reduced and lobiform; typanum open **2**
2. Cerci short, not surpassing supra-anal plate, conical and straight . . . . . ***Labioloryma***
— Cerci long, always surpassing supra-anal plate, variable in shape but never conical **3**
3. Furcula absent; pronotum with strongly developed lateral carinae . . . . . ***Euloryma***
— Furcula present; pronotum lacking lateral carinae . . . . . ***Hemiloryma***

Synopsis of *Euloryma* Species

UNCERTAIN SPECIES-GROUP

1. *Euloryma vittipennis* (Stål), 1875: 32

KAROO SPECIES-GROUP

2. *Euloryma ashleyi*, sp. nov.
3. *Euloryma carolynae*, sp. nov.
4. *Euloryma magna*, sp. nov.
5. *Euloryma browni*, sp. nov.
6. *Euloryma khoi*, sp. nov.
7. *Euloryma namaqua*, sp. nov.
8. *Euloryma san*, sp. nov.
9. *Euloryma mayi*, sp. nov.
10. *Euloryma zebrata*, sp. nov.
11. *Euloryma bonteboki*, sp. nov.
12. *Euloryma karoo*, sp. nov.

CEDERBERGENSIS SPECIES-GROUP

13. *Euloryma mirabunda*, sp. nov.
14. *Euloryma cederbergensis*, sp. nov.
15. *Euloryma lapollai*, sp. nov.
16. *Euloryma tsitsikamma*, sp. nov.
17. *Euloryma waboom*, sp. nov.
18. *Euloryma solveigae*, sp. nov.
19. *Euloryma larsenorum*, sp. nov.
20. *Euloryma umoja*, sp. nov.
21. *Euloryma lyra*, sp. nov.
22. *Euloryma ottei*, sp. nov.

Discussion of Euloryma Species-Groups

I have elected to divide *Euloryma* into two species-groups: *karoo* species-group and *cederbergensis* species-group. Due to the fact that the species-groups are based on features of males, *E. vittipennis* remains unplaced in a species-group. All other remaining species are placed in one of the two species-groups.

The *karoo* species-group consists of species that: 1) have a medial apodeme on the bridge of the epiphallus, and 2) have valves that are narrowed (regardless of length), with small apical openings. The *cederbergensis* species-group consists of species that: 1) have a thickened and curved bridge of the epiphallus, without a medial apodeme, and 2) have valves that are wide and tubular or are flattened so that they appear thinner in lateral profile and wider in posterior view (regardless of length), with medium to large apical openings. Further morphological distinctions can be seen by comparing the phallic complexes of the two species-groups in figures 14 and 15.

Key to Males of *Euloryma*

1. Bridge of epiphallus with medial apodeme (as in fig. 18 G) **2**
— Bridge of epiphallus without medial apodeme (as in fig. 40 G) **12**

2. Cerci curved dorsally, apices sharply pointed, hook-like in lateral view; tegmen bands iii.+iv. with indistinct blended boundaries, anterior white to yellow oval patch atop black or black-brown; yellow-cream patch not extending beyond mid-length of tegmen (as in figs. 17 and 19) **3**
— Cerci not curved dorsally, apices not hook-like in lateral view; tegmen band iii. white to yellow (whether diffuse, mottled or distinct), extending full length of tegmen, from base to apex paralleling radial vein **4**

3. Distal hind femur, knee, and base of tibia orange, tibia at mid-length blue, distal tibia blended to black; sclerotized membranes encircling ventral valves of aedeagus more narrow (figs. 19 and 20) … ***carolynae*, sp. nov.**
— Distal hind femur not orange, knee and proximal tibia with area of brown-black speckling, tibia faintly blue-gray at mid-length, distal tibia blended brown-black; sclerotized membranes encircling ventral valves of aedeagus widened and expanded (fig. 17 and 18) . . . . . ***ashleyi*, sp. nov.**

4. Medial apodeme of supra-anal plate with triangular apex (fig. 35 G) . . . . . ***bonteboki*, sp. nov.**
— Medial apodeme of supra-anal plate with rounded apex (as in figs. 29 G and 57 G) . . . **5**

5. Males large (>23 mm); cerci tubular in middle section between apex and base (figs. 21 and 23) **6**
— Males small to medium-sized (< 23 mm); cerci not tubular, more-or-less flattened between apex and base **7**

6. Tegmen band ii. black, both margins diffuse and iii.+iv. mottled black and yellow, indistinct blended boundaries; medial margins of apex of cerci in posterior view emarginate (fig. 23 I); basal portion aedeagal sheath as in figure 24 A and C . . . . . ***browni*, sp. nov.**
— Tegmen band ii. black, margins distinct, iii. yellow, distinct margins except faded posteroventrally, and iv. black, margins distinct; medial margins of apex of cerci in posterior view straight (fig. 21 I); basal portion of aedeagal sheath as in figure 22 A and C . . . . . ***magna*, sp. nov.**

7. Tegmen band iii. distinct, yellow-cream, extending full length of tegmen from base to apex **8**
— Tegmen band iii. not distinct from iv., yellow, if present, only found at apex, not extending length of tegmen, base of tegmen in iii.+iv. black **9**

9. Tibiae mostly or partially orange (fig. 29); in lateral view, distance between ventral base of ectophallus and dorsal surface of aedeagal arch shorter than from the dorsal surface of aedeagal arch to apices of aedeagal valves (fig. 30 E) . . . . . ***san*, sp. nov.**

— Tibia without orange and partially to mostly blue and black (fig. 33); in lateral view, distance between ventral base of ectophallus and dorsal surface of aedeagal arch longer than from the dorsal surface of aedeagal arch to apices of aedeagal valves (fig. 34 E) . . . . . ***zebrata*, sp. nov.**

9. Tegmen bands iii.+iv. not yellow; in lateral view, distance from the dorsal surface of aedeagal arch to apices of aedeagal valve at least 1/2 as long as from ventral base of ectophallus to dorsal surface of aedeagal arch **10**

— Tegmen bands iii.+iv. at least partly yellow; in lateral view, distance from dorsal surface of aedeagal arch to apices of aedeagal valve less than 1/3 as long as from ventral base of ectophallus to dorsal surface of aedeagal arch **11**

10. Cerci widest at medial bend, abruptly tapering just before apices, has notched shape in posterior view (fig. 25 F-I); aedeagal sheath with areas of sclerotized papillae distally and basally; in lateral view, region bridging zygoma of cingulum and distal portion of aedeagal sheath with two distinct emarginations of different sizes, a smaller posterior and a broader more anterior emargination (fig. 26 A-C) . . . . . ***khoi*, sp. nov.**

— Cerci widest beyond medial bend, towards apex, not notched in posterior view (fig. 31 F-I); aedeagal sheath with areas of sclerotized spines distally and basally; in lateral view, region bridging zygoma of cingulum and distal portion of aedeagal sheath with two distinct emarginations of equal sizes (fig. 32 A-C) . . . . . ***mayi*, sp. nov.**

11. Tegmen band iii.+iv. with mottled yellow and black area (fig. 27); in posterior view, medial margins of aedeagal sheath emarginate just before apex of sheath (fig. 28 A-C); ectophallus structure ventral to arch of aedeagus as in figure 28 E . . . . . ***namaqua*, sp. nov.**

— Tegmen band iii.+iv. with distinct yellow triangle at apical margin (fig. 37); in posterior view, medial margins of aedeagal sheath straight to apex of sheath (fig. 38 A-C) ectophallus ventral to arch of aedeagus as in fig 38 E . . . . . ***karoo*, sp. nov.**

12. In lateral view, apices of aedeagal valves with bulbous sclerotized lobes that curl anteriorly; in posterior view, medial surfaces of apices of ventral valves together appear sharply pointed dorsally (figs. 40 and 42) **13**

— In lateral view, apices of aedeagal valves without bulbous sclerotized lobes that curl anteriorly; in posterior view, medial surfaces of apices of ventral valves together do not appear sharply pointed dorsally (as in fig. 55) **14**

13. Apices of aedeagal valves with sclerotized lobes small (fig. 40 A-F); emargination of region bridging zygoma of cingulum and distal portion of aedeagal sheath U-shaped in lateral view (fig. 40); lateral sclerites of cingulum acutely triangular; basal and distal portions of aedeagal sheath as in figure 40 . . . . . ***mirabunda*, sp. nov.**

— Apices of aedeagal valves with sclerotized lobes large (fig. 42 A-F); emargination of region bridging zygoma of cingulum and distal portion of aedeagal sheath V-shaped in lateral view (fig. 42); lateral sclerites of cingulum not acutely triangular; basal and distal portions of aedeagal sheath as in figure 42 . . . . . ***cederbergensis*, sp. nov.**

14. Cerci each abruptly bent nearly 45° medially halfway along its length; cerci maintain constant width before fold, beyond which dorsal margins taper ventrally toward medioventral point (fig. 57 F-I) . . . . . ***ottei*, sp. nov.**

— Cerci not abruptly bent nearly 45° medially, at most weakly curved medially at apices; apices of cerci dorsally pointed, rounded or blunt toward apex **15**

15. Cerci roughly rectangular in shape, each nearly constant width along its length, apices bluntly rounded (fig. 55 F-I) . . . . . ***lyra*, sp. nov.**

— Width of each cercus increases or decreases at approximately 2/3 cercus length, apices broadly rounded, abruptly pointed or angled dorsally **16**

16. Each cercus boot-shaped, nearly constant width for 2/3 of its length, expanded dorsally in distal 1/3; in posterior view apical margins nearly vertical (fig. 45 F-I) . . . . ***tsitsikamma*, sp. nov.**

— Each cercus narrows slightly along its length then expands apically, never boot-shaped; in posterior view apical margins markedly convergent upward. **17**

17. Apices of aedeagal valves with unsclerotized membranous tissue extending outward to form two funnel-shaped rims (fig. 54 B and C) . . . . . ***umoja*, sp. nov.**

— Apices of aedeagal valves without unsclerotized membranous tissue **18**

18. In posterior view with deep lateral excavations just below distal portion of each aedeagal valve (fig. 44 C). . . . . ***lapollai*, sp. nov.**

— In posterior view without such excavations, only with small lateral constriction just below distal portion of each aedeagal valve. **19**

19. In posterior view, rami of cingula not distinctly wider than distal portion of aedeagal sheath (fig. 48 C). . . . . ***waboom*, sp. nov.**

— In posterior view, rami of cingula distinctly wider than distal portion of aedeagal sheath **20**

20. Lateral sclerites of cingulum produced to form narrow posterior lobe, in lateral view apex extending past posterior margin of aedeagal sheath and cingulum (fig. 50 B); lateral margin of aedeagal valves as in figure 50 F. . . . . ***solveigae*, sp. nov.**

— Lateral sclerites of cingulum not so produced, in lateral view not extending past posterior margin of aedeagal sheath and cingulum (fig. 52 B); lateral margin of aedeagal valves as in figure 52 F . . . . . ***larsenorum*, sp. nov.**

Euloryma Species Accounts

Other that *E. vittipennis*, whose placement is uncertain, species are listed in order of morphological similarity to each other within each species-group.

UNCERTAIN SPECIES-GROUP

1. ***Euloryma vittipennis*** (Stål), **comb. nov.**
female figure: 16

Platyphyma vittipennis, Stål, 1875: 32. Holotype female, SOUTH AFRICA: "Terra capensis" (Naturhistoriska riksmuseet, Stockholm, Lund).

Stål, 1878: 49, combination in *Loryma*; Dirsh, 1956: 121-272, junior synonym of *Loryma perficita*; Koçak and Kemal, 2010: 3, maintained junior synonymy and combination in *Aphanulacris*.

***Discussion.*—** Unfortunately, I was never able to examine the actual specimen of *E. vittipennis*. Based on the image and notes by D. Otte it is clear this species belongs with the other *Euloryma* species. It is hoped that additional fieldwork and/or molecular data may allow for a male to be associated with the holotype.

***Description.*—** Body length. 19-23 millimeters, as reported by Stål (1875).

KAROO SPECIES-GROUP

2. ***Euloryma ashleyi*, sp. nov.**
male figures: 17, 18; female figure : 59

Holotype male, SOUTH AFRICA: Northern Cape Province; 3 miles S of Kamieskroon, 4.ix.1961 (H.D. Brown, W. Fürst) (ANSP); from the same location: 8 paratype males, 7 paratype females (SANC) (ANSP) (SAMC) (BMNH). The holotype is labeled as LAS TYPE #1.

Diagnosis of Male.—From Kamieskroon region of Northern Cape; small species; mostly black tegmen, with small cream-colored spot at base; knees mottled black-brown, proximal tibiae with brown-black speckling, tibia faint blue at mid-length, distal tibia brown and black; hook-like cerci with pointed apices; aedeagal valves narrowed with small openings; medial apodeme of epiphallus bridge present.

Compare with: *E. carolynae*

Description: *Body length.—*Smaller species; male type 12.62 mm; female type 16.93 mm. *Body coloration*. Male specimens, known only from dried museum material, mostly black-brown with yellow-cream banding. Female specimens, known only from dried museum material, mostly black-brown with cream-colored banding; apices of recurved ovipositor valves black. Males and females with same leg coloration.

Male external features* (fig. 17).—Head and Pronotum*. Band coloration across apex of eye margin; occipital band with upper margin diffuse and mottled, lower margin distinct; genal band with diffuse upper and lower margins; pronotal band of lateral carinae distinct; lateral lobe band distinct and cut by primary sulcus. Prozona of dorsal field with very weak secondary sulcus; metazona with two secondary sulci, the first a very weak sulcus of dorsal field, the second a broken sulcus of lateral lobe; medial and lateral carinae not cut by sulci. Posteroventral margin of lateral lobe moderately angled ventrally, highlighted with yellow; posterior margin of dorsal field very strongly emarginate medially.

*Meso- and Metathorax.—*Mesepisternum mottled yellow, mesepimeron mottled yellow and black; pleural sulcus black; metepisternum black with distinct thick yellow band. *Wing*. Tegmina oval, twice as long as wide; tegmen banding: i.+ii. with indistinct blended boundaries, mottled yellow and black (black along radial vein margin proximately, atop radial vein distally); iii.+iv. with indistinct blended boundaries, distinct yellow to cream oval spot with broken distal margin surrounded by black coloration. *Hind legs*. Hind femur length to width ratio 3.20; margin of upper carinula and medial area with diffuse dark brown, medial area with two diffuse cream patches; margin of lower carinula without black; knees mottled black-brown; proximal tibiae with brown-black speckling; tibia faint blue at mid-length; distal tibia brown and black; posterior tibia with approximately 9 outer and 9 inner spines, all with black apices.

Abdomen. Abdominal lateral bands mottled black and faintly extend to tergite IX. *Cerci*. Longer than supra-anal plate, extending about as far posteriorly as margin of subgenital plate; hook-like with blackened margins, curving dorsomedially to apices, shoulders pronounced; thickest at base, thickened and laterally flattened at mid-length, thinnest at pointed apex.

Male internal features* (fig. 18).—Phallic complex*. Aedeagal valves narrowed with small openings; valves short (fig. 18 A, D); in lateral view, region bridging zygoma of cingulum and distal portion of aedeagal sheath sloping very little ventrally; lateral sclerites of cingulum rounded (fig. 18 B, E); distal portion of aedeagal sheath with sclerotized short spines covering a crescent shaped area which expands ventrolaterally; basal portion of aedeagal sheath with sclerotized area lacking ridge of papillae or spines, with diffuse, rounded margin; distal and basal portions of aedeagal sheath with separated areas of sclerotization; basal portions of aedeagal sheath project upward with slight outward angle toward pronounced apex of distal portion of aedeagal sheath (fig. 18 C); in posterior view, rami of cingula only slightly wider than most ventral distal portion of aedeagal sheath; most dorsal distal portion of sheath 1/4 width of rami of cingula (fig. 18 C, F). *Epiphallus*. In dorsal view lobes each

rounded at apex, bridge with pronounced medial apodeme; epiphallic lateral sclerites very elongate and flattened (fig. 18 G, H).

Etymology.—Named to honor my father, Ashley Spearman, respected architect, teacher, and dedicated community volunteer for more than 30 years.

***Distribution* (fig. 3).—**This species was collected in early September near Kamieskroon in Namaqualand, within the succulent karoo biome. *Euloryma ashleyi* is confirmed sympatric with *E. karoo* and is thought to be sympatric with *E. namaqua* and *E. carolynae*.

Discussion.—Future sampling in this Namaqualand region might yield more species with small body size and hook-like cerci. *Euloryma ashleyi* shares many morphological characteristics with *E. carolynae*, a putative relative, including: very small body size, very similar wing coloration pattern, hook-shaped cerci, and similar phallic complex features. To distinguish between *E. ashleyi* and *E. carolynae* the following morphological features should be examined: 1) in *E. carolynae*, the knee of the femur and basal tibia are orange, whereas *E. ashleyi* lacks orange coloration (figs. 19 and 17); 2) in *E. ashleyi*, the membrane wrapped around the lateral and posterior portion of the apices of the aedeagal ventral valves are more expanded, whereas the equivalent membranous area of *E. carolynae* is narrowed and much reduced (note arrows in figs. 18 and 20). The apices of the aedeagal valves for the two species should always be examined and compared. The sculpturing of the lobes of the epiphallus of both species can be deceivingly variable.

3. *Euloryma carolynae*, sp. nov.
male figures: 19, 20; female figure: 59

Holotype male, SOUTH AFRICA: Northern Cape Province; 8 kilometers S of Nababeep, 7.x.1972 (H.D. Brown, E. Koster, A.Prinsloo) (ANSP); from the same location: 5 paratype males, 10 paratype females (SANC) (ANSP) (SAMC) (BMNH). The holotype is labeled as LAS TYPE #2.

Diagnosis of Male.—From Nababeep region of Northern Cape; small species; mostly black tegmen, with small cream colored spot at tegmen base; knees and proximal tibia orange, proximal tibia with faint to pronounced brown-black speckling atop orange, mid-length tibia blue, distal tibia black; hook-like cerci with pointed apices; aedeagal valves narrowed with small openings; medial apodeme of epiphallus bridge present.

Compare with: *E. ashleyi*

Description.—*Body length*. Smaller species; male type 11.20 mm; female type 14.03 mm. *Body coloration*. Male specimens, known only from dried museum material, mostly black with yellow to cream-colored banding. Female specimens, known only from dried museum material, mostly black with yellow-cream colored banding; apices of recurved ovipositor valves black. Males and females with same leg coloration.

Male external features* (fig. 19).—Head and Pronotum*. Band across apex of eye margin; occipital band with upper margin diffuse and mottled, lower margin distinct; genal band with upper margin distinct, lower margin diffuse; pronotal band of lateral carina distinct; lateral lobe band distinct and cut by primary sulcus; metazona with very weak or no secondary sulci of lateral lobe; medial and lateral carinae not cut by sulci. Posteroventral margin of lateral lobe strongly angled ventrally, highlighted with yellow; posterior margin of dorsal field very strongly emarginate medially.

Meso- and Metathorax. Mesepisternum mottled yellow-black, mesepimeron mottled black; pleural sulcus black; metepisternum with distinct thick yellow band. *Wing*. Tegmina oval, twice as long as wide; tegmen banding: i.+ii. indistinct blended boundaries, very dark mottled black-brown; iii.+iv. indistinct blended boundaries, distinct yellow-cream oval-shaped spot surrounded by black. *Hind legs*. Hind femur length to width ratio 3.23; margin of upper carinula and medial area black, medial area with two patches of yellow-cream; margin of lower carinula without black; posterior femora, knees and proximal tibiae with orange, proximal tibiae with

faint to pronounced brown-black speckling atop orange; mid-length of tibiae with blue; distal tibiae with black; posterior tibia with approximately 9 outer and 9 inner spines, all with black apices.

Abdomen. Abdominal lateral bands black, extending to supra-anal plate; orange on lateral surface of tergite-X and supra-anal plate. *Cerci*. Shorter than supra-anal plate but extending beyond apex of subgenital plate; curving dorsomedially to apices; hook-like with blackened margins, shoulders pronounced; thickest at base, thinnest and pointed at cerci apices.

***Male internal features* (fig. 20).** *Phallic complex*. Aedeagal valves narrowed, with small openings; valves moderate in length (fig. 20 A, D); in lateral view, region bridging zygoma of cingulum and distal portion of aedeagal sheath slopes very little ventrally; lateral sclerites of cingulum rounded (fig. 20 B, E); distal portion of aedeagal sheath with sclerotized short spines covering crescent-shaped area which expands ventrolaterally; basal portion of aedeagal sheath without sclerotized papillae or spines; distal and basal portions of aedeagal sheath with separated areas of sclerotization; in posterior view, width of rami of cingula slightly greater than distance between ventral margins of distal portion of aedeagal sheath, about 4 times distance between dorsal margins of distal portion of sheath; basal portions of aedeagal sheath project upward with moderate V-shaped outward angle toward pronounced apex of distal portion of sheath (fig. 20 C, F). *Epiphallus*. In dorsal view, lobes triangular, bridge with pronounced medial apodeme; epiphallic lateral sclerites elongate and flattened (fig. 20 G, H).

Etymology.—Named to honor my mother, Carolyn Jones, a ground-breaking, dedicated designer of Montessori educational tools for children around the world for more than 30 years.

***Distribution* (fig. 3).—**This species was collected in early October, near Nababeep within Namaqualand, within the succulent karoo biome. The full range of this species remains to be determined. *E. carolynae* is thought to be sympatric with *E. ashleyi*.

Discussion.—Future sampling in this Namaqualand region may yield more species with small body size and hook-like cerci. A putative relative of *E. carolynae* is *E. ashleyi*, given the many morphological characteristics they share. Refer to the discussion section of the *E. ashleyi* description for distinguishing characters of the two species.

4. ***Euloryma magna*, sp. nov.**
male figures: 21, 22; female figure: 59

Holotype male, SOUTH AFRICA: Northern Cape Province; Swartberg Pass, (S of Prince Albert), 11.xii.1961, (H.D. Brown, W. Fürst, F. Pick)(ANSP); from the same location: 13 paratype males, 2 paratype females (SANC) (ANSP) (SAMC) (BMNH). The holotype is labeled as LAS TYPE #3.

Diagnosis of Male.—From Swartberg Pass, in Groot Swartberge, S of Prince Albert in Western Cape; large species; tegmen with four distinct bands; knees, tibiae and tarsi orange; long tong-like cerci, each at mid-length less than 1/2 as wide as at expanded, flattened apices; aedeagal valves narrowed with small openings; medial apodeme of epiphallus bridge present.

Compare with.—*E. browni*

Description.—*Body length*. Large species; male type 24.42 mm; female type 37.94 mm. *Body coloration*. Male specimens, known only from dried museum material, mostly black with yellow banding. Female specimens, known only from dried museum material, black with yellowish banding. Female also appears to have had greenish pigmentation on head, pronotum and upper marginal area of femur; apices of recurved ovipositor valves black. Males and females with same leg coloration.

Male external features* (fig. 21).—Head and Pronotum*. Band across apex of eye margin; occipital band with upper and lower margin distinct; genal band distinct; pronotal band of lateral carina distinct; lateral lobe band distinct, cut by primary sulcus; in some specimens prozona with secondary

sulcus between medial and lateral carinae of dorsal field; medial and lateral carinae not cut by sulci. Posteroventral margin of lateral lobe weakly angled ventrally and highlighted yellow; posterior margin of dorsal field weakly emarginate medially.

Meso- and Metathorax. Mesepisternum with diffuse yellowish band, mesepimeron with muted yellow and black; pleural sulcus black; metepisternum with distinct yellow band. *Wing*. Tegmina oval and elongate, more than twice as long as wide; tegmen banding: i. distinct yellow, posteroventral margin indistinct; ii. distinct black; iii. distinct yellow, posteroventral margin faded; iv. distinct black. *Hind legs*. Hind femur length to width ratio 4.08; margin of upper carinula and medial area diffuse black; margin of lower carinula without black; faint orange on posterior femora; knees, tarsi and tibiae with orange; posterior tibia with approximately 10 outer and 10 inner spines, all with black apices.

Abdomen. Abdominal medial and lateral bands black, extend to supra-anal plate. *Cerci*. Long tong-like cerci; cercus longer than supra-anal plate, extends beyond length of subgenital plate; cerci curve 90° medially inward to apices; shoulders pronounced; mid-length cerci less than 1/2 as wide as apices; cerci apices expanded, flattened and triangular with thin blackened medial margins.

Male internal features* (fig. 22).—Phallic complex*. Aedeagal valves narrowed with small openings; valves of moderate length (fig. 22 A, D); in lateral view, region bridging the zygoma of cingulum and distal portion of aedeagal sheath sloping very little ventrally; lateral sclerites of cingulum triangular (fig. 22 B, E); distal and basal portions of aedeagal sheath with sclerotized papillae; distal portion aedeagal sheath with moderately widened apex expanding laterally, with larger area of sclerotized papillae; distal and basal portions of aedeagal sheath with uniform and continuous distribution of sclerotized papillae; in posterior view, rami of cingula 1.5x as wide as distal portion of aedeagal sheath; basal portions of aedeagal sheath project upward with moderate V-shaped outward angle toward apex of distal portion of sheath (fig. 22 C, F). *Epiphallus*. Lobes rounded; in dorsal view, bridge with pronounced medial apodeme; epiphallic lateral sclerites elongate and flattened. (fig. 22 G, H).

Etymology.—The specific epithet *magna* is Latin for large or great, in reference to the fact that this species appears to be one of the two largest *Euloryma* species documented thus far (*E. browni* being the other very large species).

***Distribution* (figs. 2 and 3).—**This species was collected in mid-December, in the Swartbergpas of the Groot Swartberge, south of Prince Albert, found within the fynbos biome adjacent to a regional patch of succulent karoo biome in the Western Cape. The full range of this species remains to be determined. *E. magna* is confirmed sympatric with *E. browni*.

Discussion.—A putative relative of *E. magna* is *E. browni* given the many morphological characteristics they share: both the very largest of the *Euloryma* species, have similar black coloration with striking contrast of yellow striping and similarly colored legs, and have long tong-like cerci. To distinguish between *E. magna* and *E. browni* the following morphological features should be examined: 1) the tegmina are different, in *E. magna* all 4 bands have distinct margins, in *E. browni* the bands are indistinguishable or have blended margins (in particular iii.+iv. are indistinguishable); 2) in posterior view, the apices of the cerci of *E. magna* appear triangular, whereas in *E. browni* these appear rounded at the tips, with a shallow S-shaped medial margin; 3) in dorsal and posterior view, the sculpturing of cingulum is different, and the distal portion of aedeagal sheath of *E. magna* is more expanded and angled laterally, whereas the same structure of *E. browni* is narrowed in comparison.

5. ***Euloryma browni*, sp. nov.**
male figures: 23, 24; female figure: 59

Holotype male, SOUTH AFRICA: Eastern Cape Province; 22 miles SE Willowmore, Niewekloof, 13.xi.1958 (H.D. Brown) (ANSP); from the same location: 12 paratype males, 6 paratype females (SANC) (ANSP) (SAMC) (BMNH); 1 paratype male, SOUTH AFRICA: Eastern Cape Province; 10 miles E. Joubertina, Langkloof, 17.xi.1958 (H.D. Brown) (ANSP). The holotype is labeled as LAS TYPE #4.

Diagnosis of Male.— From region S of Willowmore and E of Joubertina, in Eastern Cape; large species; two general regions of tegmen coloration; knees, tibiae and tarsi orange; long tong-like cerci, at mid-length nearly 1/2 as wide as expanded, flattened apices; aedeagal valves narrowed with small openings; medial apodeme of epiphallus bridge present.

Compare with.—*E. magna*

Description.—*Body length*. Large species; male type 23.64 mm; female type 36.07 mm. *Body coloration*. Male specimens, known only from dried museum material, mostly black-brown with yellow-cream banding. Female specimens, known only from dried museum material, mostly black-brown with yellow-cream banding; apices of recurved ovipositor valves black. Males and females with same leg coloration.

Male external features* (fig. 23).—Head and Pronotum*. Band across apex of eye margin; occipital band with upper margin slightly diffuse, lower margin distinct; genal band distinct; pronotal band of lateral carina distinct; lateral lobe band distinct and cut by primary sulcus; medial and lateral carinae not cut by sulci. Posteroventral margin of lateral lobe moderately angled ventrally and highlighted with mottled yellow; posterior margin of dorsal field strongly emarginate medially.

Meso- and Metathorax. Mesepisternum mottled with muted yellow and black, mesepimeron with mottled black; pleural sulcus black; metepisternum with distinct yellow band. *Wing*. Tegmina oval and elongate, more than twice as long as wide; tegmen banding: i. distinct yellow, faded posteroventral margin; ii. black, upper and lower margins very diffuse; iii.+iv. blended boundaries, mottled black and yellow. *Hind legs*. Hind femur length to width ratio 3.74; margin of upper carinula without black (faded black on upper marginal area); medial area mottled black; margin of lower carinula without black; proximal tibia with minute orange-gray speckling; tibiae and tarsi mostly orange; small amount of orange on distal femur and knee; posterior tibia with approximately 10 outer and 10 inner spines, all with black apices.

Abdomen. Abdominal medial and lateral bands black; faint black at base of supra-anal plate. *Cerci*. Longer than supra-anal plate, extending beyond margin of subgenital plate; each curving nearly 90° medially before apices, shoulders pronounced; at mid-length less than 1/2 as wide as apices; apices expanded, flattened, tip rounded, with shallow S-shaped medial margin accented by thin blackened dorsomedial marginal area.

Male internal features* (fig. 24).—Phallic complex*. Aedeagal valves narrowed with small openings; valves short (fig. 24 A, D); in lateral view, region bridging zygoma of cingulum and distal portion of aedeagal sheath without significant slope; lateral sclerites of cingulum rounded (fig. 24 B, E); distal and basal portions of aedeagal sheath with area of sclerotized papillae; distal portion of aedeagal sheath with slightly widened apices that expand laterally, with larger area of sclerotized papillae; distal and basal portions of aedeagal sheath with uniform and continuous distribution of sclerotized papillae; in posterior view, rami of cingula 2 1/3x width of distal portion of aedeagal sheath; basal portions of aedeagal sheath project upward with very slight outward angle toward apices of distal portion of sheath (fig. 24 C, F). *Epiphallus*. Lobes rounded; in dorsal view, bridge with pronounced medial apodeme; epiphallic lateral sclerites elongate and flattened (fig. 24 G, H).

Etymology.—Named to honor Dr. H. Dick Brown, collector of half the material in this revision

alone, whose contributions to African orthoptera research will continue on indefinitely thanks to his work with the South African National Collection of Insects (Pretoria), and the decades of adventures earning him the legendary status of one of the last great African "Locust Hunters." This species is chronologically the very first new *Euloryma* species Dr. Brown ever collected.

***Distribution* (fig. 3).—**This species was collected in two locations in mid-November, near Willowmore and Joubertina, found within succulent karoo near Joubertina, and either the succulent karoo or fynbos biomes near Willowmore; the Willowmore collection site is in a transitional area between the two biomes, so further fieldwork is need to resolve which of the two biomes, or if both biomes, have suitable habitat for this species. The more northern (type) locality near Willowmore is southeast of Boesmanspoortberg, and the more southern locality near Joubertina is between the Suuranysberge and Tsitsikammaberge. The full range of this species remains to be determined. Though not determined to be sympatric, *E. browni* is found closest to the ranges of *E. magna* and *E. waboom* in the north, and even closer to those of *E. tsitsikamma* and *E. solveigae* in the south.

Discussion.—A putative relative of *E. browni* is *E. magna* given the many morphological characteristics they share. Refer to the discussion section of the *E. magna* description for distinguishing characters of the two species.

6. *Euloryma khoi*, sp. nov.

male figures: 25, 26; female figure: 59

Holotype male, SOUTH AFRICA: Northern Cape Province (near Western Cape border); Botterkloof Pass, 56 kilometers S of Nieuwoudtville 27.ix.1972 (H.D. Brown, E.Koster, A.Prinsloo) (ANSP); from this location: 5 paratype males, 1 paratype female (SANC) (ANSP) (SAMC) (BMNH). SOUTH AFRICA: Western Cape Province (near Northern Cape border); Van Rhyns Pass, 9 kilometers W of Nieuwoudtville, 28.ix.1972 (H.D Brown, E.Koster, A.Prinsloo); from this location: 2 paratype males (SANC) (ANSP). SOUTH AFRICA: Northern Cape Province; 24 kilometers NW Sutherland, 25:ix:1972 (H.D Brown, E.Koster, A.Prinsloo); from this location: 4 paratype females (SANC) (ANSP) (SAMC) (BMNH). The holotype is labeled as LAS TYPE #5.

Diagnosis of Male.—From region S of Willowmore and E of Joubertina, in Eastern Cape; medium-sized species; two general regions of tegmen coloration; knees, tibiae and tarsi orange; cerci simple, notched apices turn inward; aedeagal valves narrowed with small openings; medial apodeme of epiphallus bridge present.

Compare with.—*E. namaqua*

Description.—*Body length*. Medium-sized species; male type 14.50 mm; female type 22.31 mm. *Body coloration*. Male specimens, known only from dried museum material, mostly black with yellow-cream banding. Female specimens, known only from dried museum material, mostly black with yellow-cream banding; apices of recurved ovipositor valves black. Males and females with same leg coloration.

Male external features* (fig. 25).—Head and Pronotum*. Band across apex of eye margin; occipital band with upper and lower margin distinct; genal band distinct; pronotal band of lateral carina distinct; lateral lobe band distinct, cut by primary sulcus. Prozona and metazona without secondary sulci; medial and lateral carinae not cut by sulci. Posteroventral margin of lateral lobe strongly angled ventrally, highlighted with mottled yellow-cream; posterior margin of dorsal field strongly emarginate medially.

Meso- and Metathorax. Mesepisternum with wide, diffuse yellow-cream band, mesepimeron with mottled dark coloration; pleural sulcus black; metepisternum with distinct yellow-cream band. *Wing*. Tegmina oval, more than twice as long as wide; tegmen banding: i.+ii. with indistinct blended boundaries, ventral yellow-cream blended into mottled yellow-black of radial vein region; iii.+iv. with indistinct blended boundaries, nearly solid mottled black. *Hind legs*. Hind femur length to width ratio 3.50; margin of upper carinula and

medial area mottled black; medial area with two patches of white-cream; margin of lower carinula without black; small amount of orange on distal femur and knee; mixed orange-gray on proximal tibia; tibiae and tarsi mostly orange; posterior tibia with approximately 9-10 outer and 9-10 inner spines, all with black apices.

Abdomen. Abdominal medial and lateral bands mottled black, tapered, and extending onto supra-anal plate. *Cerci*. Each approximately same length as supra-anal plate, not extending posteriorly beyond margin of subgenital plate, curving nearly 90° medially before apices; at mid-length thinner than at shoulders, the latter pronounced; cerci widening at point of medial bend, then tapering just before apices, appearing notched; apices have thin blackened margins.

Male internal features* (fig. 26).—Phallic complex*. Aedeagal valves narrowed with small openings; valves of moderate length (fig. 26 A, D); in lateral view, region bridging zygoma of cingulum and distal portion of aedeagal sheath with two marginal notches, posterior one small, anterior broader and shallower; lateral sclerites of cingulum rounded at apex (fig. 26 B, E); distal and basal portions of aedeagal sheath with area of sclerotized papillae; distal portion of aedeagal sheath with apex strongly expanded dorsolaterally, with larger area of sclerotized papillae; distal and basal portions of aedeagal sheath with nearly separated areas of sclerotization; in posterior view, rami of cingula 1 1/2x as wide as distal portion of aedeagal sheath; basal portions of aedeagal sheath project upward with subtle hour-glass shaped curve toward apex of distal portion of sheath (fig. 26 C, F). *Epiphallus*. Lobes triangular; in dorsal view, bridge with pronounced medial apodeme; epiphallic lateral sclerites elongate and flattened (fig. 26 G, H).

Etymology.—Named in honor of the native Khoi people of southwestern South Africa.

***Distribution* (figs. 3 and 4).—**This species was collected in late November, west and south of Nieuwoudtville, in Van Rhyns Pass in the Bokkeveldberge, and in Botterkloof Pass near Stinkfonteinberge. Both locations are in the succulent karoo biome near the margins of the fynbos biome. Further fieldwork is needed to determine if this species is also found in the fynbos biome. The full range of this species remains to be determined. Though not confirmed to be sympatric, *E. khoi* is found closest to the range of *E. karoo*.

Discussion.—*E. khoi* is similar to *E. namaqua* in that the two species both have notched cerci, tegmen bands i. and ii. with blended margins, and iii. and iv. indistinct blended boundaries. To distinguish between *E. khoi* and *E. namaqua* the following morphological features should be examined: 1) in *E. khoi* the prozona and metazona lack secondary sulci, *E. namaqua* has secondary sulci of the prozona of the dorsal field; 2) *E. khoi* has no yellow-cream in tegmen bands iii.+iv., *E. namaqua* has yellow-cream mottling in iii.+iv.; *E. namaqua* has longer aedeagal valves, and the species differ in the sculpturing of the cingulum and aedeagal sheath in posterior and lateral views.

7. *Euloryma namaqua*, sp. nov.

male figures: 27, 28, 61; female figures: 59, 61

Holotype male, SOUTH AFRICA: Western Cape Province; a few kilometers N of Kharkams along N7, S 30°17.937', E017°53.641', 8.xi.2007 (D. Otte, E. Rohwer), D.Otte loc.code 07-43, spec. code DL003 (ANSP); from the same location: 3 paratype males, 2 paratype females (SANC) (ANSP). The holotype is labeled as LAS TYPE #6.

Diagnosis of Male.—From N of Kharkams, Western Cape; prozona of dorsal field with secondary sulcus between medial and lateral carinae, metazona without secondary sulci; tegmen with three areas of coloration; posterior femora, knees, tibiae and tarsi with dark orange; cerci simple, notched apices turn inward, aedeagal valves short and narrowed with small openings; medial apodeme of epiphallus bridge present.

Compare with: *E. khoi, E. karoo*

Description.—*Body length*. Medium-sized species; male type 17.76 mm; female type 28.88 mm. *Body coloration*. Male specimens, known

from dried museum material and field photography (fig. 61), mostly black with gray and white-yellow banding. Female specimens, known from dried museum material and field photography (fig. 61), mostly light brown with gray and cream banding; tips of recurved ovipositor valves do apparently lack significant pigmentation. Males and females with same leg coloration.

Male external features **(fig. 27).—***Head and Pronotum*. Band across apex of eye margin; occipital band with upper margin slightly mottled, lower margin distinct; genal band distinct; pronotal band of lateral carinae distinct; lateral lobe band distinct, cut by primary sulcus. Prozona with secondary sulcus between medial and lateral carinae of dorsal field; metazona without secondary sulci; medial and lateral carinae not cut by sulci; more dorsal portion of prozona of lateral lobe with indentation (male and female). Posteroventral margin of lateral lobe strongly angled ventrally and highlighted with white-gray; posterior margin of dorsal field strongly emarginate medially.

Meso- and Metathorax. Mesepisternum and mesepimeron with mottled gray; pleural sulcus black; metepisternum with distinct wide yellow-cream band. *Wing*. Tegmina oval, twice as long as wide; tegmen banding: i. distinct yellow; ii. distinct black, tapers posteriorly; iii+iv. indistinct blended boundaries, mottled yellow and black (more black at proximal end, more yellow at distal end). *Hind legs*. Hind femur length to width ratio 3.34; margin of upper carinula and medial area with a little faint gray-black; posterior femora, knee, tibiae and tarsi with dark orange (seen in field photography, lost after preservation in ethanol); posterior tibia with approximately 10 outer and 10 inner spines, all with black apices.

Abdomen. Abdominal medial and lateral bands black with yellow highlights between bands, extending to supra-anal plate. *Cerci*. Longer than supra-anal plate, not extend beyond posterior margin of subgenital plate; curving nearly 90° medially before apices; mid-length of cerci thinner than shoulders, latter pronounced; cerci widening at the point of medial bend, then tapering before apices, appearing notched in posterior view; apices with thin blackened margins.

Male internal features **(fig. 28).—***Phallic complex*. Aedeagal valves narrowed with small openings; valves short (fig. 28 A, D); in lateral view, region bridging zygoma of cingulum and distal portion of aedeagal sheath with two marginal notches, posterior one very small and shallow, anterior moderate and gradual; lateral sclerites of cingulum obtusely angulate at apex (fig. 28 B, E); distal and basal portions of aedeagal sheath with sclerotized spines; distal portion of aedeagal sheath with apices moderately expanded laterally; distal and basal portions of aedeagal sheath with nearly separated sclerotized areas; some sclerotized papillae on the soft tissue near apices of ventral valves; in posterior view, rami of cingula 2x as wide as distal portion of aedeagal sheath; basal portions of aedeagal sheath projecting upward almost parallel, then diverge toward apices of distal portion of sheath (fig. 28 C, F). *Epiphallus*. Lobes rounded; in dorsal view, bridge with pronounced medial apodeme; epiphallic lateral sclerites elongate and flattened (fig. 28 G, H).

Etymology.—Named *E. namaqua* after beautiful Namaqualand, a biodiversity hotspot in northwest South Africa.

Distribution **(fig. 3).—**This species was collected in early November, near Kharkans within Namaqualand, within the succulent karoo biome. The full range of this species remains to be determined. *E. namaqua* is confirmed sympatric with *E. ashleyi*, and thought to be sympatric with *E. karoo*. Though not thought to be sympatric, *E. namaqua* is found near the range of *E. carolynae*.

Discussion.—The cerci of *E. namaqua*, *E. khoi* and *E. karoo* have similarities. Refer to the discussion section of the *E. khoi* description for distinguishing characters of *E. namaqua* and *E. khoi* and to the discussion section of the *E. karoo* description to for distinguishing characters of *E. namaqua* and *E. karoo*.

8. ***Euloryma san*, sp. nov.**
male figures: 29, 30

Holotype male, SOUTH AFRICA: Northern Cape Province; 6 kilometers SW of Sutherland, 25.ix.1972 (H.D. Brown, E.Koster, A.Prinsloo) (ANSP); from the same location: 2 paratype males (SANC) (ANSP). No females collected. The holotype is labeled as LAS TYPE #7.

Diagnosis of Male.—From SW of Sutherland, Northern Cape; no secondary sulci of pronotum; tegmen with four areas of coloration; proximal tibiae blue, distal tibiae black, tarsi mottled black; simple cerci shape that turn inward medially; aedeagal valves exceptionally long, narrow and anterodorsally curved, with small openings; medial apodeme of epiphallus bridge present.

Compare with.—*E. mayi*

Description.—*Body length*. Smaller species; male type 13.71 mm. *Body coloration*. Male specimens, known only from dried museum material, mostly black with yellow-cream banding.

Male external features* (fig. 29).—Head and Pronotum*. Band across apex of eye margin; occipital band with upper and lower margins distinct; genal band distinct; pronotal band of lateral carinae distinct; lateral lobe band distinct with mildly mottled posterior terminus, wider and emarginate mid-length, cut by primary sulcus; medial and lateral carinae not cut by sulci. Posteroventral margin of lateral lobe strongly angled ventrally and highlighted mottled black-cream; posterior margin of dorsal field strongly emarginate medially.

Meso- and Metathorax. Mesepisternum and mesepimeron with dark, mottled black-cream; pleural sulcus black; metepisternum with short and thin distinct yellow-cream band. *Wing*. Tegmina oval, twice as long as wide; tegmen banding: i. mottled black-light brown; ii. mottled black with indistinct dorsal margin; iii. distinct yellow-cream; iv. distinct black. *Hind legs*. Hind femur length to width ratio 3.46; margin of upper carinula and medial area with mottled black, medial area also with two patches of white-cream; margin of lower carinula and knees without black; tarsi and tibiae mostly blue proximally, black distally; posterior tibiae with approximately 9-10 outer and 10 inner spines, all with black apices.

Abdomen. Abdominal medial and lateral bands with black, extending to supra-anal plate. *Cerci*. Approximately same length as supra-anal plate, not extending beyond posterior margin of subgenital plate; each gently curving 90°medially before apices; shoulders moderately pronounced; at mid-length cerci approximately same width as distal ends of cerci; tips of cerci gently angled, simple, without or with very thin blackened apical margins.

Male internal features* (fig. 30).—Phallic complex*. Aedeagal valves narrow with small openings; valves exceptionally long and anterodorsally curved (fig. 30 A, D); in lateral view, region bridging zygoma of cingulum and distal portion of aedeagal sheath with two marginal notches of equal and moderate size and depth; lateral sclerites of cingulum strongly triangular (fig. 30 B, E); distal portion of aedeagal sheath with sclerotized spines, apices slightly expanded laterally; basal portion of aedeagal sheath with ridge of smaller sclerotized spines; distal and basal portions of aedeagal sheath with nearly separated areas of sclerotization; in posterior view, rami of cingula more than 2x as wide as distal portion of aedeagal sheath; basal portions of aedeagal sheath projecting vertically upward or bowing inward very slightly before opening to apices of distal portion of sheath) (fig. 30 C, F). *Epiphallus*. Lobes triangular; in dorsal view, bridge with pronounced medial apodeme; epiphallic lateral sclerites elongate (fig. 30 G, H).

Etymology.—Named in honor of the indigenous San people of southern Africa.

***Distribution* (figs. 3 and 4).—**This species was collected in late September, near Sutherland in the Roggeveldberge, within the succulent karoo biome, near margin of the fynbos biome. The full range of this species remains to be determined.

Discussion.—This species was described with conservative criteria because I suspect that with further fieldwork and DNA analysis of *E. san* will prove to yield cryptic species. *E. san* may be related to *E. mayi* because the two species have similar cerci and a similar phallic complex. To distinguish between *E. san* and *E. mayi* the following characteristics should be examined: 1) *E. san* has four areas of tegmen bands, whereas *E. mayi* has only two distinguishable tegmen bands; 2) *E. san* lacks pronotal secondary sulci, whereas the prozona of *E. mayi* has weak pronotal secondary sulci between the medial and lateral carinae of the dorsal field; 3) in *E. san* the proximal tibiae are blue and the distal tibia black, whereas in *E. mayi* the proximal tibiae are orange with brown-black speckling and the distal tibia orange; 4) *E. san* aedeagal valves are very long, and those of *E. mayi* are of moderate length.

9. *Euloryma mayi*, sp. nov.
male figures: 31, 32; female figure: 59

Holotype male, SOUTH AFRICA: Western Cape Province; Theronsberg Pass, 22 kilometers ENE of Ceres, 24.ix.1972 (H.D. Brown, E.Koster, A.Prinsloo) (ANSP); from the same location: 4 paratype males, 5 paratype females (SANC) (ANSP) (SAMC) (BMNH). The holotype is labeled as LAS TYPE #8.

Diagnosis of Male.—From Theronsberg Pass, ENE of Ceres, Western Cape; prozona of dorsal field with weak secondary sulci between medial and lateral carinae, medial and lateral carinae not cut by sulci; tegmen with two areas of coloration; posterior femora, knees, tibiae and tarsi with orange; cerci simple with apices turning inward medially; basal aedeagal sheath with sclerotized papillae, and distal aedeagal sheath with spines; aedeagal valves of moderate length and narrow with small openings; medial apodeme of epiphallus bridge present.

Compare with.—*E. san*

Description.—*Body length*. Small species; male type 14.63 mm; female type 19.48 mm. *Body coloration*. Male specimens, known only from dried museum material, mostly black with yellow-cream banding. Female specimens, known only from dried museum material, mostly black-brown with yellow-cream banding; apices of recurved ovipositor valves black. Males and females with same leg coloration.

Male external features* (fig. 31).—Head and Pronotum*. Band across apex of eye margin; occipital band with upper margin mottled and diffuse, lower margin distinct; genal band distinct with posterior terminus tapered and mottled; pronotal band of lateral carinae distinct; lateral lobe band distinct with slightly broken posterior terminus, wider and emarginate at mid-length, cut by primary sulcus. Prozona with weak secondary sulci between medial and lateral carinae of dorsal field; medial and lateral carinae not cut by sulci; posteroventral margin of lateral lobe strongly angled ventrally and highlighted with mottled black and cream; posterior margin of dorsal field moderately emarginate medially.

Meso- and Metathorax. Mesepisternum and mesepimeron with dark, mottled black-cream coloration; pleural sulcus black; metepisternum with distinct yellow-cream band 2/3 length of visible metepisternum. *Wing*. Tegmina oval, twice as long as wide; tegmen banding: i.+ii. with indistinct blended boundaries, ventral yellow band blended into mottled yellow-brown of radial vein region; iii.+iv. indistinct blended boundaries, nearly solid mottled brown. *Hind legs*. Hind femur length to width ratio 3.27; margin of upper carinula and medial area with faint broken brown-black, medial area also with two faint patches of white-cream; margin of lower carinula with thin faint brownish-black line; posterior femora and knees with faint orange; tibiae and tarsi with strong orange; posterior tibia with approximately 9-10 outer and 10 inner spines, all with black apices.

Abdomen. Abdominal medial and lateral bands black, extending to supra-anal plate. *Cerci*. Approximately as long as supra-anal plate, not extending beyond posterior margin of subgenital plate; cerci gently curving 90°medially before apices; shoulders moderately pronounced; at mid-length only slightly thinner than distal ends; apices gently angled and spatulate, without or with very thin blackened apical margins.

Male internal features* (fig. 32).—Phallic complex*. Aedeagal valves narrow with small openings; valves of moderate length (fig. 32 A, D); in lateral view, region bridging zygoma of cingulum and distal portion of aedeagal sheath with two marginal notches of equal and moderate size and depth; lateral sclerites of cingulum triangular with rounded apices (fig. 32 B, E); distal portion of aedeagal sheath with sclerotized spines and slightly expanded apices laterally; basal portion of aedeagal sheath with ridge of sclerotized spines; distal and basal portions of aedeagal sheath with nearly separated areas of sclerotization; in posterior view, rami of cingula 2x as wide as distal portion of aedeagal sheath; basal portions of aedeagal sheath project vertically upward toward apices of distal portion of sheath (fig. 32 C, F). *Epiphallus*. Lobes triangular; in dorsal view, bridge with pronounced medial apodeme; epiphallic lateral sclerites elongate and flattened (fig. 32 G, H).

Etymology.—Named to honor Dr. Michael L. May, advisor and friend, and in celebration of his long and accomplished career in entomology.

***Distribution* (fig. 4).—**This species was collected in late September, in the Theronsberg Pass near Ceres, within the fynbos biome, near the margin of the succulent karoo biome. The collection site is in the Waboomberg and Warm Bokkeveld area. In Cape Town, the closest large city, the 30-year average (1961-1990) monthly rainfall for September was 40mm, the greatest average monthly rainfalls being: 69mm in May, 93mm in June, 82mm in July, and 77mm in August (SAWS, 2009). The full range of this species remains to be determined. *E. mayi* is thought to be sympatric with *E. lapollai*.

Discussion.—A putative relative of *E. mayi* is *E. san*, given their similar cerci and phallic complex sculpturing. Refer to the discussion section of the *E. san* description to for distinguishing characters of the two species.

10. ***Euloryma zebrata*, sp. nov.**
male figures: 33, 34, 61; female figure: 60

Holotype male, SOUTH AFRICA: Eastern Cape Province; 10 miles SW of Middelburg, 24.ix.1960 (H. Dick Brown) (ANSP); from the same location: 1 paratype male (SANC). SOUTH AFRICA: Eastern Cape Province: Mountain Zebra National Park, vic. Cradock, Rooiplaat Loop, elev. 1349m; S32º11'426 E25º24'666, 27.x.2005 (L.Spearman & J.LaPolla); from same location: 2 paratype male, 4 paratype female (ANSP). SOUTH AFRICA: Eastern Cape Province; Renosterberg; vic. Middelburg; 27.ix.1960 (H.Dick Brown); from same location: 17 paratype males, 5 paratype females (ANSP) (SANC) (BMNH). SOUTH AFRICA: Eastern Cape Province; 27 miles NE of Graaff-Reinet; 23.i.1963 (M.J.D. White); from same location: 17 paratype males, 5 paratype females (ANSP) (SANC). The holotype is labeled as LAS TYPE #9.

Diagnosis of Male.—From sites within Sneeuberge, Eastern Cape; prozona of dorsal field with secondary sulcus between medial and lateral carinae, medial and lateral carinae not cut by sulci; tegmen with four areas of coloration, band iii. very straight and even; posterior femora, knees and proximal tibiae with black-brown speckles atop cream, distal tibiae and tarsi with orange; cerci curve less than 90° medially before apices, at mid-length thinner than apices, apices gently spatulate and tapered; basal aedeagal sheath with sclerotized papillae, and distal aedeagal sheath with spines; aedeagal valves narrowed, small openings; valves of moderate length; medial apodeme of epiphallus bridge present.

Compare with.—*E. mayi*, *E. san*

Description.—*Body length*. Medium-sized species; male type 16.10 mm; female type 20.59 mm. *Body coloration*. Male specimens, known from dried museum material and field photography (fig. 61), mostly black-brown with white-cream banding. Female specimens, known from dried museum material and field observation, mostly black-brown with white-cream banding; apices of

recurved ovipositor valves black. Males and females with same leg coloration.

Male external features **(fig. 33).—***Head and Pronotum*. Band across apex of eye margin; occipital band with upper margin mottled and diffuse, lower margin distinct; genal band distinct, posterior terminus tapered; lateral carina band distinct, with slightly mottled medial margins; lateral lobe band distinct, cut by primary sulcus, anterior and posterior terminus mottled. Prozona with secondary sulcus between medial and lateral carinae of dorsal field; medial and lateral carinae not cut by sulci. Posteroventral margin of lateral lobe moderately angled ventrally and highlighted with white-cream (sometimes mottled); posterior margin of dorsal field strongly emarginate medially.

Meso- and Metathorax. Mesepisternum with mottled cream-black, mesepimeron with mottled cream-black; pleural sulcus black; metepisternum with long distinct yellow-cream band. *Wing*. Tegmina oval and elongate, more than twice as long as wide; tegmen banding: i.+ii. indistinct blended boundaries, mottled brown-black coloration becoming black along ventral margin (below radial vein); iii. distinct straight and uniform cream; iv. distinct black. *Hind legs*. Hind femur length to width ratio 3.33; margin of upper carinula and medial area with mottled black, medial area with two patches of faint white-cream; margin of lower carinula without or with very thin black line; posterior femora, knees and proximal tibiae with black-brown speckles atop cream; speckled coloration dissipates at mid-length of tibiae, distal tibiae and tarsi orange; posterior tibia with approximately 10 outer and 10 inner spines, all with black apices.

Abdomen. Abdominal medial and lateral bands mottled black, extending to supra-anal plate. *Cerci*. Approximately same length as supra-anal plate, may extend beyond posterior margin of subgenital plate; curving less than 90° medially before apices; shoulders pronounced; thinner at mid-length than at apices; apices gently spatulate and tapered.

Male internal features **(fig. 34).—***Phallic complex*. Aedeagal valves narrowed with small openings; valves of moderate length (fig. 34 A, D); in lateral view, region bridging zygoma of cingulum and distal portion of aedeagal sheath sloping slightly posteroventrally; lateral sclerites of cingulum broad, rounded (fig. 34 B, E); distal portion of aedeagal sheath with area of larger sclerotized spines, apices slightly expanded laterally; basal portion of aedeagal sheath with ridge of smaller sclerotized spines; distal and basal portions of aedeagal sheath with nearly separated areas of sclerotization; in posterior view, rami of cingula almost 2x as wide as distal portion of aedeagal sheath; basal portions of aedeagal sheath project upward with moderate V-shaped outward angle toward apices of distal portion of sheath (fig. 34 C, F). *Epiphallus*. Lobes more triangular; in dorsal view, bridge with wide and pronounced medial apodeme; epiphallic lateral sclerites elongate and flattened (fig. 34 G, H).

Etymology.—Named after one of this species' notable collecting sites, South Africa's beautiful Mountain Zebra National Park and in honor of the park's many dedicated stewards.

Distribution **(fig. 5).—**This species was collected from multiple locations across multiple months: from late September near Middelberg (Renosterberg), to late October southeast of Cradock (Swaershoek), and late January northeast of Graaff-Reinet (Voor Sneeuberg). All collections sites are within the grassland biome, though the area is surrounded by the nama karoo biome. The collection site in Mountain Zebra National Park near Cradock is designated as south-eastern mountain grassland (Lubke *et al*. 1996). The full range of this species remains to be determined. Though not thought to be sympatric, *E. zebrata* is found closest to *Hemiloryma* that have been found in the encircling nama karoo.

Discussion.—The cerci and phallic complex sculpturing of *E. zebrata* most closely resembles that of *E. san* and *E. mayi*. To distinguish between *E. zebrata*, *E. san* and *E. mayi* the following characteristics should be examined: 1) *E. zebrata*

and *E. san* have four areas of tegmen banding coloration, whereas *E. mayi* has indistinguishable tegmen banding margins with two areas of coloration; 2) *E. zebrata* and *E. mayi* have a secondary sulcus of the prozona between medial and lateral carinae of the dorsal field, whereas *E. san* lacks pronotal secondary sulci; 3) in *E. zebrata* and *E. mayi* the proximal tibiae are orange with brown-black speckling, the distal tibiae orange, whereas in *E. san* the proximal tibiae are blue and the distal tibia black; 4) in lateral view *E. zebrata* region bridging zygoma of cingulum and distal portion of aedeagal sheath slopes slightly ventrally, whereas *E. mayi* and *E. san* have two distinct notches in this region.

11. ***Euloryma bonteboki*, sp. nov.**

male figures: 35, 36; female figures: 60, 62

Holotype male, SOUTH AFRICA: Western Cape Province; S end of Kogmanskloof, S of Montagu, 1.xii.2007 (D. Otte), Otte loc.code 07-70, spec.code DL010 (ANSP); from the same location: 1 paratype male (SANC). SOUTH AFRICA: Western Cape Province, Bontebok National Park, vic. Swellendam, Eastern Drive, elev. 124m, S34º04'864S E20º28'110E, 14.x.2005 (Spearman & LaPolla); from same location: 5 paratype males, 2 paratype females (ANSP). The holotype is labeled as LAS TYPE #10.

Diagnosis of Male.— From sites in the SE Langeberg, Western Cape; prozona of dorsal field with secondary sulcus between medial and lateral carinae, prozona of lateral lobe with two depressions with raised rims just lateral to lateral carinae, medial and lateral carinae not cut by sulci; tegmen with four areas of coloration; posterior femora and knee with faint orange, proximal tibiae with moderate black-brown speckles atop white-cream, posterior tibiae and tarsi with bright orange; supra-anal plate with extraordinarily long, triangular apex; cerci curving gently less than 90° medially before apices, at mid-length thinner than at apices, apices expand to point dorsomedially, with blackened apical margins and scattered atypically thickened long hairs; aedeagal valves narrowed with small openings; valves of moderate length; medial apodeme of epiphallus bridge present.

Compare with.—*E. magna*, *E. browni*

Description.—*Body length*. Medium-sized species; male type 19.80 mm; female type 26.80 mm. *Body coloration*. Male specimens, known from dried museum material and field observation, mostly black-brown with yellow-cream banding. Female specimens, known from dried museum material and field photography (fig. 62), variable with some specimens mostly brown-black with yellow-cream banding and other specimens with green on head, pronotum, medial line of abdomen and upper marginal area of femur; apices of recurved ovipositor valves black. Males and females with same leg coloration.

Male external features* (fig. 35).—Head and Pronotum*. Band across apex of eye margin; occipital band with upper margin diffuse, lower margin distinct; genal band distinct with tapered posterior end; pronotal band of lateral carinae distinct; lateral lobe band distinct and wider immediately posterior to primary sulcus. Prozona with secondary sulcus between medial and lateral carinae of dorsal field; prozona of lateral lobe with two depressions with raised edges just lateral to lateral carinae; medial and lateral carinae are not cut by sulci. Posteroventral margin of lateral lobe moderately angled ventrally and highlighted with yellow-cream; posterior margin of dorsal field moderately to strongly emarginate medially.

Meso- and Metathorax. Mesepisternum with mottled diffuse cream-black band, mesepimeron mottled diffuse cream-black; pleural sulcus black; metepisternum with distinct long yellow-cream band. *Wing*. Tegmina oval, less than twice as long as wide; tegmen banding: i. distinct yellow-cream, slightly mottled posterior margin; ii. distinct black-brown; iii. distinct yellow-cream, thin anteriorly and thick posteriorly; iv. distinct black-brown, minimal mottling at posterior end. *Hind legs*. Hind femur length to width ratio 3.56; margin of upper carinula and medial area with mottled black; margin of lower carinula without black; posterior femora and knee with faint orange; proximal tibiae with faint to moderate black-brown speckles atop variable white-cream; posterior tibiae and tarsi with bright orange (proximal and distal tibiae color transitions at mid-length); posterior tibiae with approximately 10 outer and 10 inner spines, all with black apices.

Abdomen. Abdominal medial and lateral bands mottled black, extend to supra-anal plate; supra-anal plate with extraordinarily long, triangular apex. *Cerci*. Shorter than supra-anal plate, because of elongated apex of latter, and not extending beyond posterior margin of subgenital plate; curving gently less than 90° medially before apices; shoulders moderately pronounced; at mid-length thinner than at apices; apices expanded to point dorsomedially, with blackened apical margins and scattered atypically thickened long hairs.

Male internal features* (fig. 36).—Phallic complex*. Aedeagal valves narrowed with small openings; valves of moderate length (fig. 36 A, D); in lateral view, region bridging zygoma of cingulum and distal portion of aedeagal sheath with smaller posterior marginal notch, broader deeper more anterior notch; lateral sclerites of cingulum triangular (fig. 36 B, E); distal and basal portions of aedeagal sheath with area of sclerotized papillae; distal portion of aedeagal sheath with widened apices markedly expanded laterally, creating large area of sclerotized papillae; distal and basal portions of aedeagal sheath with uniform and continuous distribution of sclerotization, (although in lateral view, basal and distal portions of sheath appear nearly separate); in posterior view, rami of cingula 1.5x as wide as distal portion of aedeagal sheath; basal portions of aedeagal sheath project upward with moderate V-shaped outward angle toward apices of distal portion of sheath (fig. 36 C, F). *Epiphallus*. Lobes generally triangular; in dorsal view, bridge with pronounced medial apodeme; epiphallic lateral sclerites elongate and flattened (fig. 36 G, H).

Etymology.—Named after one of this species' notable collecting sites, South Africa's beautiful Bontebok National Park, and in honor of the park's many dedicated stewards and the many kind people we came to know in historic Swellendam.

***Distribution* (fig. 4).—**This species was collected from two locations during different months: from mid-October near Swellendam (south of Eastern Langeberge) to early December south of Montagu (in Kogmanskloof in Langeberge). Both collections sites are within the fynbos biome, with vegetation designation of west coast renosterveld (Rebelo 1996b). In Cape Town, the closest large city, the 30-year average (1961-1990) monthly rainfall for October was 30mm, November was 14mm, and December was 17mm, the greatest average monthly rainfalls being: 69mm in May, 93mm in June, 82mm in July, and 77mm in August (SAWS, 2009). The full range of this species remains to be determined.

Discussion.—The body and hind leg coloration, length of cerci, and phallic complex sculpturing of *E. bonteboki* is most similar to *E. magna* and *E. browni*, although the species are easily distinguishable by examining the following characteristics: 1) *E. bonteboki* has extraordinarily long, triangular apex of supra-anal plate, thus far unique within *Euloryma*; 2) *E. bonteboki* is a medium sized species, *E. magna* and *E. browni* are the largest known in the genus; 3) the cerci of *E. bonteboki* are more lateromedially flattened mid-length compared to *E. magna* and *E. browni*, in which the cerci at mid-length are rounded; 4) in posterior view the rami of the cingulum and aedeagal sheaths of *E. bonteboki*, *E. magna* and *E. browni* are all sculptured differently.

12. *Euloryma karoo*, sp. nov.

male figures: 37, 38; female figure: 60

Holotype male, SOUTH AFRICA: Western Cape Province; 12 miles WNW of Calvinia, 6.ix.1968 (H.D. Brown) (ANSP); from the same location: 2 paratype males, 2 paratype females (SANC) (ANSP). SOUTH AFRICA: Northern Cape Province; Gannaga Pass, 27 kilometers S of Middelpos, 26.ix.1972, (H.D. Brown, E.Koster, A.Prinsloo), loc.code L17; from the same location: 17 paratype males, 17 paratype females (SAMC) (ANSP) (BMNH). SOUTH AFRICA: Western Cape Province; 4 miles N of Bitterfontein, 3.ix.1961, (H.D. Brown, W. Fürst), loc.code L22; from the same location: 2 paratype males (SAMC) (ANSP). SOUTH AFRICA: Northern Cape Province; 3 miles S of Kamieskroon, 4.ix.1961. (H.D. Brown, W. Fürst), loc.code L31c; from the same location: 10 paratype males, 7 paratype females (SAMC)

(ANSP) (BMNH). The holotype is labeled as LAS TYPE #11.

Diagnosis of Male.— From sites in NW from Kamiesroon in Namaqualand to the SE in the Onder-Bokkeveld, Western and Northern Cape; prozona of dorsal field with secondary sulcus between medial and lateral carinae, medial and lateral carinae not cut by sulci; tegmen with three areas of coloration, iii.+iv. with small triangular yellow area; posterior femora, knees, tibiae and tarsi with orange; cerci bend 90° medially before apices, thin at mid-length, tapering gradually beyond medial bend, pointed at apices; aedeagal valves narrowed with small openings, valves short; medial apodeme of epiphallus bridge present.

Compare with.—*E. namaqua*

Description.—*Body length*. Medium-sized species; male type 15.73 mm; female type 25.42 mm. *Body coloration*. Male specimens, known only from dried museum material, black with yellow-cream banding. Female specimens, known only from dried museum material, black-brown with yellow-cream banding; apices of recurved ovipositor valves black. Males and females with same leg coloration.

Male external features* (fig. 37).—Head and Pronotum*. Band across apex of eye margin; occipital band with upper margin mottled and diffuse, lower margin distinct; genal band distinct, tapered posterior terminus; pronotal band of lateral carinae distinct, slightly mottled medial margin; lateral lobe band distinct, cut by primary sulcus. Prozona with secondary sulcus between medial and lateral carinae of dorsal field; medial and lateral carinae not cut by sulci. Posteroventral margin of lateral lobe moderately angled ventrally and highlighted mottled yellow-black; posterior margin of dorsal field strongly emarginate medially.

Meso- and Metathorax. Mesepisternum with mottled yellow-black, mesepimeron with mottled yellow-black; pleural sulcus black; metepisternum with distinct yellow band, wider at anterior end. *Wing*. Tegmina oval, twice as long as wide; tegmen banding: i. distinct yellow; ii. distinct black, width greatest mid-length, tapers posteriorly; iii.+iv. indistinct blended boundaries, mostly black coloration with small triangular yellow area at apical margin. *Hind legs*. Hind femur length to width ratio 3.32; margin of upper carinula and medial area with mottled black, medial area with two patches of white-cream; margin of lower carinula and knees without black; posterior femora and knee with faint orange; tibiae and tarsi with strong orange (anterior tibiae possibly with mottled brown atop orange); posterior tibia with approximately 10 outer and 10 inner spines, all with black apices.

Abdomen. Abdominal medial and lateral bands black, extending onto supra-anal plate. *Cerci*. Approximately same length as supra-anal plate, not extending beyond posterior margin of subgenital plate; bend 90° medially before apices; shoulders pronounced; thinner at mid-length than apices; cerci tapering gradually beyond medial bend, pointed at apices.

Male internal features* (fig. 38).—Phallic complex*. Aedeagal valves narrowed with small openings; valves short (fig. 38 A, D); in lateral view, region bridging zygoma of cingulum and distal portion of aedeagal sheath with smaller posterior marginal notch, gentle broader more anterior notch; lateral sclerites of cingulum triangular (fig. 38 B, E); distal and basal portions of aedeagal sheath with sclerotized spines; distal portion of aedeagal sheath with apices widely expand laterally; distal and basal portions of aedeagal sheath have nearly separated areas of sclerotization; sclerotized papillae on soft tissue near apices of ventral valves; in posterior view, rami of cingula 1.5x as wide as distal portion of aedeagal sheath; basal portions of aedeagal sheath project upward with moderate V-shaped angle toward apices of distal portion of sheath (fig. 38 C, F). *Epiphallus*. Lobes triangular; in dorsal view, bridge with pronounced medial apodeme; epiphallic lateral sclerites rounded and flattened (fig. 38 G, H).

Etymology.—Named *E. karoo* for the succulent karoo biome, a biodiversity hotspot with endemic flora and fauna, which needs further study, protection and preservation.

***Distribution* (figs. 3 and 4).—**This species was collected from multiple locations during one month: from early September south of Kamieskroon (Namaqualand), to early September north of Bitterfontein, to early September west-northwest of Calvinia (Hantam region), and late September in Gannaga Pass, south of Middelpos (Roggeveldberge). The first site listed (nearest Kamieskroon) is found well within the succulent karoo biome, although the three latter sites (nearest Bitterfontein, Calvinia and Middelpos) are within the succulent karoo biome but very close to the margins of the fynbos biome. In Calvinia, the closest large city, the 30-year average (1961-1990) monthly rainfall for September was 13mm, the greatest average monthly rainfalls being: 26mm in March, 27mm in April, 22mm in May, 34mm in June, 23mm in July, and 24mm in August (SAWS, 2009). The full range of this species remains to be determined. In its most northeastern collection site, *E. karoo* is confirmed sympatric with *E. ashleyi* and thought to be sympatric with *E. namaqua*.

Discussion.—A putative relative of *E. karoo* is *E. namaqua*, given similar morphological characteristics such as: 1) tegmen coloration in three regions with indistinguishable margins between iii.+iv.; 2) prozona with secondary sulci between medial and lateral carinae of dorsal field; 3) hind leg with orange coloration; 4) cerci sculpturing similar, with tapered apices; 5) very similar sculpturing and sclerotization of phallic complex. To distinguish between *E. karoo* and *E. namaqua* the following characteristics should be examined: 1) *E. karoo* with small triangular area of yellow in tegmina area iii.+iv., *E. namaqua* with large mottled yellow-black in iii.+iv.; 2) *E. karoo* cercal apices gradually tapered beyond medial bend at 1/2 along its length, *E. namaqua* emarginate just before apex, appearing notched in posterior view; 3) basal portions of aedeagal sheath project upward with moderate V-shaped toward apices of distal portion of sheath in *E. karoo*, in *E. namaqua* basal portions project upward almost parallel, then diverge near apices of distal portion of sheath.

CEDERBERGENSIS SPECIES-GROUP

13. ***Euloryma mirabunda*, sp. nov.**
male figures: 39, 40, 62; female figures: 60, 62

Holotype male, SOUTH AFRICA: Western Cape Province; along Boesmansrivier, W of Picketberg, S 32°43.631', E 018°39.071', 3.xi.2007 (D. Otte, E. Rohwer), Otte loc.code 07-18Boes, spec.code DL032 (ANSP); from the same location: 2 paratype females (ANSP). The holotype is labeled as LAS TYPE #12.

Diagnosis of Male.—From W of Picketberg, Western Cape; prozona of lateral lobe with weak secondary sulci, prozona of dorsal field with weak secondary sulcus between medial and lateral carinae, metazona with deep secondary sulcus cutting medial and lateral carinae, dorsal field and lateral lobe; tegmen with four areas of coloration; posterior femora, knees, tibiae and tarsi with orange, anterior tibiae with gray mottling; cerci flattened lateromedially, rectangular, and not curving medially before apices; aedeagal valves extraordinarily long and narrowed, moderate openings, apices of valves with small sclerotized bulbous lobes that curl anteriorly; no medial apodeme on epiphallus bridge.

Compare with: *E. cederbergensis*

Description.—*Body length*. Medium-sized species; male type 16.58 mm; female type 22.15 mm. *Body coloration*. Male specimens, known from dried museum material and field photography (fig. 62), mostly black and gray with white-cream banding. Female specimens, known from dried museum material and field photography (fig. 62), mostly light brown and gray with some black and white-cream banding; apices of recurved ovipositor valves brown-black. Males and females have same leg coloration.

Male external features* (fig. 39).—Head and Pronotum*. Band across apex of eye margin; band on ecdysial line distinct with mottled margins; occipital band diffuse and mottled, with only lower margin distinct; genal band with upper margin distinct,

lower margin diffuse; band of medial carina distinct with mottled margins; lateral carina band diffuse and mottled, with only lower margin distinct; lateral lobe band distinct and cut by primary sulcus. Prozona with two secondary sulci, one weakly cutting lateral lobe, the second weakly cutting dorsal field between medial and lateral carinae, not vertically aligned with first; metazona with deep secondary sulcus cutting medial and lateral carinae, dorsal field and lateral lobe. Posteroventral margin of lateral lobe moderately angled ventrally and highlighted white-cream; posterior margin of dorsal field strongly emarginate medially.

Meso- and Metathorax. Mesepisternum with distinct white-cream band, mesepimeron with mottled white-cream; pleural sulcus black; metepisternum with distinct thick white-cream band along 3/4 its visible length. *Wing*. Tegmina oval, less than twice as long as wide; tegmen banding: i. mottled white-cream and brown, diffuse ventral margin; ii. distinct black; iii. distinct white-cream, with widened and mottled ventro-apical margin; iv. mottled black band; areas ii.+iii.+iv. with apical margin of white-cream. *Hind legs*. Hind femur length to width ratio 3.93; margin of upper carinula and medial area with mottled black, medial area with two patches of white-cream; margin of lower carinula without black; posterior femora, knees, tibiae and tarsi with faint orange, anterior tibiae with slight gray mottling; posterior tibia with approximately 10 outer and 10 inner spines, all with black apices.

Abdomen. Abdominal medial and lateral bands mottled black with white-cream highlights between the bands; bands extending to supra-anal plate. *Cerci*. A little longer than supra-anal plate, not extending beyond posterior margin of subgenital plate; not curving medially inward significantly before apices; shoulders not pronounced; at mid-length cerci slightly thinner than at apices, cerci flattened lateromedially, apices expanded and rectangular with blackened apical margins and each with two atypically thickened long dark hairs.

Male internal features* (fig. 40).—Phallic complex*. Aedeagal valves narrowed, with moderate openings; valves extraordinarily long; apices of valves with small sclerotized bulbous lobes curling anteriorly (fig. 40 A, D); in lateral view, margin of region bridging zygoma of cingulum and distal portion of aedeagal sheath deeply concave, U-shaped; lateral sclerites of cingulum acutely triangular (fig. 40 B, E); distal and basal portions of aedeagal sheath with area of sclerotized papillae; distal portion of aedeagal sheath with apices slightly expanded laterally, with larger area of sclerotized papillae; distal and basal portions of aedeagal sheath with uniform and continuous distribution of sclerotized papillae; in posterior view, rami of cingula same width as distal portion of aedeagal sheath; basal portions of aedeagal sheath project upward without any, or a very subtle, outward angle toward apex of distal portion of sheath (fig. 40 C, F). *Epiphallus*. Lobes narrowly rounded; in dorsal view, bridge curved and without apodeme; epiphallic lateral sclerites assumed to be very small (lost in dissections) (fig. 40 G, H).

Etymology.—The specific epithet *mirabunda* is Latin for full of wonder, in reference to the wondrous sculpturing of this species' cingulum and aedeagus.

***Distribution* (figs. 3 and 4).—**This species was collected in early November, in the Picketberg region, within the fynbos biome. In Cape Town, the closest large city, the 30-year average (1961-1990) monthly rainfall for November was 14mm, the greatest average monthly rainfalls being: 69mm in May, 93mm in June, 82mm in July, and 77mm in August (SAWS, 2009). The full range of this species remains to be determined. Though not thought to be sympatric, *E. mirabunda* is closest to the range of *E. cederbergensis*.

Discussion.—A putative relative of *E. mirabunda* is *E. cederbergensis*, because they share many morphological characteristics including: 1) lateromedially flattened, broad rectangular cerci that do not curve inward; 2) very similar tegmen banding coloration, mottling and margins; 3) mottled coloration of head and pronotum, orange coloration of hind legs; 4) prozona with two secondary sulci (weakly cutting lateral lobe and dorsal field respectively), metazona with deep

secondary sulcus cutting medial and lateral carinae, dorsal field and lateral lobe; and 5) similar phallic complex sculpturing, the valves extraordinarily long and their apices with small sclerotized bulbous lobes that curl anteriorly.

To distinguish between *E. mirabunda* and *E. cederbergensis* the following morphological features should be examined: 1) *E. mirabunda* has narrower cerci (length to width, ≈3:1 compared to ≈2.5:1 in *E. cederbergensis*) and at mid-length the cerci proportionately narrower than in *E. cederbergensis*; 2) region bridging zygoma of cingulum and distal portion of aedeagal sheath deeply concave and U-shaped in lateral view in *E. mirabunda*, in *E. cederbergensis* this concavity resembles a wide open V-shape; 3) basal portions of aedeagal sheath project upward without any or very subtle outward angle toward apex of distal portion of sheath for *E. mirabunda*, but in *E. cederbergensis* the basal portions of aedeagal sheath project upward with subtle hour-glass shape finishing with an outward thickened curve at apex of distal portion of sheath.

Geographically, it appears that *E. mirabunda* might be limited to the Piketberg region, whereas *E. cederbergensis* might be found in the Olifantsrivierberg and Cederberg regions.

14. ***Euloryma cederbergensis*, sp. nov.**

male figures: 41, 42, 63; female figures: 60, 63

Holotype male, SOUTH AFRICA: Western Cape Province; 2 kilometers N of N7 on Olifantsberge, Piekerierskloofpass, 9.xi.2007 (D. Otte, E. Rohwer), Otte loc.code 07-46, spec. code DL142 (ANSP); from the same location: 7 paratype males, 2 paratype females (SANC) (ANSP) (SAMC). D. Otte collection location code: 07-46. SOUTH AFRICA: Western Cape Province, Cederberg Wilderness Park, vic. Algeria Restcamp, elev. 675m; S32º23'733 E19º05'214, 7.x.2005 (L.Spearman & J.LaPolla), Spearman coll.code S1T3Q1; from the same location: 1 paratype male (ANSP). The holotype is labeled as LAS TYPE #13.

Diagnosis of Male.— From Olifantsberge and Cederberg Wilderness, Western Cape; prozona of lateral lobe with weak secondary sulci, prozona of dorsal field with weak secondary sulcus between medial and lateral carinae, metazona with deep secondary sulcus cutting medial and lateral carinae, dorsal field and lateral lobe; tegmen with four areas of coloration; posterior femora, knees, tibiae and tarsi with orange, anterior tibiae with gray mottling; cerci flattened lateromedially, rectangular, and not curving medially before apices; aedeagal valves extraordinarily long and moderately narrow with moderately large openings, apices of valves with large bulbous sclerotized lobes that curl anteriorly; no medial apodeme on epiphallus bridge.

Compare with.—*E. mirabunda*

Description.—*Body length*. Medium-sized species; male type 15.70 mm; female type 22.96 mm. *Body coloration*. Male specimens, known from dried museum material and field photography (fig. 63), mostly black-brown and gray with white-cream banding. Female specimens, known from dried museum material and field photography (fig.63), mostly light brown and gray with some black, with white-cream banding; apices of recurved ovipositor valves brown-black. Males and females have same leg coloration.

Male external features* (fig. 41).—Head and Pronotum*. Band across apex of eye margin; band on ecdysial line mottled; occipital band diffuse and mottled, with only lower margin distinct; genal band with upper margin distinct, lower margin diffuse; band of medial carina distinct with mottled margins; lateral carina band diffuse and mottled, with only lower margin distinct; lateral lobe band distinct and cut by primary sulcus. Prozona with two secondary sulci, one weakly cutting lateral lobe, the second weakly cutting dorsal field between medial and lateral carinae; metazona with deep secondary sulcus cutting medial and lateral carinae, dorsal field and lateral lobe. Posteroventral margin of lateral lobe moderately angled ventrally and highlighted with white-cream; posterior margin of dorsal field weak to moderately emarginate medially.

Meso- and Metathorax. Mesepisternum with distinct white-cream band, mesepimeron mottled white-cream; pleural sulcus black; metepisternum with distinct white-cream band. *Wing*. Tegmina

oval, less than twice as long as wide; tegmen banding: i. mottled white-cream and brown, dorsal margin lightest area of color; ii. distinct, thin black-brown; iii. distinct white-cream, widened and mottled at ventro-apical margin; iv. mottled black-brown. Area iii.+iv. with white-cream apical margin. *Hind legs*. Hind femur length to width ratio 3.36; margin of upper carinula and medial area with very little mottled black, medial area also with two patches of white-cream; margin of lower carinula without black; posterior femora, knees, tibiae and tarsi with faint orange, anterior tibiae with slight gray mottling; posterior tibia with approximately 10 outer and 10 inner spines, all with black apices.

Abdomen. Abdominal medial and lateral bands mottled black-brown with white-cream highlights between the bands; bands extend to supra-anal plate. *Cerci*. A little longer than supra-anal plate, not extending beyond posterior margin of subgenital plate; not curving significantly inward before apices; shoulders very subtle; at mid-length slightly thinner than at apices; flattened lateromedially, apices rectangular, sometimes with blackened apical margins.

Male internal features* (fig. 42).—Phallic complex*. Aedeagal valves moderately narrow with moderately large openings; valves extraordinarily long, apices of valves with large bulbous sclerotized lobes that curl anteriorly (fig. 42 A, D); in lateral view, margin of region bridging zygoma of cingulum and distal portion of aedeagal sheath deeply concave, V-shaped; lateral sclerites of cingulum rounded (fig. 42 B, E); distal and basal portions of aedeagal sheath with area of sclerotized papillae; distal portion of aedeagal sheath with moderately thickened apices that expand laterally, with large area of sclerotized papillae, basal sheath with relatively few sclerotized papillae; distal and basal portions of aedeagal sheath have uniform and continuous distribution of sclerotized papillae; in posterior view, rami of cingula is 1 1/4 x as wide as distal portion of aedeagal sheath; basal portions of aedeagal sheath project upward with subtle hour-glass shape ending with an outward curve at apices of distal portion of sheath (fig. 42 C, F). *Epiphallus*. Lobes rounded; in dorsal view, bridge curved and without medial apodeme; epiphallic lateral sclerites are extremely small (fig. 42 G, H).

Etymology.—Named after one of this species' notable collecting sites, South Africa's harsh but enchanting Cederberg Wilderness (Cape Nature), and in honor of the park's dedicated stewards, Donnie Malherbe, Rika du Plessis, the many hard working rangers, and our adopted Cederberg Valley family, the Nieuwoudts of Jamaka Organic Farms.

***Distribution* (figs. 3 and 4).—**This species was collected from two locations across two months: from early October within the Cederberg Wilderness Reserve, to early November in the Piekerierskloofpass (Olifantsrivierberge). Both collections sites are within the fynbos biome, with vegetation designation of mountain fynbos (Rebelo 1996a). In Cape Town, the closest large city, the 30-year average (1961-1990) monthly rainfall for October was 30mm, and for November was 14mm, the greatest average monthly rainfalls being: 69mm in May, 93mm in June, 82mm in July, and 77mm in August (SAWS, 2009). The full range of this species remains to be determined. Though not thought to be sympatric, *E. cederbergensis* is closest to the range of *E. mirabunda*.

Discussion.—A putative relative of *E. cederbergensis* is *E. mirabunda* given the many morphological characteristics they share. Refer to the discussion section of the *E. mirabunda* description to for distinguishing characters of the two species.

15. *Euloryma lapollai*, sp. nov.
male figures: 43, 44, 63

Holotype male, SOUTH AFRICA: Western Cape Province; vic. Klondyke, E of Swaarmoedpas, S 33°18.486', E019°35.375', 11.xi.2007 (D. Otte, E. Rohwer), Otte loc.code 07-52, spec.code DL062/DL063 (ANSP); from the same location: 4 paratype males (SANC) (ANSP) (SAMC). No females collected. The holotype is labeled as LAS TYPE #14.

Diagnosis of Male.—From vic. Klondyke, E of Swaarmoedpas, Western Cape; prozona of lateral lobe with weak secondary sulci, prozona of dorsal field with weak secondary sulcus between medial and lateral carinae, metazona with deep secondary

sulcus cutting medial and lateral carinae, dorsal field and lateral lobe; tegmen with four areas of coloration; posterior femora, knees, tibiae and tarsi with orange, anterior to mid-length tibiae with subtle mottled gray; cerci flattened lateromedially and do not curve medially before apices, at mid-length wider than at apices, apices triangular and tapered to point, with blackened apical margins; aedeagal valves moderately narrowed, with moderate openings and length; in posterior view, two distinctive lobes are visible on lateral surfaces of aedeagal valves, projecting dorsolaterally immediately posterior to valve apices; no medial apodeme on epiphallus bridge.

Compare with.— *E. umoja*

Description.—*Body length*. Medium-sized species; male type 16.0 mm. *Body coloration*. Male specimens, known from dried museum material and field photography (fig. 63), mostly black-brown with white-cream banding.

Male external features* (fig. 43).—Head and Pronotum*. Band across apex of eye margin; band on ecdysial line distinct with mottled margins; occipital band with upper margin diffuse and mottled, lower margin distinct; genal band with upper margin distinct, lower margin distinct with tapered posterior end; band of medial carina distinct with mottled margins, lateral carina band mottled and very thin; lateral lobe band distinct, cut by primary sulcus. Prozona with two secondary sulci, one very weakly cutting lateral lobe, the second very weakly cutting dorsal field between medial and lateral carinae; metazona with deep secondary sulcus cutting medial and lateral carinae, dorsal field and lateral lobe. Posteroventral margin of lateral lobe moderately angled ventrally and highlighted white-cream; posterior margin of dorsal field weakly emarginate medially.

Meso- and Metathorax. Mesepisternum with distinct white-cream band, mesepimeron with mottled black; pleural sulcus black; metepisternum with distinct white-cream band. *Wing*. Tegmina oval, approximately twice as long as wide; tegmen banding: i. mottled black to light brown; ii. distinct black, radial vein highlighted in brown; iii. distinct white-cream, slightly widened and mottled ventral apical margin; iv. distinct black. *Hind legs*. Hind femur length to width ratio 3.72; margin of upper carinula and medial area mottled black, medial area also with one patch of cream; margin of lower carinula without black; posterior femora, knees, tibiae and tarsi with faint orange, tibiae anterior to mid-length with additional subtle mottled gray; posterior tibia with approximately 10 outer and 10 inner spines, all with black apices.

Abdomen. Abdominal medial and lateral bands black with white-cream highlights between bands, extending to supra-anal plate. Supra-anal plate faint orange. *Cerci*. Longer than supra-anal plate, extending beyond posterior margin of subgenital plate; not curving significantly inward before apices; shoulders subtle; at mid-length cerci than at apices; flattened lateromedially, apices triangular and tapered to point, with blackened apical margins.

Male internal features* (fig. 44).—Phallic complex*. Aedeagal valves moderately narrowed, with moderate openings; valves of moderate length (fig. 44 A, D); in lateral view, margin of region bridging zygoma of cingulum and distal portion of aedeagal sheath deeply concave; lateral sclerites of cingulum triangular (fig. 44 B, E); distal and basal portions of aedeagal sheath with area of sclerotized papillae, more extensive on distal portion; distal portion of aedeagal sheath with strongly thickened and widened apices that expand laterally; distal and basal portions of aedeagal sheath uniformly and continuously sclerotization; in posterior view, rami of cingula narrower than distal portion of aedeagal sheath; basal portions of aedeagal sheath project upward with wide open curve outward toward apices of distal portion of sheath (fig. 44 C, F); in posterior view, two distinctive lobes visible on lateral surfaces of valves, lobes projecting dorsolaterally immediately posterior to distal portion of valves. *Epiphallus*. Lobes rounded distally; in dorsal view, bridge thickened and curved, without medial apodeme; epiphallic lateral sclerites extremely small (fig. 44 G, H).

Etymology.—Named to honor Dr. John S. LaPolla, dedicated myrmecologist, husband and father.

***Distribution* (fig. 4).—**This species was collected in mid-November, near Klondyke (east of Warm Bokkeveld, north of Hexrivierberge), within the fynbos biome, near the margin of the succulent karoo biome. In Cape Town, the closest large city, the 30-year average (1961-1990) monthly rainfall for November was 14mm, the greatest average monthly rainfalls being: 69mm in May, 93mm in June, 82mm in July, and 77mm in August (SAWS, 2009). The full range of this species remains to be determined. *E. lapollai* is thought to be sympatric with *E. mayi*.

Discussion.—Within the *cederbergensis* species-group, *E. lapollai* most closely resembles *E. umoja* because they share some external morphological characteristics including: 1) flattened, pointed cerci that do not bend medially inward, with blackened apical margins; 2) prozona with two secondary sulci (one weakly cutting lateral lobe, other weakly cutting dorsal field between medial and lateral carinae), metazona with deep secondary sulcus cutting medial and lateral carinae, dorsal field and lateral lobe; 3) four-banded tegmen, with similar coloration, margins and mottling; 4) orange hind femur, tibiae and tarsi. Though *E. lapollai* and *E. umoja* share multiple external morphological similarities, the phallic complexes of *E. lapollai* and *E. umoja* are very distinct.

To distinguish between *E. lapollai* and *E. umoja* the following morphological features should be examined: 1) cerci of *E. lapollai* have more acutely triangular apices, *E. umoja* cerci apices more blunt; 2) rami of cingulum and aedeagal sheath sculptured differently, *E. lapollai* with distal portion of aedeagal sheath same width as rami of cingulum, and *E. umoja* with distal portion of aedeagal sheath smaller than width of rami of cingulum; 3) in posterior view, two distinctive lobes visible on lateral surfaces of valves of *E. lapollai*, projecting dorsolaterally immediately posterior to distal portion of valves, but in *E. umoja*, valves narrowed immediately posterior to their apices, from which fleshy membrane flares outward (trumpet-like).

16. ***Euloryma tsitsikamma*, sp. nov.**
male figures: 45, 46; female figure: 60

Holotype male, SOUTH AFRICA: Eastern Cape Province; 11 miles W of Kareedouw, (near) Langkloof, 18.xi.1958 (H.D. Brown) (ANSP); from the same location: 4 paratype males, 1 paratype female (SANC) (ANSP) (SAMC). SOUTH AFRICA: Eastern Cape Province; 10 miles W of Kareedouw, Langkloof, 18.xi.1958, (H.Dick Brown), 3 paratype males, 4 paratype females (SANC) (ANSP) (SAMC) (BMNH). The holotype is labeled as LAS TYPE #15.

Diagnosis of Male.—From W of Kareedouw, Eastern Cape; metazona with secondary sulcus cutting dorsal field, lateral carinae and lateral lobe; tegmen with four areas of coloration; posterior femora, knees, tibiae and tarsi with orange, anterior tibiae with mottled brown-black; cerci flattened lateromedially and do not curve medially before apices, apices broadly expanded with a straight, vertical edge and with apical margins distinctly blackened; aedeagal valves long and wide with moderate openings; no medial apodeme on epiphallus bridge.

Compare with.—*E. waboom*, *E. solveigae, E. larsenorum*

Description.—*Body length*. Medium-sized species; male type 18.82 mm; female type 24.59 mm. *Body coloration*. Male specimens, known only from dried museum material, mostly black with yellow-cream banding. Female specimens, known only from dried museum material, mostly black with yellow-cream banding; apices of recurved ovipositor valves black. Males and females have same leg coloration.

Male external features* (fig. 45).—Head and Pronotum*. Band across apex of eye margin; occipital band with upper margin diffuse and mottled, lower margin distinct; genal band with upper margin distinct, lower margin distinct with minimal mottling; pronotal band of lateral carinae very thin with mottled margins; lateral lobe band distinct, cut by primary sulcus. Metazona with

secondary sulcus of dorsal field, cutting lateral carinae (not medial carinae) and lateral lobe. Posteroventral margin of lateral lobe moderately angled ventrally, highlighted cream; posterior margin of dorsal field weakly emarginate medially.

Meso- and Metathorax. Mesepisternum and metepisternum each with distinct cream band, mesepimeron with mottled black; pleural sulcus black. *Wing*. Tegmina oval, approximately twice as long as wide; tegmen banding: i. mottled black-brown; ii. distinct black, dorsal margin diffuse; iii. distinct white-cream, slightly widened and mottled at ventral apical margin; iv. distinct black, becomes mottled apically *Hind legs*. Hind femur length to width ratio 3.70; margin of upper carinula and medial area mottled black; margin of lower carinula without black; posterior femora, knees, tibiae and tarsi with orange, anterior tibiae with additional subtle mottled brown-black; posterior tibiae with approximately 9-10 outer and 10 inner spines, all with black apices.

Abdomen. Abdominal medial and lateral bands mottled black and extending to supra-anal plate; supra-anal plate faint orange. *Cerci*. Approximately same length as supra-anal plate, extending slightly beyond margin of subgenital plate; not curving significantly inward before apices; shoulders subtle; at mid-length thinner than at apices, flattened lateromedially, broadly expanded apically; apical margins distinctly blackened, with straight, nearly vertical edge.

Male internal features* (fig. 46).—Phallic complex*. Aedeagal valves wide, with moderate openings; valves long (fig. 46 A, D); in lateral view, margin of region bridging zygoma of cingulum and distal portion of aedeagal sheath with deep narrowly U-shaped concavity in lateral view; lateral sclerites of cingulum triangular (fig. 46 B, E); distal and basal portions of aedeagal sheath with area of sclerotized papillae; distal portion of aedeagal sheath with strongly thickened apices expanded laterally, with larger area of sclerotized papillae, basal sheath with fewer sclerotized papillae; distal and basal portions of aedeagal sheath uniformly and continuously sclerotized; in posterior view, rami of cingula narrower than distal portion of aedeagal sheath; basal portions of aedeagal sheath widely divergent, projecting upward opening smooth outward curve toward apices of distal portion of sheath (fig. 46 C, F); in posterior view, aedeagal valves with two small lateral lobes; sclerotized spots on soft tissue near ventral valve apices. *Epiphallus*. Lobes relatively narrow, rounded distally; in dorsal view, bridge thickened, curved and without medial apodeme; epiphallic lateral sclerites assumed very small (lost in dissections) (fig. 46 G, H).

Etymology.—On a suggestion from H. Dick Brown, the collector, this species is named *E. tsitsikamma* for the mountainous, biotically diverse Tsitsikamma region of South Africa.

***Distribution* (fig. 5).—**This species was collected in mid-November, west of Kareedouw (in Langkloof), within the fynbos biome. The full range of this species remains to be determined. Though not determined to be sympatric, the known range of *E. tsitsikamma* is close to that of *E. solveigae*.

Discussion.—Within the *cederbergensis* species-group, *E. tsitsikamma* has unique boot-shaped cerci. However, the internal genitalia of *E. tsitsikamma* most closely resemble those of *E. waboom*, *E. solveigae* and *E. larsenorum*, suggesting that all these species may be closely related. The internal morphological characteristics that they all share include: 1) triangular sclerites of the cingulum; 2) in lateral view, a U-shaped region bridging the zygoma and distal portion of aedeagal sheath; 3) aedeagal valves that are anteroposteriorly flattened, appearing thinner in lateral view, wider in posterior view; 4) a similar pattern of width variation of the circumference of the distal portion of the aedeagal valves; 5) a similar pattern of sculpturing of the cingulum and basal and distal portions of the aedeagal sheath.

To distinguish *E. tsitsikamma* from *E. waboom*, *E. solveigae,* and *E. larsenorum*, the following morphological features should be examined: 1) cerci of *E. tsitsikamma* are unique, boot-shaped and with very blackened apical margins, whereas the other species have rounded flattened spatulate cerci with little or no black along apical margins; 2) in lateral view in *E. tsitsikamma* the distance from the base of the ectophallus to the arch of aedeagus is only about half as long as the distance from the arch of aedeagus to the apex of the aedeagal valves

(0.5:1), whereas corresponding length ratios are notably greater for *E. waboom*, *E. solveigae* and *E. larsenorum,* i.e., 1:1, 1:1, and 1:0.5 respectively; 3) in posterior view, the rami of the cingulum and distal portion of the aedeagal sheath are equally wide in *E. tsitsikamma* and *E. waboom*, but are significantly wider than the distal portion of the aedeagal sheath in *E. solveigae* and *E. larsenorum*; 4) in posterior view, the sculpturing of the apices of the aedeagal valves is different in each species.

17. ***Euloryma waboom*, sp. nov.**
male figures: 47, 48

Holotype male, SOUTH AFRICA: Western Cape Province; Swartberg Pass, (S of Prince Albert), 11.xii.1961 (H.D. Brown, W. Fürst, F. Pick) (ANSP); from the same location: 3 paratype male (ANSP). No females collected. The holotype is labeled as LAS TYPE #16.

Diagnosis of Male.—From Swartberg Pass S of Prince Albert, Western Cape; prozona and metazoan of dorsal field each with very weak secondary sulcus between medial and lateral carinae, medial and lateral carinae not cut by sulci; tegmen with four areas of coloration; posterior femora, knees, tibiae and tarsi with orange, anterior tibiae with additional subtle mottled brown-black; cerci broadly expanded spatulate, flattened lateromedially and not curving medially before apices; aedeagal valves of moderate length and wide, with moderate openings; no medial apodeme on epiphallus bridge.

Compare with.—*E. solveigae* and *E. larsenorum* (cerci and genitalia)*, E. tsitsikamma* (genitalia)

Description.—*Body length*. Medium-sized species; male type 18.25 mm. *Body coloration*. Male specimens, known only from dried museum material, mostly black with yellow-cream banding.

Male external features* (fig. 47).—Head and Pronotum*. Band across apex of eye margin; occipital band wide with upper margin diffuse and mottled, lower margin distinct; genal band with upper margin distinct, lower margin distinct with minimal mottling; pronotal band of lateral carinae with very thin mottled margins; lateral lobe band distinct, cut by primary sulcus. Prozona and metazona each with very weak secondary sulcus between medial and lateral carinae of dorsal field; medial and lateral carinae not cut by sulci. Posteroventral margin of lateral lobe moderately angled ventrally and highlighted with mottled cream; posterior margin of dorsal field weakly emarginate medially.

Meso- and Metathorax. Mesepisternum with diffuse cream band, mesepimeron with mottled black; pleural sulcus black; metepisternum with distinct cream band. *Wing*. Tegmina oval, less than twice as long as wide; tegmen banding: i. mottled brown; ii. mottled black, dorsal margin diffuse; iii. distinct white-cream, slightly widened mid-length, mottled at ventral apical margin; iv. distinct but thin black, mottled along dorsal margin. *Hind legs*. margin of upper carinula and medial area with mottled black, medial area with two cream patches; margin of lower carinula without black; posterior femora, knees, tibiae and tarsi with orange, anterior tibiae with additional subtle mottled brown-black; posterior tibia with approximately 10 outer and 10 inner spines, all with black apices.

Abdomen. Abdominal medial and lateral bands mottled black, extending to supra-anal plate; supra-anal plate and cerci orange. *Cerci*. Approximately same length as supra-anal plate, not extending beyond posterior margin of subgenital plate; not curving significantly inward before apices; shoulders subtle; at mid-length wider than pointed apices, although cerci further widen 2/3 length; cerci remain flattened lateromedially, broadly expanded; apices of cerci tapered, spatulate.

Male internal features* (fig. 48).—Phallic complex*. Aedeagal valves wide, moderate openings; valves of moderate length (fig. 48 A, D); in lateral view, margin of region bridging zygoma of cingulum and distal portion of aedeagal sheath deeply concave, U-shaped; lateral sclerites of cingulum acutely triangular (fig. 48 B, E); distal and basal portions of aedeagal sheath with areas

of sclerotized papillae; distal portion of aedeagal sheath with strongly thickened apices expanding laterally, with larger area of sclerotized papillae, the than basal sheath; distal and basal portions of aedeagal sheath with uniform and continuous distribution of sclerotization; in posterior view, rami of cingula approximately same width as distal portion of aedeagal sheath; basal portions of aedeagal sheath project upward with wide open more V-shaped curve outward toward apices of distal portion of sheath (fig. 48 C, F); in posterior view, valves narrow immediately posterior to apices of aedeagal valves. *Epiphallus*. Lobes more-or-less triangular; in dorsal view, bridge curved, without medial apodeme; epiphallic lateral sclerites assumed to be small (lost in dissections) (fig. 48 G, H).

Etymology.—Named *E. waboom* after the adjacent Waboomsberg peak within the Groot Swartberge of the Western Cape.

***Distribution* (figs. 4 and 5).—**This species was collected in mid-December, in Swartberg Pass of Groot Swartberge, within the fynbos biome. The full range of this species remains to be determined. *E. waboom* is confirmed sympatric with *E. magna*.

Discussion.—Putative relatives of *E. waboom* are *E. tsitsikamma*, *E. solveigae* and *E. larsenorum* given the morphological characteristics they share. In particular, the cerci of *E. waboom* is most similar to that of *E. solveigae* and *E. larsenorum*. Refer to the discussion section of *E. tsitsikamma* for distinguishing characteristics of these four species.

18. *Euloryma solveigae*, sp. nov.
male figures: 49, 50

Holotype male, SOUTH AFRICA: Eastern Cape Province; 10 miles SE Clarkson, (near) Humansdorp. 19.xi.1958 (H.D. Brown) (ANSP); from the same location: 2 paratype males (SANC) (ANSP). No females collected. The holotype is labeled as LAS TYPE #17.

Diagnosis of Male.—From SE Clarkson vic. Humansdorp, Eastern Cape; prozona of dorsal field with very weak secondary sulcus between medial and lateral carinae, metazona of dorsal field with weak secondary sulcus between medial and lateral carinae; tegmen with four areas of coloration; posterior femora, knees, tibiae and tarsi orange, anterior tibiae with subtle mottled brown-black; cerci flattened lateromedially and curved medially slightly before apices, narrowed slightly at mid-length, widening at 2/3 along length, broadly expanded with rounded tapered apices with blackened dorsoapical margins; aedeagal valves wide with moderate openings and moderate length; no medial apodeme of epiphallus bridge.

Compare with.—*E. waboom* and *E. larsenorum* (cerci and genitalia), *E. tsitsikamma* (genitalia)

Description.—*Body length*. Medium-sized species; male type 18.59 mm. *Body coloration*. Male specimens, known only from dried museum material, mostly black with yellow-cream banding.

Male external features* (fig. 49).—Head and Pronotum*. Band across apex of eye margin; occipital band distinct with upper margin mottled, lower margin distinct; genal band with upper margin distinct, lower margin distinct with minimal mottling posteriorly; pronotal band of lateral carinae distinct; lateral lobe band distinct, cut by primary sulcus. Prozona with very weak secondary sulcus between medial and lateral carinae of dorsal field; metazona with weak secondary sulcus between medial and lateral carinae of dorsal field, in some specimens cutting lateral carinae. Posteroventral margin of lateral lobe moderately angled ventrally, highlighted mottled cream-brown; posterior margin of dorsal field moderate to strongly emarginate medially.

Meso- and Metathorax. Mesepisternum with diffuse mottled cream band, mesepimeron mottled black-brown with cream; pleural sulcus black; metepisternum with distinct cream band. *Wing*. Tegmina elongate and oval, more than twice as long as wide; tegmen banding: i. mottled brown; ii. mottled black, dorsal margin diffuse, radial vein brown; iii. distinct white-cream; iv. distinct black. *Hind legs*. Hind femur length to width ratio 4.19; margin of upper carinula and medial area mottled black; margin of lower carinula without black; posterior femora, knees, tibiae and tarsi orange, anterior tibiae with additional subtle mottled brown-black; posterior tibia with approximately 10 outer and 10 inner spines, all with black apices.

Abdomen. Abdominal medial and lateral bands mottled black and extending onto supra-anal plate. Tergite-X, supra-anal plate and cerci orange. *Cerci*. Approximately same length as supra-anal plate, not extending beyond posterior margin of subgenital plate; curving medially slightly before apices; shoulders subtle; narrowing slightly at mid-length, widening at 2/3 length, then tapering slightly apically; cerci flattened lateromedially, broadly expanded with rounded apices with blackened dorsoapical margins.

Male internal features* (fig. 50).—Phallic complex*. Aedeagal valves wide, moderate openings; valves of moderate length (fig. 50 A, D); in lateral view, region bridging zygoma of cingulum and distal portion of aedeagal sheath deeply concave, shallowly U-shaped in lateral view; lateral sclerites of cingulum acutely triangular (fig. 50 B, E); distal and basal portions of aedeagal sheath with area of sclerotized papillae; distal portion of aedeagal sheath with thickened apices, moderately expanded laterally, with larger area of sclerotized papillae than on basal sheath; distal and basal portions of aedeagal sheath with uniform, continuous sclerotization; in posterior view, rami of cingula approximately 1.4x as wide as distal portion of aedeagal sheath; basal portions of aedeagal sheath project upward with moderately open V-shaped curve outward toward apices of distal portion of sheath (fig. 50 C, F); in posterior view, valves slightly narrowed, hen immediately expanded posterior to their apices. *Epiphallus*. Lobes generally narrow, rounded; in dorsal view, bridge thickened and curved, without medial apodeme; epiphallic lateral sclerites small (fig. 50 G, H).

Etymology.—Named to honor Solveig Otte, medical technologist, author, and dedicated humanitarian whose crucial community work with underserved South Africans with HIV and AIDS is inspiring.

***Distribution* (fig. 5).—**This species was collected in mid-November, southeast of Clarkson near Humansdorp, within the fynbos biome. The type collection site is south of Kareedouwberge in the Tsitsikamma region. The full range of this species remains to be determined. Though not determined to be sympatric, the known range of *E. solveigae* is closest to that of *E. tsitsikamma*.

Discussion.—Putative relatives of *E. solveigae* are *E. tsitsikamma*, *E. waboom*, and *E. larsenorum* given the morphological characteristics they share. In particular, the cerci of *E. solveigae* is most similar to that of *E. waboom* and *E. larsenorum*, and the sculpturing and proportions of the cingulum and aedeagal sheath in posterior view of *E. solveigae* is most similar to *E. larsenorum*. Refer to the discussion section of *E. tsitsikamma* for distinguishing characteristics of these four species.

19. *Euloryma larsenorum*, sp. nov.
male figures: 51, 52, 64

Holotype male, SOUTH AFRICA: Western Cape Province; N of Somerset West, S of Helderberg, S 34°03.833', E 018°52.453', 1.xi.2007 (D. Otte, E. Rohwer), Otte loc.code: 07-14B, spec.code DL050 and DL051 (ANSP); from the same location: 4 paratype males (SANC) (ANSP) (SAMC). The holotype is labeled as LAS TYPE #18.

Diagnosis of Male.—From N of Somerset West, S of Helderberg, Western Cape; prozona of lateral lobe with weak, broken secondary sulcus, metazona of dorsal field with weak secondary sulci between medial and lateral carinae, and metazona of lateral lobe with secondary sulci; tegmen with four areas of coloration; posterior femora, knees, tibiae and tarsi with orange-red; cerci flattened lateromedially, broadly expanded, with rounded apices slightly curve medially; aedeagal valves wide and moderate in length to short, with moderate openings; no medial apodeme on epiphallus bridge.

Compare with.—*E. waboom* and *E. solveigae* (cerci and genitalia), *E. tsitsikamma* (genitalia)

Description.—*Body length*. Medium-sized species; male type 18.26 mm. *Body coloration*. Male specimens, known from dried museum material and field photography (fig. 64), mostly black with yellow-cream banding.

Male external features* (fig. 51).—Head and Pronotum*. Band across apex of eye margin; occipital band distinct with upper margin mottled, lower margin distinct; genal band with upper margin distinct, lower margin distinct with minimal mottling posteriorly; pronotal band of lateral carinae distinct with upper margin mottled; lateral lobe band distinct and cut by primary sulcus. Prozona with weak, broken secondary sulcus of lateral lobe; metazona with two secondary sulci, a weak sulcus between medial and lateral carinae of dorsal field that weakly cuts medial carinae, and second on lateral lobe. Posteroventral margin of lateral lobe strongly angled ventrally and highlighted with mottled cream; posterior margin of dorsal field weakly to moderately emarginate medially.

Meso- and Metathorax. Mesepisternum with distinct cream band, mesepimeron with mottled black and cream; pleural sulcus black; metepisternum with distinct cream band. *Wing*. Tegmina oval, twice as long as wide; tegmen banding: i. blended mottled cream to mottled brown; ii. black, dorsal margin diffuse; iii. distinct yellow-cream; iv. distinct black, apical margin highlighted cream. *Hind legs*. Hind femur length to width ratio 3.65; margin of upper carinula and medial area with broken gray, very little if any black; margin of lower carinula without black; posterior femora, knees with orange; tibiae and tarsi with bright orange-red; posterior tibia with approximately 10 outer and 10 inner spines, all with black apices.

Abdomen. Abdominal medial and lateral bands mottled black with white-cream highlights between bands, extending to tergite-X; orange on supra-anal plate, subgenital plate and cerci. *Cerci*. Shorter than supra-anal plate, not extending beyond posterior margin of subgenital plate; curving slightly medially before apices; shoulders subtle; narrowing slightly at 1/3 length, widening dramatically at 2/3 length, then tapering dorsomedially toward apex. Cerci flattened lateromedially, broadly expanded with rounded apices.

Male internal features* (fig. 52).—Phallic complex*. Aedeagal valves wide, moderate openings; valves moderate in length to short (fig. 52 A, D); in lateral view, region bridging zygoma of cingula and distal portion of aedeagal sheath deeply concave, shallowly U-shape in lateral view; lateral sclerites of cingulum triangular (fig. 52 B, E); distal and basal portions of aedeagal sheath with area of sclerotized papillae; distal portion of aedeagal sheath with thickened apices expanded slightly laterally, with larger area of sclerotized papillae, than on basal sheath; distal and basal portions of aedeagal sheath have uniform and continuous sclerotization; in posterior view, rami of cingula approximately 1.5x as wide as distal portion of aedeagal sheath; basal portions of aedeagal sheath projecting upward with gentle open V-shaped curve outward toward apices of distal portion of sheath (fig. 52 C, F); in posterior view, valves appear narrowest immediately posterior to apices of valves. *Epiphallus*. Lobes narrow but rounded; in dorsal view, bridge thickened, moderately curved, without a medial apodeme; epiphallic lateral sclerites elongate and flattened (fig. 52 G, H).

Etymology.—Named *E. larsenorum* to honor the Larsen family of Cape Town. The contributions and dedication of Dawn Larsen to the collections of the Iziko South African Museum Entomology Department is greatly appreciated and essential to researchers around the World. Dawn, Norman, and Nikki, my little South African family, have for decades helped and taken a personal interest in those who seek to learn and study the fascinating terrestrial invertebrates of South Africa.

***Distribution* (fig. 4).—**This species was collected in early November, near Somerset West and south of Helderberg, within the fynbos biome. The full range of this species remains to be determined. *E. larsenorum* is confirmed sympatric with *E. umoja*.

Discussion.—Putative relatives of *E. larsenorum* are *E. tsitsikamma*, *E. waboom*, and *E. solveigae* given the morphological characteristics they share. In particular, the cerci of *E. larsenorum* is most similar to that of *E. waboom* and *E. solveigae*, and the sculpturing and proportions of the cingulum and aedeagal sheath in posterior view of *E. larsenorum* is most similar to *E. solveigae*.

Refer to the discussion section of *E. tsitsikamma* for distinguishing characteristics of these four species.

20. ***Euloryma umoja*, sp. nov.**
male figures: 53, 54, 64

Holotype male, SOUTH AFRICA: Western Cape Province; N of Somerset West, S of Helderberg, S 34°03.833', E 018°52.453', 1.xi.2007 (D. Otte, E. Rohwer), Otte loc.code: 07-14B, spec. code DL064 (ANSP); from the same location: 3 paratype males (SANC) (ANSP) (SAMC). The holotype is labeled as LAS TYPE #19.

Diagnosis of Male.— From N of Somerset West, S of Helderberg, Western Cape; prozona of lateral lobe with weak broken secondary sulci, prozona of dorsal field with weak secondary sulcus, metazona secondary sulcus cuts medial and lateral carinae of dorsal field, extending onto lateral lobe; tegmen with four areas of coloration; posterior femora, knees, tibiae and tarsi with orange; cerci flattened lateromedially and curve very little medially before apices with blackened apical margins; aedeagal valves moderately wide and long with moderate openings; no medial apodeme on epiphallus bridge.

Compare with.—*E. lapollai* (cerci), *E. lyra* and *E. ottei* (genitalia)

Description.—*Body length*. Medium-sized species; male type 16.24 mm. *Body coloration*. Male specimens, known from dried museum material and field photography (fig. 64), mostly black and gray-brown with cream banding.

Male external features* (fig. 53).—Head and Pronotum*. Band across apex of eye margin; band on ecdysial line diffuse and mottled; occipital band diffuse with upper margin mottled, lower margin more distinct; genal band with upper margin distinct, lower margin distinct with minimal mottling posteriorly; pronotal band of lateral carinae distinct with upper margin mottled, lower margin distinct; lateral lobe band distinct and cut by primary sulcus. Prozona with two secondary sulci, weak broken sulcus of lateral lobe and weak sulcus of dorsal field; metazona secondary sulcus cuts medial and lateral carinae of dorsal field, extends onto lateral lobe. Posteroventral margin of lateral lobe moderate to strongly angled ventrally and highlighted cream; posterior margin of dorsal field moderately emarginate medially.

Meso- and Metathorax. Mesepisternum with distinct cream band, mesepimeron with mottled cream and black; pleural sulcus black; metepisternum with distinct cream band. *Wing*. Tegmina oval, less than twice as long as wide; tegmen banding: i. blended mottled cream to mottled brown-black; ii. distinct black, dorsal margin diffuse, radial vein brown-cream; iii. distinct yellow-cream; iv. distinct black, apical margin highlighted cream. *Hind legs*. Hind femur length to width ratio 3.58; margin of upper carinula and medial area with mottled black and gray, medial area with two patches of white-cream; margin of lower carinula without black; posterior femora, knees, tibiae and tarsi with orange; posterior tibia with approximately 11 outer and 10 inner spines, all with black apices.

Abdomen. Abdominal medial and lateral bands mottled black with white-cream mottled highlights between bands, extending to supra-anal plate. *Cerci*. Longer than supra-anal plate, not extending beyond posterior margin of subgenital plate; cerci curving very little medially before apices; shoulders moderate; narrowing slightly for most of length, widening slightly at 3/4 length before tapering dorsomedially toward apex; flattened lateromedially, with blackened apical margins.

Male internal features* (fig. 54).—Phallic complex*. Aedeagal valves moderately wide, moderate openings; valves long (fig. 54 A, D); in lateral view, region bridging zygoma of cingulum and distal portion of aedeagal sheath deeply concave, V-shaped in lateral view; lateral sclerites of cingulum broadly triangular (fig. 54 B, E); distal and basal portions of aedeagal sheath with area of sclerotized papillae; distal portion of aedeagal sheath with thickened apices, moderately expanded laterally, with larger area of sclerotized papillae than on basal sheath; distal and basal portions

of aedeagal sheath with uniform and continuous sclerotization; in posterior view, rami of cingula a little wider than distal portion of aedeagal sheath; basal portions of aedeagal sheath project upward with gentle open V-shaped curve outward toward apices of distal portion of sheath (fig. 54 C, F); in posterior view, valves narrowest immediately posterior to apices of valves; apices of valves with fleshy membrane flaring outward, trumpet-like); scattered sclerotized papillae on posterior surface of membranous tissue of ventral valve. *Epiphallus*. Lobes rounded; in dorsal view, bridge thickened and gently curved, without medial apodeme; epiphallic lateral sclerites very small (fig. 54 G, H).

Etymology.—The specific epithet *umoja* is Swahili for "unity" and the name of an all-female village founded on principles of women's rights. This species is named to honor two inspiring and resilient South African women, Susan Swart and Brona Nomangesi Magwa, dear friends whose love and support made my time in South Africa a deeply personal, unforgettable experience.

***Distribution* (fig. 4).—**This species was collected in early November, near Somerset West and south of Helderberg, within the fynbos biome. The full range of this species remains to be determined. *E. umoja* is confirmed sympatric with *E. larsenorum*.

Discussion.—The external male morphology of *E. umoja* most closely resembles that of *E. lapollai*. The internal male genitalia most closely resemble that of *E. lyra* and *E. ottei*. Refer to the discussion sections of both *E. lapollai* and *E. lyra* for distinguishing characteristics of these species.

21. ***Euloryma lyra*, sp. nov.**
male figures: 55, 56, 65; female figures: 60, 65

Holotype male, SOUTH AFRICA: Western Cape Province; S of Kwaggaskloofdam, S 33°47.373', E019°27.043', 11.xi.2007 (D. Otte, E. Rohwer), Otte loc.code 07-53, spec.code DL024 (ANSP); from the same location: 2 paratype females (ANSP). The holotype is labeled as LAS TYPE #20.

Diagnosis of Male.—From S of Kwaggaskloofdam, Western Cape; prozona of dorsal field with very weak secondary sulcus, prozona of lateral lobe with weak secondary sulcus, metazona with secondary sulci cutting medial and lateral carinae of dorsal field, extending onto lateral lobe; tegmen with four areas of coloration; posterior femora, knees, tibiae and tarsi with cream color; cerci flattened lateromedially, almost rectangular and curving very little medially before apices, prominently blackened dorsal and posterior apical margins; aedeagal valves very wide and long with large openings; no medial apodeme on epiphallus bridge.

Compare with.—*E. umoja* and *E. ottei* (genitalia), *E. mirabunda* and *E. cederbergensis* (cerci)

Description.—*Body length*. Medium-sized species; male type 16.84 mm; female type 20.91 mm. *Body coloration*. Male specimens, known from dried museum material and field photography (fig. 65), mostly black and gray-brown with cream banding. Female specimens, known from dried museum material and field photography (fig. 65), black, brown and gray with cream; some female specimens with color variation, orange pigmentation on dorsal surfaces of head, pronotum, abdomen and upper marginal area of femur; apices of recurved ovipositor valves black. Males and females generally with same leg coloration, although the latter highly variable (for the females especially, see live field photography in fig. 65).

Male external features* (fig. 55).—Head and Pronotum*. Band across apex of eye margin; band on ecdysial line very diffuse and mottled; occipital band diffuse with upper margin mottled, lower margin more distinct; genal band with upper margin distinct, lower margin distinct with minimal mottling posteriorly; pronotal band of lateral carinae diffuse and narrowed, with upper margin mottled, lower margin distinct; lateral lobe band distinct and cut by primary sulcus. Prozona with two secondary sulci, very weak sulcus of dorsal field and weak sulcus of lateral lobe; metazona with secondary

sulcus cutting medial and lateral carinae of dorsal field, extending onto lateral lobe. Posteroventral margin of lateral lobe moderately angled ventrally and highlighted with cream; posterior margin of dorsal field strongly emarginate medially.

Meso- and Metathorax. Mesepisternum with distinct cream-gray band, and mesepimeron with more mottled cream-gray band; pleural sulcus black; metepisternum with distinct cream band. *Wing*. Tegmina oval, approximately twice as long as wide. Tegmen banding: i. mottled brown and black; ii. black, dorsal margin diffuse, radial vein brown; iii. distinct yellow-cream, wider at apex than base, with slight mottling at apex; iv. distinct black. *Hind legs*. Hind femur length to width ratio 3.62; margin of upper carinula and medial area with very little broken brown to gray, medial area with two faint white-cream patches; margin of lower carinula without black; posterior femora, knees, tibiae and tarsi with cream color; posterior tibia with approximately 10 outer and 10 inner spines, all with black apices.

Abdomen. Abdominal medial and lateral bands mottled black with white-cream, mottled highlights between bands; bands extending to supra-anal plate. *Cerci*. Longer than supra-anal plate, extending beyond posterior margin of subgenital plate; curving very little medially before apices; shoulders of cerci nearly absent; of uniform width for most of length, tapering slightly toward apex for last 1/3 of length; flattened lateromedially, almost rectangular, with prominently blackened dorsal and posterior apical margins.

Male internal features* (fig. 56).—Phallic complex*. Aedeagal valves very wide, large openings; valves long (fig. 56 A, D); in lateral view, region bridging zygoma of cingulum and distal portion of aedeagal sheath deeply concave, broadly V-shape in lateral view; lateral sclerites of cingulum roughly triangular (fig. 56 B, E); distal and basal portions of aedeagal sheath with area of sclerotized papillae; distal portion of aedeagal sheath with thickened apices expanded laterally, with larger area of sclerotized papillae than on basal sheath; apices of distal sheath curling outward and forward, appearing bi-lobed in posterior view; distal and basal portions of aedeagal sheath with uniform and continuous distribution of sclerotization; in posterior view, rami of cingula 1.2x as wide as distal portion of aedeagal sheath; basal portions of aedeagal sheath project upward and outward with gentle hour-glass shaped curve toward apices of distal portion of sheath (fig. 56 C, F); in lateral view (less visible in posterior view), valves narrowed immediately posterior to apices of valves, with fleshy membrane flaring outward broadly (trumpet-like); scattered sclerotized papillae on posterior surface of membranous tissue of ventral valve. *Epiphallus*. Lobes rounded, elongate; in dorsal view bridge very thickened and curved, without medial apodeme; epiphallic lateral sclerites assumed to be very small (lost in dissections) (fig. 56 G, H).

Etymology.—The specific epithet *lyra* is Greek for lyre or harp, in reference to the lovely shape created by the cingulum and aedeagal sheath together in posterior view.

***Distribution* (fig. 4).—**This species was collected in mid-November, south of Kwaggaskloofdam, within the fynbos biome. The type collection site is north of Hammansberg in the Breëriviervallei. In Cape Town, the closest large city, the 30-year average (1961-1990) monthly rainfall for November was 14mm, the greatest average monthly rainfalls being: 69mm in May, 93mm in June, 82mm in July, and 77mm in August (SAWS, 2009). The full range of this species remains to be determined.

Discussion.—Within the *cederbergensis* species-group, *E. lyra* has cerci that are most similar to *E. mirabunda* and *E. cederbergensis* because of their more rectangular shape. However, the internal genitalia of *E. lyra* most closely resembles that of *E. umoja* and *E. ottei*, which might suggest that these species are closely related. The internal morphological characteristics that they all share include: 1) moderately triangular sclerites of cingulum; 2) in lateral view, very similar region bridging zygoma and distal portion of aedeagal sheath; 3) aedeagal valves with large sometimes flared or trumpet-like apices; 4) similar pattern of sculpturing of the cingulum and basal and distal portions of the aedeagal sheath (in posterior view appearing harp-shaped), with cingulum wider

than the distal portion of the aedeagal sheath, sclerotization of the basal and distal portions of the aedeagal sheath forming an open U-shape, and the distal portion of the aedeagal sheath thickened, sometimes expanding and curling outward.

To distinguish *E. lyra* from *E. umoja* and *E. ottei*, the following morphological features should be examined: 1) cerci of *E. ottei* are unique having a dog-eared shape, whereas *E. lyra* and *E. umoja* have flattened spatulate cerci without any medial folding before apices; 2) in posterior view, the distal portion of the aedeagal sheath of *E. lyra* has two areas of lateral expansion, whereas *E. umoja* has only one such area, and *E. ottei* has the least lateral expansion and lateral outward curl of the distal sheath; 4) in lateral view, the aedeagal valves of *E. umoja* appear narrow and pinched inward before the apices, whereas *E. lyra* and *E. ottei* have aedeagal valves that maintain an even width and diameter for their length until the fleshy apices that flare outward (to greatest degree with *E. lyra*).

22. *Euloryma ottei*, sp. nov.

male figures: 57, 58, 65; female figure: 60

Holotype male, SOUTH AFRICA: Western Cape Province; along R46 S of Tulbagh, S 33°19.800', E019°09.572', 10.xi.2007 (D. Otte, E. Rohwer), Otte loc.code 07-50, spec.code DL006 (ANSP). SOUTH AFRICA: Western Cape Province; OudePost 15 miles NNW of Malmesbury, 9.ix.1967, (H.D. Brown); from the same location: 10 paratype males, 4 paratype females (SANC) (ANSP) (SAMC) (BMNH). The holotype is labeled as LAS TYPE #21.

Diagnosis of Male.—From S of Tulbagh and NNW of Malmesbury, Western Cape; prozona of lateral lobe with weak secondary sulcus, prozona of dorsal field with very weak secondary sulcus of dorsal field, metazona with secondary sulcus cutting medial and lateral carinae of dorsal field, extending onto lateral lobe; tegmen with four areas of coloration; posterior femora and knees with faint orange, majority of tibiae and tarsi with cream color, ventral surface of posterior tibiae with patch of black-gray; cerci flattened and abruptly folded nearly 45° medially at 1midlength, appearing dog-eared, with blackened apical margins; aedeagal valves long and extremely wide, extremely large openings; no medial apodeme on epiphallus bridge.

Compare with.—*E. lyra, E. umoja*

Description.—*Body length*. Medium-sized species; male type 15.94 mm; female type 19.07 mm. *Body coloration*. Male specimens, known from dried museum material and field photography (fig. 65), mostly black-brown with cream banding. Female specimens, known only from dried museum material, mostly black-brown with cream colored banding; tips of the recurved ovipositor valves black-brown. Males and females have same leg coloration.

Male external features* (fig. 57).—Head and Pronotum*. Band across apex of eye margin; occipital band diffuse with upper margin mottled, lower margin more distinct; genal band with upper margin distinct, lower margin distinct, tapering posteriorly; pronotal band of lateral carinae diffuse and narrowed, upper margin mottled, lower margin distinct; lateral lobe band distinct, cut by primary sulcus. Prozona with two secondary sulci, weak sulcus of lateral lobe and very weak sulcus of dorsal field; metazona with secondary sulcus that cuts medial and lateral carinae of dorsal field, extending onto lateral lobe. Posteroventral margin of lateral lobe moderate to strongly angled ventrally, highlighted with cream; posterior margin of dorsal field strongly emarginate medially.

Meso- and Metathorax. Mesepisternum with distinct cream band, mesepimeron with mottled cream-gray band; pleural sulcus black; metepisternum with distinct cream band. *Wing*. Tegmina oval, a little less than twice as long as wide; tegmen banding: i. mottled cream and brown-black, diffuse ventral margin; ii. black band with dorsal margin diffuse, radial vein brown; iii. distinct yellow-cream, wider at apex than base, with moderate mottling at apex; iv. distinct black, mottled apex. *Hind legs*. Hind femur length to width ratio 3.55; margin of upper carinula and medial area with mottled black-brown and gray, medial area with two patches of cream; margin of lower carinula without black; posterior femora and knees with faint orange; majority of tibiae and tarsi

with cream color, posterior 1/3 of tibiae with patch of black-gray on ventral surface (opposite spines); posterior tibia with approximately 10 outer and 10 inner spines, all with black apices.

Abdomen. Abdominal medial and lateral bands mottled black with cream highlights between bands, extending to supra-anal plate; supra-anal plate and cerci with faint orange. *Cerci*. Approximately same length as supra-anal plate, extending beyond posterior margin of subgenital plate; abruptly folded nearly 45° medially at midlength; shoulders absent; not narrowed before medial fold, then dorsal and ventral margins taper in ventrally oriented triangle toward apex; flattened lateromedially, appearing folded ("dog-eared"), with blackened apical margins.

Male internal features* (fig. 58).—Phallic complex*. Aedeagal valves extremely wide, extremely large openings; valves long (fig. 58 A, D); in lateral view, region bridging zygoma of cingulum and distal portion of aedeagal sheath deeply concave, concavity L-shaped in lateral view; lateral sclerites of cingulum triangular (fig. 58 B, E); distal and basal portions of aedeagal sheath with area of sclerotized papillae; distal portion of aedeagal sheath with broad and thickened apices, moderately expanded laterally, with large area of sclerotized papillae, basal sheath with very few sclerotized papillae; distal and basal portions of aedeagal sheath with uniform and continuous sclerotization; in posterior view, rami of cingula less than twice as wide as distal portion of aedeagal sheath; basal portions of aedeagal sheath project upward with U-shaped curve, then project slightly outward toward apices of distal portion of sheath (fig. 58 C, F); in lateral and posterior view, valves wide throughout distal 1/3 of ectophallus; apices of valves with wide. open fleshy tube-like membrane. *Epiphallus*. Lobes rounded and elongate; in dorsal view, bridge very thickened and curved, without medial apodeme; sclerites very small, rounded and flattened (fig. 58 G, H).

Etymology.—Named to honor Dr. Daniel Otte, world-renowned orthopterist, ultimate campfire czar, mentor, friend.

***Distribution* (fig. 4).—**This species was collected from two locations across multiple months: from mid-September north-northwest of Malmesbury, to mid-October south of Tulbagh (west of Witsenberg, east of Voëlvleiberge). Both collection sites are within the fynbos biome. In Cape Town, the closest large city, the 30-year average (1961-1990) monthly rainfall for September was 40mm and for October was 30mm, the greatest average monthly rainfalls being: 69mm in May, 93mm in June, 82mm in July, and 77mm in August (SAWS, 2009). The full range of this species remains to be determined. Though not determined to be sympatric, the more eastern locality for *E. ottei* is closest to the known range of *E. mayi*.

Discussion.—Within the *cederbergensis* species-group, *E. ottei* has unique dog-eared shaped cerci. The internal male genitalia most closely resembles that of *E. lyra*, and more distantly that of *E. umoja*. Refer to the discussion section of *E. lyra* for distinguishing characteristics of these species.

The *E. ottei* holotype was the solitary specimen collected at the Tulbagh locality in 2007, whereas the 10 male and 4 female paratypes were collected together at a second locality in 1967. Though the holotype was the solitary find at the locality, the specimen is ideal for representing the species because it was photographed live and the dissection revealed that the specimen was an older adult male (collected in November). In contrast to the holotype, all paratype males were found to be slightly younger adult males (collected in September), though they were old enough to identify as being *E. ottei*. Both collection sites, although visited 40 years apart in time, are in the same approximate region of the Western Cape (see fig. 2). In the future, if further fieldwork or museum studies reveal heretofore unseen morphological or genetic features that suggest the paratypes are a different species from the holotype, all paratypes should be considered and kept together.

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TABLE 1. Comparison of morphological features of new *Euloryma* species.

The new *Euloryma* species are clustered in their respective species-groups and then listed in approximate order reflecting internal and external similarity of male morphological features (as it is also presented in the synopsis and species description sections). *Euloryma vittipennis* (1.) is not included in this table because I was unable to do a detailed morphological examination of the type species. All morphological features are from males with the exception of the "size & body length (mm)" column where male (m.) and female (f.) body lengths are given.

Abbreviations: DF=dorsal field; P=prozona; PDF=prozona dorsal field; PLL=prozona lateral lobe; LL=lateral lobe; M=metazona; MDF=metazona dorsal field; MLL=metazona lateral lobe; MC=medial carinae; LC=lateral carinae; PF=posterior femur; K=knee of femur; T=tibia; PT=proximal tibia; MT=mid-length tibia; DT=distal tibia; TR=tarsi; MA=medial apodeme; PC=phallic complex

	Locality	Size & body	Pronotum sculpturing	Hind Leg	Epiphallus length (mm)
2. ***E. ashleyi***	Northern Cape, vic. Kamieskroon	Small sp.; m. 12.62; f. 16.93	PDF very weak 2 sulcus; MDF very weak 2 sulcus; MLL broken 2 sulcus; MC and LC not cut by sulci	K mottled black-brown; PT with brown-black speckling; MT faint blue; DT tibia brown and black	with MA; PC fig. 18
3. ***E. carolynae***	Northern Cape, vic. Nababeep	Small sp.; m. 11.20; f. 14.03	MLL very weak or no 2 sulcus; MC and LC not cut by sulci	PF, K and PT with orange (PT with faint to pronounced brown-black speckling atop orange); MT blue; DT with black	with MA; PC fig. 20
4. ***E. magna***	Northern Cape; Swartberg Pass, S of Prince Albert	Large sp.; m. 24.42; f. 37.94	PDF with 2 sulcus between MC and LC; MC and LC are not cut by sulci	PF faint orange; K, T and TR with orange	with MA; PC fig. 22
5. ***E. browni***	Eastern Cape, vic. Willowmore and Joubertina	Large sp.; m. 23.64; f. 36.07	P and M without secondary sulci; MC and LC not cut by sulci	DF and K with small amount of orange; PT with minute orange-gray; T and TR mostly orange	with MA; PC fig. 24
6. ***E. khoi***	Eastern Cape, in S vic. Willowmore, in E vic. Joubertina	Medium-sized sp.; m. 14.50; f. 22.31	P and M without 2 sulci; MC and LC not cut by sulci	DF and K with small amount of orange; PT mixed orange-gray; T and TR mostly orange	with MA; PC fig. 26
7. ***E. namaqua***	Northern Cape, vic. Kharkans in Namaqualand	Medium-sized sp.; m. 17.76; f. 28.88	PDF with 2 sulci between the MC and LC; M without 2 sulci; MC and LC not cut by sulci; more dorsal portion of P of LL with indentation (male and female)	PF, K, T and TR with dark orange	with MA; PC fig. 28
8. ***E. san***	Northern Cape, vic. Sutherland	Small sp.; m. 13.71; f. unknown	P and M without 2 sulci; MC and LC not cut by sulci	T and TR mostly blue to black (blue PT, black DT)	with MA; PC fig. 30
9. ***E. mayi***	Western Cape, Theronsberg Pass, vic. Ceres	Small sp.; m. 14.63; f. 19.48	PDF with weak 2 sulci between MC and LC; MC and LC not cut by sulci	PF and K with faint orange; T and TR with strong orange	with MA; PC fig. 32
10. ***E. zebrata***	Eastern Cape, vic. Middelberg, Cradock, Graaff-Reinet	Medium-sized sp.; m. 16.10; f. 20.59	PDF with 2 sulci between MC and LC; MC and LC not cut by sulci dissipates;	PF, K and PT with black-brown speckles atop cream; MT speckled coloration DT and TR orange	with MA; PC fig. 34
11. ***E. bonteboki***	Western Cape, vic. Swellendam, S of Montagu	Medium-sized sp.; m. 19.80; f. 26.80	PDF with 2 sulci between MC and LC; PLL with depressions with raised edges just posterior of LC;	PF and K faint orange; PT with faint to moderate black-brown speckles atop variable white-cream; PT and TR MC and LC not cut by sulci bright orange (at MT coloration transitions)	with MA; PC fig. 36

TABLE 1. (continued)

	Locality	Size & body	Pronotum sculpturing	Hind Leg	Epiphallus length (mm)
12. ***E. karoo***	Northern and Western Cape, vic. Kamieskroon, Bitterfontein, Calvinia, Gannaga Pass, Middelpos	Medium-sized sp.; m. 15.73; f. 25.42	PDF with 2 sulci between MC and LC; MC and LC not cut by sulci brown atop orange)	PF and K with faint orange; T and TR with strong orange; (PT possibly with mottled	with MA; PC fig. 38
13. ***E. mirabunda***	Western Cape, vic. Picketberg f. 22.15	Medium-sized sp.; m. 16.58; weakly cutting between MC and LC; M with deep 2 sulci cutting MC, LC, DF and LL	PLL with 2 sulci weakly cutting, PDF with 2 sulci	PF, K, T and TR with faint orange; PT with slight gray mottling	with no MA; PC fig. 40
14. ***E. cederbergensis***	Western Cape, Cederberg Wilderness, Piekeriers-kloofpass Olifantsrivierberge	Medium-sized sp.; m. 15.70; f. 22.96	PLL with 2 sulci weakly cutting, PDF with 2 sulci weakly cutting between MC and LC; M with deep 2 sulci cutting MC, LC, DF and LL	PF, K, T and TR with faint orange; PT with slight gray mottling	with no MA; PC fig. 42
15. ***E. lapollai***	Western Cape, vic. Klondyke f. unknown	Medium-sized sp.; m. 16.00; weakly cutting between MC and LC; M with deep 2 sulci cutting MC, LC, DF and LL	PLL with very weak 2 sulci, PDF with 2 sulci very subtle mottled gray	PF, K, T and TR with faint orange; PT to MT with	with no MA; PC fig. 44
16. ***E. tsitsikamma***	Eastern Cape, W of Kareedouw f. 24.59	Medium-sized sp.; m. 18.82;	M with 2 sulci of DF, cutting LC (not MC) and LL mottled brown-black	PF, K, T and TR with orange; PT with additional subtle	with no MA; PC fig. 46
17. ***E. waboom***	Western Cape, in Swartberg Pass, S of Prince Albert	Medium-sized sp.; m. 18.25; f. unknown between MC and LC; MC and LC not cut by sulci	PDF with very weak 2 sulci between MC and LC; MDF with very weak 2 sulci	PF, K, T and TR with orange; PT with additional subtle mottled brown-black	with no MA; PC fig. 48
18. ***E. solveigae***	Eastern Cape, SE Clarkson, vic. Humansdorp	Medium-sized sp.; m. 18.59; f. unknown MC and LC; in some specimens LC is cut	PDF with very weak 2 sulci between MC and LC; MDF with weak 2 sulci between	PF, K, T and TR orange; PT with additional subtle mottled brown-black	with no MA; PC fig. 50
19. ***E. larsenorum***	Western Cape, N of Somerset West, S of Helderberg	Medium-sized sp.; m. 18.26; f. unknown MLL with 2 sulci	PLL with weak, broken 2 sulci; MDF with weak 2 sulci between MC and LC which weakly cuts MC,	PF, K with orange; T and TR with bright orange-red	with no MA; PC fig. 52
20. ***E. umoja***	Western Cape, N of Somerset West, S of Helderberg	Medium-sized sp.; m. 16.24; f. unknown onto LL	PLL with 2 sulci weak broken, PDF with 2 sulci weak; M with 2 sulci cuts MC and LC of DF, extends	PF, K, T and TR with orange	with no MA; PC fig. 54
21. ***E. lyra***	Western Cape, S of Kwaggas-kloofdam	Medium-sized sp.; m. 16.84; f. 20.91 and extends onto LL	PDF with weak 2 sulci, PLL with weak 2 sulci, MDF with 2 sulci cuts MC and LC,	PF, K, T and TR without any significant coloration	with no MA; PC fig. 56
22. ***E. ottei***	Western Cape, S of Tulbagh, vic. OudePost, NNW of Malmesbury	Medium-sized sp.; m. 15.94; f. 19.07	PLL with weak 2 sulci, PDF with very weak 2 sulci, MDF with 2 sulci that cuts MC and LC, and extends onto LL gray on ventral surface opposite spines	PF and K with faint orange; majority of T and TR without significant coloration, TD 1/3 length with patch of black-	with no MA; PC fig. 58

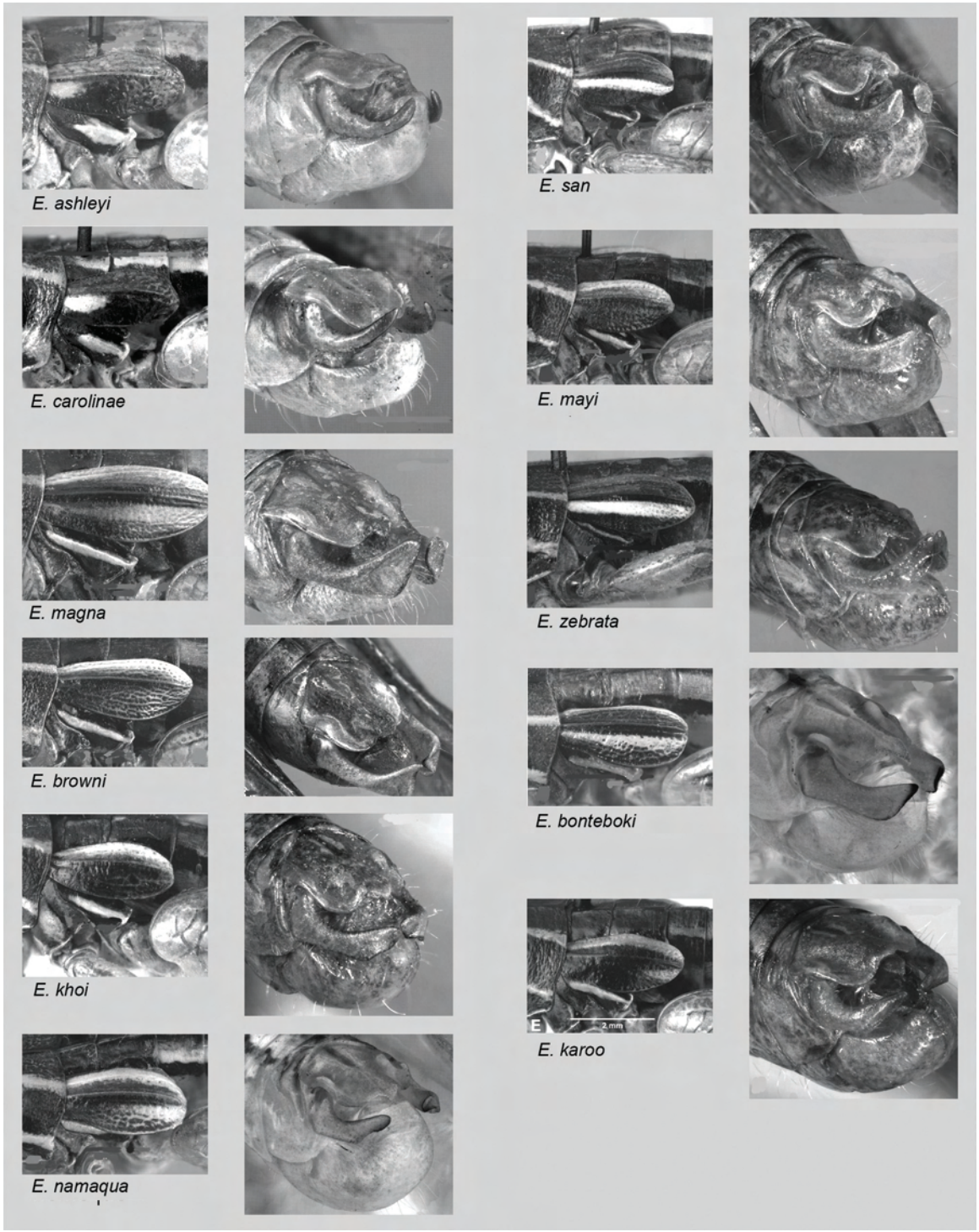

TABLE 2. Pictorial comparison of tegmina and cerci in *Euloryma* species (see also Table 3).

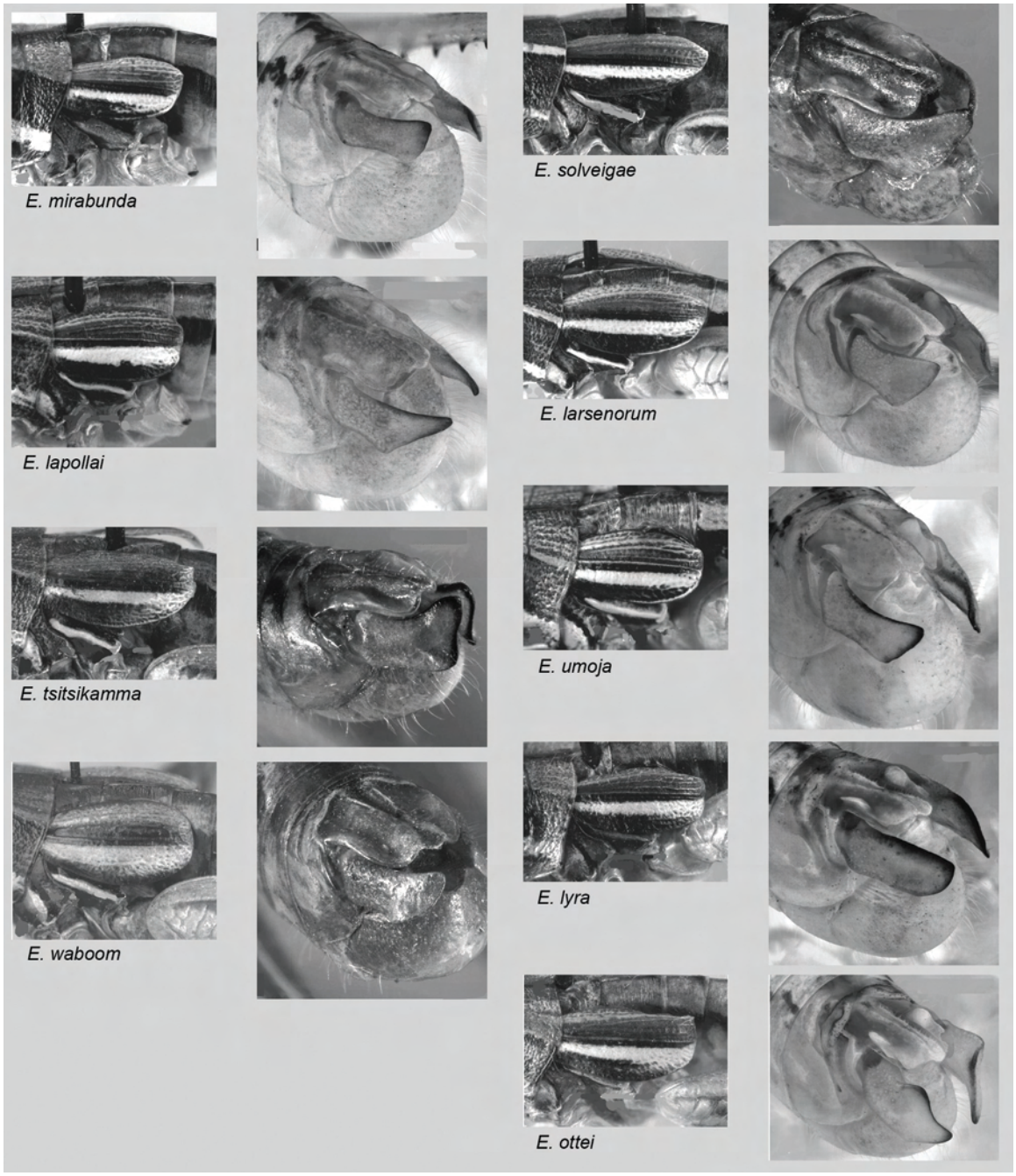

TABLE 3. Pictorial comparison of tegmina and cerci in *Euloryma* species (see also Table 2).

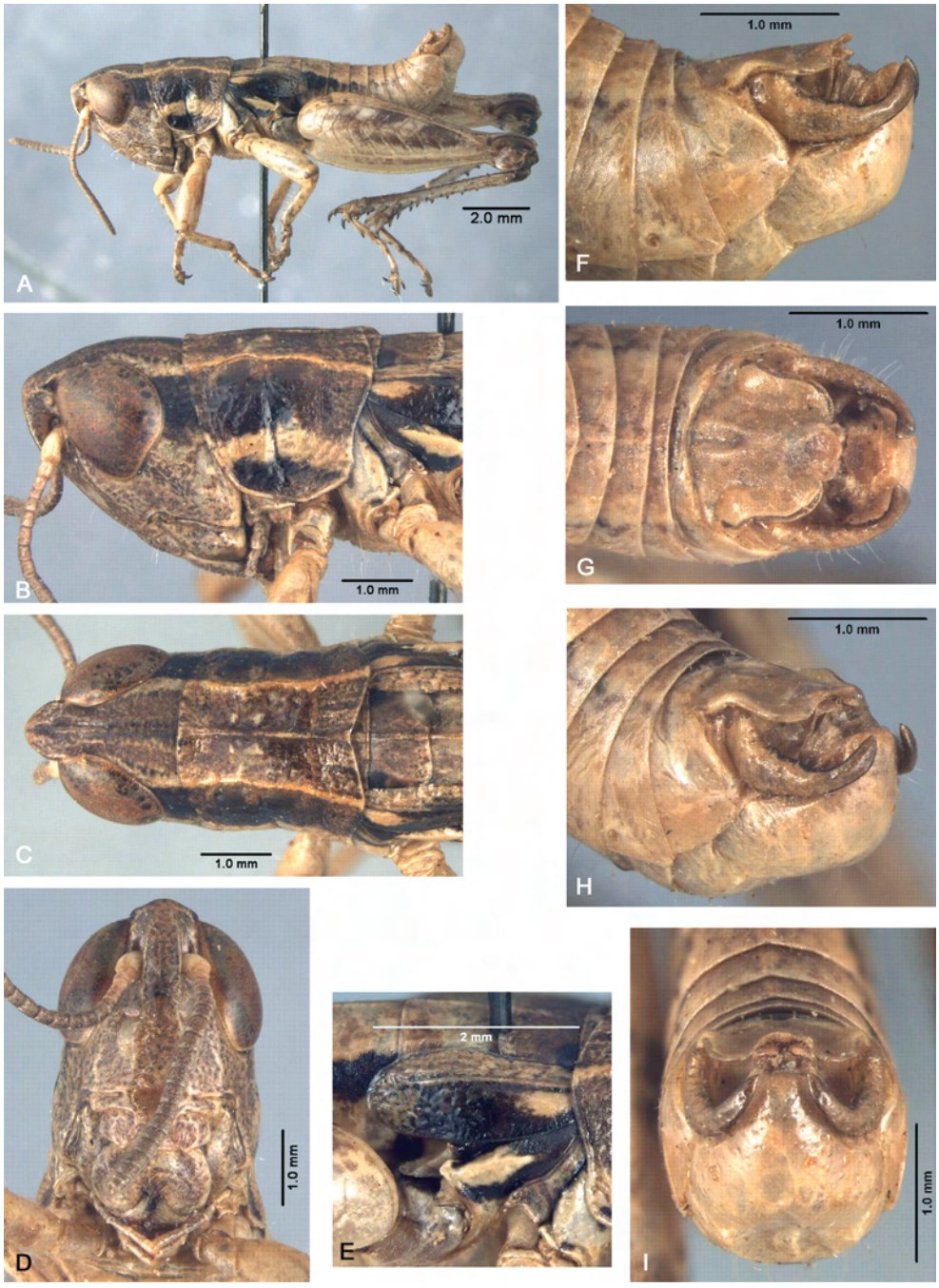

Figure 17. *Euloryma ashleyi* male external morphology (A-I). A) body lateral; B) head and pronotum lateral; C) head and pronotum dorsal; D) head front; E) tegmen. Cerci views F-I: F) lateral; G) dorsal; H) three-quarter; I posterior.

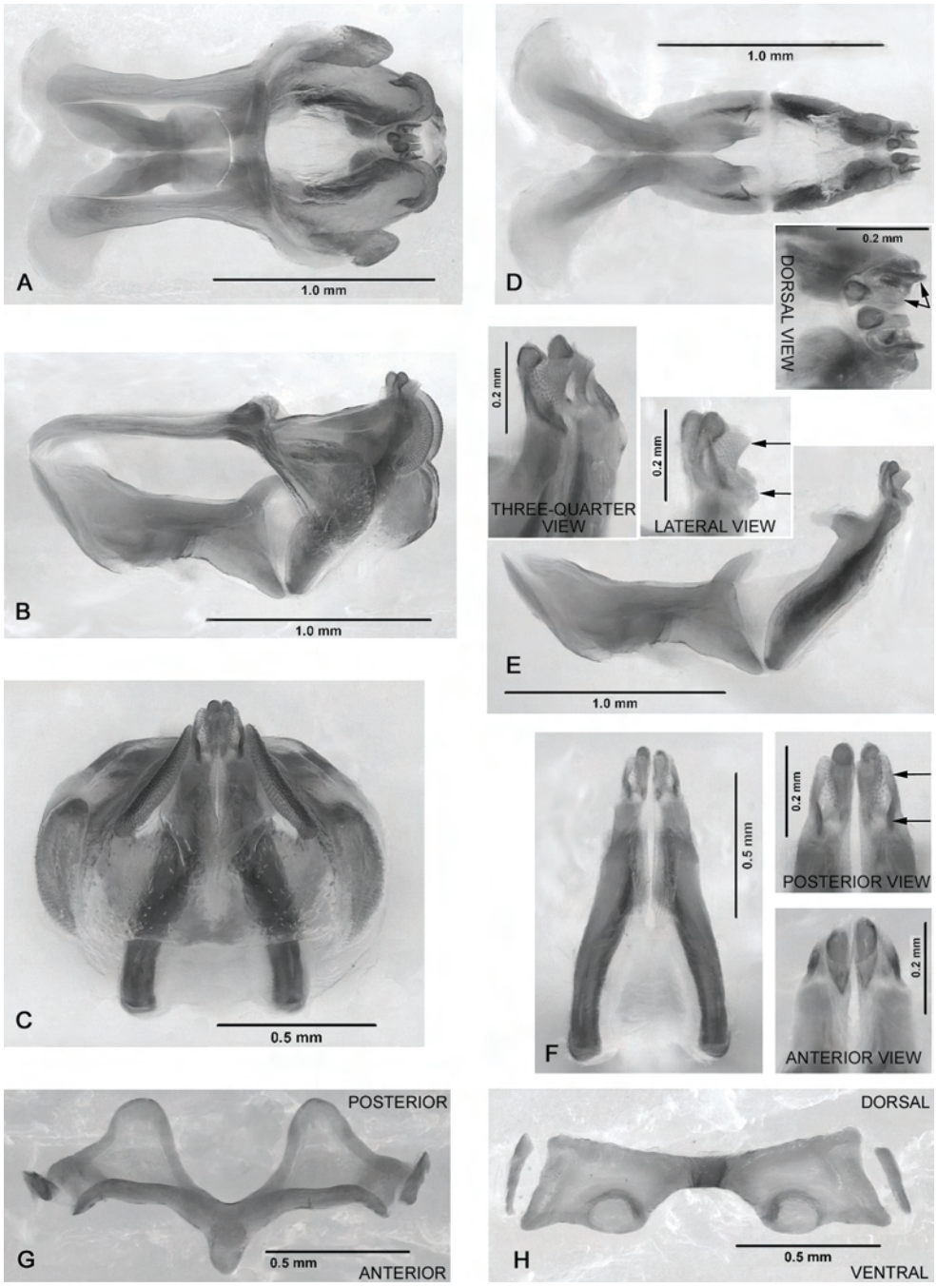

Figure 18. *Euloryma ashleyi* male genitalia (A-H). Phallic complex views (cingulum atop aedeagus, with lateral sclerites): A) dorsal; B) lateral; C) posterior. Aedeagus views: D) dorsal; E) lateral; F) posterior. Epiphallus views: G) dorsal; H) posterior.

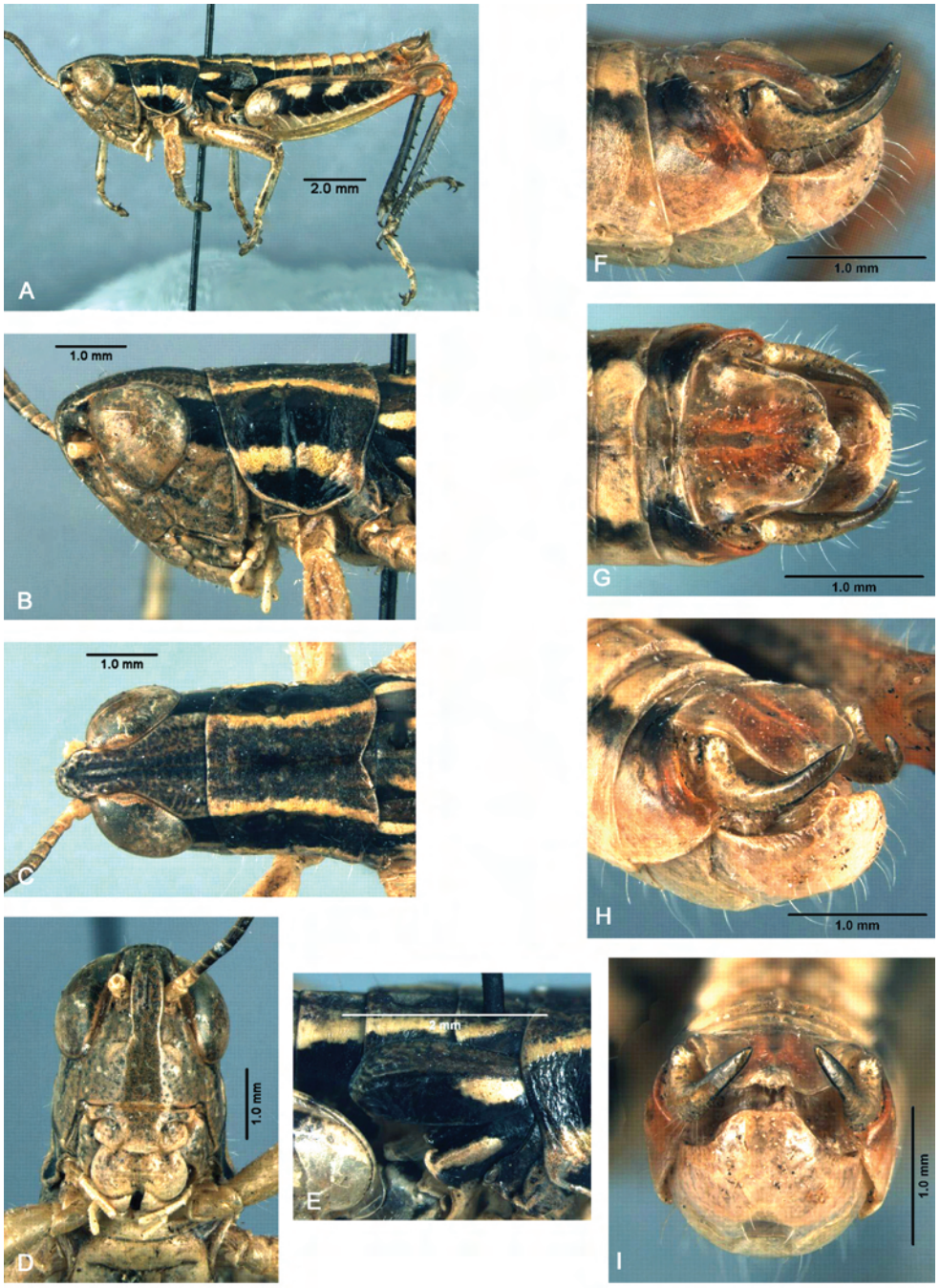

Figure 19. *Euloryma carolynae* male external morphology (A-I). A) body lateral; B) head and pronotum lateral; C) head and pronotum dorsal; D) head front; E) tegmen. Cerci views F-I: F) lateral; G) dorsal; H) three-quarter; I) posterior.

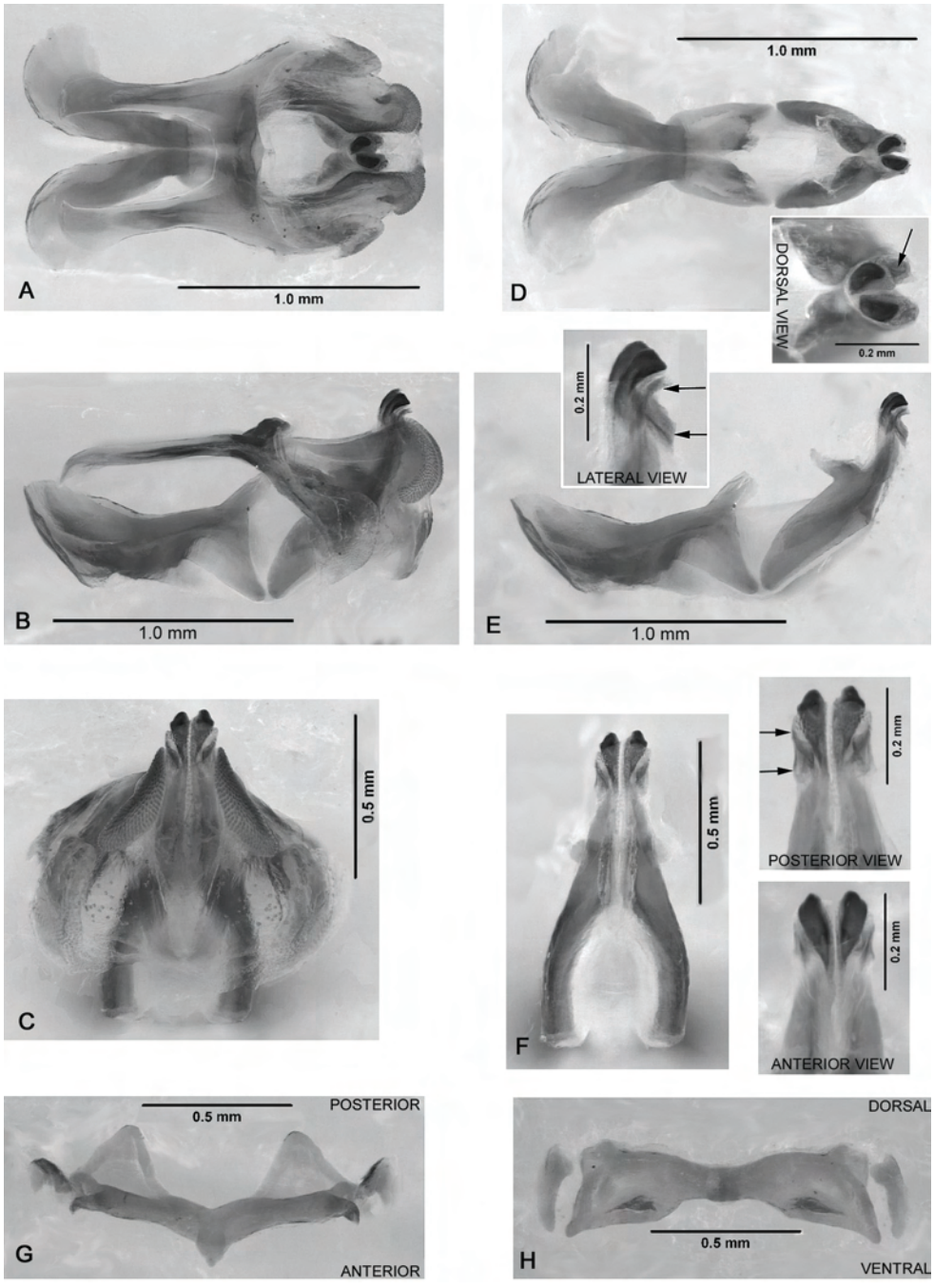

Figure 20. *Euloryma carolynae* male genitalia (A-H). Phallic complex views (cingulum atop aedeagus, with lateral sclerites): A) dorsal; B) lateral; C) posterior. Aedeagus views: D) dorsal; E) lateral; F) posterior. Epiphallus views: G) dorsal; H) posterior.

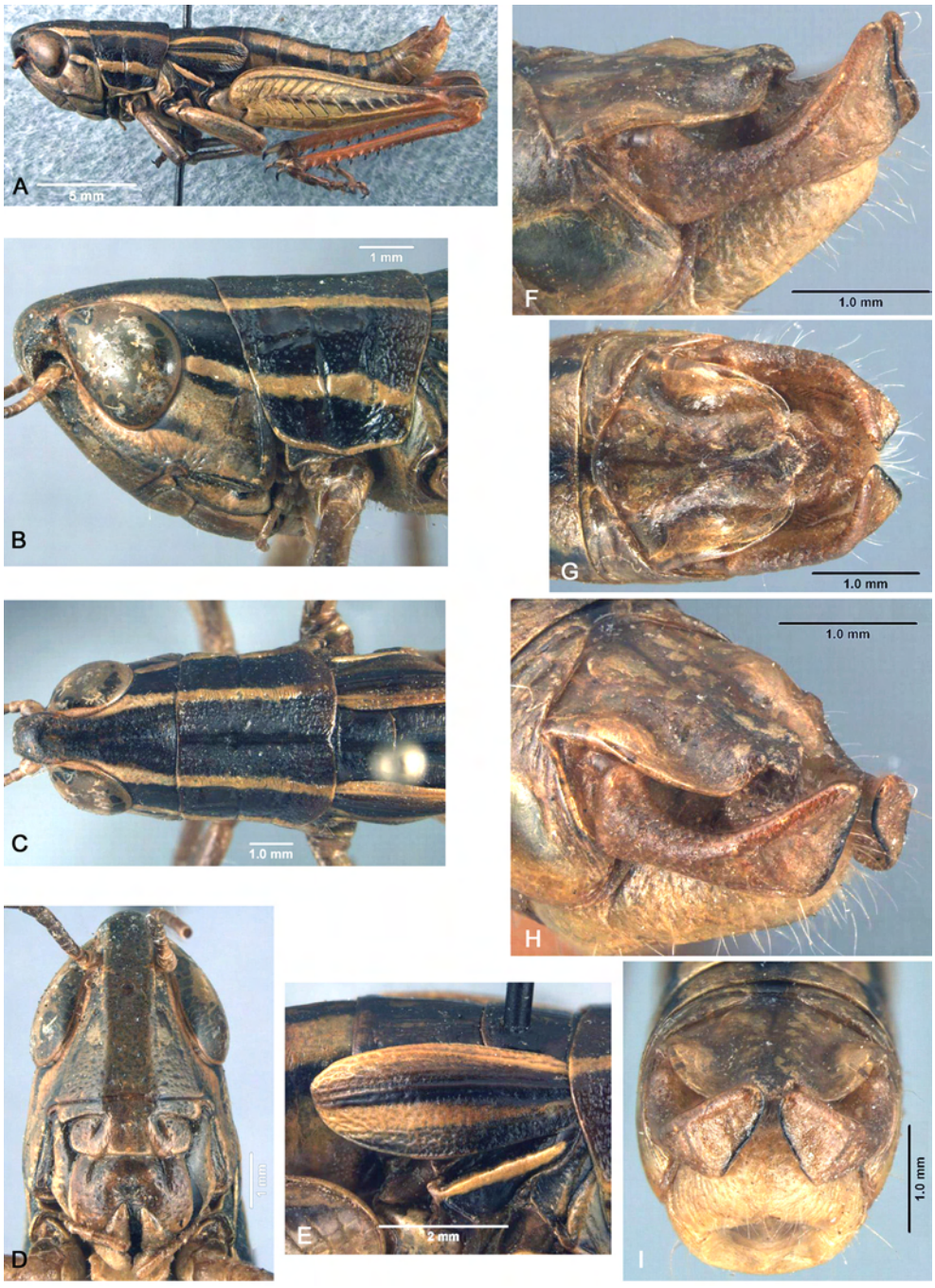

Figure 21. *Euloryma magna* adult male external morphology (A-I). A) body lateral; B) head and pronotum lateral; C) head and pronotum dorsal; D) head front; E) tegmen. Cerci views F-I: F) lateral; G) dorsal; H) three-quarter; I) posterior.

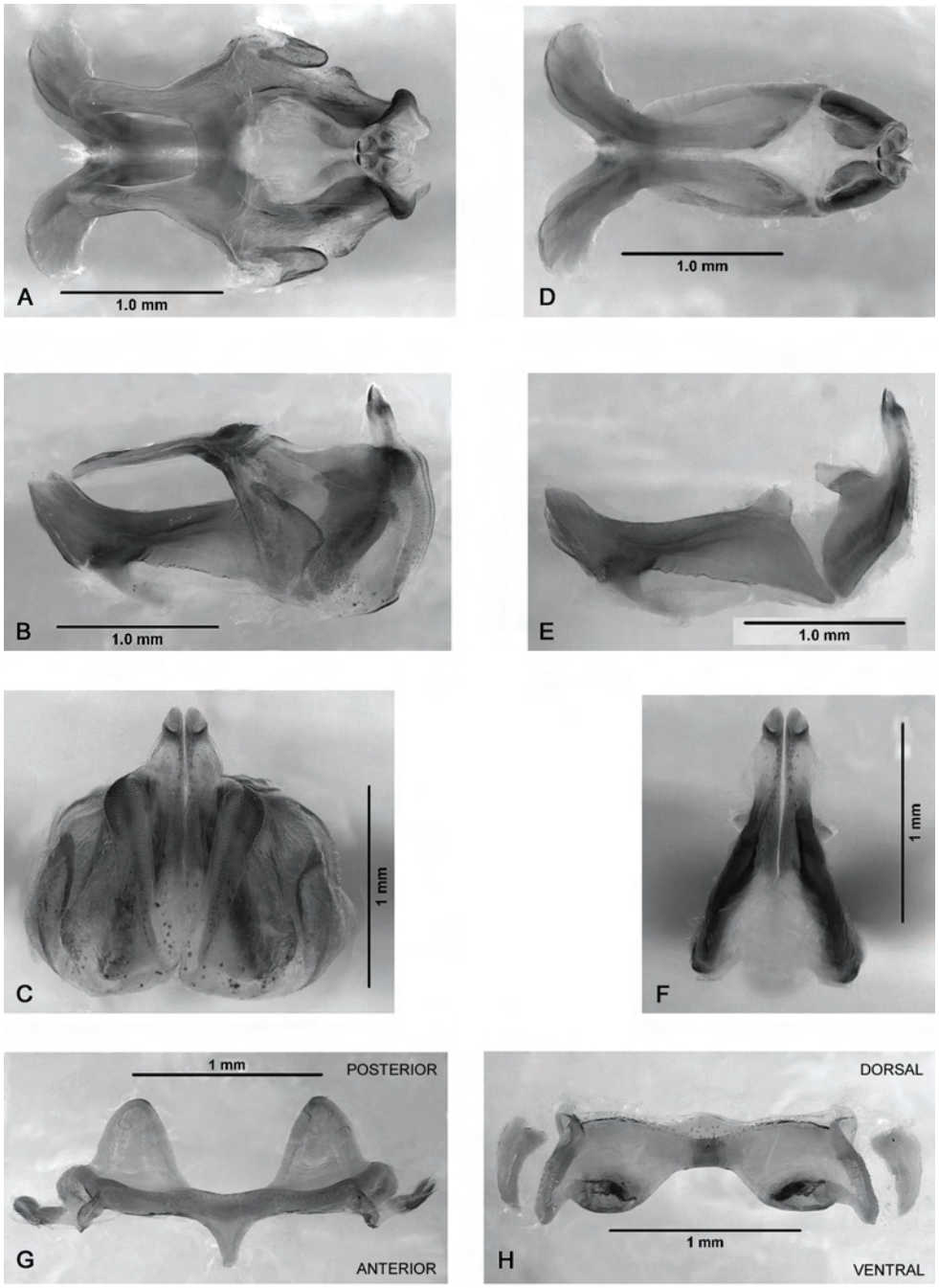

Figure 22. *Euloryma magna* male genitalia (A-H). Phallic complex views (cingulum atop aedeagus, with lateral sclerites): A) dorsal; B) lateral; C) posterior. Aedeagus views: D) dorsal; E) lateral; F) posterior. Epiphallus views: G) dorsal; H) posterior.

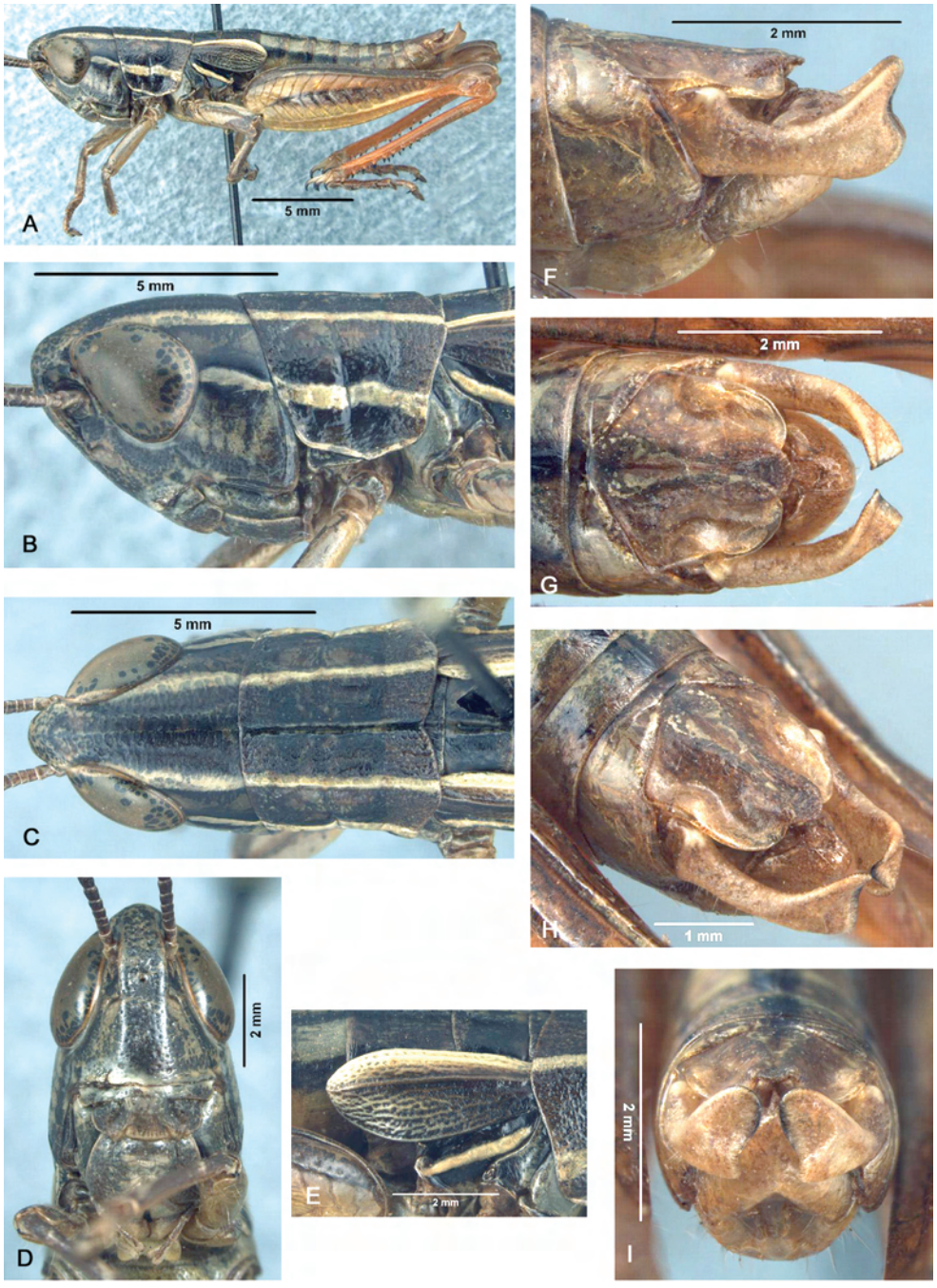

Figure 23. *Euloryma browni* adult male external morphology (A-I). A) body lateral; B) head and pronotum lateral; C) head and pronotum dorsal; D) head front; E) tegmen. Cerci views F-I: F) lateral; G) dorsal; H) three-quarter; I) posterior.

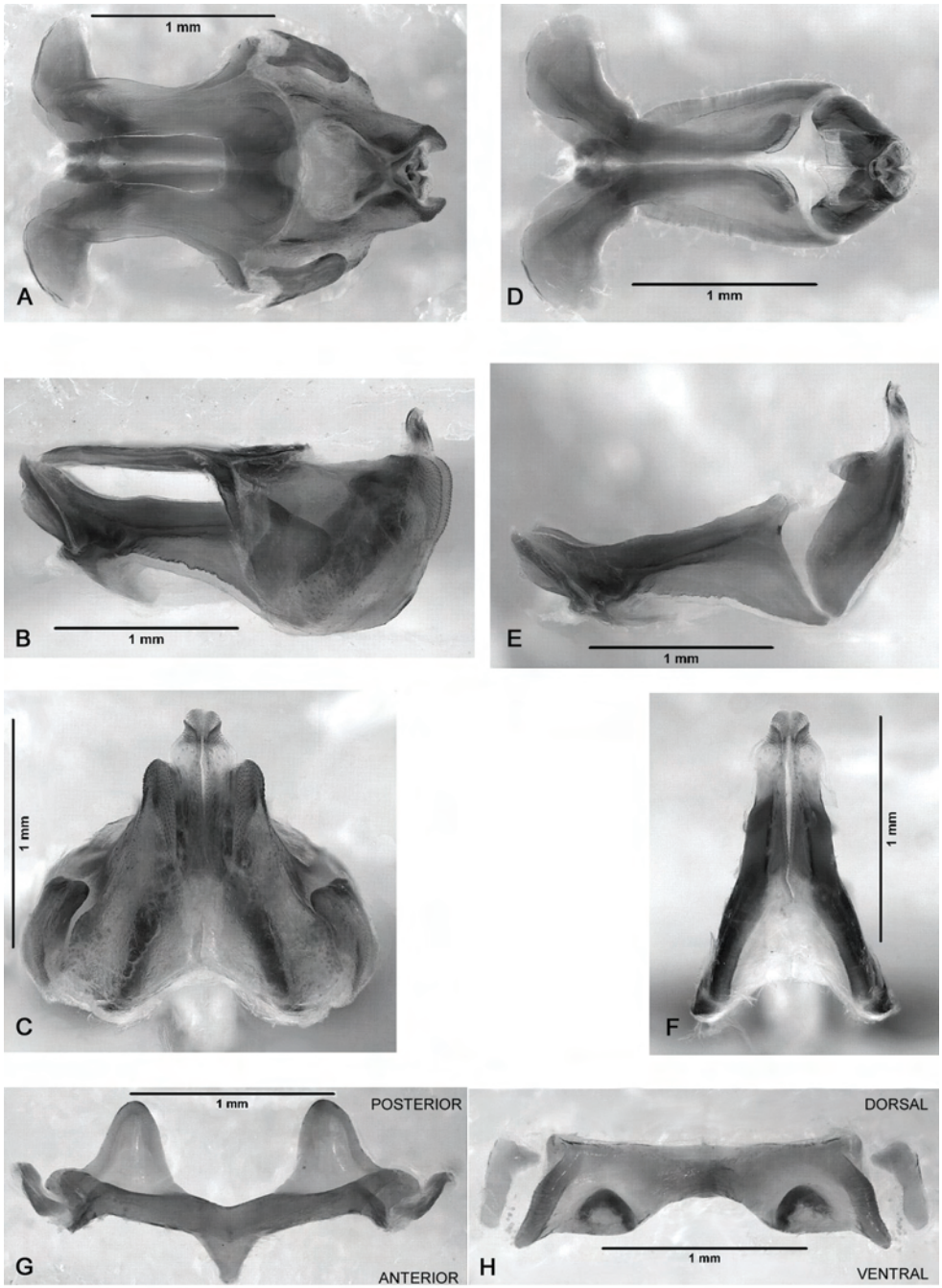

Figure 24. *Euloryma browni* male genitalia (A-H). Phallic complex views (cingulum atop aedeagus, with lateral sclerites): A) dorsal; B) lateral; C) posterior. Aedeagus views: D) dorsal; E) lateral; F) posterior. Epiphallus views: G) dorsal; H) posterior.

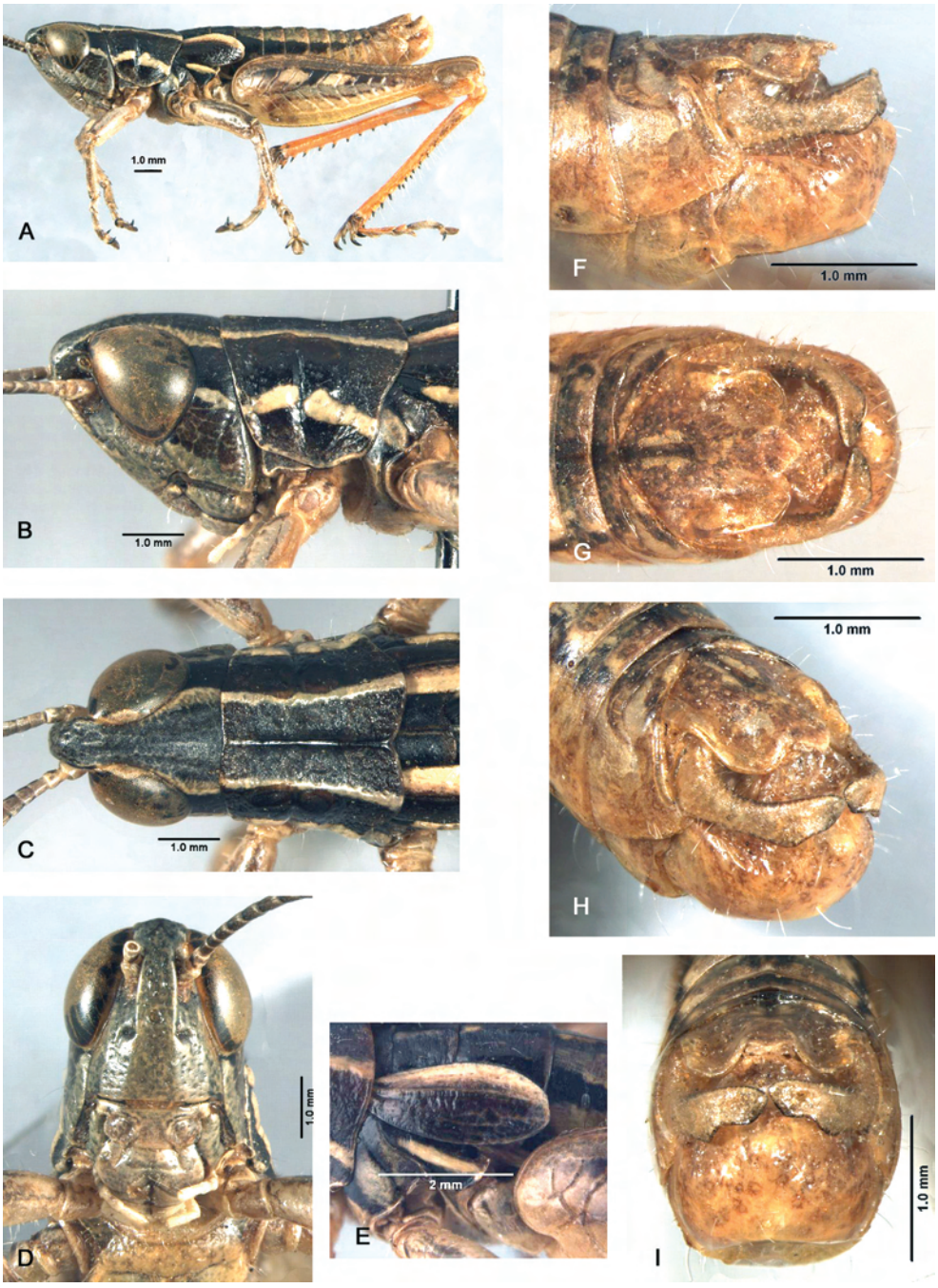

Figure 25. *Euloryma khoi* adult male external morphology (A-I). A) body lateral; B) head and pronotum lateral; C) head and pronotum dorsal; D) head front; E) tegmen. Cerci views F-I: F) lateral; G) dorsal; H) three-quarter; I) posterior.

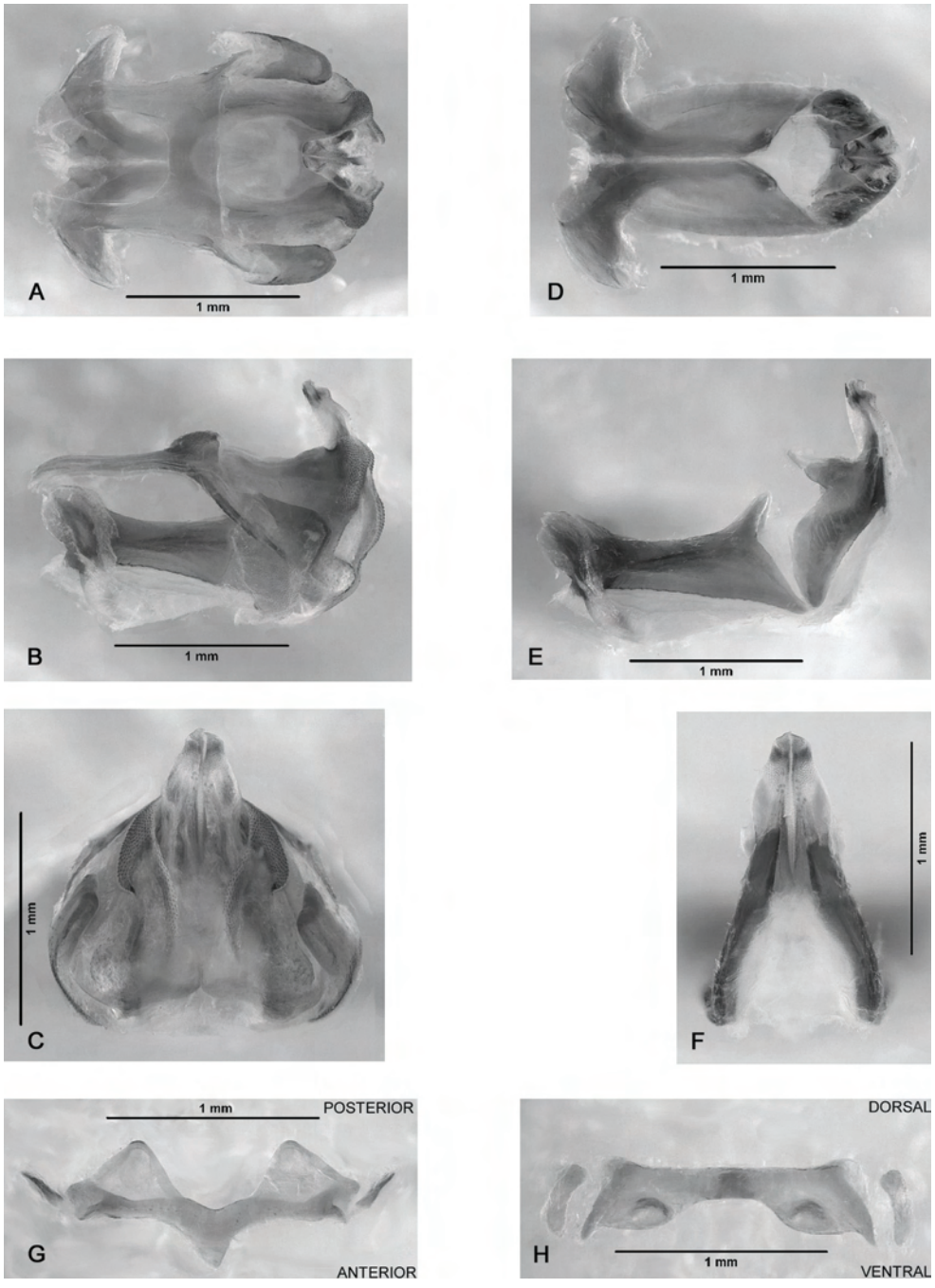

Figure 26. *Euloryma khoi* male genitalia (A-H). Phallic complex views (cingulum atop aedeagus, with lateral sclerites): A) dorsal; B) lateral; C) posterior. Aedeagus views: D) dorsal; E) lateral; F) posterior. Epiphallus views: G) dorsal; H) posterior.

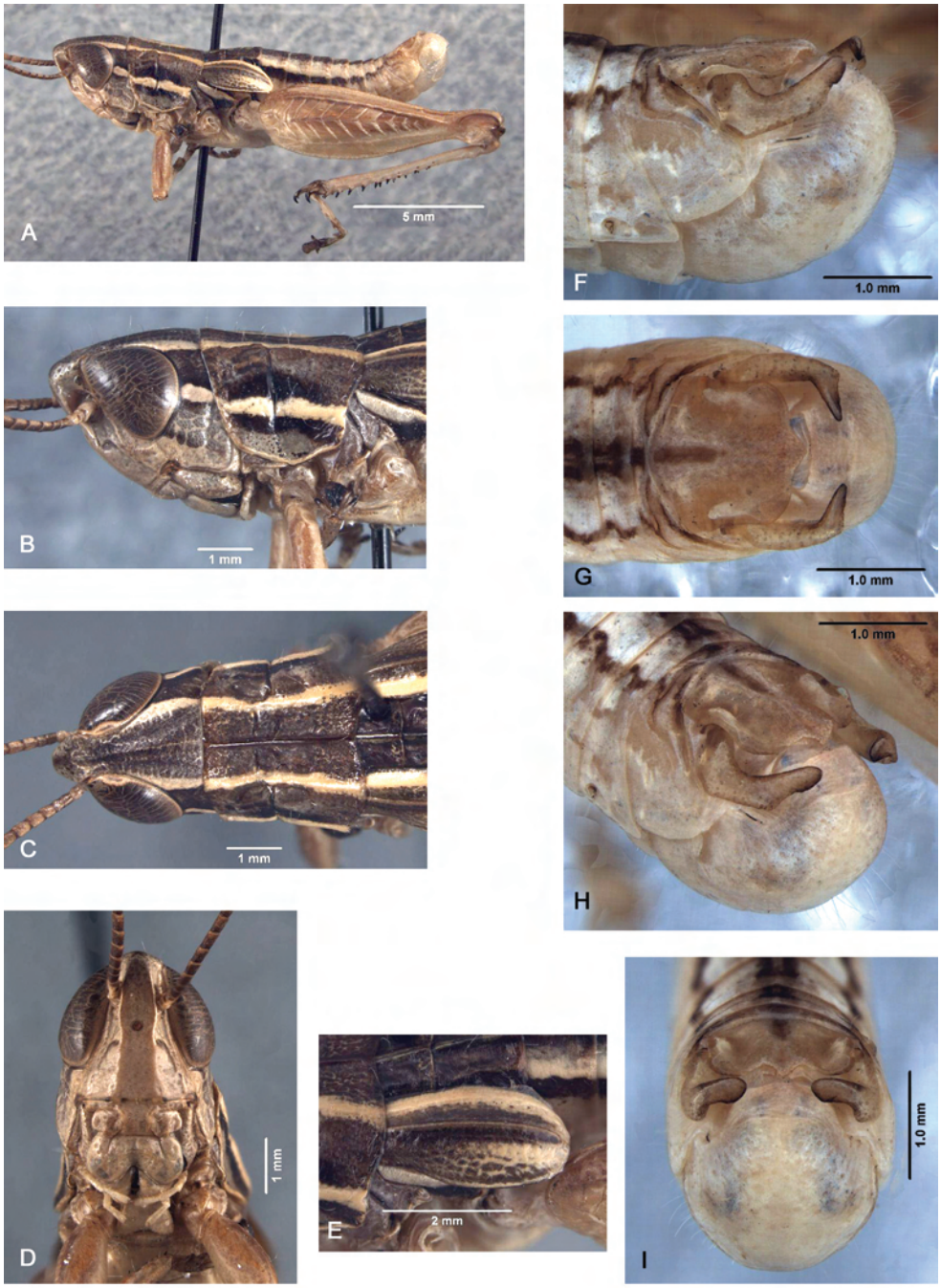

Figure 27. *Euloryma namaqua* adult male external morphology (A-I). A) body lateral; B) head and pronotum lateral; C) head and pronotum dorsal; D) head front; E) tegmen. Cerci views F-I: F) lateral; G) dorsal; H) three-quarter; I) posterior.

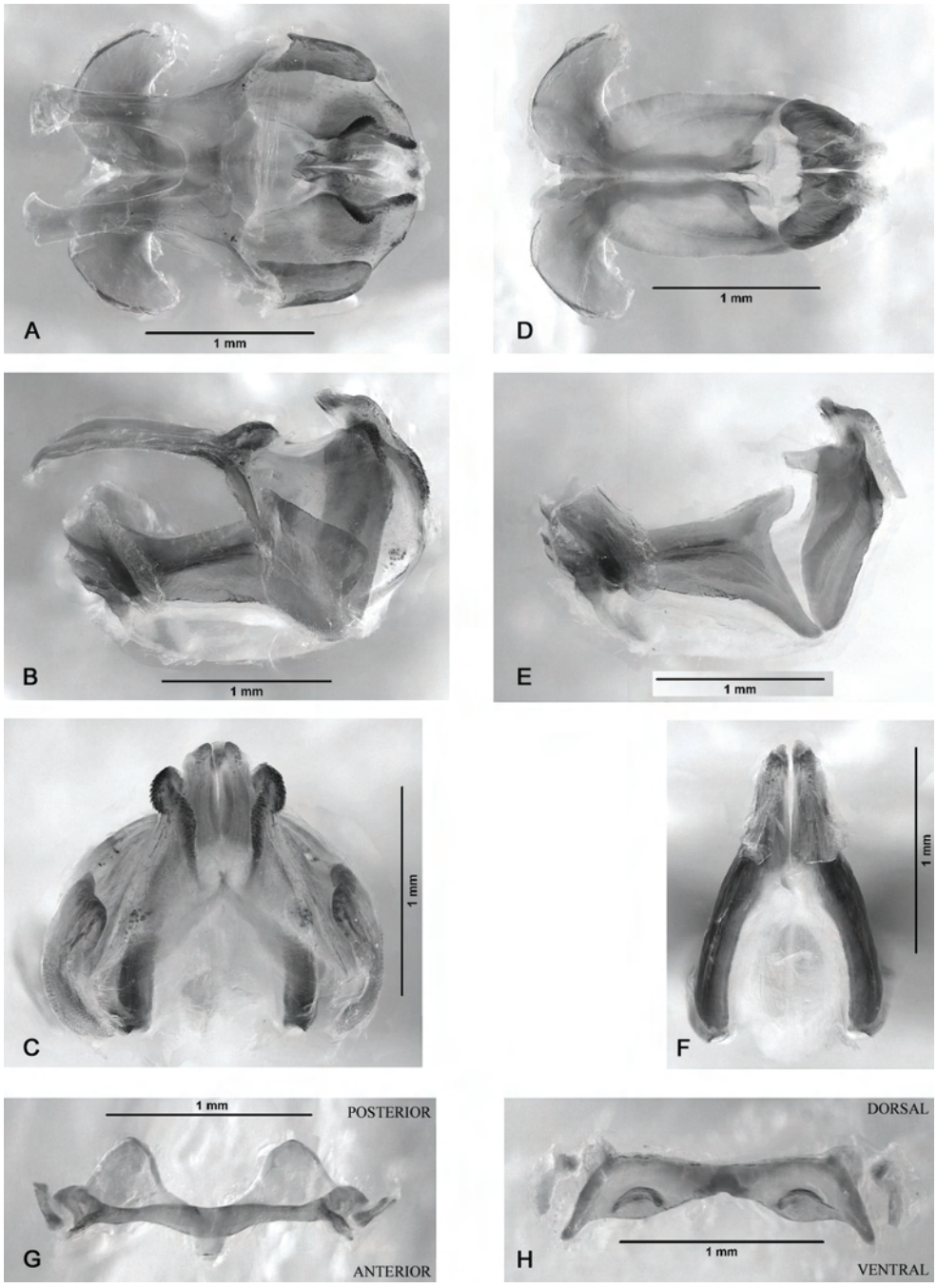

Figure 28. *Euloryma namaqua* male genitalia (A-H). Phallic complex views (cingulum atop aedeagus, with lateral sclerites): A) dorsal; B) lateral; C) posterior. Aedeagus views: D) dorsal; E) lateral; F) posterior. Epiphallus views: G) dorsal; H) posterior.

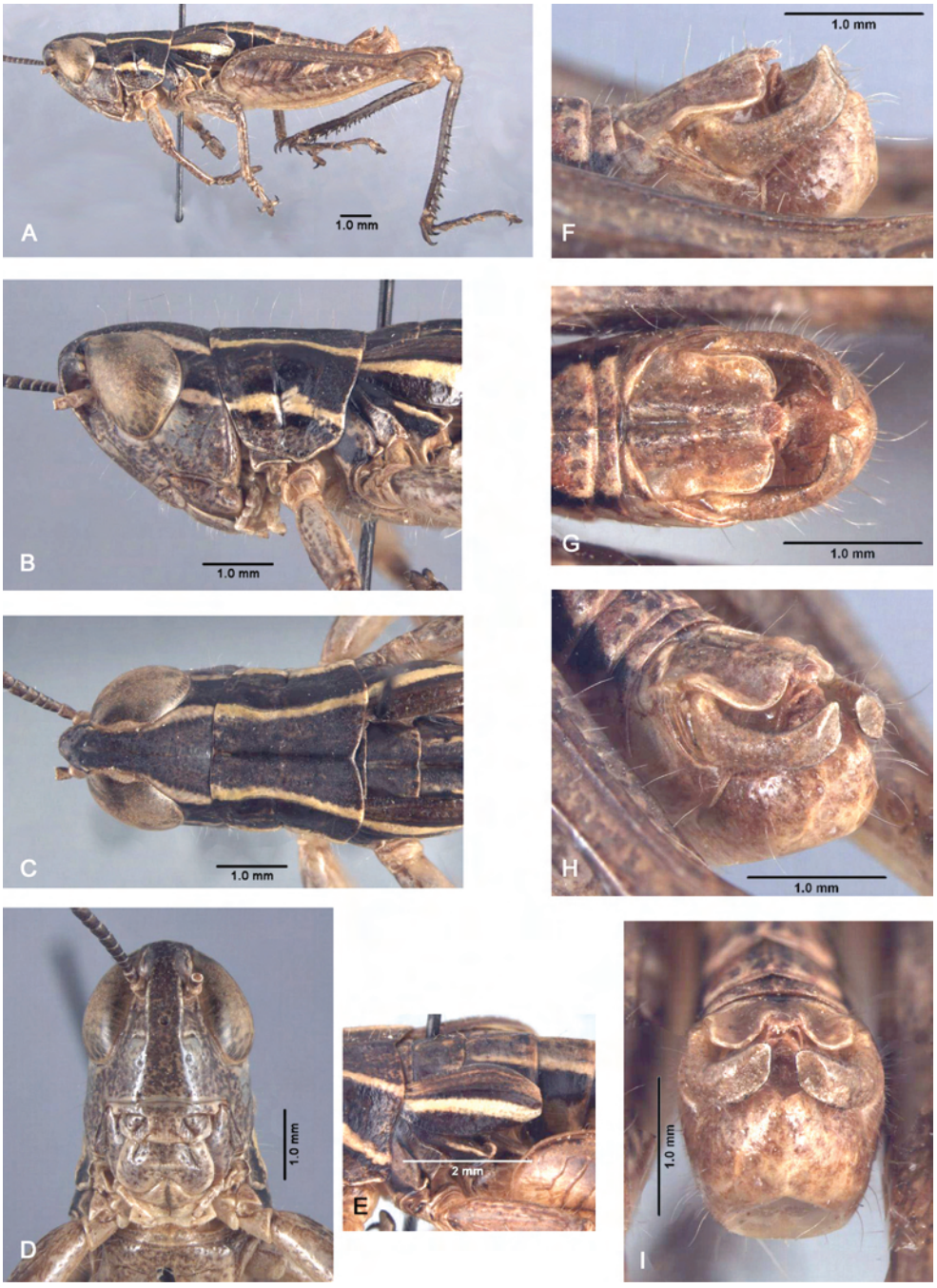

Figure 29. *Euloryma san* adult male external morphology (A-I). A) body lateral; B) head and pronotum lateral; C) head and pronotum dorsal; D) head front; E) tegmen. Cerci views F-I: F) lateral; G) dorsal; H) three-quarter; I) posterior.

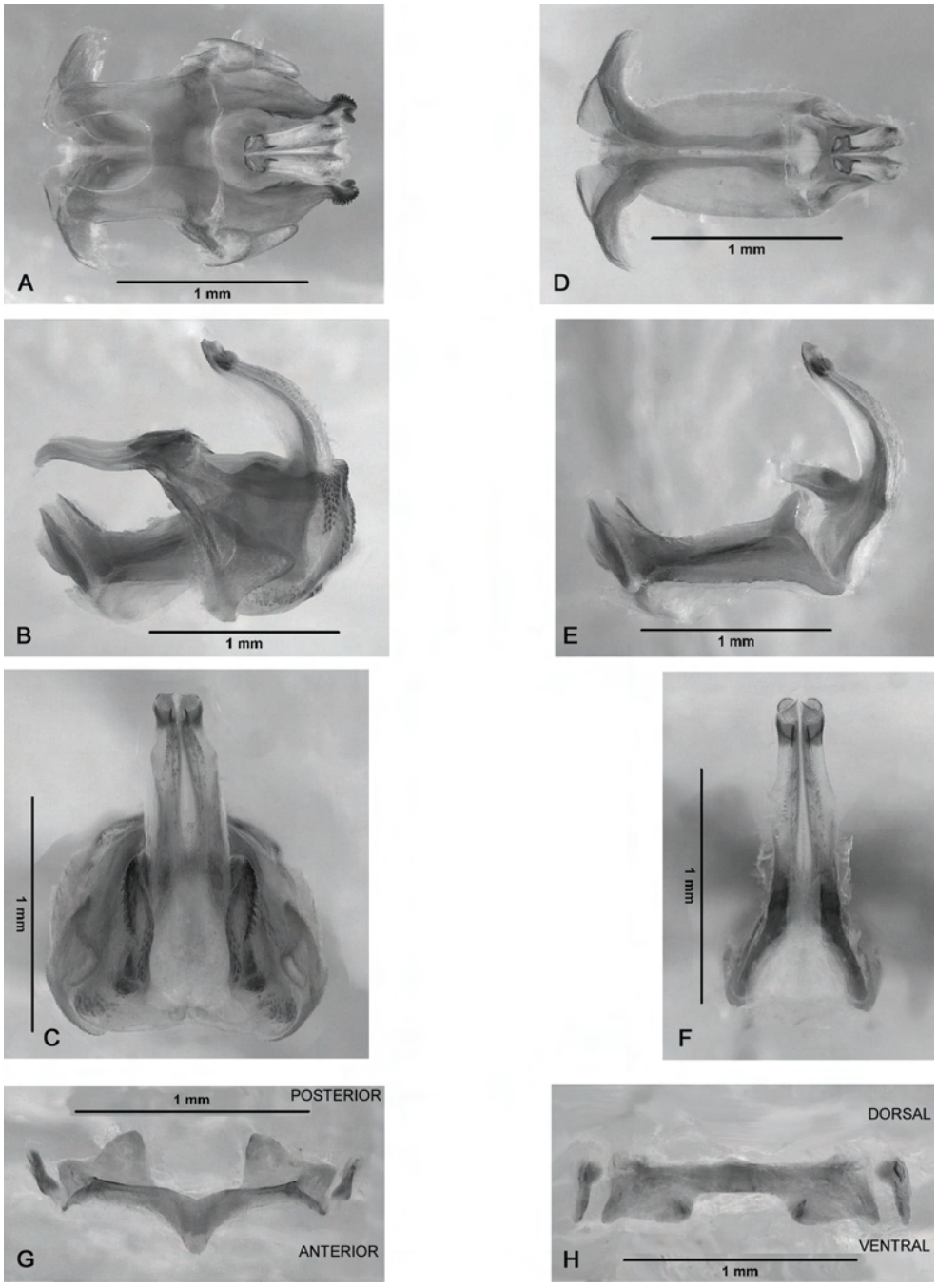

Figure 30. *Euloryma san* male genitalia (A-H). Phallic complex views (cingulum atop aedeagus, with lateral sclerites): A) dorsal; B) lateral; C) posterior. Aedeagus views: D) dorsal; E) lateral; F) posterior. Epiphallus views: G) dorsal; H) posterior.

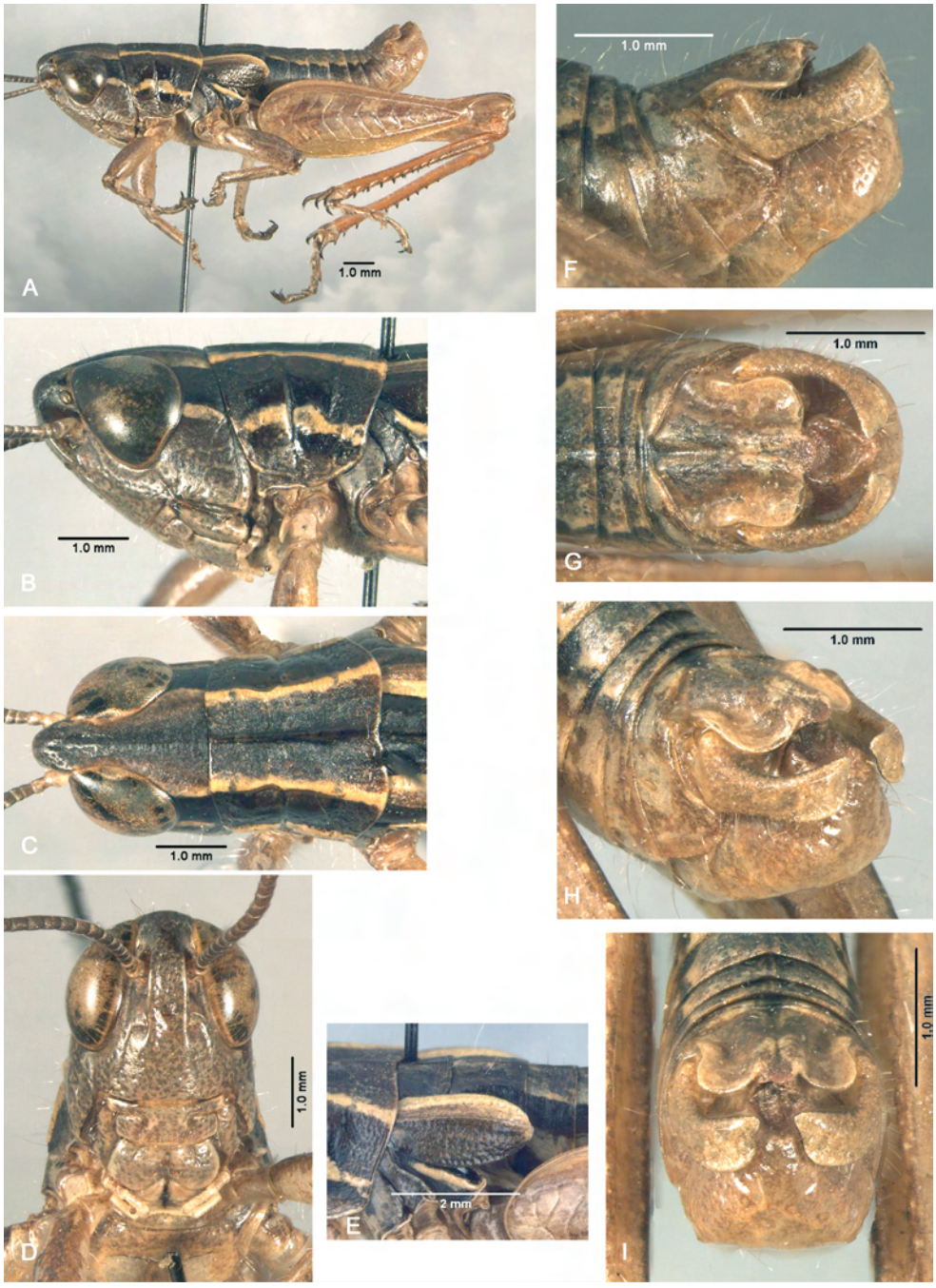

Figure 31. *Euloryma mayi* adult male external morphology (A-I). A) body lateral; B) head and pronotum lateral; C) head and pronotum dorsal; D) head front; E) tegmen. Cerci views F-I: F) lateral; G) dorsal; H) three-quarter; I) posterior.

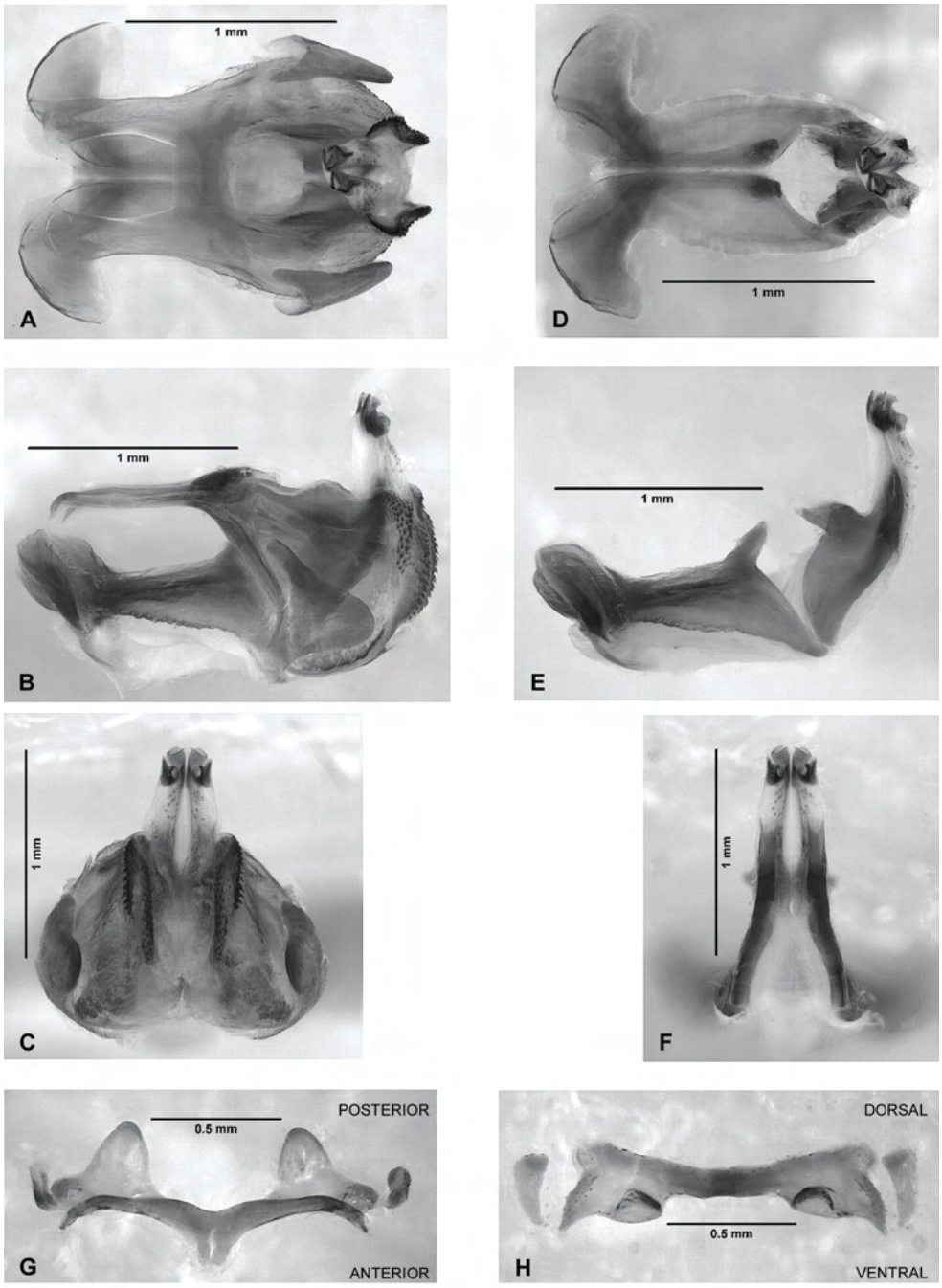

Figure 32. *Euloryma mayi* male genitalia (A-H). Phallic complex views (cingulum atop aedeagus, with lateral sclerites): A) dorsal; B) lateral; C) posterior. Aedeagus views: D) dorsal; E) lateral; F) posterior. Epiphallus views: G) dorsal; H) posterior.

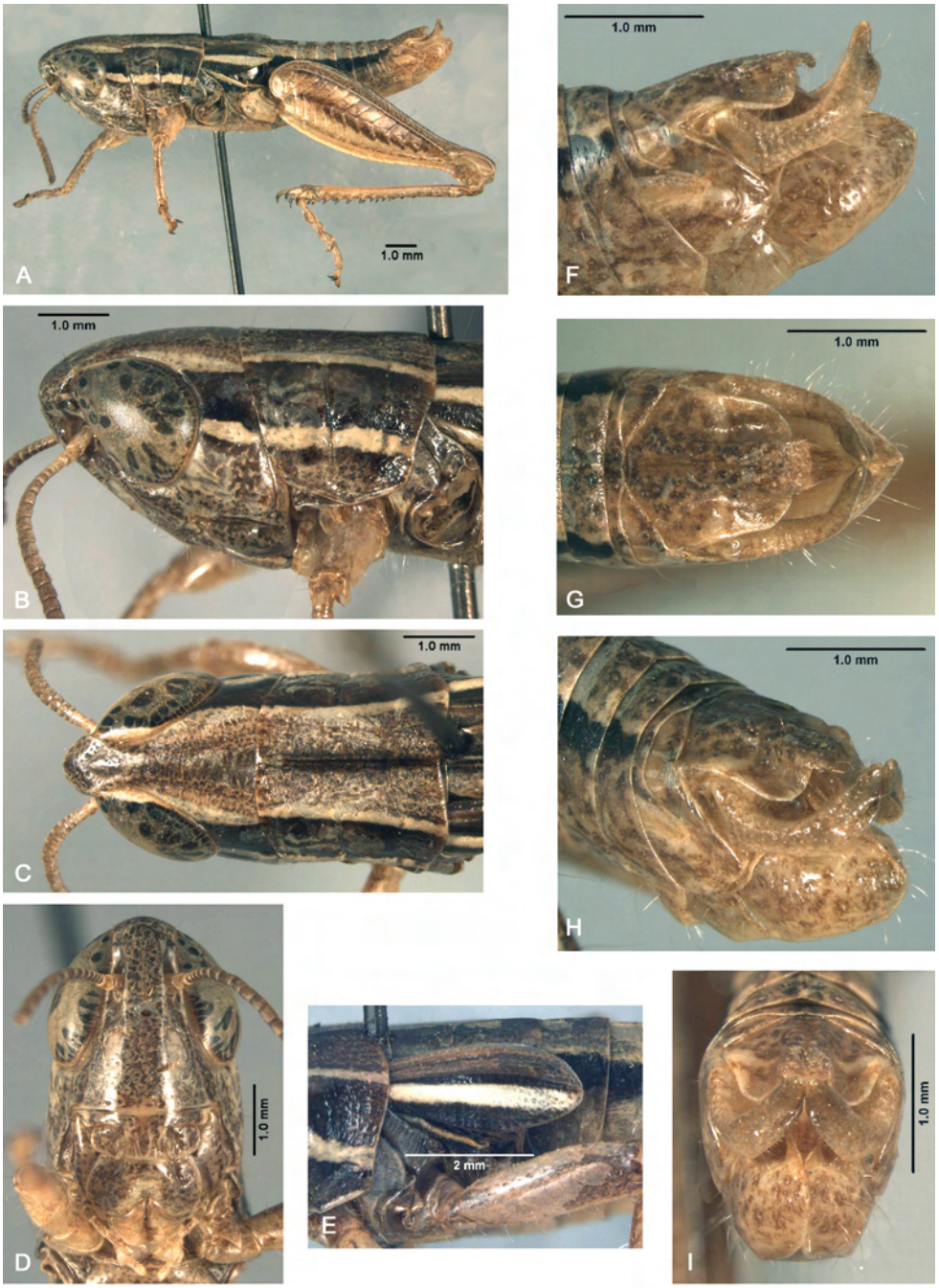

Figure 33. *Euloryma zebrata* adult male external morphology (A-I). A) body lateral; B) head and pronotum lateral; C) head and pronotum dorsal; D) head front; E) tegmen. Cerci views F-I: F) lateral; G) dorsal; H) three-quarter; I) posterior.

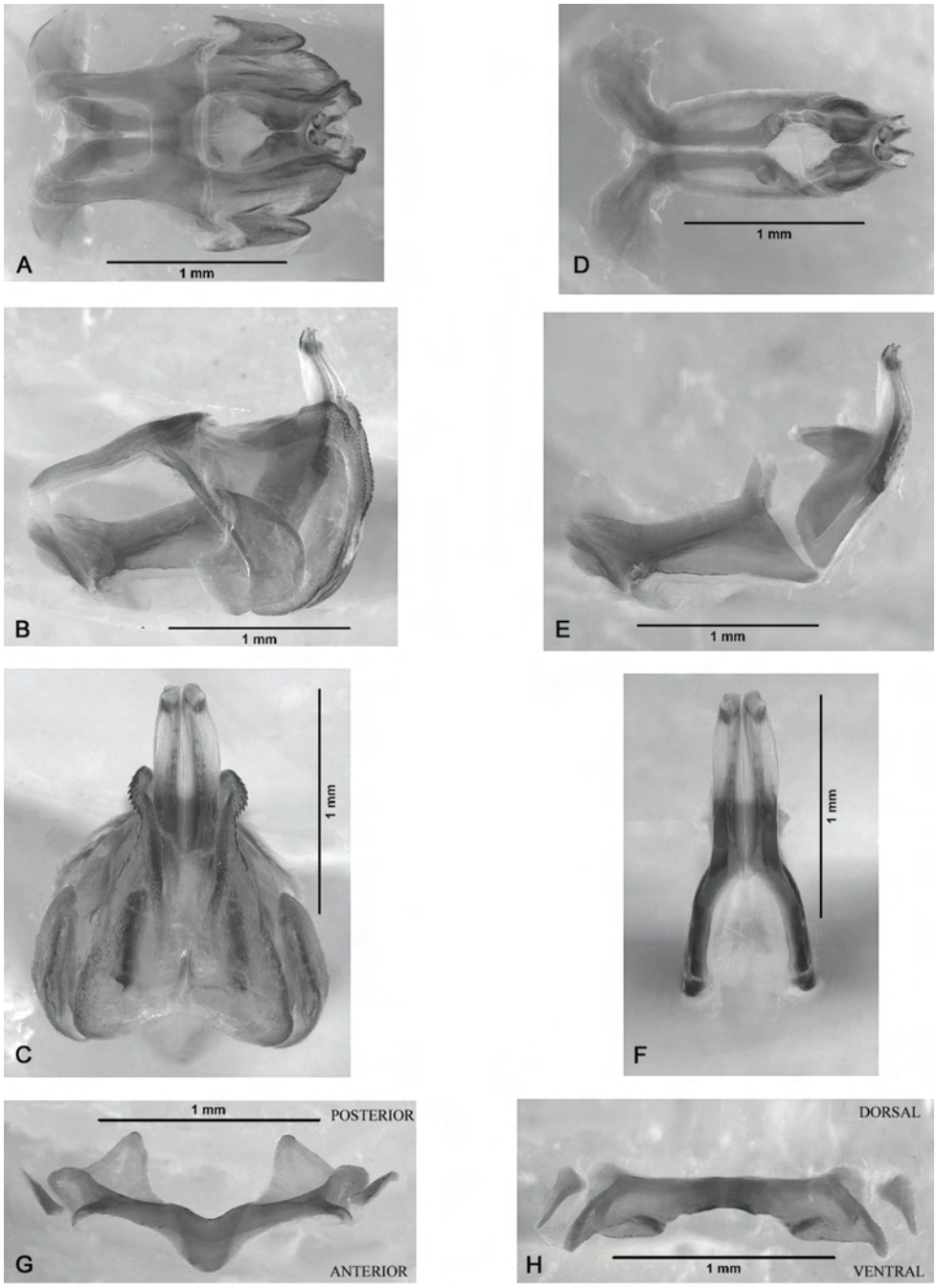

Figure 34. *Euloryma zebrata* male genitalia (A-H). Phallic complex views (cingulum atop aedeagus, with lateral sclerites): A) dorsal; B) lateral; C) posterior. Aedeagus views: D) dorsal; E) lateral; F) posterior. Epiphallus views: G) dorsal; H) posterior.

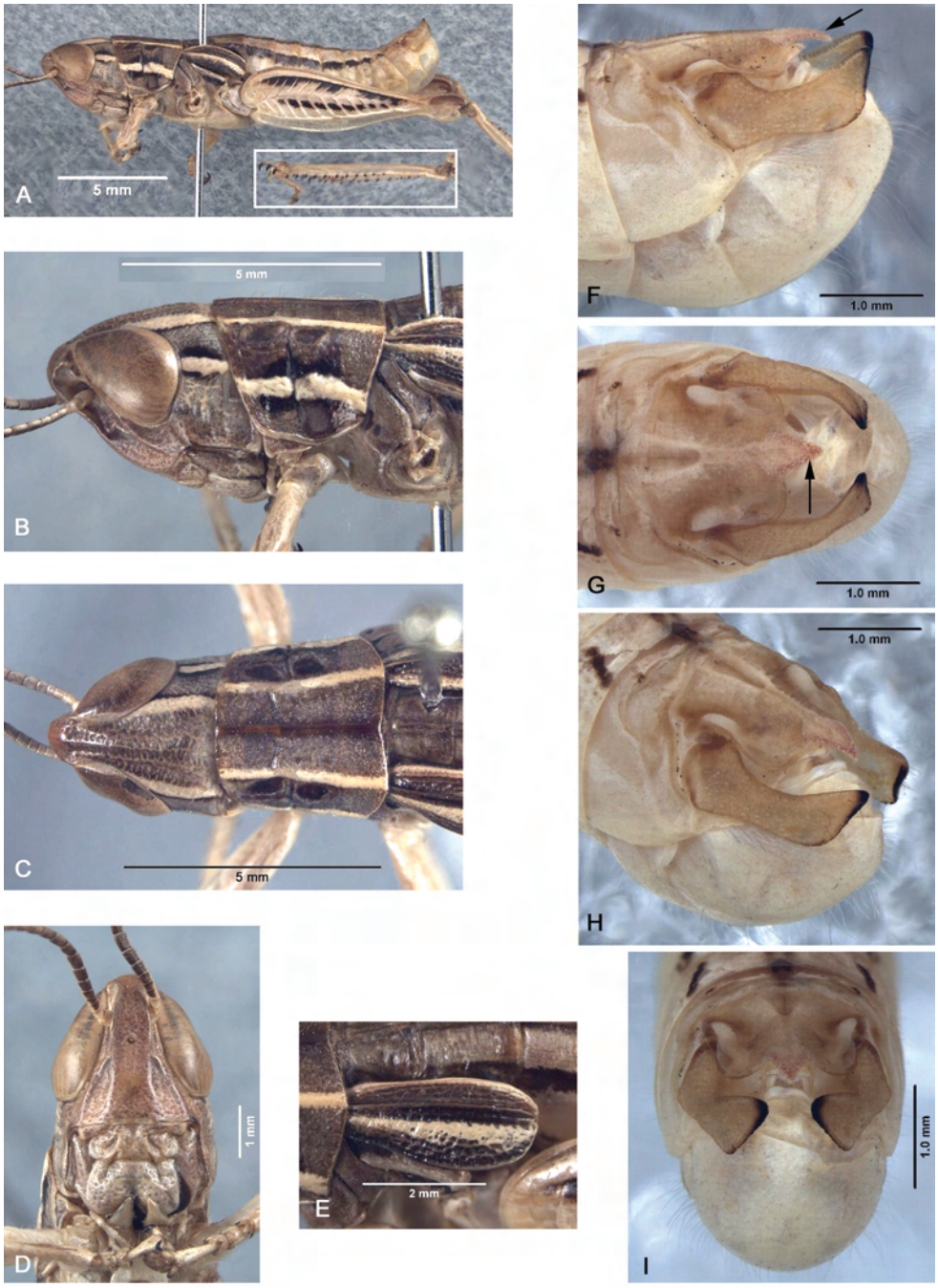

Figure 35. *Euloryma bonteboki* adult male external morphology (A-I). A) body lateral; B) head and pronotum lateral; C) head and pronotum dorsal; D) head front; E) tegmen. Cerci views F-I: F) lateral; G) dorsal; H) three-quarter; I) posterior.

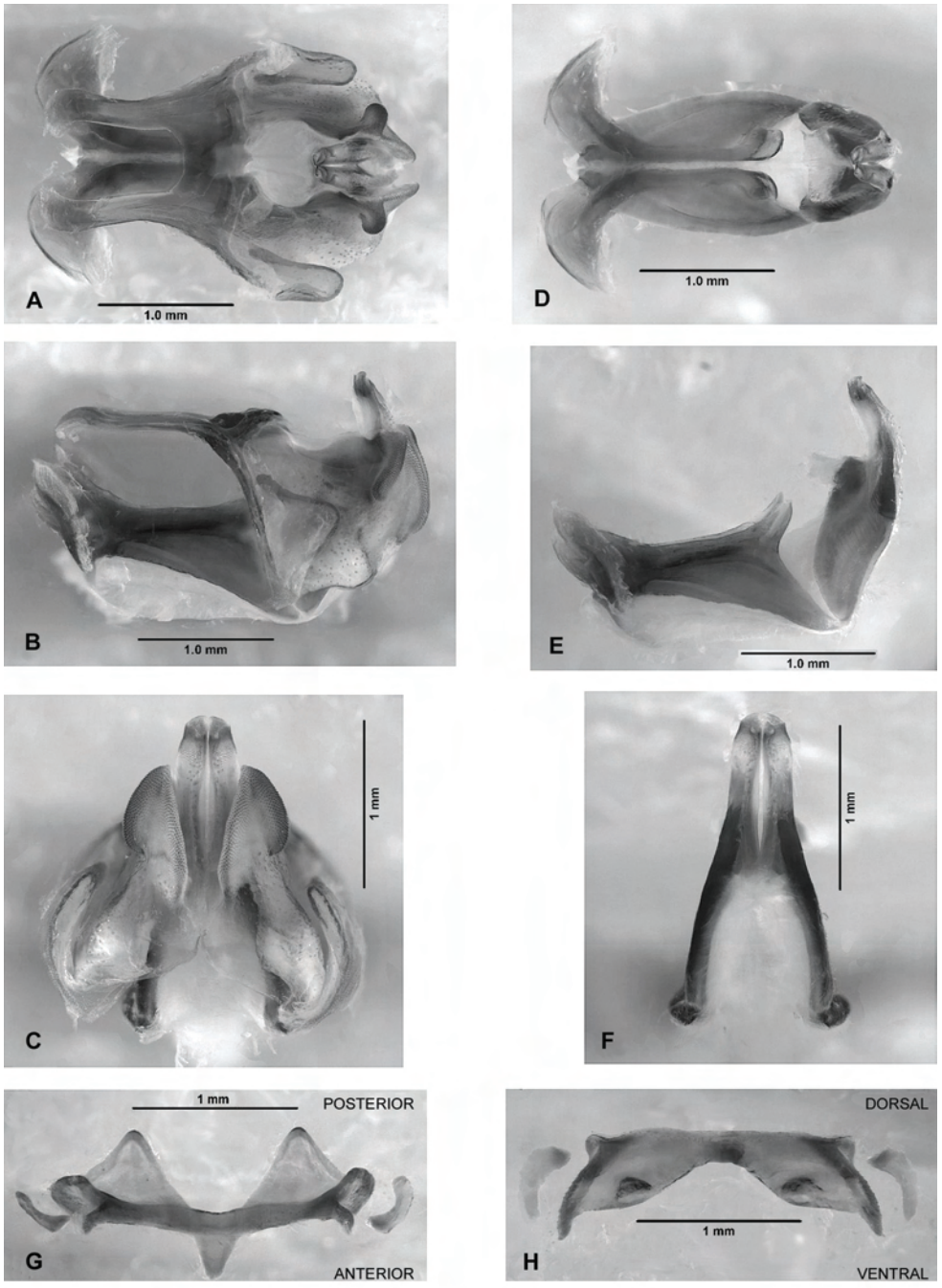

Figure 36. *Euloryma bonteboki* male genitalia (A-H). Phallic complex views (cingulum atop aedeagus, with lateral sclerites): A) dorsal; B) lateral; C) posterior. Aedeagus views: D) dorsal; E) lateral; F) posterior. Epiphallus views: G) dorsal; H) posterior.

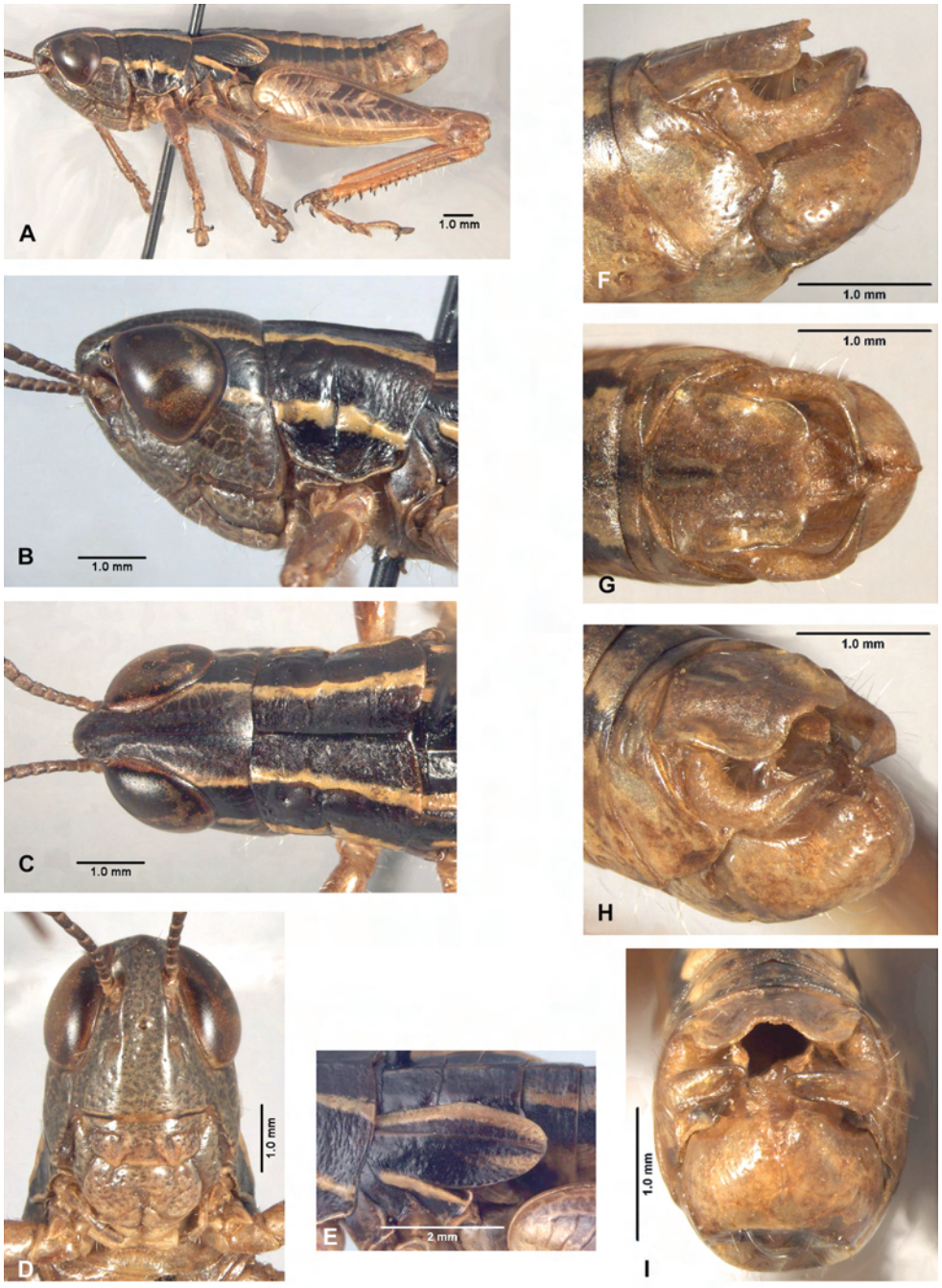

Figure 37. *Euloryma karoo* adult male external morphology (A-I). A) body lateral; B) head and pronotum lateral; C) head and pronotum dorsal; D) head front; E) tegmen. Cerci views F-I: F) lateral; G) dorsal; H) three-quarter; I) posterior.

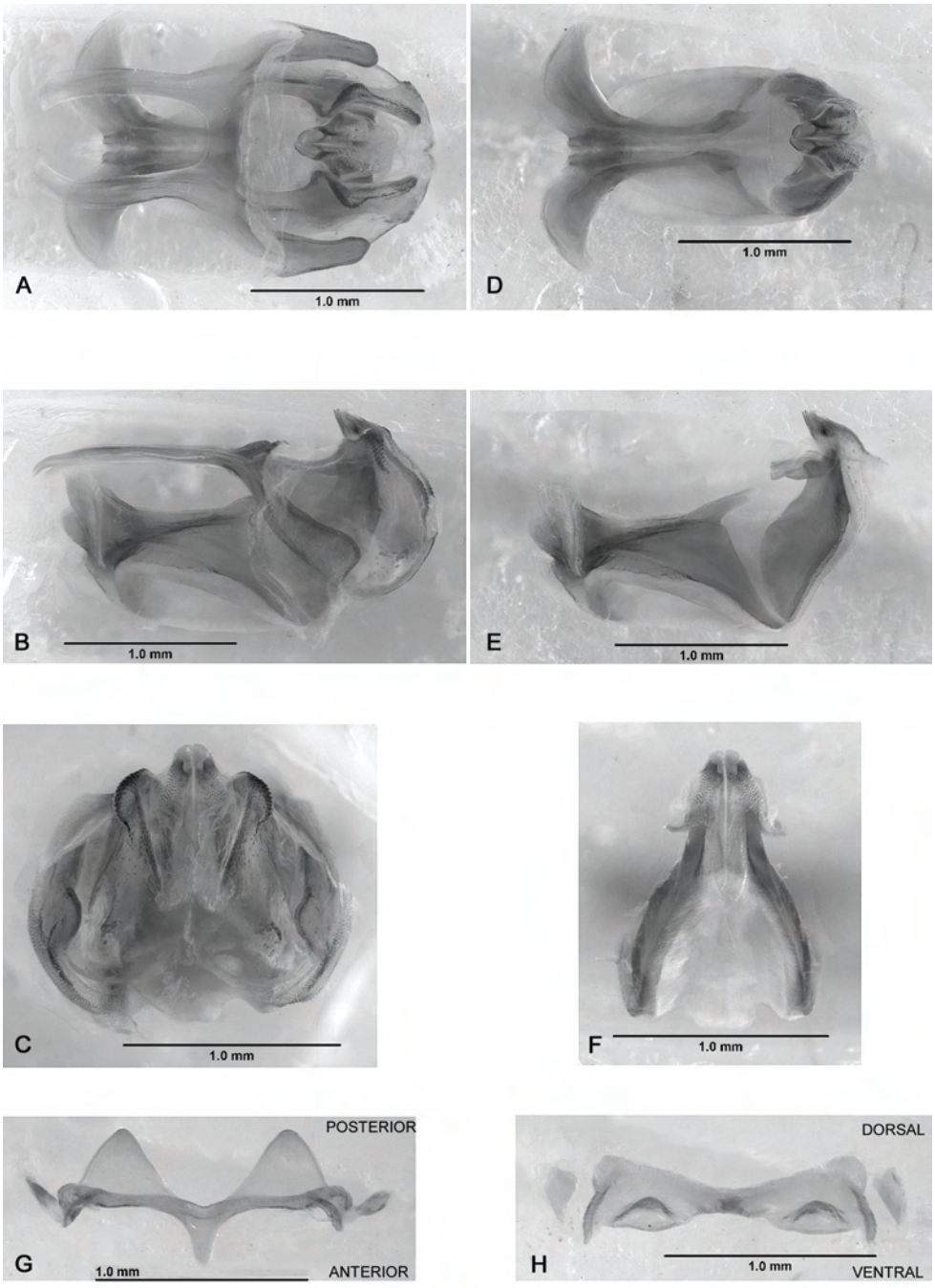

Figure 38. *Euloryma karoo* male genitalia (A-H). Phallic complex views (cingulum atop aedeagus, with lateral sclerites): A) dorsal; B) lateral; C) posterior. Aedeagus views: D) dorsal; E) lateral; F) posterior. Epiphallus views: G) dorsal; H) posterior.

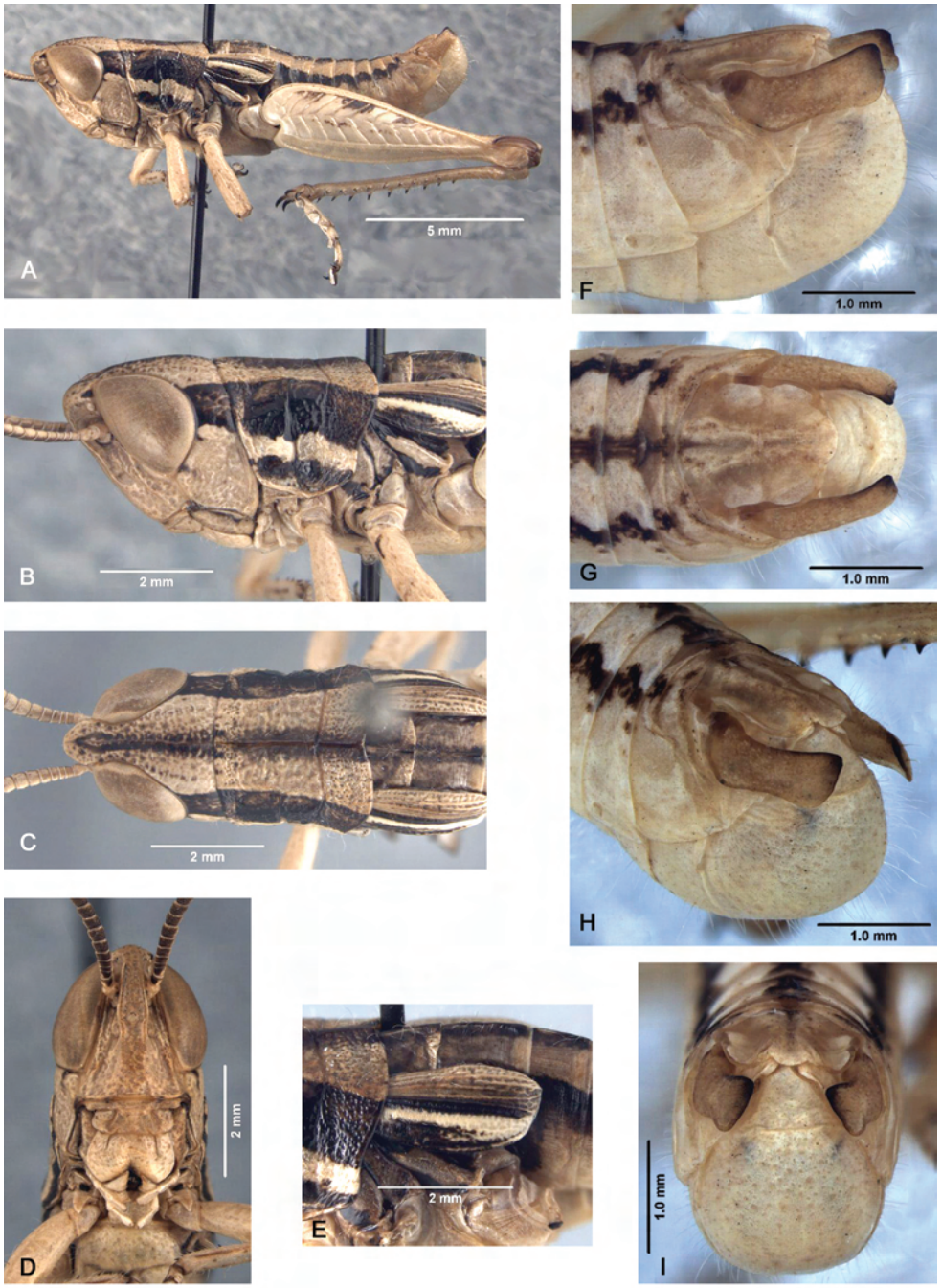

Figure 39. *Euloryma mirabunda* adult male external morphology (A-I). A) body lateral; B) head and pronotum lateral; C) head and pronotum dorsal; D) head front; E) tegmen. Cerci views F-I: F) lateral; G) dorsal; H) three-quarter; I) posterior.

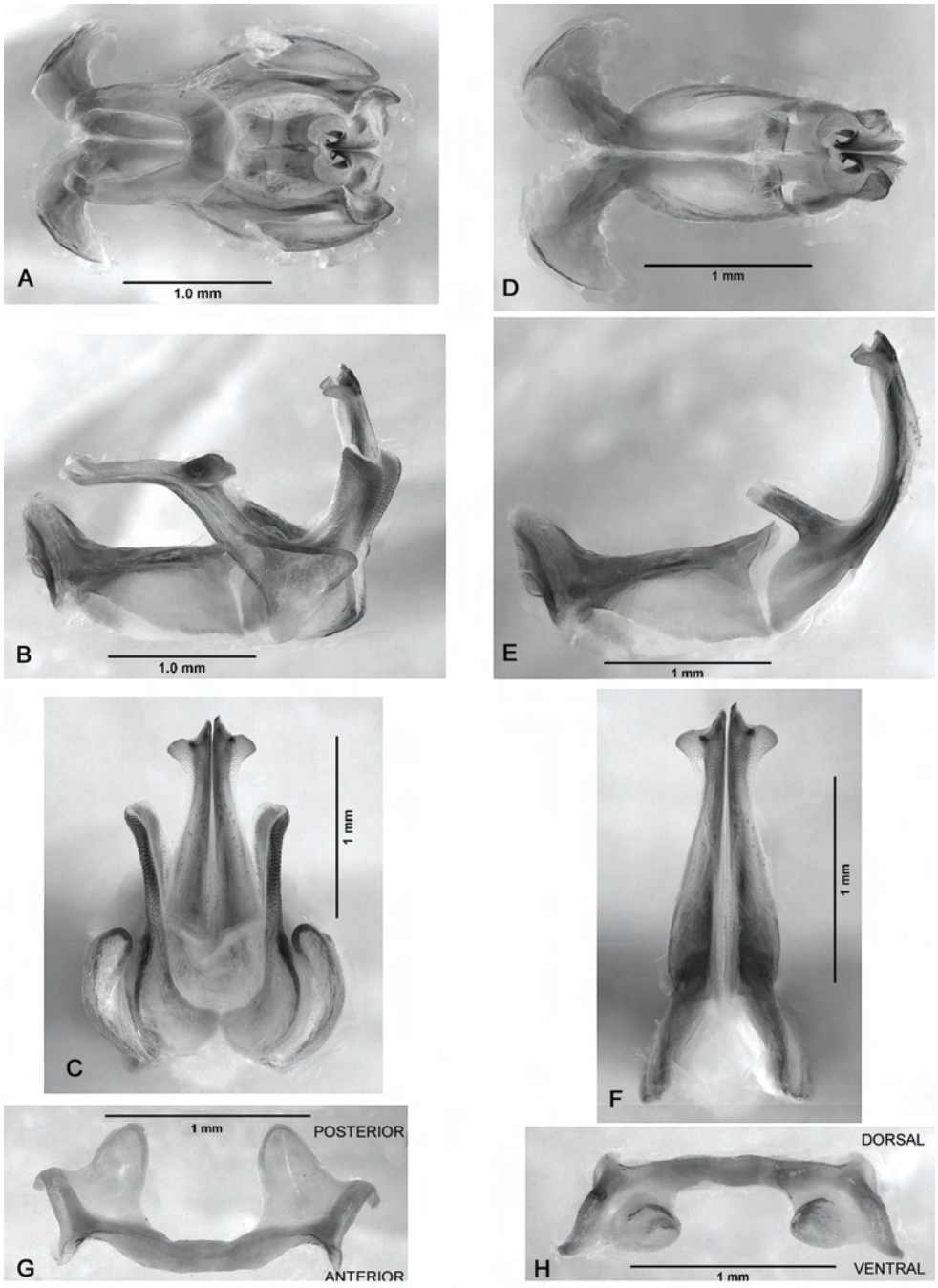

Figure 40. *Euloryma mirabunda* male genitalia (A-H). Phallic complex views (cingulum atop aedeagus, with lateral sclerites): A) dorsal; B) lateral; C) posterior. Aedeagus views: D) dorsal; E) lateral; F) posterior. Epiphallus views: G) dorsal; H) posterior.

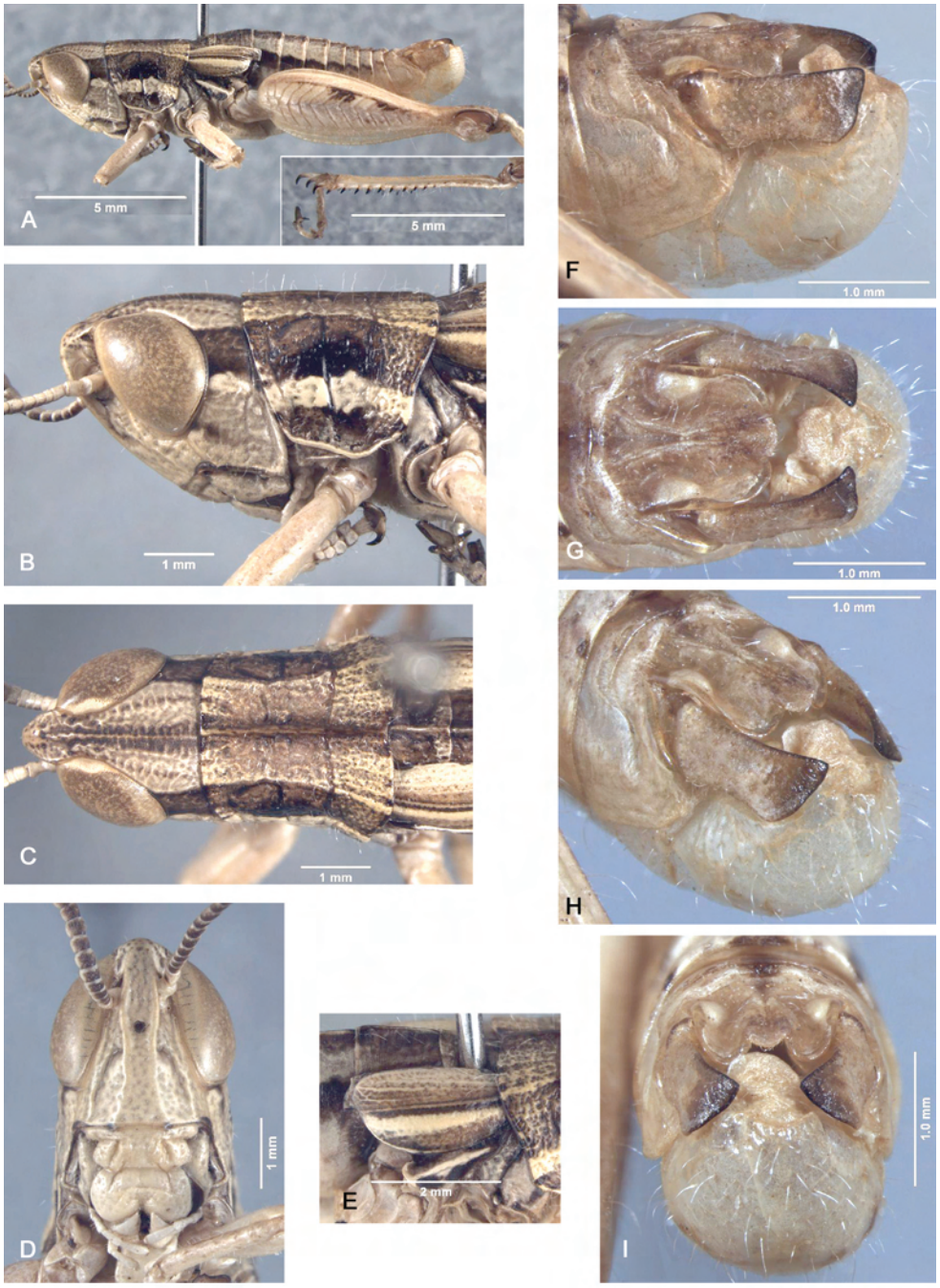

Figure 41. *Euloryma cederbergensis* adult male external morphology (A-H). A) body lateral; B) head and pronotum lateral; C) head and pronotum dorsal; D) head front; E) tegmen. Cerci views F-I: F) lateral; G) dorsal; H) three-quarter; I) posterior.

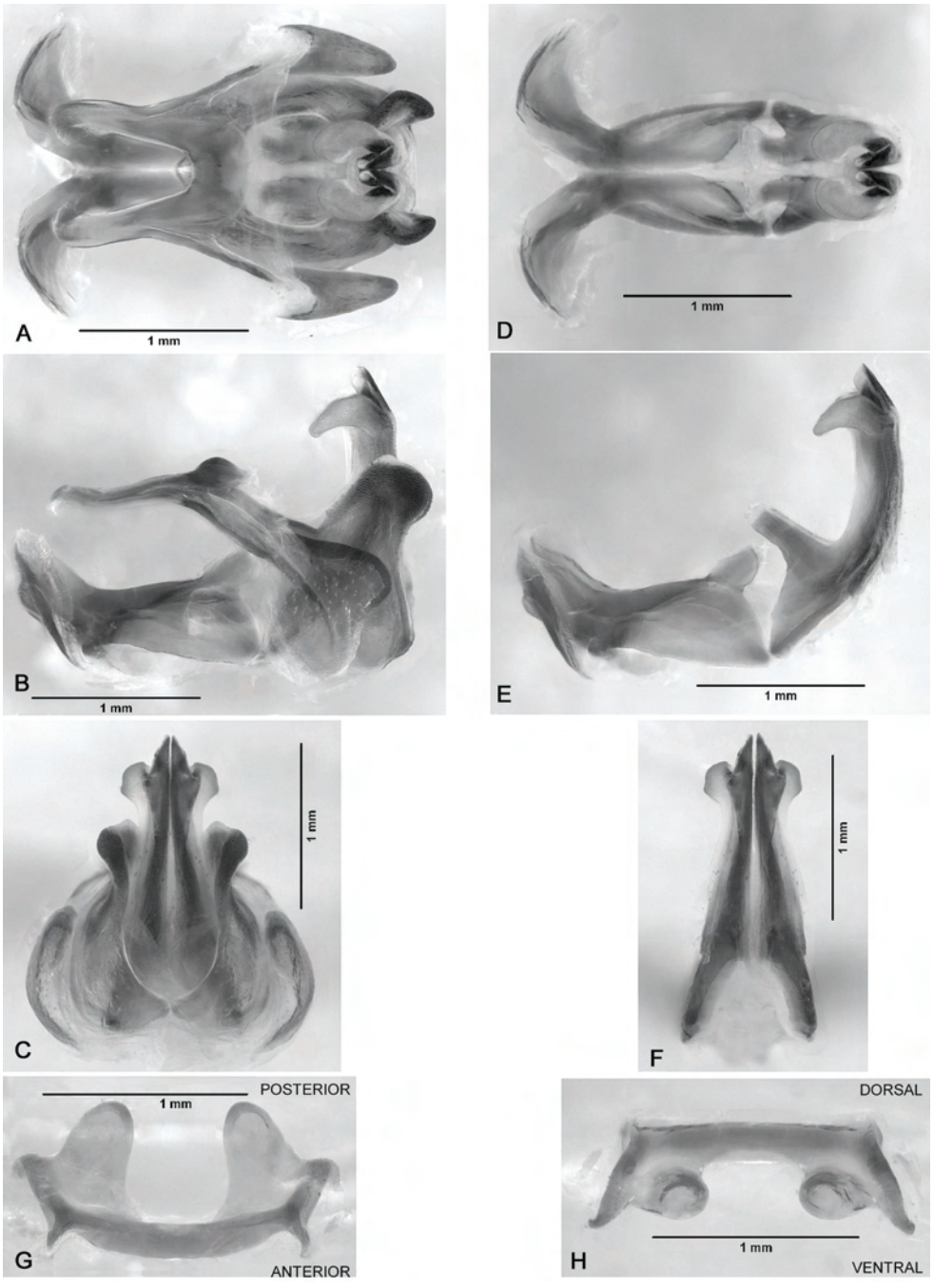

Figure 42. *Euloryma cederbergensis* male genitalia (A-H). Phallic complex views (cingulum atop aedeagus, with lateral sclerites): A) dorsal; B) lateral; C) posterior. Aedeagus views: D) dorsal; E) lateral; F) posterior. Epiphallus views: G) dorsal; H) posterior.

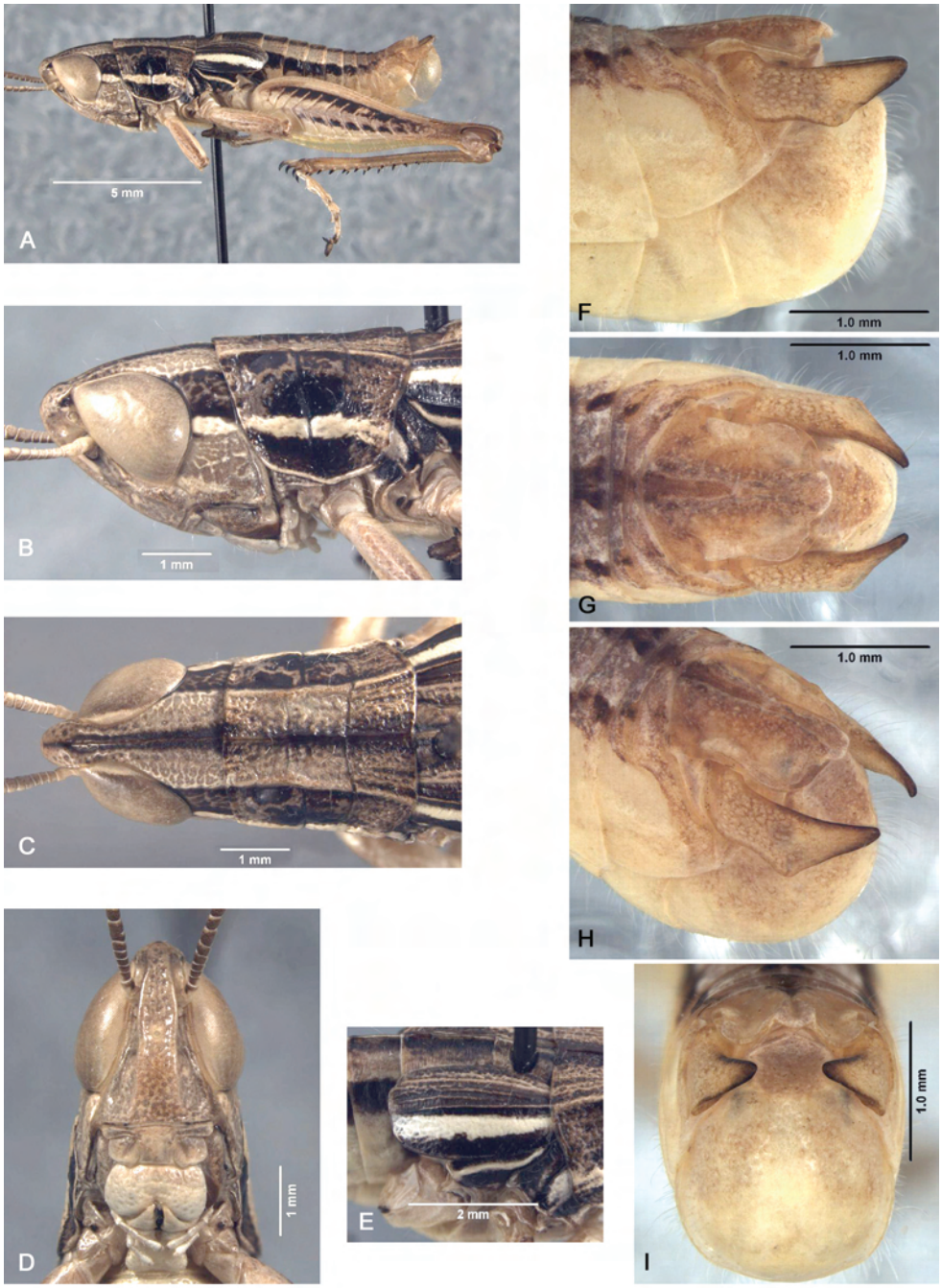

Figure 43. *Euloryma lapollai* adult male external morphology (A-H). A) body lateral; B) head and pronotum lateral; C) head and pronotum dorsal; D) head front; E) tegmen. Cerci views F-I: F) lateral; G) dorsal; H) three-quarter; I) posterior.

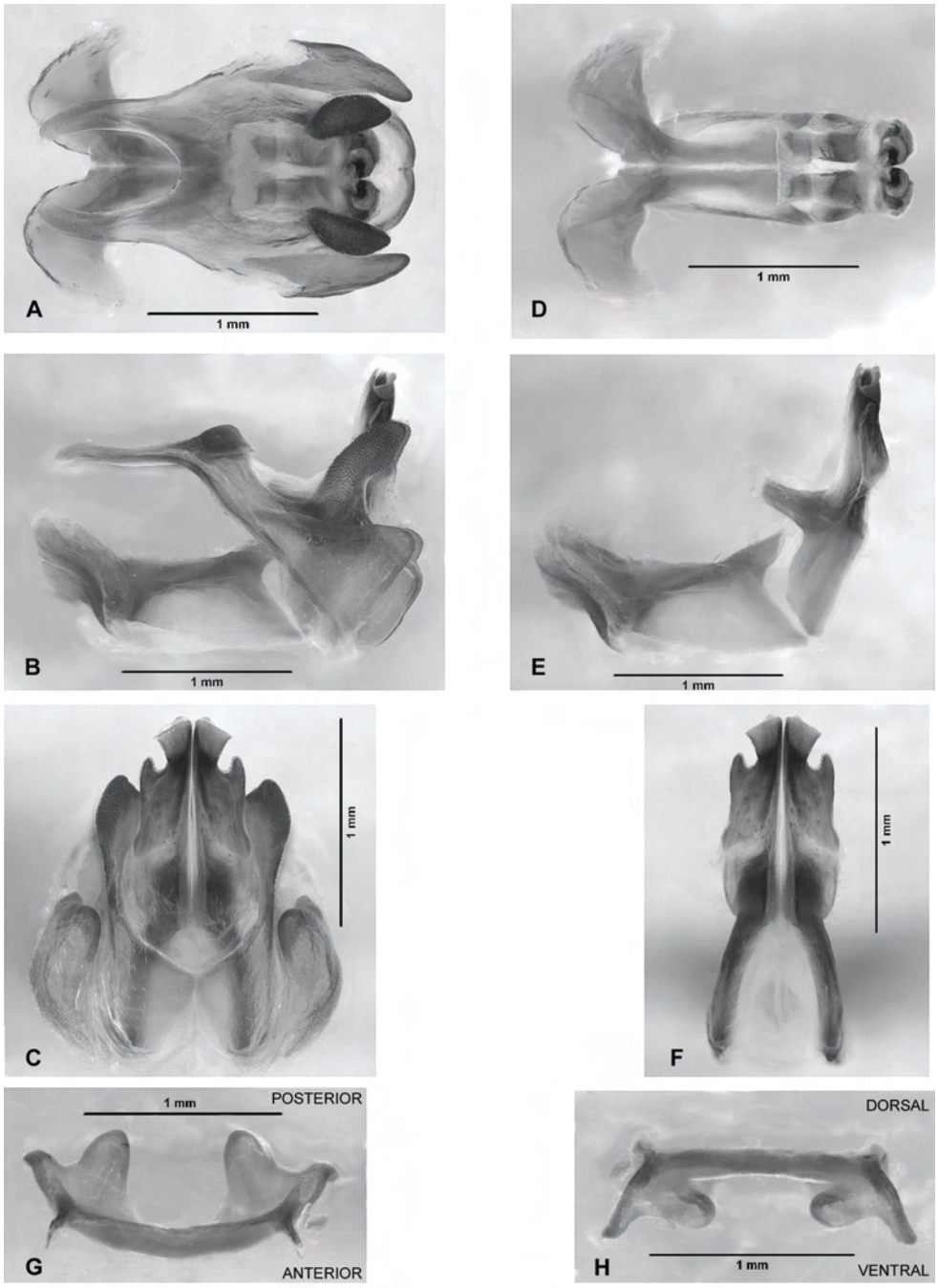

Figure 44. *Euloryma lapollai* male genitalia (A-H). Phallic complex views (cingulum atop aedeagus, with lateral sclerites): A) dorsal; B) lateral; C) posterior. Aedeagus views: D) dorsal; E) lateral; F) posterior. Epiphallus views: G) dorsal; H) posterior.

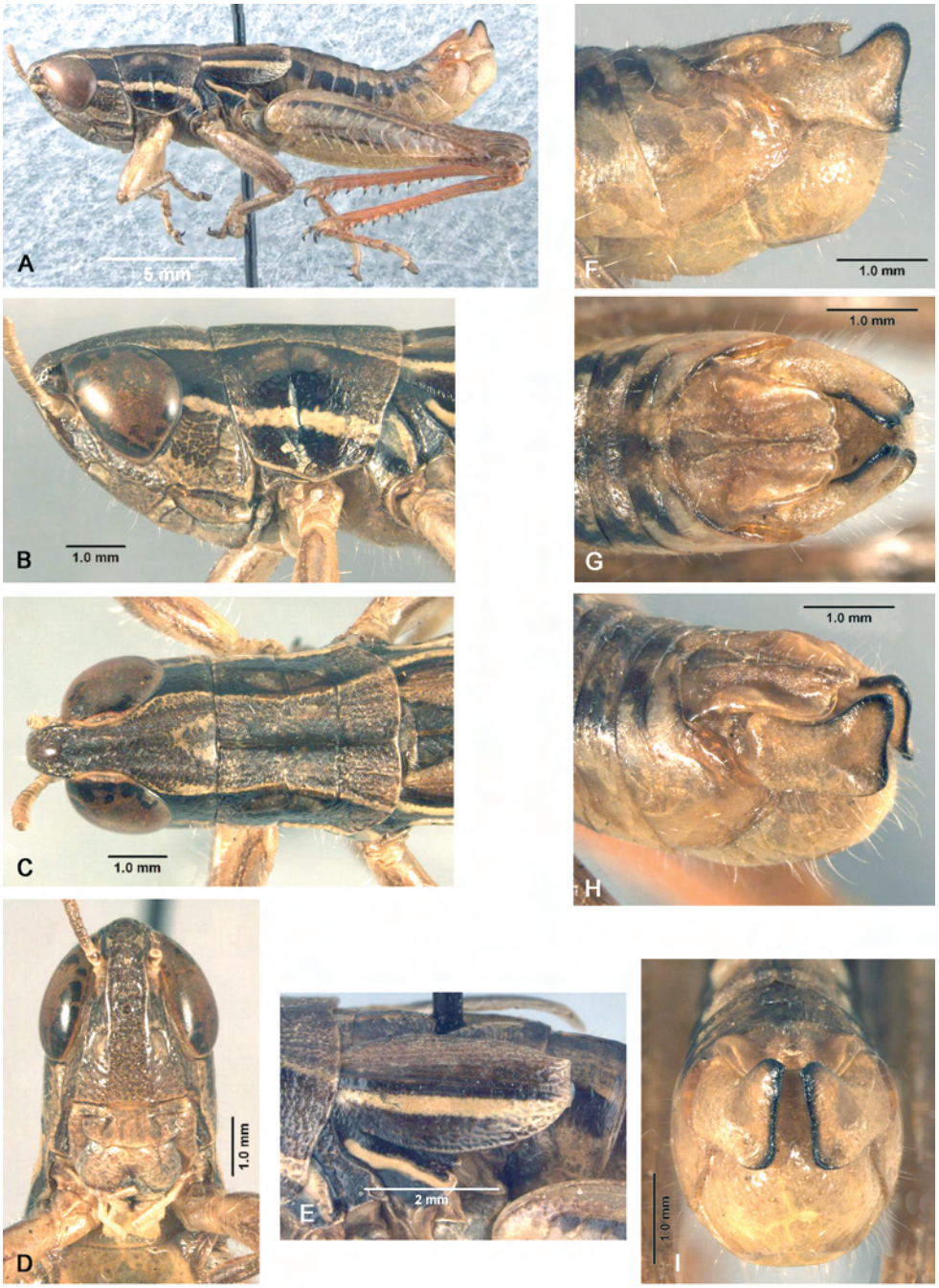

Figure 45. *Euloryma tsitsikamma* adult male external morphology (A-I). A) body lateral; B) head and pronotum lateral; C) head and pronotum dorsal; D) head front; E) tegmen. Cerci views F-I: F) lateral; G) dorsal; H) three-quarter; I) posterior.

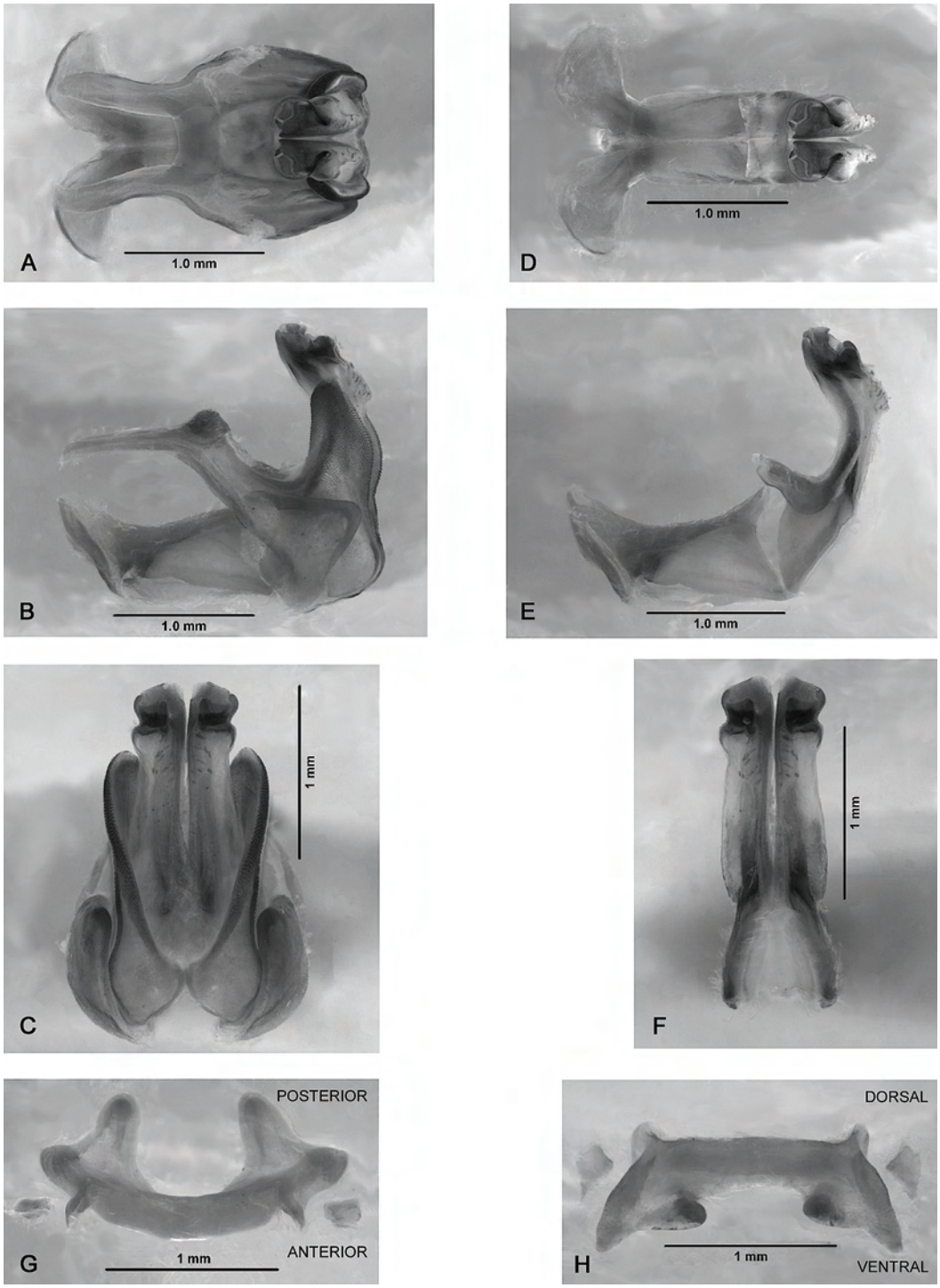

Figure 46. *Euloryma tsitsikamma* male genitalia (A-H). Phallic complex views (cingulum atop aedeagus, with lateral sclerites): A) dorsal; B) lateral; C) posterior. Aedeagus views: D) dorsal; E) lateral; F) posterior. Epiphallus views: G) dorsal; H) posterior.

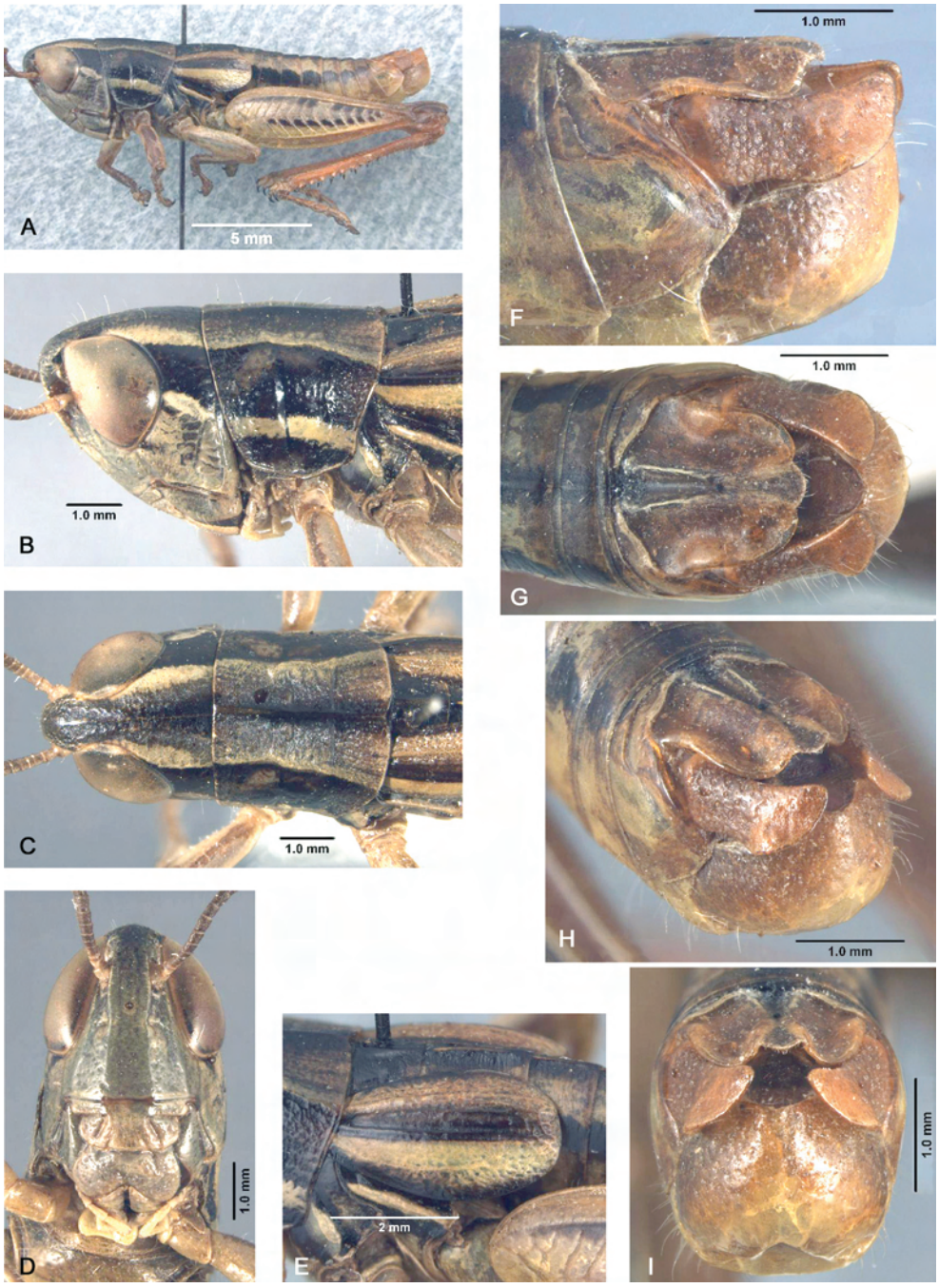

Figure 47. *Euloryma waboom* adult male external morphology (A-I). A) body lateral; B) head and pronotum lateral; C) head and pronotum dorsal; D) head front; E) tegmen. Cerci views F-I: F) lateral; G) dorsal; H) three-quarter; I posterior.

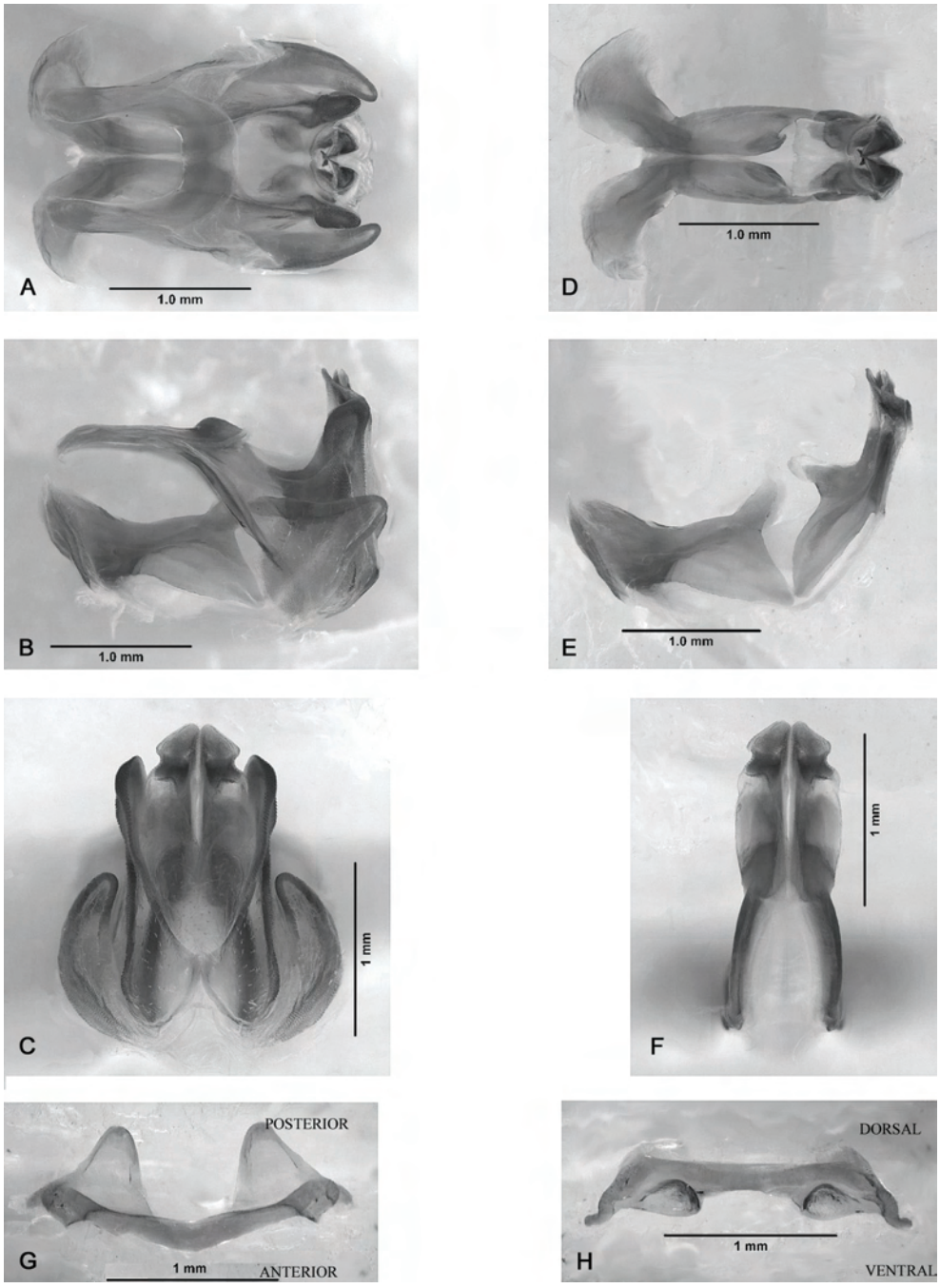

Figure 48. *Euloryma waboom* male genitalia (A-H). Phallic complex views (cingulum atop aedeagus, with lateral sclerites): A) dorsal; B) lateral; C) posterior. Aedeagus views: D) dorsal; E) lateral; F) posterior. Epiphallus views: G) dorsal; H) posterior.

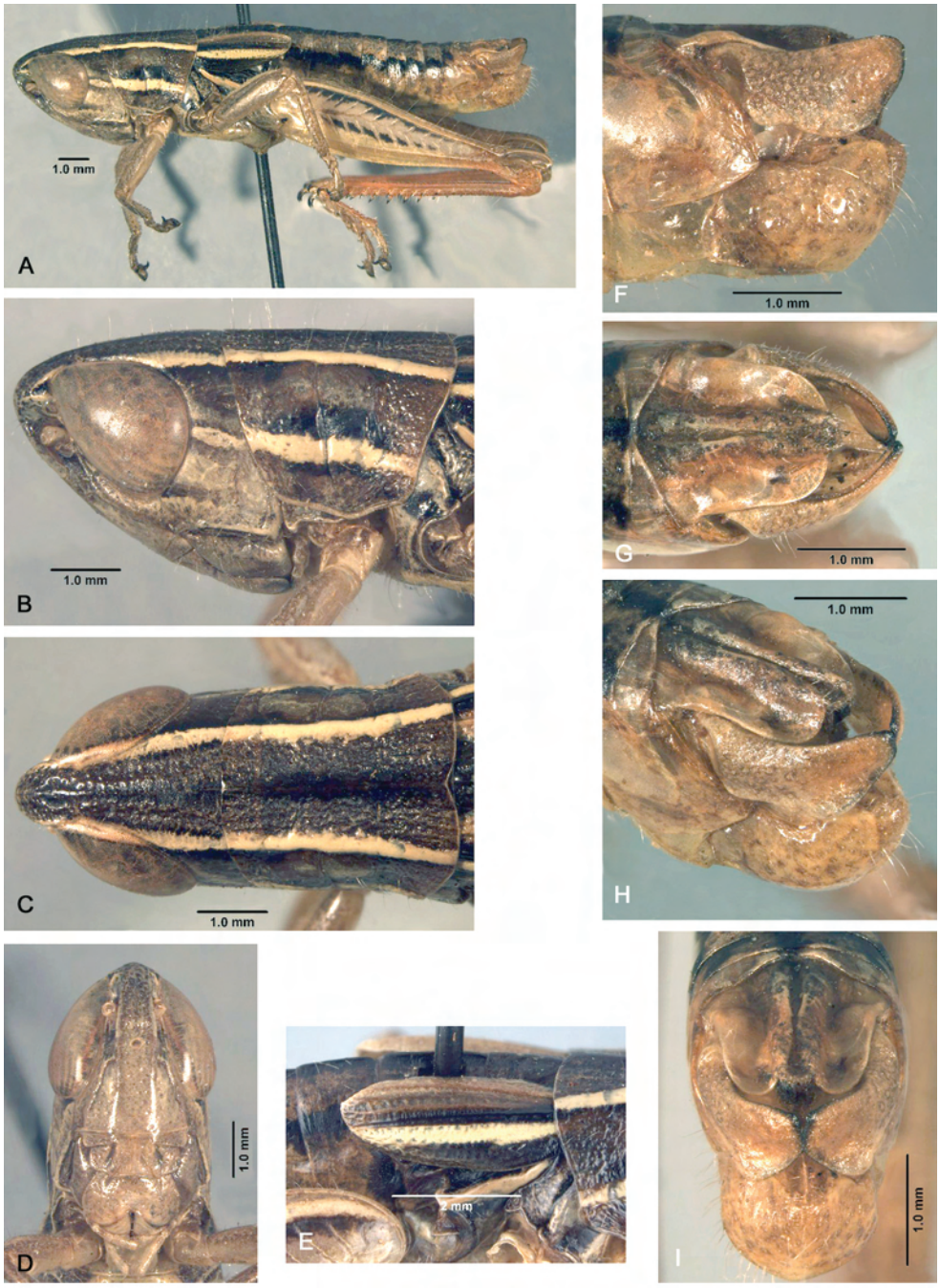

Figure 49. *Euloryma solveigae* adult male external morhology (A-I). A) body lateral; B) head and pronotum lateral; C) head and pronotum dorsal; D) head front; E) tegmen. Cerci views F-I: F) lateral; G) dorsal; H) three-quarter; I posterior.

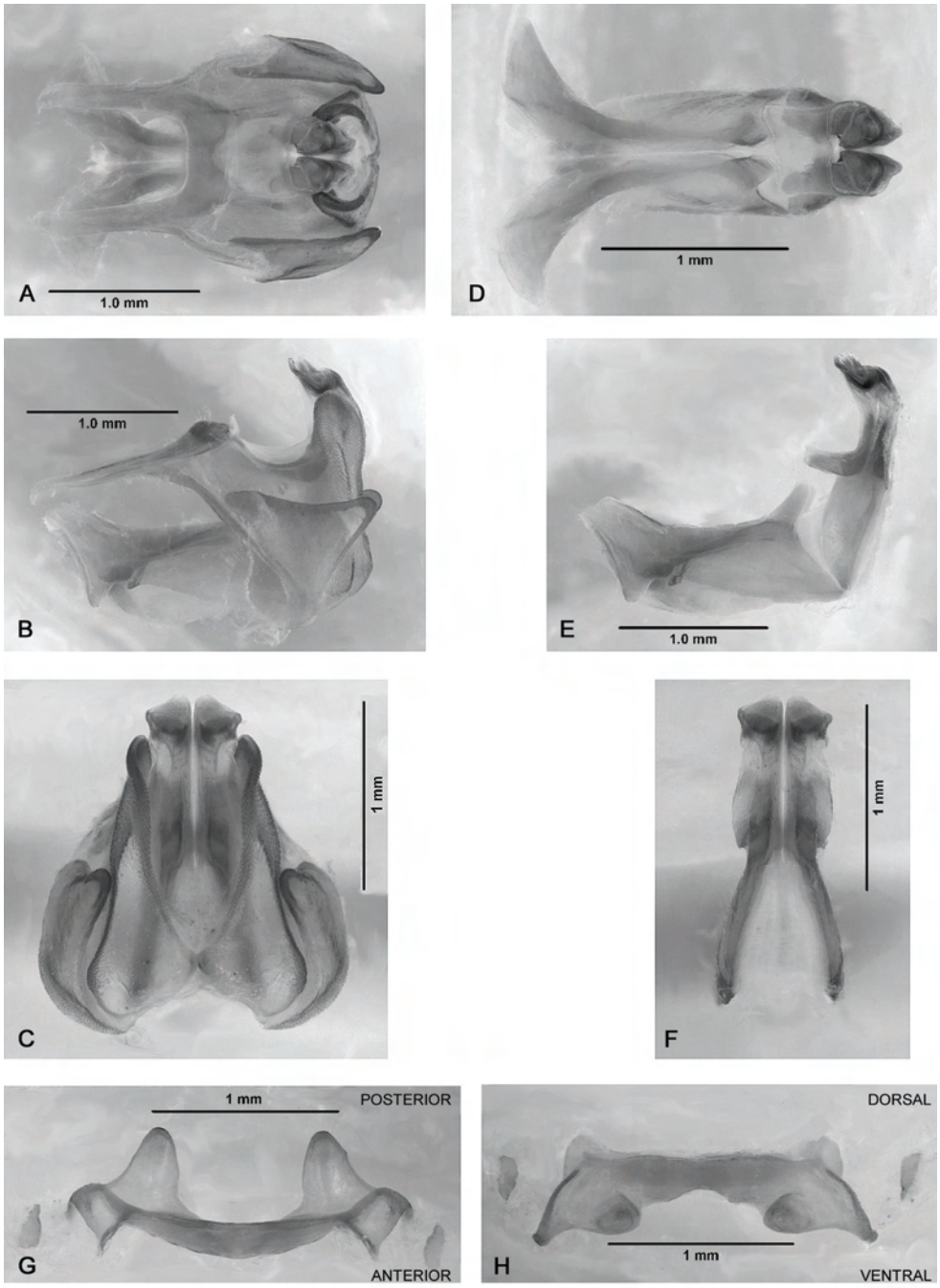

Figure 50. *Euloryma solveigae* male genitalia (A-H). Phallic complex views (cingulum atop aedeagus, with lateral sclerites): A) dorsal; B) lateral; C) posterior. Aedeagus views: D) dorsal; E) lateral; F) posterior. Epiphallus views: G) dorsal; H) posterior.

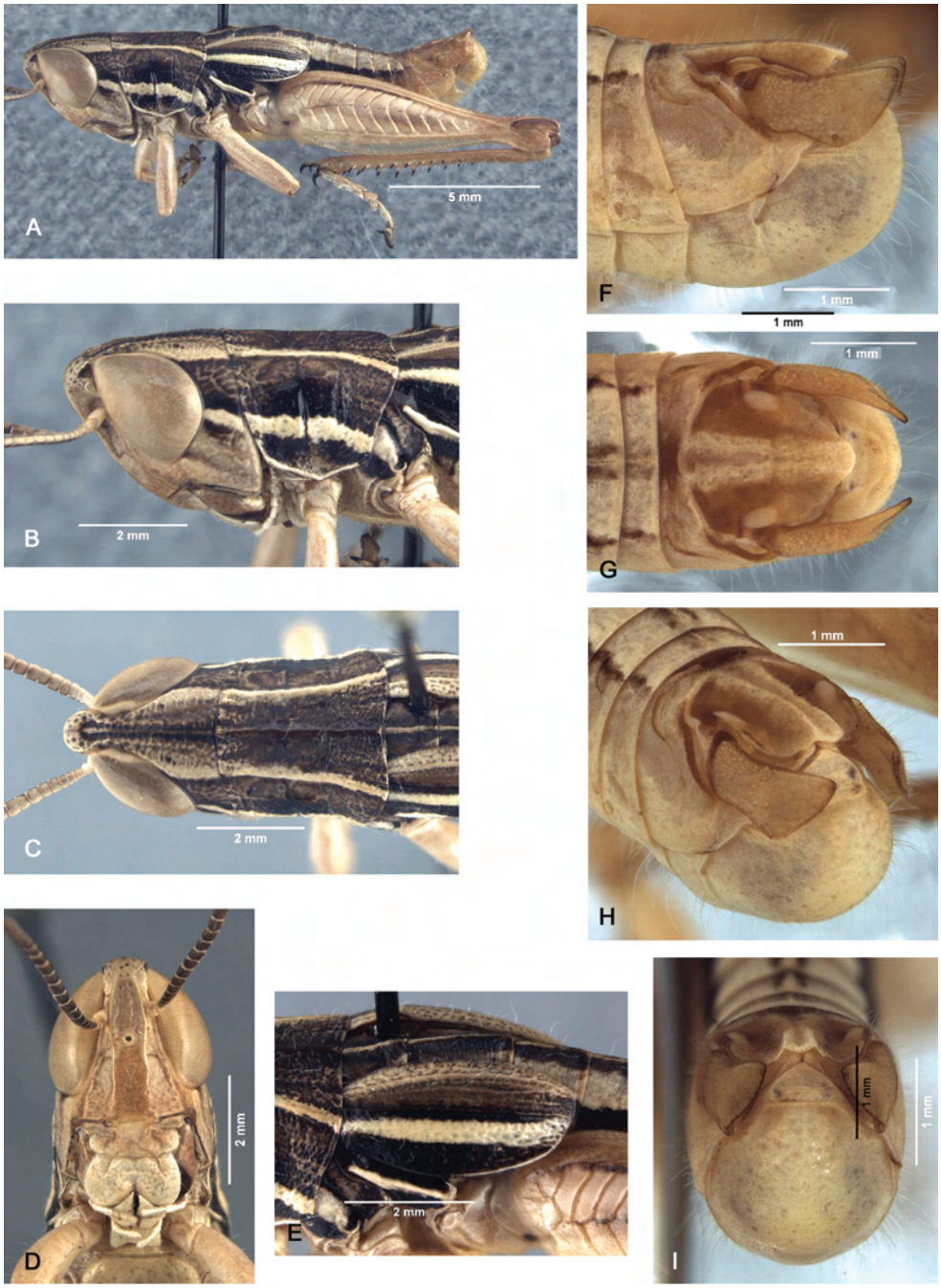

Figure 51. *Euloryma larsenorum* adult male external morphology (A-I). A) body lateral; B) head and pronotum lateral; C) head and pronotum dorsal; D) head front; E) tegmen. Cerci views F-I: F) lateral; G) dorsal; H) three-quarter; I) posterior.

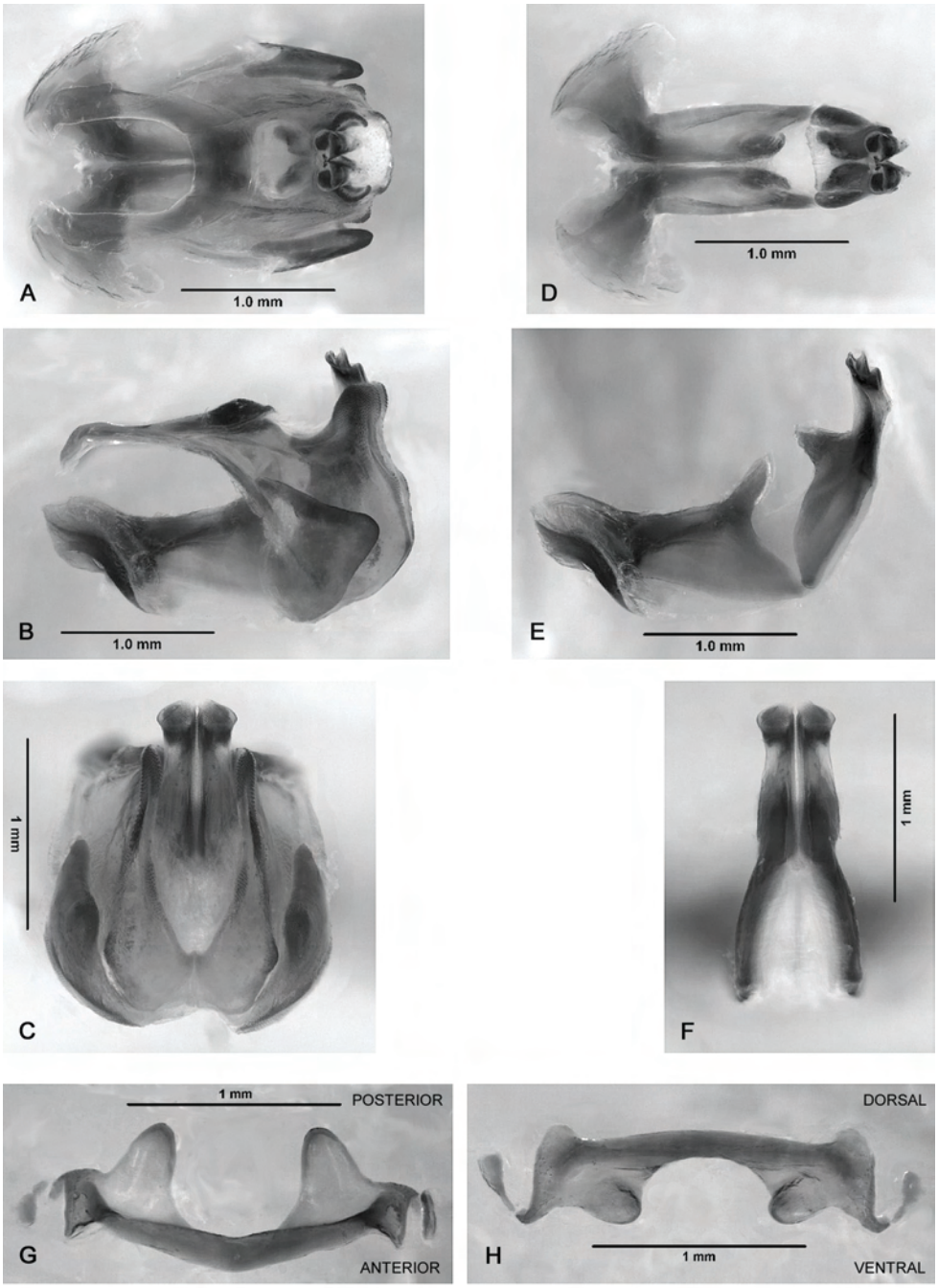

Figure 52. *Euloryma larsenorum* male genitalia (A-H). Phallic complex views (cingulum atop aedeagus, with lateral sclerites): A) dorsal; B) lateral; C) posterior. Aedeagus views: D) dorsal; E) lateral; F) posterior. Epiphallus views: G) dorsal; H) posterior.

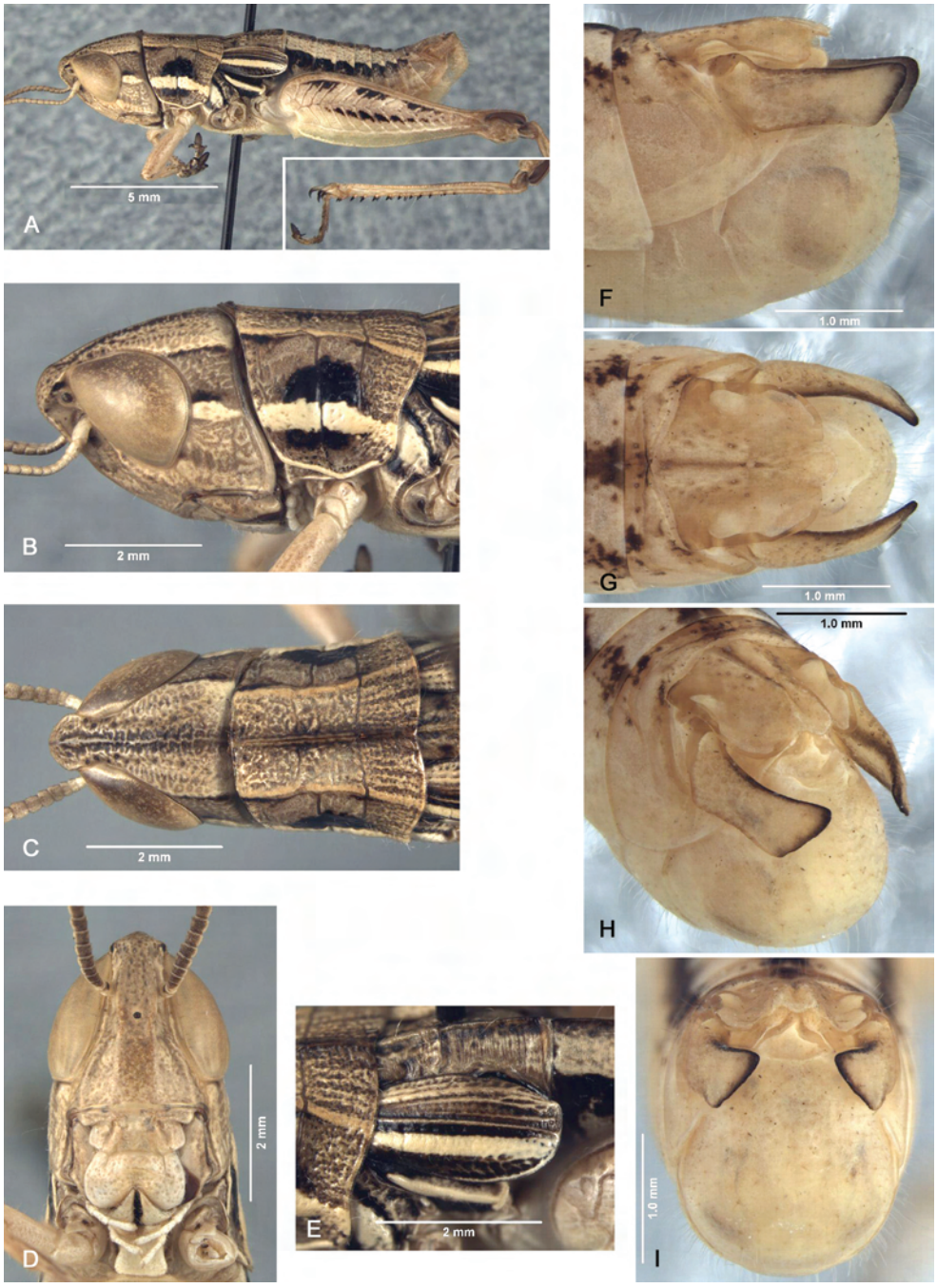

Figure 53. *Euloryma umoja* male external morphology (A-I). A) body lateral; B) head and pronotum lateral; C) head and pronotum dorsal; D) head front; E) tegmen. Cerci views F-I: F) lateral; G) dorsal; H) three-quarter; I) posterior.

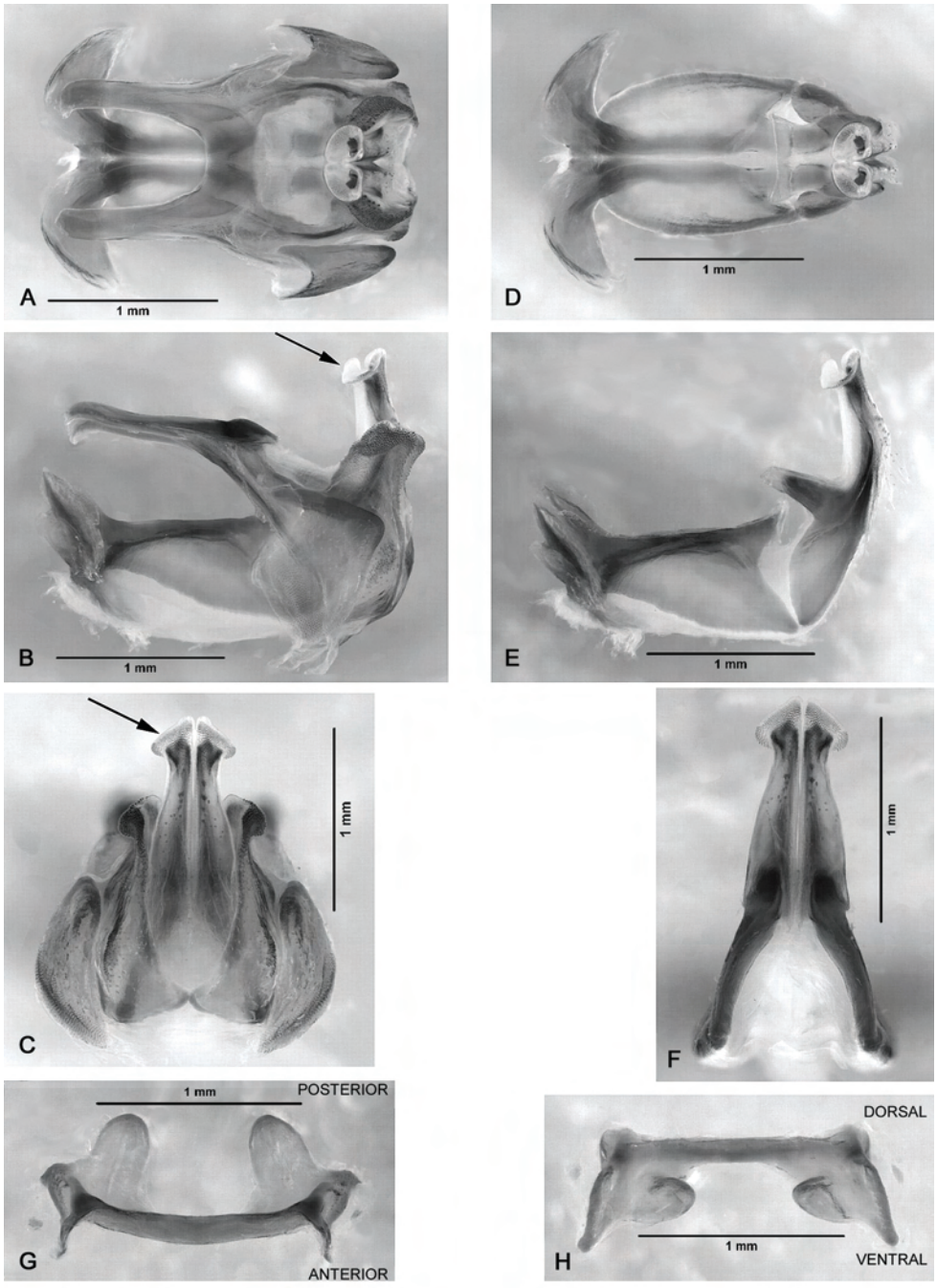

Figure 54. *Euloryma umoja* male genitalia (A-H). Phallic complex views (cingulum atop aedeagus, with lateral sclerites): A) dorsal; B) lateral; C) posterior. Aedeagus views: D) dorsal; E) lateral; F) posterior. Epiphallus views: G) dorsal; H) posterior.

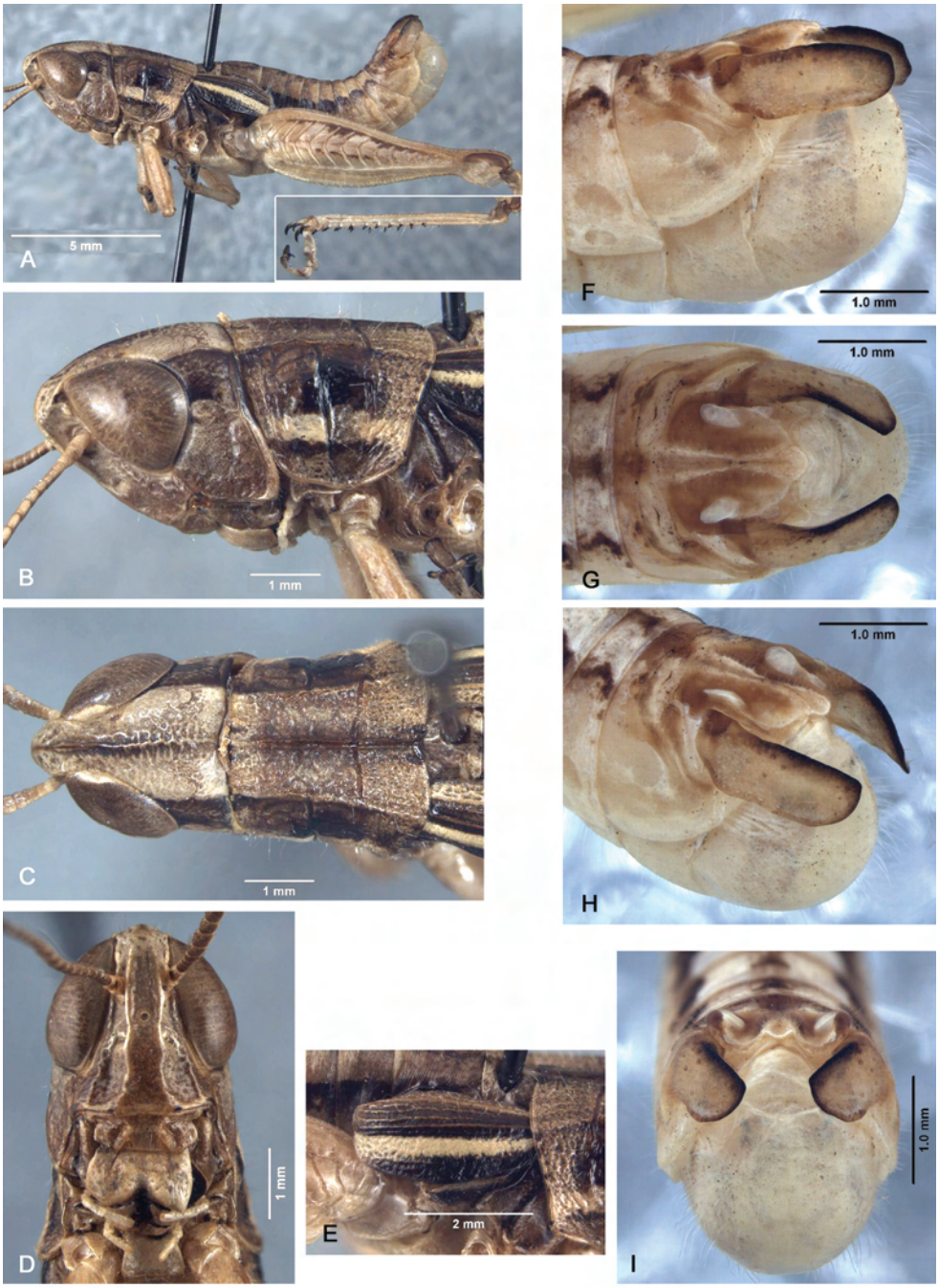

Figure 55. *Euloryma lyra* adult male external morphology (A-H). A) body lateral; B) head and pronotum lateral; C) head and pronotum dorsal; D) head front; E) tegmen. Cerci views F-I: F) lateral; G) dorsal; H) three-quarter; I) posterior.

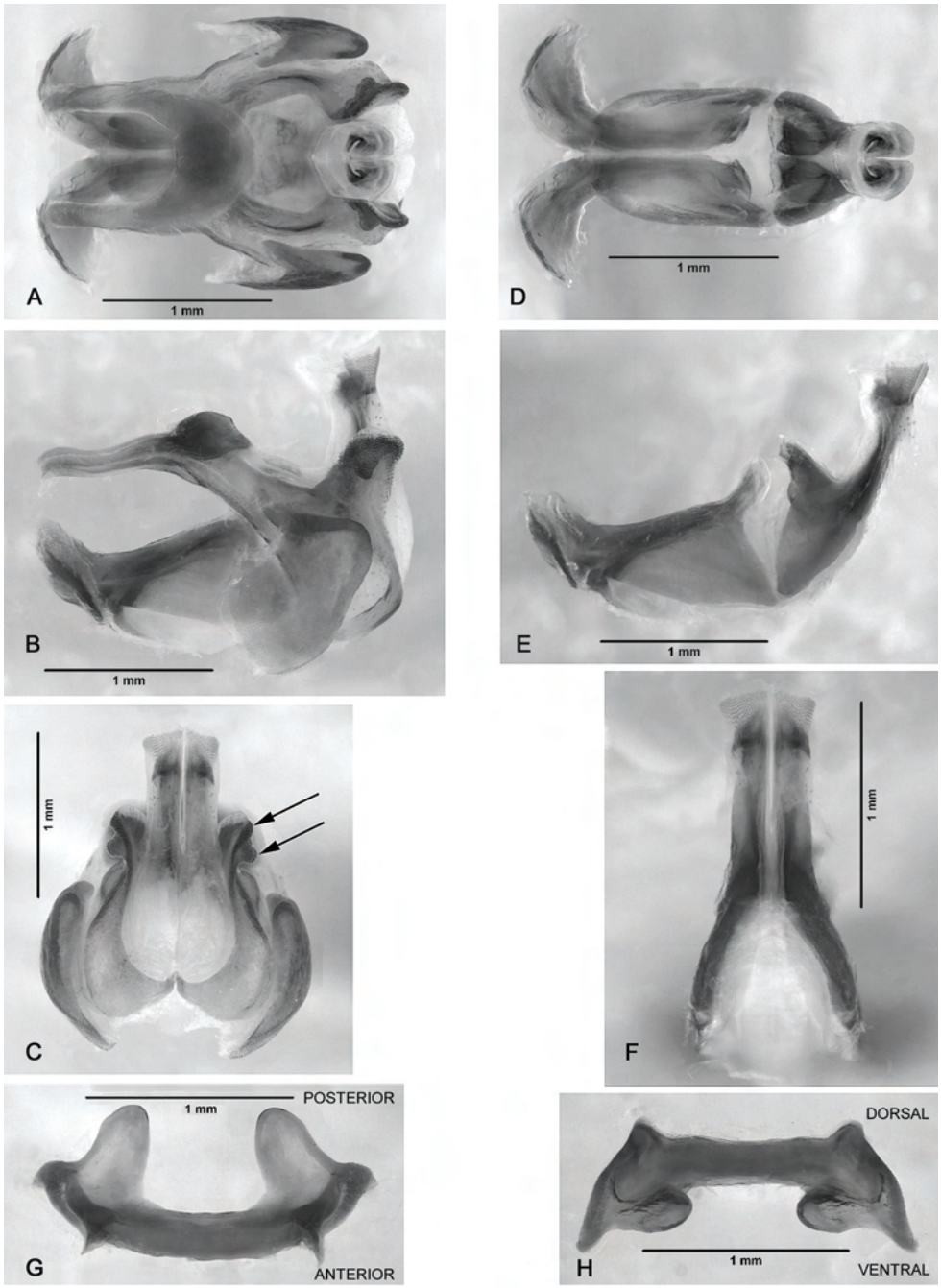

Figure 56. *Euloryma lyra* male genitalia (A-H). Phallic complex views (cingulum atop aedeagus, with lateral sclerites): A) dorsal; B) lateral; C) posterior. Aedeagus views: D) dorsal; E) lateral; F) posterior. Epiphallus views: G) dorsal; H) posterior.

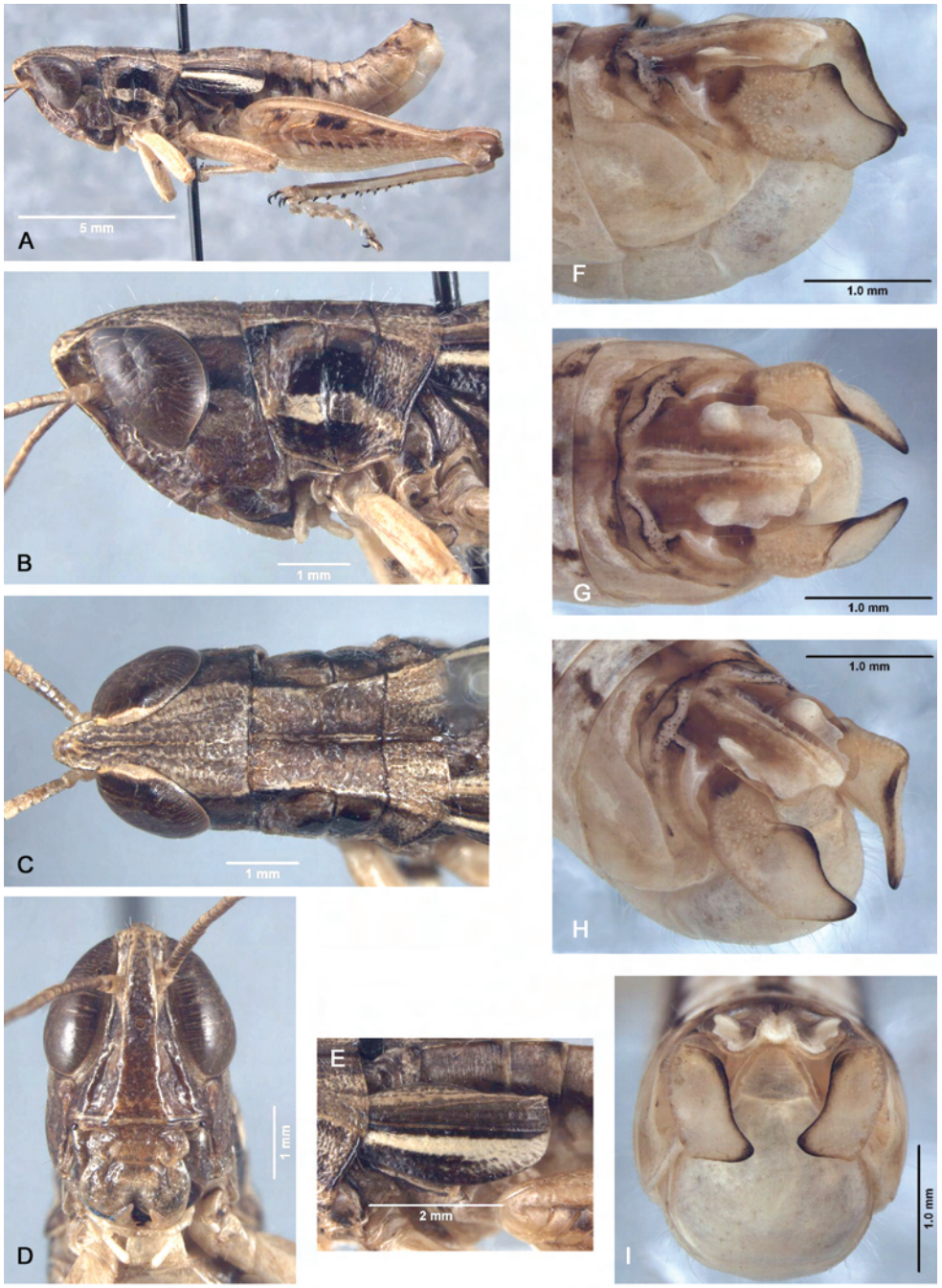

Figure 57. *Euloryma ottei* adult male external morphology (A-I). A) body lateral; B) head and pronotum lateral; C) head and pronotum dorsal; D) head front; E) tegmen. Cerci views F-I: F) lateral; G) dorsal; H) three-quarter; I posterior.

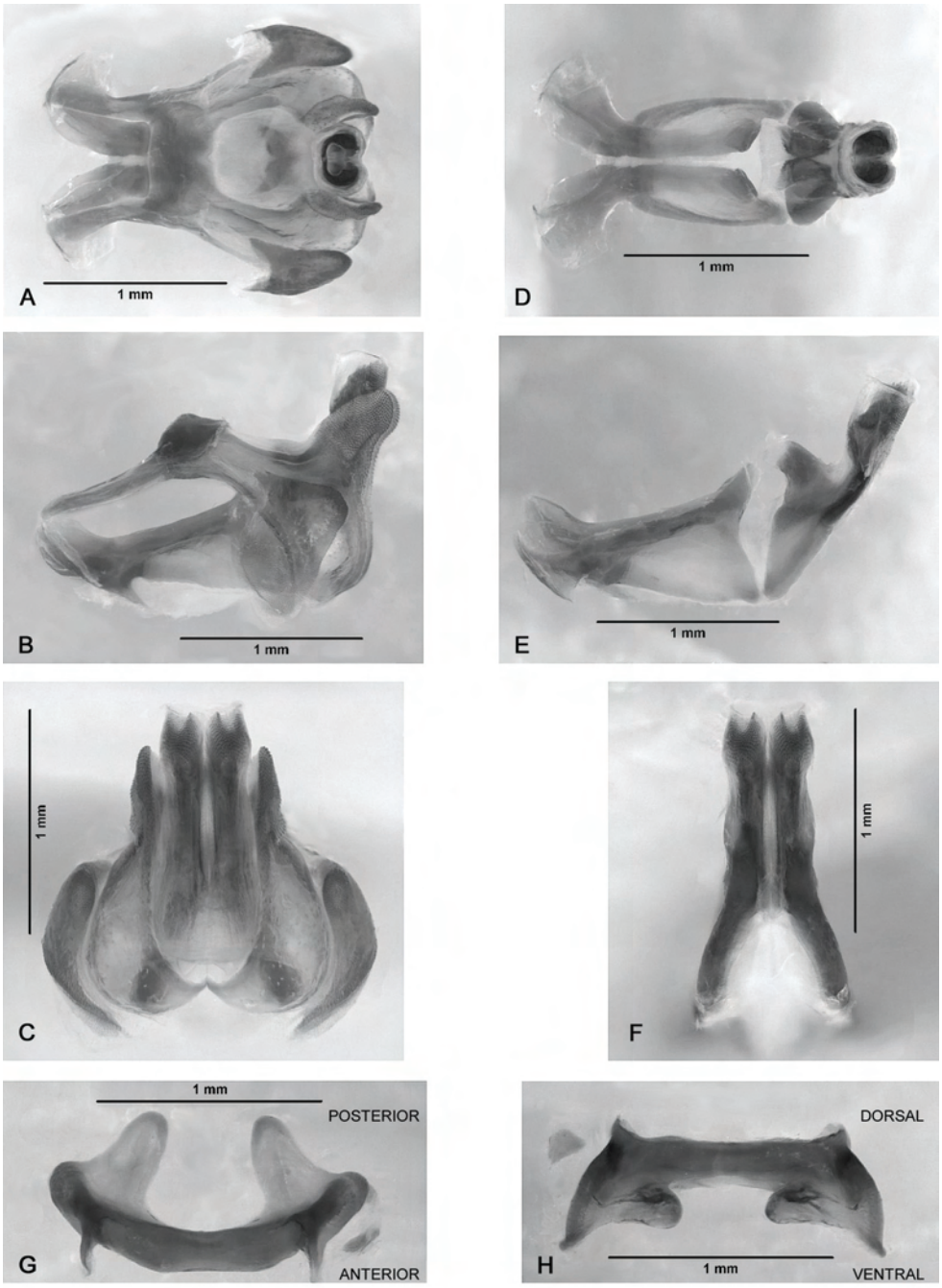

Figure 58. *Euloryma ottei* male genitalia (A-H). Phallic complex views (cingulum atop aedeagus, with lateral sclerites): A) dorsal; B) lateral; C) posterior. Aedeagus views: D) dorsal; E) lateral; F) posterior. Epiphallus views: G) dorsal; H) posterior.

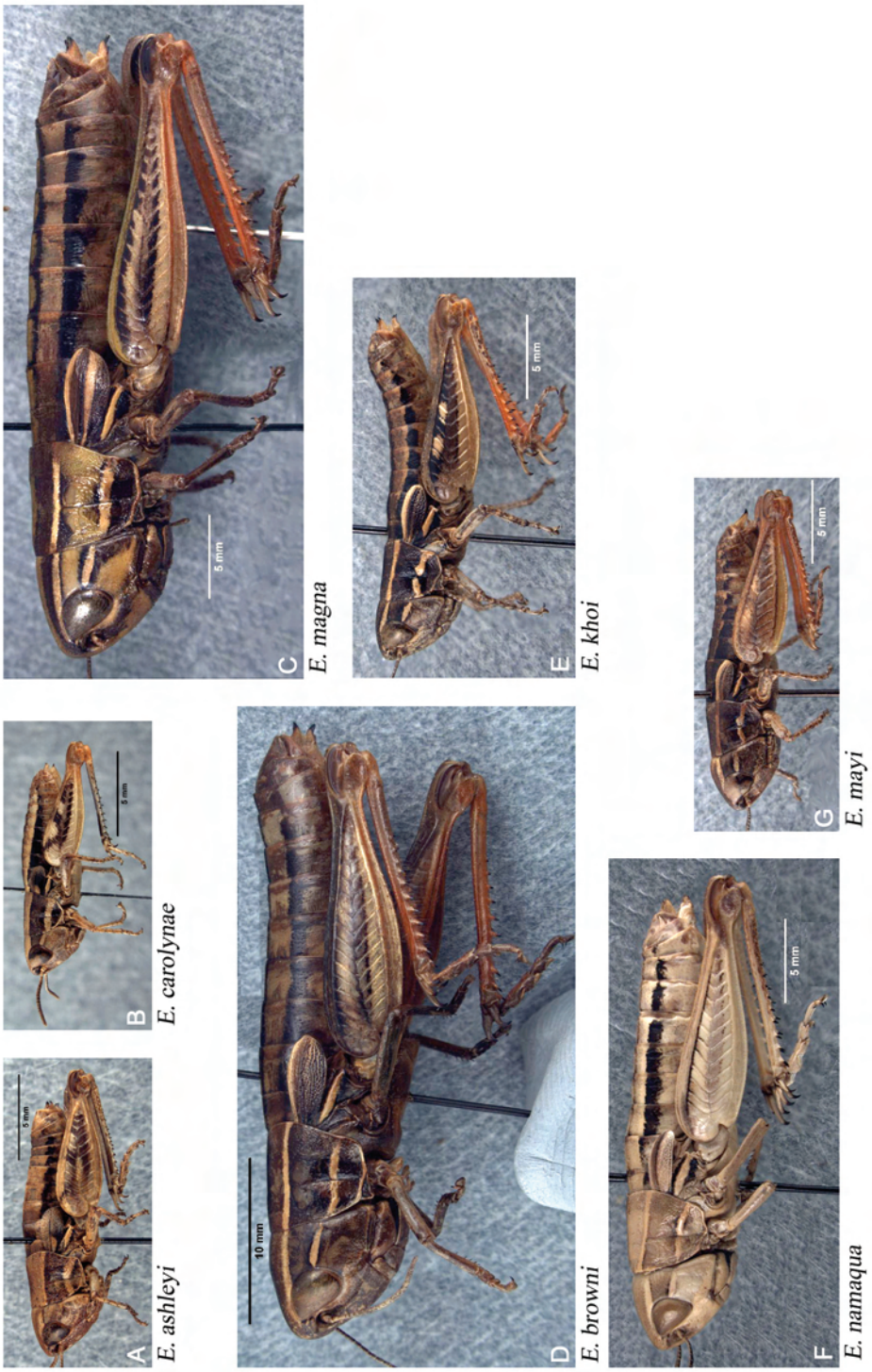

Figure 59. *Euloryma* females plate 1. Lateral view of external morphology for 6 species (A-G). All shown at same scale to demonstrate size differences. All species (A-G) are in the karoo species-group.

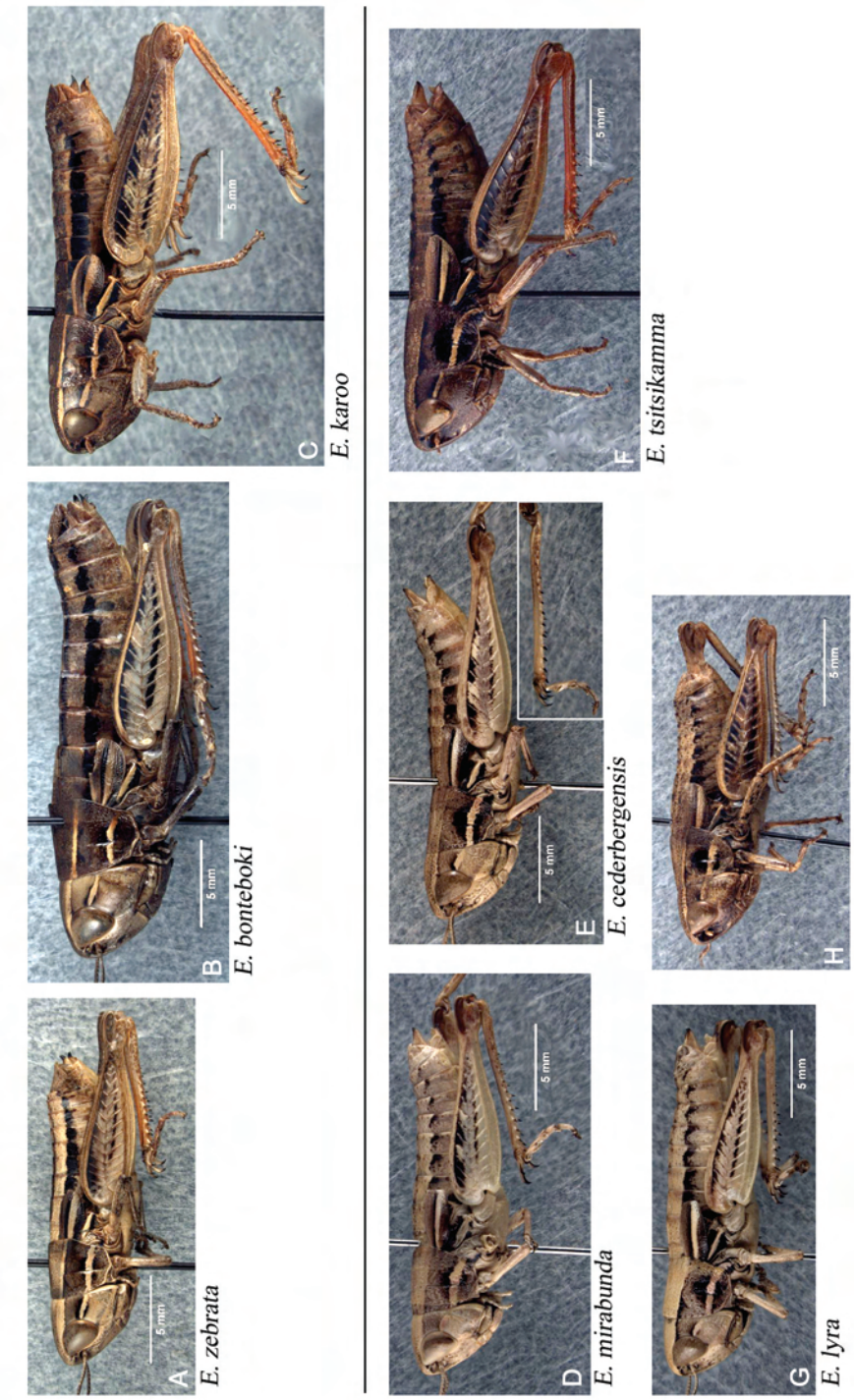

Figure 60. *Euloryma* females plate 2. Lateral view of external morphology for 8 species (A-H). All shown at same scale to demonstrate size differences. Species A-C are in the karoo species-group, species D-H are in the cederbergensis species-group.

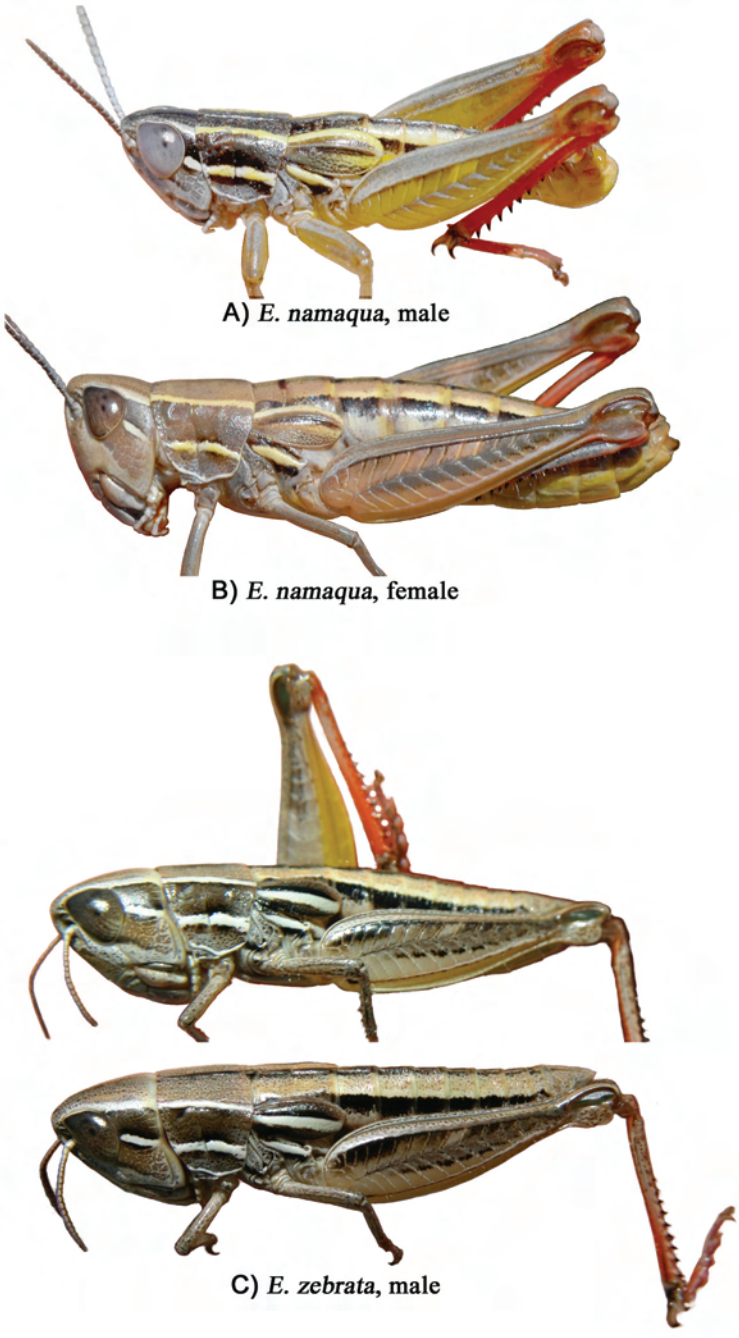

Figure 61. *Euloryma* species field collection photography. A-B) *E. namaqua*, male and female: Note color variation of body and legs. C) *E. zebrata*, male: Note color of body and hind leg of male. Pictured species are shown at different scales. Photos by D. Otte and L. Spearman.

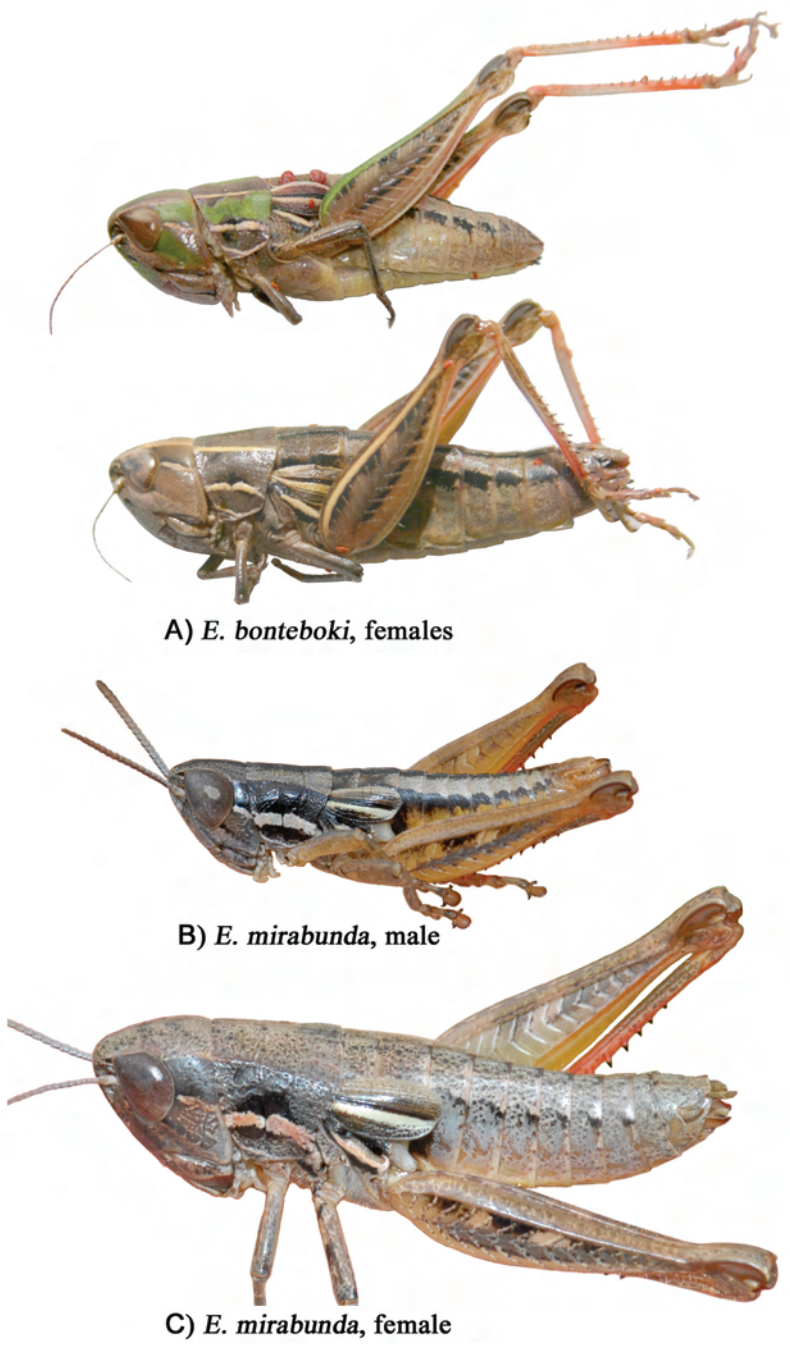

Figure 62. *Euloryma* species field collection photography. A) *E. bonteboki*, females: Note color variation for both body and femora. B-C) *E. mirabunda*, male and female: Note color variation of body and legs. Pictured species are shown at different scales. Photos by L. Spearman and D. Otte.

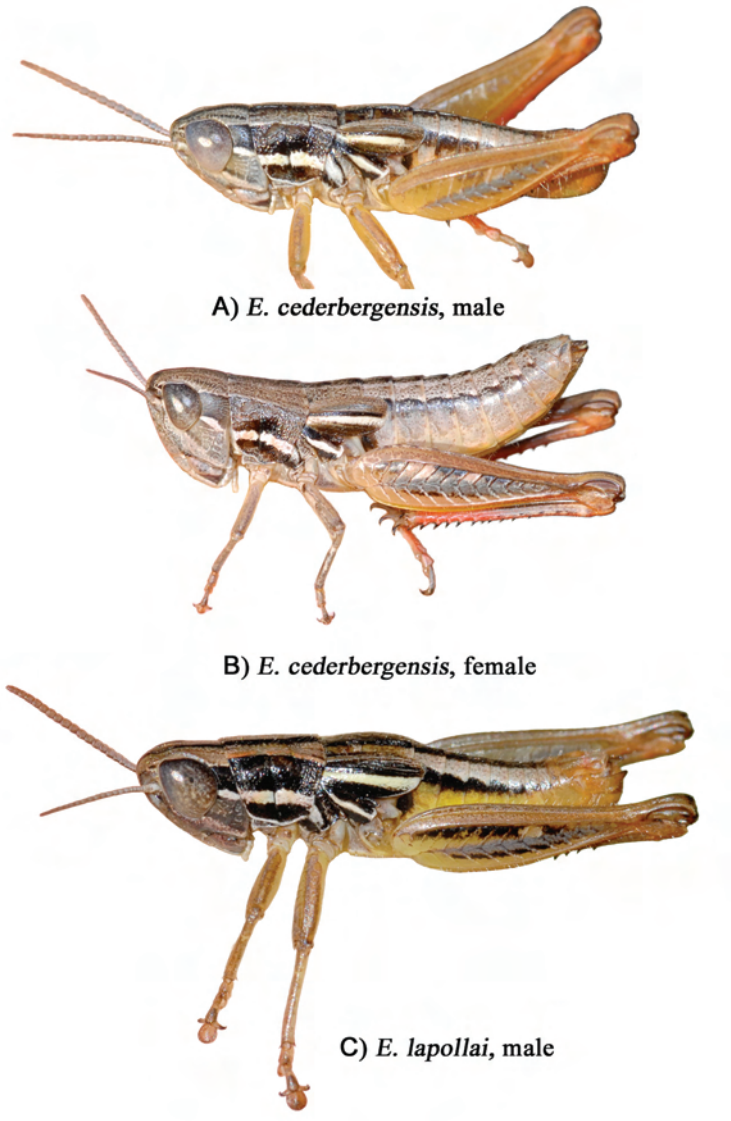

Figure 63. *Euloryma* species field collection photography. A-B) *E. cederbergensis*, male and female: Note coloration of body and legs. C) *E. lapollai*, male: Note coloration of body and legs. Pictured species are shown at different scales. Photos by D. Otte.

A) *E. larsenorum*, male

B) *E. umoja*, males

Figure 64. *Euloryma* species field collection photography. A) *E. larsenorum*, male: Note color of body and hind leg of male. B) *E. umoja*, males: Note color variation of males. Pictured species are shown at different scales. Photos by D. Otte.

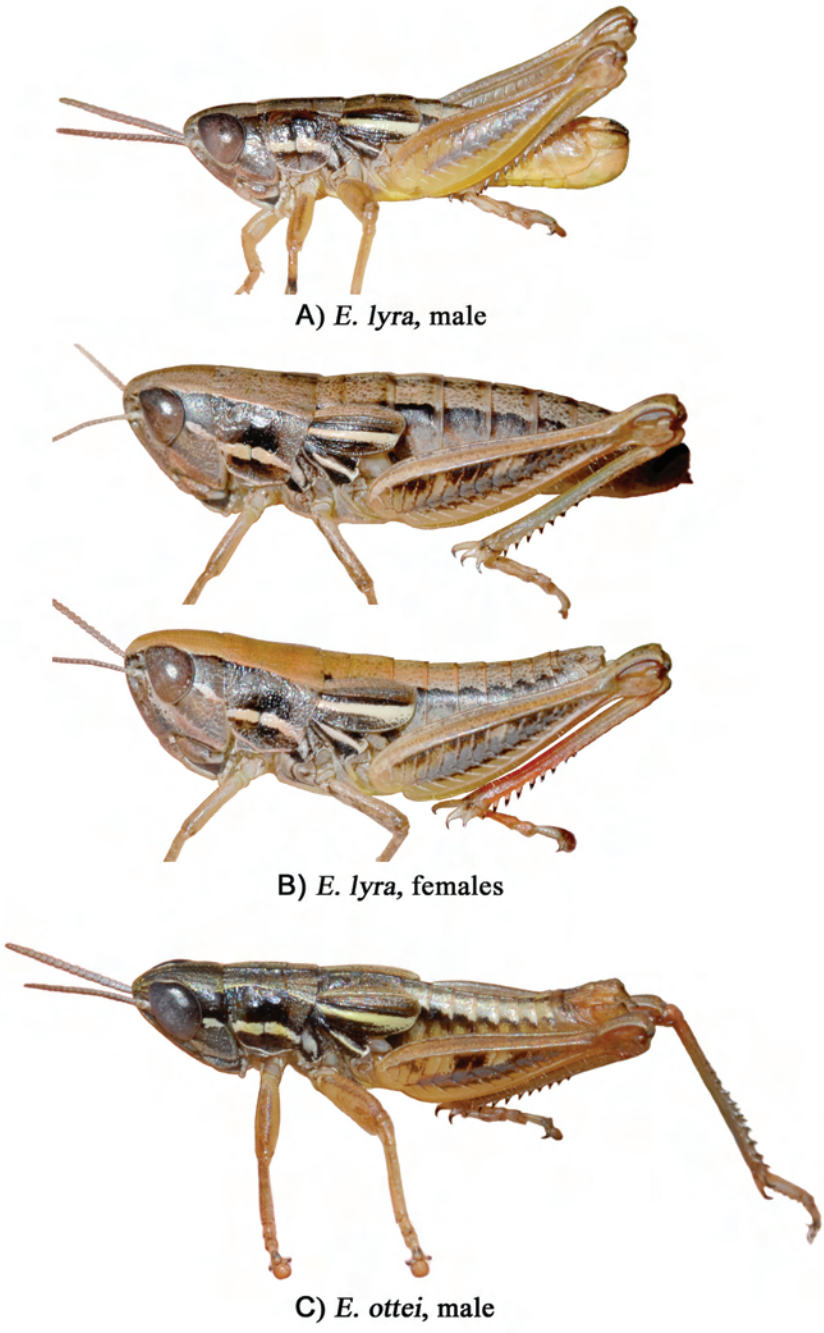

Figure 65. *Euloryma* species field collection photography. A) *E. lyra*, male: Note color of body and hind leg. B) *E. lyra*, females: Note color variation of body and hind tibiae. C) *E. ottei*, male: Note coloration of body and hind leg. Pictured species are shown at different scales. Photos by D. Otte.

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