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New species of arboreal predatory katydids from West Africa (Orthoptera: Tettigoniidae: Meconematinae)

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Abstract

A new genus (*Brachyamytta* **n. gen.**) and ten new species (*Proamytta spinifera* **n. sp.**, *Amyttosa insectivora* **n. sp.**, *Anepitacta wrightae* **n. sp.**, *Amyttopsis bakowskii* **n. sp.**, *A. palmulicerca* **n. sp.**, *Xiphidiola hokei* **n. sp.**, *X. lobaticerca* **n. sp.**, *Brachyamytta rapidoaestima* **n. sp.**, *B. mcculloughae* **n. sp.**, and *B. maculipes* **n. sp.**) of West African Meconematinae (Orthoptera: Tettigoniidae) are described. New distribution records for several species are presented, and unusual egg morphology of *A. insectivora* is discussed.

Key words: West African katydids, Meconematinae, new species, egg morphology

Introduction

Similar to most other groups of West African katydids, the Meconematinae of this region are poorly known, and their diversity is likely to be several times higher than the numbers of described species indicate. The most comprehensive treatment of West African Meconematinae is that of Beier (1965), and only seven species have been added since (Beier 1967; Roy 1967; Ragge and Roy 1971; Gorochov 1993, 1994). Overall, 43 species and subspecies were described from the region (including species described from the Democratic Republic of Congo) between 1890 and 1994, making it the majority of all 64 species of the Meconematinae recorded from the entire continent between 1888 and 2001. A recent series of rapid biological surveys conducted in Guinea and Ghana by Conservation International between 2002 and 2006 adds to this list 10 new species, described below.

West and Central African Meconematinae are small (10–25 mm), slender-legged katydids of rather uniform appearance. Most species are green and macropterous, although a few have reduced wings, and some have generally brown coloration. The front and middle tibiae are equipped with short spines (usually not much longer than the diameter of the tibia), and the tympanum is always bilaterally open. All known species have a well developed stridulatory apparatus in the male, although in some species the stridulatory file is exceptionally small (less than 250 μm long). The length of the file is in no way correlated with the degree of wing reduction, and brachypterous species often have stridulatory files several times larger than those in species with fully developed wings. Males of African Meconematinae possess some of the most diverse and complex external reproductive structures among katydids. Virtually every element of the abdominal terminalia of the male, including the 10th tergite, the epiproct (= supraanal plate), cerci, paraprocts, the subgenital plate, and the styli has been strongly modified in at least some of the species, although functions of these structures during copulation and sperm transfer are completely unknown. Only genera Anepitacta Br.-Watt., Proamytta Beier, and Amyttopsis Beier appear to have sclerotized epiphallus (= titillators).

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Virtually nothing is known about the biology and behavior of species of West African Meconematinae, but they are presumed to be predaceous. My field observations in Ghana and Guinea support this notion, and I have seen several species feeding on small flies and homopterans. All species described below have been collected at night in forested habitats, usually from short trees and bushes in lowland and mid-elevation evergreen forests. No species appeared to be active during the day. Nothing is known about the reproductive biology of this group, but the morphology of the ovipositor and eggs in most species is consistent with that of katydids depositing their eggs inside stems of herbaceous plants. A potentially very interesting exception is the genus *Amyttosa* Beier, in which both the morphology of the ovipositor and the egg seem to indicate a very different egg laying strategy (see notes below.)

Methods

The new species described below were collected during four biological surveys conducted in 2002–2006 in Guinea and Ghana, organized by the Rapid Assessment Program (RAP) of Conservation International. Three methods were employed for collecting meconematine katydids: (1) collecting at incandescent and ultraviolet (UV) lights at night (2) visual search at night, and (3) net sweeping of the understory vegetation during the day and at night. Net sweeping was employed in the vegetation along the roads within the forest, the forest understory, and natural openings within the forest, such as edges of streams or forest ponds. This method was the most effective one for collecting species of Meconematinae.

Representatives of all encountered species were collected and voucher specimens were preserved in 95% ethanol and as pinned, dry specimens.

The following conventions were adopted for specimen measurements:

body with wings—in the female, the distance from the apex of the fastigium to the apex of ovipositor, or the apex of wings, whichever is longer; in the male, the distance from the apex of the fastigium to the apex of the subgenital plate, or the apex of wings, whichever is longer;

body without wings—in both sexes, the distance from the apex of fastigium to the end of subgenital plate

ovipositor—the distance from the base of the subgenital plate to the apex of the ovipositor.

Collection codens:

ANSP	Academy of Natural Sciences of Philadelphia, Philadelphia, USA
BMNH	The Natural History Museum, London, UK
CAS	California Academy of Sciences, San Francisco, CA, USA
MCZ	Museum of Comparative Zoology, Harvard University, Cambridge, USA
MNCN	Museo Nacional de Ciencias Naturales, Madrid, Spain
MNHN	Museum National d'Histoire Naturelle, Paris, France
MRAC	Section d'Entomologie, Musee Royal de l'Afrique Centrale, Tervuren, Belgium
NHRS	Naturihistoriska Rijksmuseum, Stockholm, Sweden
ZMHB	Museum für Naturkunde der Humboldt-Universität, Berlin, Germany

Species descriptions

Proamytta Beier 1965

Type species: *Amytta straminea* Sjöstedt, 1912: 16.

This rather poorly defined genus is represented by nine species, restricted in their distribution to West and Central Africa. Gorochov (1993) noted a high variation in the male reproductive structures among species of this genus, and suggested the need for erecting several subgenera to reflect this diversity, but stopped short of reviewing the genus and created only one subgenus, *Archamytta* Gorochov (with 3 species). By default, all remaining species are placed in the nominal subgenus *Proamytta* Beier. The new species described below is placed tentatively in *Proamytta (Proamytta)* because of the close resemblance of its cerci to those found in *P. (P.) straminea* Sjöstedt, although the unusual modification of the male subgenital plate may in the future warrant placing it in a separate subgenus or genus.

Proamytta (Proamytta) spinifera n. sp.
(Figs. 2A–C, 4A, K)

Differential diagnosis. *P. spinifera* can be distinguished from all its congeners by the presence of highly modified paraprocts (fig. 2A) and an unsual development of the male subgenital plate, which is strongly thickened dorso-ventrally and bears a pair of vertical, dorsal spines (fig. 2B). It appears to be most closely related to *P. straminea*, which has similarly shaped male cerci and the stridulatory area of the tegmen, with exceptionally small stridulatory file, but lacks the enlarged paraprocts, and its subgenital plate is not modified.

Description (male only, female unknown).

*General.*Body small, slender; macropterous.

Head. Fastigium of vertex triangular, blunt apically, not reaching apex of antennal sockets, flat dorsally; antennae about twice as long as body; frons slightly convex, vertical; eyes circular, weakly protruding.

Thorax. Pronotum surface smooth; lateral lobe wider than high; humeral sinus of pronotum absent; anterior margin of pronotum flat; metazona slightly raised, distinctly convex; posterior edge of metazona narrowly rounded.

Legs. Legs slender. Front tibia unarmed dorsally, with 5 spines on posterior and 4 on anterior ventral margin; tympanum bilaterally open, small, oval; genicular lobes of front femur unarmed; front femur unarmed ventrally. Mid tibia with 4 spines on posterior and 5 on anterior ventral margin; mid femur unarmed ventrally; genicular lobes of mid femur unarmed. Hind femur unarmed ventrally; genicular lobes of hind femur unarmed.

Wings. Tegmen distinctly surpassing apex of abdomen; hind wing as long as tegmen. Costal field clearly widened at base; veins Sc and R close together, parallel along their entire length; vein Rs branching off in middle of tegmen, with 2 apical branches; right stridulatory area with small but well developed, rectangular mirror (Fig. 4K) Stridulatory file exceptionally short, elevated on thickened vein, straight, with 49 teeth, 0.24 mm long, 0.04 mm wide (fig. 4A).

Abdomen. Tenth tergite unmodified. Cercus with small inner lobe halfway, long and slender, bent inwards; apex slightly flattened dorso-ventrally (fig. 2A); paraprocts strongly enlarged, forming paired, bulbous structures covered with tiny spinules (fig. 2C); subgenital plate strongly modified, thick, with 2 large, vertical spines on dorsal surface (fig. 2B); styli cylindrical, about 4 times as long as wide.

Coloration. Coloration light green; antennae with dark annulations; eyes uniformly colored; face pale green; occiput without markings; pronotum without markings; prozona green; tegmen green, with small,

brown patch behind stridulatory field; hind wing hyaline; hind legs uniformly colored; abdominal sterna and subgenital plate without markings.

Measurements (1 male). body w/wings: 16; body w/o wings: 13; pronotum: 6; tegmen: 12.5; hind femur: 11.2 mm.

Material examined. GHANA: Eastern Region, Atewa Range, Asiakwa (South), elev. 690 m (6°15'44.3"N, 0°33'18.8"W), 11–16.vi. 2006, coll. P. Naskrecki (Camp 2) - 1 male (holotype) (ANSP).

Etymology. Named with reference to a pair of long, vertical spines on the subgenital plate of the male of this new species.

Other species of *Proamytta* examined

Proamytta (Archamytta) eburnea Beier, 1965

Listed by Beier (1965) from Côte d'Ivoire, Togo, and Guinea.

Material examined. CÔTE D'IVOIRE: 6 km Tai (5°52'N, 7°27'0"W), 21.i.1955 - 1 male (holotype) (MNHN); Neka, 11.i.1955 - 1 female (allotype) (MNHN); TOGO: Misahöhe (6°57'N, 0°35'0"E), 1894, coll. F. Baumann - 1 male (paratype) (ZMHB).

Proamytta (Archamytta) kamerunensis Beier, 1965

Known only from a few locations in Cameroon (Beier 1965).

Material examined. CAMEROON: Hinterland, Jaunde Stat. (3°52'N, 11°31'0"E), coll. S. Zenker - 1 male (paratype) (ZMHB).

Proamytta (Archamytta) simillima Beier, 1965

Listed by Beier (1965) from Ghana, Cameroon, and Sao Tome & Principe.

Material examined. GHANA: Kwadaso (6°42'N, 1°39'0"W), 14.xi.1955, coll. J. Forsyth - 1 male (holotype); Tafo (6°13'N, 0°22'0"W), 22.ii.1962, coll. B.M. Gardner - 1 female (allotype) (BMNH).

Proamytta (P.) brevipennis (Chopard, 1945)

Known only from the type locality in Cameroon (Chopard 1945).

Material examined. CAMEROON: N'Kongsamba, Mt. N'Lonako, elev. 1800 m, 1939, coll. Lepesme, Paulian &Villiers - 1 male (holotype) (MNHN).

Proamytta (P.) insularis (Chopard, 1958)

Known only from the type locality in Sao Tome & Principe (Chopard 1958).

Material examined. SAO TOME & PRINCIPE: Principe, Infante Dom Henrique (foret) (1°34'N, 7°25'0"E), 26–27.vi.1956, coll. P. Viette - 1 male (holotype), 1 female (allotype) (MNHN).

***Proamytta (P.) reducta* Beier, 1965**

Listed by Beier (1965) from Sierra Leone and Ghana.

Material examined. SIERRA LEONE: Njala, 23.x.1930, coll. E. Hargreaves - 1 male (holotype) (BMNH).

***Proamytta (P.) simplicoides* Beier, 1965**

Previously known only from the Democratic Republic of Congo (Beier 1965), here reported for the first time from Angola.

Material examined. DEMOCRATIC REPUBLIC OF CONGO: Garamba National Park (4°10'N, 29°30'0"E), 5.x.1950, coll. G. Demoulin - 1 male (holotype); Lac Kivu, Rwankwi (2°0'S, 29°0'0"E), iv.1948, coll. Leroy - 1 female (allotype) (MRAC); ANGOLA: Dundo (Lunda), A. O. P., coll. A. DE B. Machado - 1 male (MNCN).

***Proamytta (P.) sincera* Beier, 1965**

Listed by Beier (1965) from Côte d'Ivoire, Sierra Leone, Ghana, Nigeria, Cameroon, and the Democratic Republic of Congo.

Material examined. NIGERIA: Ibadan (7°16'60"N, 3°30'0"E), vi.1965, coll. J. L. Gregroy - 1 male (holotype) (BMNH);CAMEROON: Lolodorf (3°14'N, 10°44'0"E), 1895, coll. L. Conradt - 1 female (paratype) (ZMHB).

***Proamytta (P.) straminea* (Sjöstedt, 1912)**

Known from Ghana, Cameroon, and Gabon (Beier 1965).

Material examined. CAMEROON: Buea (4°9'34"N, 9°14'12"E), coll. Rohde - 1 male (lectotype, here designated), 1 female (paralectotype) (NHRS).

***Amyttopsis* Beier 1965**

Type species: *Amyttopsis vinculata* Beier 1965: 227.

Members of this genus are known only from West and Central Africa. They are diagnosed by the combination of the unique development of the 10th abdominal tergite of the male, the latero-ventral lobes of which form a pair of distinct, often twisted projections, and the shape of the cercus, which is always unarmed and strongly dorso-ventrally flattened. The character not mentioned by Beier (1965) in the generic diagnosis, but most likely present in all species of the genus is the presence of a partially sclerotized epiphallus. Unfortunately, although I had the opportunity to examine types of all described species of *Amyttopsis*, I did not dissect their gentalic structures, and thus cannot describe them here. The presence of a sclerotized epiphallus may indicate a close relationship of this genus to *Anepitacta* Br.-Watt. and *Proamytta* Beier, which are the only other genera of West African Meconematinae known to possess such structures.

***Amyttopsis palmulicerca* n. sp.**
(Figs. 1A–E; 4B, L; 5B; 6A–C)

Differential diagnosis. This species is diagnosed by the unique combination of long, paddle-shaped cerci of the male and the presence of a partially sclerotized epiphallus, which is evenly covered with tiny denticles and has a pair of large, dorsal tubercles. *A. palmulicerca* seems to be most closely related to *A. vinculata* Beier, from which it can be distinguished by the shape of the cercus (cercus with sides nearly parallel in *A. vinculata*, distinctly narrowing towards apex in *A. palmulicerca).* From *A. podicealata* Beier it differs in the development of the basal part of the cercal lobe (with a nearly rectangular projection in *A. podicealata*, smoothly rounded in *A. palmulicerca).*

Description.

General. Body small, slender; macropterous (Fig. 6A–C).

Head. Fastigium of vertex triangular, blunt apically, not reaching apex of antennal sockets, flat dorsally; antennae about twice as long as body; frons flat, vertical; eyes circular, weakly protruding.

Thorax. Lateral lobe of pronotum higher than wide; humeral sinus of pronotum present (Fig. 6A); anterior margin of pronotum flat; metazona flat; posterior edge of metazona narrowly rounded.

Legs. Legs slender. Front tibia unarmed dorsally, with 5 spines on posterior and 4 on anterior ventral margin; tympanum bilaterally open; genicular lobes of front femur unarmed; front femur unarmed ventrally. Mid tibia unarmed dorsally; thickened in proximal 3/4. with 4 spines on posterior and 5 on anterior ventral margin; mid femur unarmed ventrally; genicular lobes of mid femur unarmed. Hind femur unarmed ventrally; genicular lobes of hind femur unarmed.

Wings. Tegmen narrowly rounded, surpassing apex of hind femur; anterior margin straight; hind wing slightly longer than tegmen. Costal field not dilated at base; veins Sc and R slightly diverging towards apex of tegmen; vein Rs branching off before middle of tegmen, with 3 apical branches; right stridulatory area with small but well developed mirror; left stridulatory area with small, roughly rectangular mirror (Fig. 4L). Stridulatory file elevated on thickened vein, straight, with 94 teeth, 0.84 mm long, 0.04 mm wide (Fig. 4B).

Abdomen. Tenth tergite with posterior, lower corners forming pair of elongate, apically flattened projections (Fig. 1B); epiproct small, triangular. Cercus unarmed, strongly dilated and extended apically, paddle-like; apex strongly flattened dorso-ventrally, narrower than base of cercal lobe (Figs. 1A, C); paraprocts unmodified; epiphallus evenly covered with minute denticles, with pair of large tubercles basally (Fig. 5B). Subgenital plate unmodified. broadly trapezoidal; with deep, triangular incision; styli cylindrical, about 3 times as long as wide (Fig. 1B). Female subgenital plate broadly trapezoidal, with very shallow apical incision (Fig. 1D).

Ovipositor. Ovipositor slightly curved, shorter than hind femur (ratio femur/ovipositor 1.13); apex pointed, with both valvulae smooth, dorsal edge of upper valvula parallel to lower valvula (Fig. 1E).

Coloration. Coloration light green; antennae concolorous; eyes uniformly colored; face without darker markings; occiput without markings; pronotum without markings; prozona green; tegmen without markings; without any markings; hind wing hyaline; hind legs uniformly colored; abdominal sterna and subgenital plate without markings.

Measurements (5 males, 2 females). body w/wings: male 21–23 (22±1), female 21–23 (22±1.4); body w/o wings: male 12–15 (13.5±1.4), female 17.5–18.5 (18±.7); pronotum: male 4–4.3 (4.1±.1), female 3.5–4 (3.8±.4); tegmen: male 18–19 (18.5±.5), female 16.5–19 (17.8±1.8); hind femur: male 9.5–10 (9.8±.4), female 9; ovipositor: 7.5–8 (7.8±.4) mm.

Material examined. GHANA: Eastern Region, Ajenjua Bepo Forest Reserve, elev. 300–320 m (6°22'2.3"N, 1°1'58"W), 26–30.viii. 2006, coll. P. Naskrecki, V. Awotwe-Pratt and M. Bakowski (Camp 1) – male holotype (ANSP), 2 females, 4 males (paratypes) (ANSP, MCZ); Atewa Range, Asiakwa (South), elev. 690 m (6°15'44.3"N, 0°33'18.8"W), 11–16.vi. 2006, coll. P. Naskrecki (Camp 2) - 1 male (paratype) (MCZ).

Etymology. The specific epithet is derived from the Latin word “palmula”, or the blade of the oar, with respect to the paddle-like shape of the male’s cercus.

***Amyttopsis bakowskii* n. sp.**
(Figs. 1F; 4C, M; 5C)

Differential diagnosis. Similar to *A. palmulicerca* **n. sp.**, from which it differs in the general shape of the cercus (Fig. 1F) and the epiphallus (Fig. 5C). From other species of the genus it differs in having the apical part of the cercus distinctly distended apically.

Description. (male only, female unknown).

General. Body small, slender; macropterous.

Head. Fastigium of vertex triangular, blunt apically, not reaching apex of antennal sockets, flat dorsally; antennae about twice as long as body; frons flat, vertical; eyes circular, weakly protruding.

Thorax. Lateral lobe of pronotum higher than wide; humeral sinus of pronotum present; anterior margin of pronotum flat; metazona flat; posterior edge of metazona narrowly rounded.

Legs. Legs slender. Front tibia unarmed dorsally, with 5 spines on posterior and 4 on anterior ventral margin; tympanum bilaterally open; genicular lobes of front femur unarmed; front femur unarmed ventrally. Mid tibia unarmed dorsally; thickened in proximal 3/4. with 4 spines on posterior and 5 on anterior ventral margin; mid femur unarmed ventrally; genicular lobes of mid femur unarmed. Hind femur unarmed ventrally; genicular lobes of hind femur unarmed.

Wings. Tegmen surpassing apex of hind femur; anterior margin straight; hind wing slightly longer than tegmen. Costal field not dilated at base; veins Sc and R diverging towards apex of tegmen; vein Rs branching off before middle of tegmen, with 3 apical branches; right stridulatory area with small but well developed mirror; left stridulatory area with small, roughly rectangular mirror (Fig. 4M). Stridulatory file elevated on thickened vein, straight, with 106 teeth, 0.84 mm long, 0.05 mm wide (Fig. 4C).

Abdomen. Tenth tergite with posterior, lower corners forming pair of elongate, apically flattened projections; epiproct small, triangular. Cercus unarmed, strongly dilated and extended apically, paddle-like; apex strongly flattened dorso-ventrally and distended laterally; paraprocts unmodified (Fig. 1F); epiphallus with large denticles arranged in small, evenly distributed clusters along posterior edge (Fig. 5C). Subgenital plate unmodified, broadly trapezoidal, with deep, triangular incision; styli cylindrical, about 3 times as long as wide (Fig. 1F).

Coloration. Coloration light green; antennae concolorous; eyes uniformly colored; face without darker markings; pronotum without markings; tegmen without any markings; hind wing hyaline; hind legs uniformly colored; abdominal sterna without markings.

Measurements (3 males). body w/wings: 20.5–22.2 (21.2±.9); body w/o wings: 12–14 (13±1); pronotum: 3.8–4 (3.9±.1); tegmen: 16–19 (17.3±1.5); hind femur: 9 mm.

Material examined. GHANA: Eastern Region, Ajenjua Bepo Forest Reserve, elev. 300–320 m (6°22'2.3"N, 1°1'58"W), 26–30.viii. 2006, coll. P. Naskrecki, V. Awotwe-Pratt and M. Bakowski (Camp 1) - male holotype (ANSP), 2 males (paratypes) (MCZ).

Etymology. Named in honor of the Polish entomologist, Dr Marek Bakowski.

Other species of *Amyttopsis* examined:

***Amyttopsis forcipata* Beier 1965**

Known only from the type locality in the Democratic Republic of Congo ("Kongo") (Beier 1965).

Material examined. DEMOCRATIC REPUBLIC OF CONGO: 74 mi. NE of Tshikapa (5°37'S, 20°1'E), 9.viii.1957, coll. E. S. Ross & R. E. Leech - 2 males (incl. holotype) (CAS).

***Amyttopsis vinculata* Beier 1965**

Recorded by Beier (1965) from Ghana, Cameroon, and Equatorial Guinea (Fernando Poo).

Material examined. CAMEROON: Johann Alberchtshohe, 25.i.1896, coll. L. Conradt - 1 male (holotype) (ZMHB); GHANA: Ashanti, near Naraume, 14.viii.1957, coll. N.D. Jago - 1 male (paratype) (BMNH).

***Amyttopsis podicealata* Beier 1965**

Known only from two localities in Côte d'Ivoire (Beier 1965).

Material examined. CÔTE D'IVOIRE: Foret du Banco, 15.x.1963 - 1 male (holotype) (BMNH).

***Amyttosa* Beier 1965**

Type species: *Amytta mutillata* Karsch, 1890: 367.

This genus is unique among all known Meconematinae in the strong reduction of the ovipositor, a possible adaptation to dropping eggs to the ground, rather than their insertion in the soil, plant tissue, or bark, typical of other species of this group of katydids. The valvules of the ovipositor are poorly sclerotized and not flattened laterally, which indicates that the eggs are not inserted between the layers of the leaf epidermis, a behavior known in some Phaneropterinae with short ovipositors. The morphology of the egg is also unique among katydids (Figs. 5D–G). The egg is spherical, and not spindle shaped as in species laying eggs in the soil or plant tissues, nor is it laterally flattened as in species laying eggs in leaves. It is also unlikely that eggs of *Amyttosa* spp. are deposited in clusters on exposed surfaces, a behavior common in canopy-dwelling Phaneropterinae, because the morphology of the egg does not suggest a high resistance to desiccation (eggs deposited on exposed surfaces are smooth, with very thick chorionic layers that reduce the rate of water loss.) The chorion of the *Amyttosa* egg is covered with regularly distributes tubercles, and both ends of the egg carry a collar-like projections, similar, but not likely homologous to, the capitulum present in the eggs of many phasmids. This type of egg morphology, combined with a similar reduction of the ovipositor, also found in many Phasmodea that drop eggs to the ground, may indicate similar egg laying behavior. Hughes and Westoby (1992) demonstrated that phasmid eggs equipped with the capitulum have the same removal and burial rates by ants as plant seeds equipped with an elaiosome. Although at this point empirical evidence for such behavior is absent, it is possible that the morphology of eggs of *Amyttosa* has a similar function, and eggs are dispersed, and subsequently buried by ants.

Virtually nothing is known about the behavior of the previously described species of *Amyttosa*. *A. insectivora*, the new species described below, is common in lowland and mid-elevation forests of Eastern Ghana, where it could be found at night on low trees and understory bushes in both primary and secondary evergreen

forests. This species is predaceous and was frequently observed catching and eating small insects, primarily nymphs of Membracidae and Cicadellidae.

***Amyttosa insectivora* n. sp.**
(Figs. 1G–K; 4H, R; 5D, E; 7G)

Differential diagnosis. This species is most closely related to *A. mutillata* (Karsch), but can be distinguished by the combination of a unique shape of the male cercus (Fig. 1I–K), the length of the tegmina (tegmina clearly exceeding apices of hind knees in *A. mutillata*, not reaching the hind knees in *A. insectivora*), and the shape of the female subgenital plate (subgenital plate with two elongate, apical lobes in *A. mutillata*.) From *A. nimbana* Chopard it differs in the shape of the male cerci (cercus straight and strongly narrowed apically in *A. nimbana*), and from *A. brevipennis* Beier this new species differs in the development of wings (in *A. brevipennis* tegmina do not reach the middle of the abdomen) and the shape of the male cerci.

Description.

General. Body small, relatively robust; macropterous (Fig. 7G).

Head. Fastigium of vertex triangular, blunt apically, not reaching apex of antennal sockets, flat dorsally; antennae about twice as long as body; frons flat, vertical; eyes circular, weakly protruding.

Thorax. Lateral lobe about as long as wide; humeral sinus of pronotum absent; anterior margin of pronotum flat; metazona weakly convex; posterior edge of metazona narrowly rounded.

Legs. Legs slender. Front tibia unarmed dorsally, with 5 spines on posterior and 4 on anterior ventral margin; tympanum bilaterally open; genicular lobes of front femur unarmed; front femur unarmed ventrally. Mid tibia unarmed dorsally; thickened in proximal 3/4. with 4 spines on posterior and 5 on anterior ventral margin; mid femur unarmed ventrally; genicular lobes of mid femur unarmed. Hind femur unarmed ventrally; genicular lobes of hind femur unarmed.

Wings. Tegmen slightly surpassing apex of abdomen but not reaching apex of hind femur; anterior margin straight; hind wing slightly longer than tegmen. Costal field wide, evenly narrowing towards wing tip; veins Sc and R slightly diverging towards apex of tegmen; vein Rs branching off in middle of tegmen, with 2 apical branches; right stridulatory area with small but well developed mirror; left stridulatory area with small, roughly rectangular mirror (Fig. 4R). Stridulatory file elevated on thickened vein, straight, with 73 teeth, very short, only 0.27 mm long, 0.03 mm wide (Fig. 4H).

Abdomen. Tenth tergite with posterior edge sclerotized, slightly raised, and with small, triangular incision. Cercus with large, flat, almost rectangular inner lobe, bent inwards; apex slightly flattened dorso-ventrally (FigS. 1I, J); paraprocts forming large, paired structure, with upper, bulbous, and lower, finger-like parts (Fig. 1K); epiphallus not sclerotized. Subgenital plate unmodified, broadly trapezoidal and slightly convex apically; styli cylindrical, about 4 times as long as wide, parallel (Fig. 1I). Female subgenital plate wide, with broad, shallow apical incision (Fig. 1H).

Ovipositor. Ovipositor strongly reduced; straight, only as long as 1/4 of hind femur; apex blunt, with both valvulae smooth, dorsal edge of upper valvula convex in middle (Fig. 1G, H).

Egg. Egg nearly spherical one end slightly flattened), about 1mm in diameter, with paired, collar-like capitula on both ends; chorion densely reticulate, its surface covered with regularly distributed, small tubercles (Figs. 5D, E).

Coloration. Coloration light green; antennae with dark annulation; eyes uniformly colored; face without darker markings; occiput without markings; pronotum without markings; prozona green; tegmen without markings; without any markings; hind wing hyaline; hind legs uniformly colored; abdominal sterna and subgenital plate without markings.

Measurements (2 males, 6 females). body w/wings: male 16, female 17.5–20.5 (18.6±1.3); body w/o wings: male 14, female 15–17.5 (16.4±.9); pronotum: male 5, female 4.5–5.5 (5±.3); tegmen: male 11–11.5 (11.3±.4), female 12.3–15.5 (13.6±1.4); hind femur: male 10.5–11.5 (11±.7), female 10.5–14 (12±1.5); ovipositor: 2.5–4.5 (3.3±.8) mm.

Material examined. GHANA: Eastern Region, Atewa Range, Asiakwa, main road, elev. 817 m (6°15'.7"N, 0°33'53.7"W), 7–11.xii. 2007, coll. P. Naskrecki, V. Awotwe-Pratt and N. Jengre - 1 male (holotype) (ANSP), 3 females (paratypes) (ANSP, MCZ); Asiakwa (North), elev. 769 m (6°16'16.4"N, 0°33'52.8"W), 16–24.vi. 2006, coll. P. Naskrecki (Camp 3) - 1 female (paratype) (MCZ); Asiakwa (South), elev. 690 m (6°15'44.3"N, 0°33'18.8"W), 11–16.vi. 2006, coll. P. Naskrecki (Camp 2) - 8 females, 2 males (incl. 9 paratypes) (ANSP, MCZ); Atiwiredu, elev. 795 m (6°12'24.7"N, 0°34'37.2"W), 6–10.vi. 2006, coll. P. Naskrecki (Camp 1) - 1 female (paratype) (MCZ); Ajenjua Bepo Forest Reserve, elev. 300–320 m (6°22'2.3"N, 1°1'58"W), 26–30.viii. 2006, coll. P. Naskrecki, V. Awotwe-Pratt and M. Bakowski (Camp 1) - 1 female; Mamang Forest Reserve, elev. 130 m (6°15'1.4"N, 1°2'25.4"W), 30.viii. – 5.ix. 2006, coll. P. Naskrecki, V. Awotwe-Pratt and M. Bakowski (Camp 2) - 1 female (paratype) (MCZ).

Etymology. Named after the insectivorous feeding behavior of this species.

Other species of *Amyttosa* examined:

***Amyttosa mutillata* (Karsch, 1890)**

=*Amytta angulata* Chopard, 1945
= *Amytta occidentalis* Karsch, 1890 [partim]
=*Xiphidiopsis bubianus* Bolivar, 1906
=*Xiphidiopsis mitrata*Bolivar, 1906 [partim]

This widespread species was recorded from Cameroon, Equatorial Guinea (Fernando Poo), Democratic Republic of Congo, and possibly Uganda (“N. Ruvenzori Riv.”) (Beier 1965).

Material examined. CAMEROON: Southwest, Barombi Station (4°40'N, 9°23'E), coll. S. Preuss - 1 female (holotype) (ZMHB); Mont Etinde, elev. 1000–1500-1500 m, 1939, coll. P. Lepesme, R. Paulian & A. Villiers - 1 male (holotype of *Amytta angulata* Chopard) (MNHN); EQUATORIAL GUINEA: Isla de Fernando Poo, Santa Isabel (3°37'N, 8°45'E), vii.1901, coll. Escalera - 1 male (lectotype of *Xiphidiopsis bubianus* Bolivar) (MNCN).

***Amyttosa brevipennis* Beier, 1967**

Known only from the type locality in Côte d'Ivoire (Beier 1965).

Material examined. CÔTE D’IVOIRE: Toulepleu (6°34'N, 8°24'W), v.1964 - 1 male (holotype), 1 female (allotype) (MNHN).

***Amyttosa nimbana* (Chopard, 1954)**

Reported from Guinea (Chopard 1954) and Côte d’Ivoire (Beier 1967).

Material examined. GUINEA: Guinee Forestiere, Mt. Nimba, Camp 4, elev. 1000 m, vi.1942, coll. M. Lamotte - 1 male (holotype) (MNHN).

***Anepitacta* Brunner von Wattenwyl, 1891**

Type species: *Anepitacta inconspicua* Brunner von Wattenwyl, 1891: 178.

Members of this genus are characterized by a strong modification of the 10th abdominal tergite of the male. Gorochov (1993) divided this genus into two subgenera based on the type of this modification as well as the shape of the female subgenital plate. In the nominal subgenus *Anepitacta* Br.-Watt (9 species) the posterior margin of the male 10th tergite is divided into two distinct lobes, ranging from small and shallow ones (as in *A. scrofina* Beier, although this SE African species should probably be excluded from *Anepitacta*) to nearly complete division of the 10th tergite into two separate parts (as in *A. bicaudata* Beier); in some cases the 10th tergite is strongly bent caudally and overhangs the abdominal apex. The subgenital plate of the female is rounded or acute apically, but does not have sharp projections at the base. In the subgenus *Teratacta* Gorochov, 1993 (3 species) the male 10th tergite is not divided medially, but instead has two pairs of processes (a large, lobe-like median pair, and small lateral ones), which are fused with the epiproct. The female subgenital plate has three sharp projections on its posterior margin.

The coloration of *Anepitacta* spp. is less uniform than in most West African Meconematinae, and many species have distinct dark markings on the occiput, pronotum, and the basal portion of the tegmina. The antennal scape and the antennae also frequently have darker markings.

***Anepitacta (Anepitacta) wrightae* n. sp.**
(Figs. 2J–O; 4D, N; 5A; 6D, E)

Differential diagnosis. This species is closely related to *A. (A.) guentheri* Gorochov, from which it differs in the strong reduction of wings, and the shape of the male cercus (the male cercus is equipped with a larger, more distended apical part in *A. guentheri.)* The 10th male tergite of the new species also resembles that of *A. (A.) inconspicua* Br.-Watt., but the latter has a small and partially membranous apical part of the male cercus, and is macropterous. The female subgenital plate of *A. (A.) wrightae* resembles that of *A. (A.) guineensis* Beier, but the latter is also macropterous.

Description.

General. Body small, slender; brachypterous (Fig. 6E).

Head. Fastigium of vertex triangular, blunt apically, not reaching apex of antennal sockets, flat dorsally; antennae more than twice as long as body; frons flat, vertical; eyes circular, weakly protruding.

Thorax. Lateral lobe of pronotum wider than high; humeral sinus of pronotum absent (Fig. 6D); anterior margin of pronotum flat; metazona flat; posterior edge of metazona narrowly rounded.

Legs. Legs slender. Front tibia unarmed dorsally, with 5 spines on posterior and 4 on anterior ventral margin; tympanum bilaterally open, oval; genicular lobes of front femur unarmed; front femur unarmed ventrally; mid tibia very weakly thickened in proximal ¾, with 3 spines on posterior and 5 on anterior ventral margin; mid femur unarmed ventrally; genicular lobes of mid femur unarmed. Hind femur unarmed ventrally; genicular lobes of hind femur unarmed.

Wings. Wings reduced, tegmen barely reaching 5th abdominal tergite; anterior margin broadly rounded; hind wing reduced, half as long as tegmen. Costal field slightly widened at base; veins Sc and R close together, parallel along their entire length; Rs detached from R, starts before middle of tegmen, without secondary branches; right stridulatory area with large, fully developed mirror; left stridulatory area with large, fully developed, roughly rectangular mirror (Fig. 4N). Stridulatory file elevated on thickened vein, nearly straight, bent in proximal fourth, with 147 teeth, 0.49 mm long, 0.04 mm wide (Fig. 4D).

Abdomen. Tenth tergite with posterior edge sclerotized, forming paired, long lobes overhanging epiproct (Figs. 2J, M); epiproct strongly modified, forming large, paired, sinuous structure (Fig. 2L), styli parallel. Cer-

cus with small, basal tooth, S-shaped, held vertically; apex strongly flattened dorso-ventrally and distended laterally (Fig. 2K); paraprocts unmodified; epiphallus weakly sclerotized, with central, bulbous structure covered with tiny denticles (Fig. 5A). Subgenital plate unmodified. broadly trapezoidal; straight apically; styli cylindrical, about 4 times as long as wide. Female subgenital plate roughly rectangular, about 1.5 times longer than wide (Fig. 2O).

Ovipositor. Ovipositor normally developed; slightly curved, slightly shorter than hind femur (ratio femur/ovipositor 1.06–1.13); apex of ovipositor pointed, with apex of lower valvula slightly bent downwards; edges of both valvulae smooth, dorsal edge of upper valvula parallel to lower valvula (Fig. 2N).

Egg. Egg elongate; without external appendages.

Coloration. Coloration olive green; antennae concolorous; eyes uniformly colored; face without darker markings; occiput with brown band; pronotum with light brown band and dark markings on posterior edge; tegmen green, with posterior edge brown; hind wing hyaline; hind legs uniformly colored; abdominal sterna and subgenital plate without markings.

Measurements (5 males, 7 females). body w/o wings: male 10–12 (11±1), female 8–11 (9.5±1.2); pronotum: male 3.5–4 (3.9±.2), female 3.3–4 (3.6±.2); tegmen: male 3.4–3.7 (3.5±.1), female 3.2–3.5 (3.4±.1); hind femur: male 8.5–9.3 (8.9±.3), female 9–10 (9.4±.4); ovipositor: 8–9 (8.4±.4) mm.

Material examined. GHANA: Eastern Region, Atewa Range, Asiakwa (North), elev. 769 m (6°16'16.4"N, 0°33'52.8"W), 16–24.vi. 2006, coll. P. Naskrecki (Camp 3) – male holotype (ANSP), male paratype) (MCZ); Asiakwa (South), elev. 690 m (6°15'44.3"N, 0°33'18.8"W), 11–16.vi. 2006, coll. P. Naskrecki (Camp 2) - 8 females, 2 males (incl. 10 paratypes) (MCZ); Asiakwa, main road, elev. 817 m (6°15'.7"N, 0°33'53.7"W), 7–11.xii. 2007, coll. P. Naskrecki, V. Awotwe-Pratt and N. Jengre - 1 female, 1 male (paratypes) (ANSP).

Etymology. Named in honor of Heather Wright for her help in organizing the Rapid Assessment survey, during which this new species was initially collected.

Other species of *Anepitacta* examined:

***Anepitacta (A.) bicaudata* Beier, 1965**

Listed by Beier (1965) from Guinea, Nigeria, Democratic Republic of Congo, and Uganda.

Material examined. NIGERIA: Niger Prov., Minna (9°36'50"N, 6°33'25"E), 14.xii.1958, coll. R.W. & M.E. Crosskey – 1 male (holotype), 1 female (paratype) (BMNH).

***Anepitacta (A.) egestoides* Beier, 1967**

Known only from the type locality in Nigeria (Beier 1967).

Material examined. NIGERIA: Ibadan, xii.1965, coll. J.D. Pye - 1 male (holotype) (BMNH).

***Anepitacta (A.) egestosa* Karsch, 1893**

Listed by Beier (1966) from Togo and Cameroon.

Material examined. TOGO: Bismarckburg (8°11'N, 0°41'0"E), 20.ix. – 31.x.1890, coll. R. Büttner - 1 male (holotype) (ZMHB).

***Anepitacta (A.) guentheri* Gorochov, 1994**
(Fig. 5I)

Previously known only from the type locality in Cameroon (Gorochov 1994), here listed for the first time from Guinea and Ghana.

Material examined. GHANA: Eastern Region, Ajenjua Bepo Forest Reserve, elev. 300–320 m (6°22'2.3"N, 1°1'58"W), 26–30.viii. 2006, coll. P. Naskrecki, V. Awotwe-Pratt and M. Bakowski (Camp 1) - 1 female, 1 male (ANSP); Atewa Range, Asiakwa (South), elev. 690 m (6°15'44.3"N, 0°33'18.8"W), 11–16.vi. 2006, coll. P. Naskrecki (Camp 2) - 1 male; Asiakwa, main road, elev. 817 m (6°15'.7"N, 0°33'53.7"W), 7–11.xii. 2007, coll. P. Naskrecki, V. Awotwe-Pratt and N. Jengre - 2 females, 1 male; GUINEA: Guinee Forestiere, Mt. Bero, elev. 630 m (8°8'21"N, 8°34'24"W), 2–6.xii. 2003, coll. P. Naskrecki - 2 females, 1 male (MCZ).

***Anepitacta (A.) guineensis* Beier, 1965**

Known only from the type locality in Guinea (Beier 1965).

Material examined. GUINEA: Guinee Forestiere, Nimba, Nion (7°36'34"N, 8°28'45"W), 11.vi.1942, coll. M. Lamotte - 1 female (holotype) (MNHN).

***Anepitacta (A.) inconspicua* Brunner von Wattenwyl, 1891**

Reported by Beier (1966) from Sierra Leone, Togo, Ghana, Cameroon, Equatorial Guinea (Fernando Poo), Nigeria, Democratic Republic of Congo, and Uganda, and here it is reported for the first time from Guinea and Angola.

Material examined. TOGO: Bismarckburg (8°11'N, 0°41'0"E), i.1891, coll. Buttner - 1 male (holotype of *A. contaminate* Karsch) (ZMHB); EQUATORIAL GUINEA: Isla de Fernando Poo, Santa Isabel (3°37'60"N, 8°45'0"E), vii.1901, coll. Escalera - 1 female (lectotype of *Xiphidiopsis lineatus* Bolivar) (MNCN); ANGOLA: Dundo (Lunda), A. O. P., coll. A. DE B. Machado - 1 male (MNCN); GUINEA: Guinee Forestiere, Foret Classee Dere, elev. 440 m (7°36'14"N, 8°12'42"W), 17–19.xi. 2003, coll. P. Naskrecki - 1 female (MCZ); Foret Classee Diecke, Camp 1, elev. 450 m (7°35'45"N, 8°52'19"W), 21–25.xi. 2003, coll. P. Naskrecki - 1 female (MCZ).

***Anepitacta (A.) lomana* Ragge, 1971**

Known only from the type locality in Sierra Leone (Ragge, 1971).

Material examined. SIERRA LEONE: Monts Loma, elev. 1350 m, 27.v.1963, coll. Mission ENS-IFAN - 1 female (holotype) (MNHN).

***Anepitacta (Teratacta) katangica* Beier, 1965**

Known only from the type locality in the Democratic Republic of Congo (Beier, 1965).

Material examined. DEMOCRATIC REPUBLIC OF CONGO: Katanga, Mufunga-Sampwe, 1955, coll. R.S.M. Faber - 1 male (holotype) (MRAC).

***Anepitacta (Teratacta) nigerica* Beier, 1965**

Reported from western part of the Democratic Republic of Congo and Nigeria (Beier, 1965).

Material examined. NIGERIA: Minna (9°36'50"N, 6°33'25"E), xi.1954–ix.1955, coll. R.W. & M.E. Crosskey – 1 female (paratype), 1 male (holotype) (BMNH).

***Xiphidiola* Bolivar, 1906**

Type species: *Xiphidiola nigrospinosa* Bolivar, 1906: 364 (= *Anepitacta aliquantula* Karsch, 1893).
= *Amyttina* Beier, 1965

Xiphidiola is diagnosed by the combination of relatively simple cerci as well as unmodified 10th tergite and the epiproct in the male, and the presence of distinct dentition in the apical part of the ovipositor. A constant element of the coloration of species of this genus is the presence of dark patches on the anterior genicular lobes of the front femora. Eleven species of *Xiphidiola* have been described from an area extending from Côte d'Ivoire to Democratic Republic of Congo to Angola, and two additional species from Ghana are described below.

***Xiphidiola hokei* n. sp.**
(Figs. 2G–I; 4I, S; 6H, I)

Differential diagnosis. This species resembles *X. kivuensis* (Beier), but differs in shorter, straight cerci of the male (cerci slightly curved in *X. kivuensis*), and shorter tegmina, wich do not reach the apices of hind knees. It also resembles *X. pulchra* Beier in the length of tegmina, but differs in the shape of the male cerci (cerci evenly tapered, with a small apical hook in *X. pulchra*.) From all other species of the genus it differs in the unique shape of the styli (fig. 2I).

Description.

General. Body small, slender; macropterous (Fig. 6I).

Head. Fastigium of vertex triangular, blunt apically, barely reaching base of scapus, flat dorsally; antennae about twice as long as body; frons slightly convex, vertical; eyes globular, moderately protruding.

Thorax. Lateral lobe of pronotum wider than high, humeral sinus absent; anterior margin of pronotum flat (Fig. 6H); metazona weakly convex; posterior edge of metazona narrowly rounded.

Legs. Legs slender. Front tibia unarmed dorsally, with 5 spines on posterior and 4 on anterior ventral margin; tympanum bilaterally open; genicular lobes of front femur unarmed; front femur unarmed ventrally. Mid tibia unarmed dorsally; thickened in proximal 3/4, with 4 spines on posterior and 5 on anterior ventral margin; mid femur unarmed ventrally; genicular lobes of mid femur unarmed. Hind femur unarmed ventrally; genicular lobes of hind femur unarmed.

Wings. Tegmen surpassing apex of abdomen but not reaching apex of hind femur; anterior margin straight; hind wing slightly shorter than tegmen. Costal field wide, evenly narrowing towards wing tip; veins Sc and R slightly diverging towards apex of tegmen; vein Rs branching off in middle of tegmen, with 3 apical branches; right stridulatory area with large, fully developed mirror; left stridulatory area with large, fully developed, roughly rectangular mirror (Fig. 4S). Stridulatory file elevated on thickened vein, weakly bent, with 89 teeth, 0.86 mm long, 0.04 mm wide (Fig.4I).

Abdomen. Tenth tergite unmodified; epiproct unmodified, rounded. Cercus with blunt, finger-like subapical tooth (Fig. 2H), short, straight; apex narrowed, blunt (Fig. 2G); paraprocts unmodified; epiphallus not sclerotized. Subgenital plate narrowly trapezoidal; distal end strongly curved downwards, with small, triangular apical incision; styli laterally flattened, spatulate, parallel (Fig. 2I).

Coloration. Coloration light green; antennae concolorous; eyes uniformly colored; face without darker markings; occiput without markings; pronotum without markings; prozona green; tegmen without markings; hind wing hyaline; genicular lobes of front legs with small, dark patches; hind legs uniformly colored; abdominal sterna and subgenital plate without markings.

Measurements (1 male). body w/wings: 16; body w/o wings: 11.5; pronotum: 5; tegmen: 11.5; hind femur: 11 mm.

Material examined. GHANA: Eastern Region, Ajenjua Bepo Forest Reserve, elev. 300–320 m (6°22'2.3"N, 1°1'58"W), 26–30.viii. 2006, coll. P. Naskrecki, V. Awotwe-Pratt and M. Bakowski (Camp 1) - 1 male (holotype) (ANSP).

Etymology. Named in honor of Peter Hoke of the Rapid Assessment Program, Conservation International.

***Xiphidiola lobaticerca* n. sp.**
(Figs. 2D–F; 4J, T; 6F, G)

Differential diagnosis. This species seems to be closely related to *X. aliquantula* (Karsch), but differs in having apically flattened, lobe-like cerci in the male.

Description.

General. Body small, slender; macropterous (Fig. 6G).

Head. Fastigium of vertex triangular, blunt apically, barely reaching base of scapus, flat dorsally; antennae about twice as long as body; frons flat, vertical; eyes globular, moderately protruding.

Thorax. Lateral lobe of pronotum as long as wide; anterior margin of pronotum flat; metazona weakly convex (Fig. 6F); posterior edge of metazona narrowly rounded.

Legs. Legs slender. Front tibia unarmed dorsally, with 5 spines on posterior and 4 on anterior ventral margin; tympanum bilaterally open; genicular lobes of front femur unarmed; front femur unarmed ventrally. Mid tibia unarmed dorsally; thickened in proximal 3/4, with 5 spines on posterior and 4 on anterior ventral margin; mid femur unarmed ventrally; genicular lobes of mid femur unarmed. Hind femur unarmed ventrally; genicular lobes of hind femur armed on inner side.

Wings. Tegmen surpassing apex of hind femur; anterior margin straight; hind wing slightly longer than tegmen. Costal field wide, gradually narrowing towards wing tip, ending at 4/5 of tegmen; veins Sc and R close together, parallel along their entire length; vein Rs branching off before middle of tegmen, with 3 apical branches; right stridulatory area with large, fully developed mirror; left stridulatory area with large, fully developed, roughly rectangular mirror (Fig. 4T). Stridulatory file elevated on thickened vein, straight, with 46 teeth, 0.75 mm long, 0.04 mm wide (Fig. 4J).

Abdomen. Epiproct unmodified, rounded; 10th tergite unmodified. Cercus with vertical rounded lobe on upper surface (Fig. 2E), short, slightly bent inwards; apex strongly flattened laterally (Fig. 2F); paraprocts unmodified; epiphallus not sclerotized. Subgenital plate narrowly trapezoidal; distal end strongly narrowed (Fig. 2D); styli short, strongly flattened laterally, approximately triangular (Fig. 2F), parallel.

Coloration. Coloration light green; antennal scapus with dark markings on anterior surface; antennae concolorous; eyes uniformly colored; face without darker markings; occiput with dark band; prozona with darker band, continuous with that on occiput; tegmen without markings; hind wing slightly fumose; genicular lobes of front legs with small, dark patches; hind legs uniformly colored; abdominal sterna and subgenital plate without markings.

Measurements (1 male). body w/wings: 22.5; body w/o wings: 12; pronotum: 4; tegmen: 18.5; hind femur: 11 mm.

Material examined. GHANA: Eastern Region, Ajenjua Bepo Forest Reserve, elev. 300–320 m (6°22'2.3"N, 1°1'58"W), 26–30.viii. 2006, coll. P. Naskrecki, V. Awotwe-Pratt and M. Bakowski (Camp 1) - 1 male (holotype) (ANSP).

Etymology. Named with reference to the apically flattened, lobe-like cerci in the male of this new species.

Other species of *Xiphidiola* examined:

***Xiphidiola aliquantula aliquantula* (Karsch, 1893)**
=*Xiphidiola nigrospinosa* Bolivar, 1906

Reported from Cameroon (Griffinia 1908), Ghana, Togo, and Equatorial Guinea (Fernando Poo)(Beier 1965).

Material examined. TOGO: Bismarckburg (8°11'N, 0°41'0"E), 20.ix.–30.x.1890, coll. R. Büttner - 1 female (holotype) (ZMHB); EQUATORIAL GUINEA: Isla de Fernando Poo, Santa Isabel (3°37'60"N, 8°45'0"E), vii.1901, coll. Escalera - 1 female (holotype of *Xiphidiola nigrospinosa* Bolivar) (MNCN).

***Xiphidiola aliquantula schoutedeni* Beier, 1965**

Known only from the type locality in the Democratic Republic of Congo (Beier 1965).

Material examined. DEMOCRATIC REPUBLIC OF CONGO: Kai Bumba,10.x.1920, coll. H. Schoutedeni - 1 male (holotype) (MRAC).

***Xiphidiola concolor* Bolivar, 1906**

Known only from the type locality in Equatorial Guinea (Bolivar 1906).

Material examined. EQUATORIAL GUINEA: Isla de Fernando Poo, Santa Isabel (3°37'60"N, 8°45'0"E), vii.1901, coll. Escalera - 1 female (lectotype) (MNCN).

***Xiphidiola congica* (Beier, 1965)**

Known only from the type locality in the Democratic Republic of Congo (Beier 1965).

Material examined.— DEMOCRATIC REPUBLIC OF CONGO: 39 km S of Walikale, elev. 700 m (1°45'S, 28°3'E), 25.xii.1957, coll. E. S. Ross & R. E. Leech - 1 male (holotype) (CAS).

***Xiphidiola dispersa* (Beier, 1965)**

This species appears to be widely distributed, having been reported from Ghana, Cameroon, Democratic Republic of Congo, and Angola (Beier 1965).

Material examined.— DEMOCRATIC REPUBLIC OF CONGO: 39 km S of Walikale, elev. 700 m (1°45'S, 28°3'E), 25.xii.1957, coll. E. S. Ross & R. E. Leech - 1 male (holotype) (CAS); ANGOLA: Dundo, 1960, coll. unknown - 1 male (paratype) (BMNH).

***Xiphidiola kivuensis* (Beier, 1965)**

Known only from the type locality in the Democratic Republic of Congo (Beier 1965).

Material examined.— DEMOCRATIC REPUBLIC OF CONGO: Kivu, Mabuita, xii.1935, coll. Boutakoff - 1 male (holotype) (MRAC).

***Xiphidiola pulchra* Beier, 1967**

This species was reported from Côte d'Ivoire by Beier (1967), and here it is reported for the first time from Ghana.

Material examined. CÔTE D'IVOIRE: Man (7°24'19"N, 7°32'51"W), 12.v.1964, coll. Gillon - 1 male (holotype) (MNHN); Toulepleu (6°34'29"N, 8°24'31"W), v.1964 - 1 female (allotype) (MNHN); GHANA: Eastern Region, Ajenjua Bepo Forest Reserve, elev. 300–320 m (6°22'2.3"N, 1°1'58"W), 26–30.viii. 2006, coll. P. Naskrecki, V. Awotwe-Pratt and M. Bakowski (Camp 1) - 1 female (MCZ).

***Brachyamytta* n. gen**

Type species: *Brachyamytta rapidoaestima* **n. sp.**, here designated

Differential diagnosis. This new genus does not appear to be very closely related to any other African genera of Meconematinae. However, it bears some resemblance to the monotypic genus *Orophilopsis* Chopard in the shape of the head, maxillary and labial palps and ovipositor, and the reduction of wings (only the female of *O. subaptera* Chopard is known). It differs in the shape of the pronotum (metazona of the pronotum truncated in *Orophilopsis*, well developed and broadly rounded in *Brachyamytta*), the degree of wing reduction (wings strongly reduced and hidden under the pronotum in *Orophilopsis*), the presence of the coxal spine on the front pair of legs (first coxae unarmed in *Orophilopsis*), and the shape of the fastigium of vertex (fastigium with a distinct dorsal depression in *Orophilopsis*). Also, legs in all species of the new genus are proportionately longer and more slender than in *Orophilopsis.* From all other African Meconematinae it differs in the combination of smooth, pointed ovipositor (most other African genera with reduced wings, such as *Aroeagas* Peringuey or *Afromeconema* Massa, have apically serrated ovipositors), strong reduction of wings in both sexes, and largely unmodified abdominal terminalia of the male.

Description.

General. Body small, slender; brachypterous (Figs. 7A–F).

Head. Fastigium of vertex triangular, blunt apically, barely reaching base of scapus, flat dorsally; scapus unarmed; antennae about twice as long as body; frons convex, vertical; eyes globular, moderately protruding. Terminal segments of labial and maxillary palps strongly distended apically, cone-shaped.

Thorax. Pronotum surface smooth; lateral lobe wider than high; humeral sinus of pronotum absent; anterior margin of pronotum flat; metazona moderately elongate, flat to weakly convex; posterior edge of metazona broadly rounded. Prosternum unarmed.

Legs. Legs extremely long and slender. Front tibia unarmed dorsally, with 3–4 spines on posterior and 4 on anterior ventral margin; ventral spines on front tibia as long as tibia diameter; tympanum bilaterally open, oval, about twice as long as wide; genicular lobes of front femur unarmed; front femur unarmed ventrally; front coxa armed with short spine. Mid tibia unarmed dorsally; thickened in proximal 3/4; with 2–3 spines on posterior and 3–4 on anterior ventral margin; mid femur unarmed ventrally; genicular lobes of mid femur unarmed. Hind femur unarmed ventrally; genicular lobes of hind femur unarmed (Figs. 3K, L).

Wings. Tegmen reduced, reaching only 4th or 5th abdominal tergite; hind wings reduced to minute lobes, about 1/5 of tegmen length. Tegmen narrowed towards apex or broadly truncated; anterior margin straight to weakly convex. Costal field not dilated at base; veins Sc and R close together, parallel along their entire length or slightly diverging; right stridulatory area with large, fully developed mirror; left stridulatory area with large, fully developed, roughly rectangular mirror, stridulatory file weakly bent, with 87–100 teeth.

Abdomen. Tenth tergite unmodified; epiproct unmodified, small and rounded. Cercus long and slender, slightly bent inwards or straight; apex unmodified or bent outwards under right angle; blunt or acute (Figs. 3A–F); paraprocts unmodified; sclerotized epiphallus absent. Subgenital plate trapezoidal; styli horizontal to vertical, pointing downwards; cylindrical, about twice as long as wide, parallel; separated by small gap or very close together, nearly touching. Female subgenital plate with two narrow lobes on posterior margin; posterior lobes acute to rounded, sometimes slightly divergent.

Ovipositor. Apex with both valvulae smooth; dorsal edge of upper valvula parallel to lower valvula; ovipositor slightly curved; apex pointed; ovipositor shorter than hind femur (Figs. 3H, J).

Egg. Egg elongate; tapered on one end; chorion densely reticulate (fig. 5G).

Coloration. General coloration green to brown, with or without brown and yellow markings; antennal scapus without markings; antennae concolorous; eyes uniformly colored; face without darker markings; occiput without markings or with darker patches behind eyes; pronotum unmarked or with dark brown patches, posterior edge of metazona sometimes darker brown; tegmen with basal part lighter then remainder of wing, sometimes bright yellow; small, brown patch present behind stridulatory area; genicular lobes of front legs without markings; hind femur sometimes with darker markings; hind tibia green to brown; abdominal sterna without markings; subgenital plate without markings.

Etymology. The generic name reflect the brachyptery of all known species of this genus, combined with –*amytta*, a common stem of generic names of arboreal, African Meconematinae.

***Brachyamytta rapidoaestima* n. sp.**
(Figs. 3E, F, I, J, L; 4E, O; 7C–E)

Differential diagnosis. *B. rapidoaestima* can be distinguished from the remaining species of the genus by the shape of male cerci (apex unmodified, bent outwards under right angle in other *Brachyamytta* spp.), and coloration (stridulatory area bright yellow, posterior margin of pronotum dark brown.)

Description.

General. As in generic (Figs. 7C–E).

Legs. Front tibia with 4 spines on posterior and 4 on anterior ventral margin. Mid tibia with 2 spines on posterior and 3 on anterior ventral margin.

Wings. Tegmen distinctly narrowed towards apex, not reaching middle of abdomen; anterior margin straight. Costal field not dilated at base; veins Sc and R close together, parallel along their entire length; left stridulatory area with large, fully developed, roughly rectangular mirror (Fig. 4O). Stridulatory file flat, weakly bent, with 100 teeth, 1.05 mm long, 0.05 mm wide (Fig. 4E).

Abdomen. Cercus unarmed, long and slender, slightly bent inwards; apex narrowed, blunt (Figs. 3E, F); styli horizontal; cylindrical, about twice as long as wide, parallel, separated by small gap. Female subgenital plate with two narrow lobes on posterior margin; posterior lobes acute to rounded, slightly divergent (Fig. 3I).

Ovipositor. Ovipositor normally developed, slightly curved; shorter than hind femur (ratio femur/ovipositor 1.68–1.75) (Fig. 3J); apex with both valvulae smooth; pointed, dorsal edge of upper valvula parallel to lower valvula;.

Coloration. Coloration green, with brown and yellow markings; antennal scapus without markings; antennae concolorous; eyes uniformly colored; face without darker markings; occiput without markings;

pronotum light green (Ghanaian population) to brown, posterior edge of metazone darker brown; prozona light brown; tegmen with basal part bright yellow, and small, brown patch behind stridulatory area; hind wing hyaline; genicular lobes of front legs without markings; hind femur with basal part light green, apical part gradually turning brown; hind tibia brown.

Measurements (2 males, 5 females). body w/o wings: male 10, female 9–10 (9.7±.4); pronotum: male 4.5, female 4–4.5 (4.3±.3); tegmen: male 3.3, female 3.3–4 (3.6±.4); hind femur: male 10, female 10–10.5 (10.1±.2); ovipositor: 6 mm.

Material examined. GUINEA: Guinee Forestiere, Mt. Bero, elev. 630 m (8°8'21"N, 8°34'24"W), 2–6.xii. 2003, coll. P. Naskrecki – male (holotype) (ANSP), 3 females, 1 male (paratypes) (ANSP, MCZ); Foret Classee Diecke, Camp 2, nr. Yossono, elev. 460 m (7°29'40"N, 8°49'54"W), 26–29.xi. 2003, coll. P. Naskrecki - 1 female (paratype) (MCZ); Simandou Mts., nr. Banko, Camp 2, elev. 590–700-700 m (8°31'29"N, 8°56'12"W), 3–7.xii. 2002, coll. P. Naskrecki - 2 females, 1 male (paratypes) (ANSP); GHANA: Eastern Region, Atewa Range, Asiakwa (North), elev. 769 m (6°16'16.4"N, 0°33'52.8"W), 16–24.vi. 2006, coll. P. Naskrecki (Camp 3) - 2 females, 1 male (paratypes) (MCZ); Asiakwa (South), elev. 690 m (6°15'44.3"N, 0°33'18.8"W), 11–16.vi. 2006, coll. P. Naskrecki (Camp 2) - 1 male (paratype) (MCZ); Asiakwa, main road, elev. 817 m (6°15'.7"N, 0°33'53.7"W), 7–11.xii. 2007, coll. P. Naskrecki, V. Awotwe-Pratt and N. Jengre - 1 female, 1 male nymph (paratypes) (MCZ).

Etymology. Named with reference to the Rapid Assessment Program of Conservation International, a group of dedicated conservationists, who bring to light many new species of organisms and are on the forefront of biological exploration and protection of Earth's ecosystems.

***Brachyamytta mcculloughae* n. sp.**
(Figs. 3A, B, K; 4F, P; 7F)

Differential diagnosis. This species is similar to *B. maculipes* **n. sp.**, but differs in the general coloration, the shape of the male cerci (Figs. 3A, B; 3C, D), the shape of the tegmen (Figs. 4P, Q), and the significantly longer stridulatory file.

Description.

[*General*.] As in generic (Fig. 7F); female unknown.

Legs. Front tibia with 3 spines on posterior and 4 on anterior ventral margin. Mid tibia with 3 spines on posterior and 3 on anterior ventral margin.

Wings. Tegmen distinctly narrowed towards apex, not reaching middle of abdomen; anterior margin straigh. Costal field not dilated at base; veins Sc and R diverging towards apex of tegmen; left stridulatory area with large, fully developed, roughly rectangular mirror (Fig. 4P). Stridulatory file flat, weakly bent, with 88 teeth, 1.2 mm long, 0.06 mm wide (Fig. 4F).

Abdomen. Cercus long and slender, straight, bent outwards under right angle in apical fourth; apex tapered, bent slightly downwards (Figs. 3A, B). Subgenital plate broadly trapezoidal; styli vertical, pointing down, cylindrical, about twice as long as wide, parallel, very close together, nearly touching.

Coloration. Coloration reddish brown; antennal scapus without markings; antennae concolorous; eyes uniformly colored; face without darker markings; occiput with dark brown markings around posterior margins of eyes; pronotum light brown dorsally, lateral lobe with small, dark brown patch, and lower edge of pronotum dark brown; prozona light brown; tegmen with small, brown patch behind stridulatory area; veins light, with membrane between veins brown; hind wing hyaline; genicular lobes of front legs without markings; hind femur with dark brown patch at base and wide, irregular, dark brown band in proximal third (Fig. 3K); hind tibia brown.

Measurements (2 males). body w/o wings: 10–11 (10.5±.7); pronotum: 4–4.3 (4.2±.2); tegmen: 3–3.7 (3.4±.5); hind femur: 10 mm.

Material examined. GUINEA: Guinee Forestiere, Simandou Mts., nr. Banko, Camp 2, elev. 590–700-700 m (8°31'29"N, 8°56'12"W), 3–7.xii. 2002, coll. P. Naskrecki - 2 males (holotype in ANSP, paratype in MCZ).

Etymology. Named in honor of Jennifer McCullough of the Rapid Assessment Program, Conservation International.

***Brachyamytta maculipes* n. sp.**
(Figs. 3C, D, G, H; 4G, Q; 7A, B)

Differential diagnosis. This species is similar to *B. mcculloughae*, but differs in the general coloration, the shape of the male cerci (Figs. 3A, B; 3C, D), the shape of the tegmen (Figs. 4P, Q), and the significantly shorter stridulatory file.

Description.

General. As in generic (Figs. 7A, B).

Legs. Front tibia with 3 spines on posterior and 4 on anterior ventral margin. Mid tibia with 3 spines on posterior and 4 on anterior ventral margin.

Wings. Tegmen distinctly narrowed towards apex, not reaching middle of abdomen; anterior margin rounded; hind wing rudimentary, about as long as fifth of tegmen. Costal field not dilated at base; veins Sc and R close together, parallel along their entire length; left stridulatory area with large, fully developed, roughly rectangular mirror (Fig. 4Q). Stridulatory file flat, weakly bent, with 87 teeth, 0.8 mm long, 0.05 mm wide (Fig. 4G).

Abdomen. Cercus long and slender, straight, bent outwards under right angle in apical fourth; apex tapered and distinctly bent downwards (Figs. 3C, D). Subgenital plate broadly trapezoidal; styli vertical, pointing down; cylindrical, about twice as long as wide, parallel, very close together, nearly touching. Female subgenital plate with two narrow, rounded lobes on posterior margin (Fig. 3G).

Ovipositor. Ovipositor normally developed, slightly curved; shorter than hind femur (ratio femur/ovipositor 1.83–1.91) (Fig. 3H); apex with both valvulae smooth; pointed, dorsal edge of upper valvula parallel to lower valvula;.

Coloration. Coloration olive green; antennal scapus without markings; antennae concolorous; eyes uniformly colored; face without darker markings; occiput without markings; pronotum olive green, without markings; prozona green; tegmen with small, brown patch behind stridulatory area; hind wing hyaline; genicular lobes of front legs without markings; hind femur green, with small, gray, dorsal patch in proximal third; hind tibia olive green.

Measurements (2 males, 2 females). female ; body w/o wings: male 9–9.5 (9.3±.4), female 9.5–11 (10.3±1.1); pronotum: male 4, female 4; tegmen: male 3–3.5 (3.3±.4), female 3–3.5 (3.3±.4); hind femur: male 9.5–10 (9.8±.4), female 10.5–11 (10.8±.4); ovipositor: 5.5–6 (5.8±.4) mm.

Material examined. GHANA: Eastern Region, Atewa Range, Asiakwa (South), elev. 690 m (6°15'44.3"N, 0°33'18.8"W), 11–16.vi. 2006, coll. P. Naskrecki (Camp 2) - 1 male (holotype) (ANSP); Asiakwa (North), elev. 769 m (6°16'16.4"N, 0°33'52.8"W), 16–24.vi. 2006, coll. P. Naskrecki (Camp 3) - 2 females, 1 male (paratypes) (MCZ); Asiakwa, main road, elev. 817 m (6°15'.7"N, 0°33'53.7"W), 7–11.xii. 2007, coll. P. Naskrecki, V. Awotwe-Pratt and N. Jengre - 1 female (paratype), 1 male nymph (ANSP).

Etymology. The specific epithet refers to the presence of darker maculation on the hind femora in this species.

Additional species examined:

***Gonamytta occidentalis* (Karsch, 1890)**
=*Xiphidiopsis mitrata* Bolivar, 1906
(Fig. 5H)

This widely distributed species has been reported from Ghana, Côte d'Ivoire, Sierra Leone, Nigeria, Cameroon, Equatorial Guinea, Democratic Republic of Congo, Uganda, and Mozambique (Beier 1966).

Material examined. CAMEROON: Kribi, (2°57'N, 9°55'0"E), xii. 1888, coll. Morgan - 1 female (holotype) (ZMHB); EQUATORIAL GUINEA: Isla de Fernando Poo, Santa Isabel, (3°37'60"N, 8°45'0"E), vii. 1901, coll. Escalera - 1 female (paralectotype of *X. mitrata*) (MNCN); GHANA: Eastern Region, Ajenjua Bepo Forest Reserve, elev. 300–320 m (6°22'2.3"N, 1°1'58"W), 26–30.viii. 2006, coll. P. Naskrecki, V. Awotwe-Pratt and M. Bakowski (Camp 1) - 14 females, 13 males; Mamang Forest Reserve, elev. 130 m (6°15'1.4"N, 1°2'25.4"W), 30.viii.–5.ix. 2006, coll. P. Naskrecki, V. Awotwe-Pratt and M. Bakowski (Camp 2) - 1 male (MCZ).

***Orophilopsis subaptera* Chopard, 1945**

This species is known only from its type locality in Cameroon (Chopard 1945).

Material examined. CAMEROON: Mt. Cameroun, versant S-E, elev. 1800–2000-2000 m (4°12'N, 9°10'60"E), 1.i.–31.xii. 1939, coll. P. Lepesme, R. Paulian & A. Villiers - 1 female (holotype) (MNHN).

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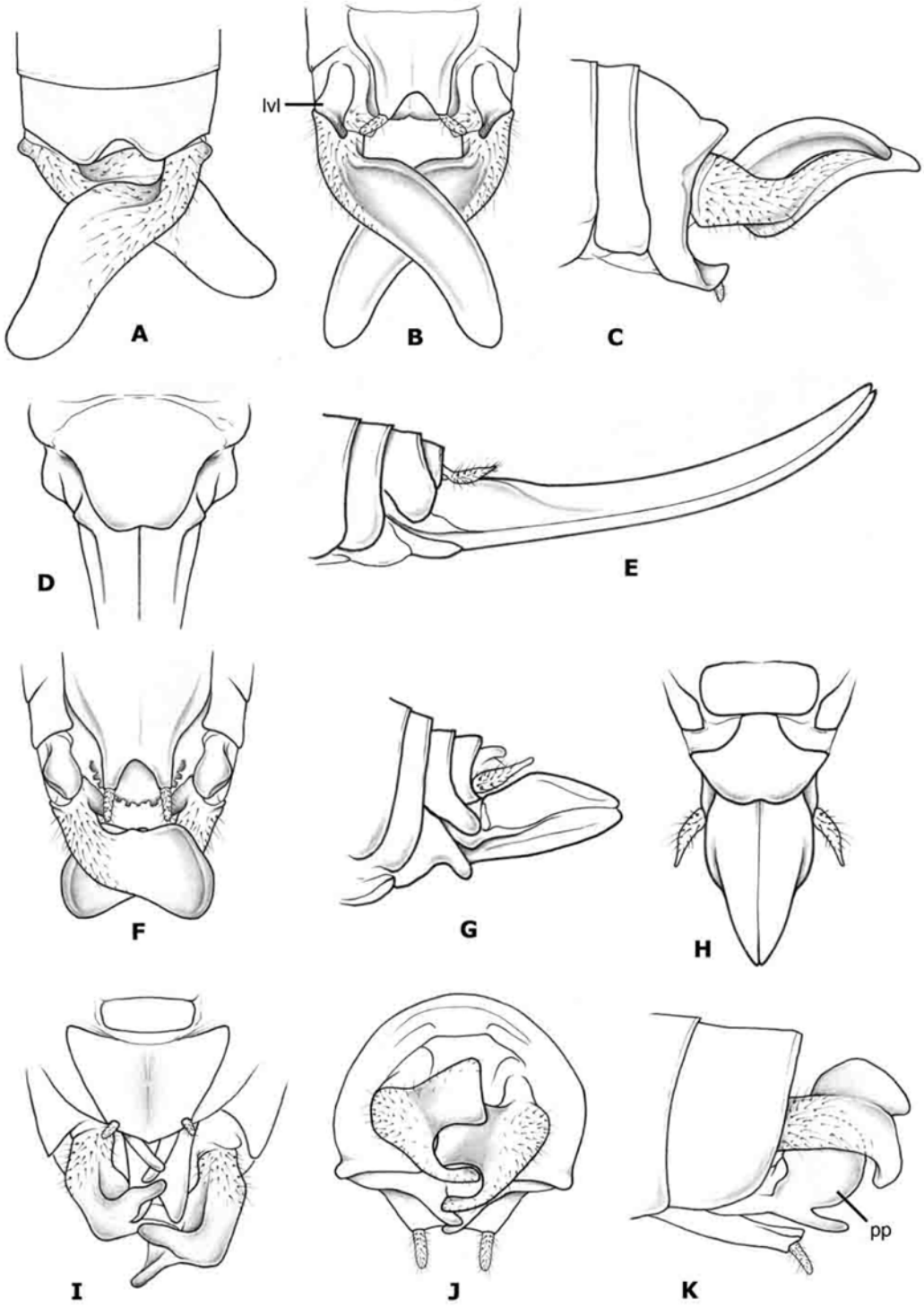

FIGURE 1. *Amyttopsis palmulicerca*: A. male cerci, dorsal view; B. ditto, ventral view (lvl – latero-ventral lobe of 10th tergite); C. ditto, lateral view; D. female subgenital plate; E. ovipositor; *A. bakowskii*: F. male cerci, ventral view; *Amyttosa insectivora*: G. ovipositor, lateral view; H. ovipositor and subgenital plate, ventral view; I. male cerci, ventral view; J. ditto, posterior view; K. ditto, lateral view (pp – paraprocts).

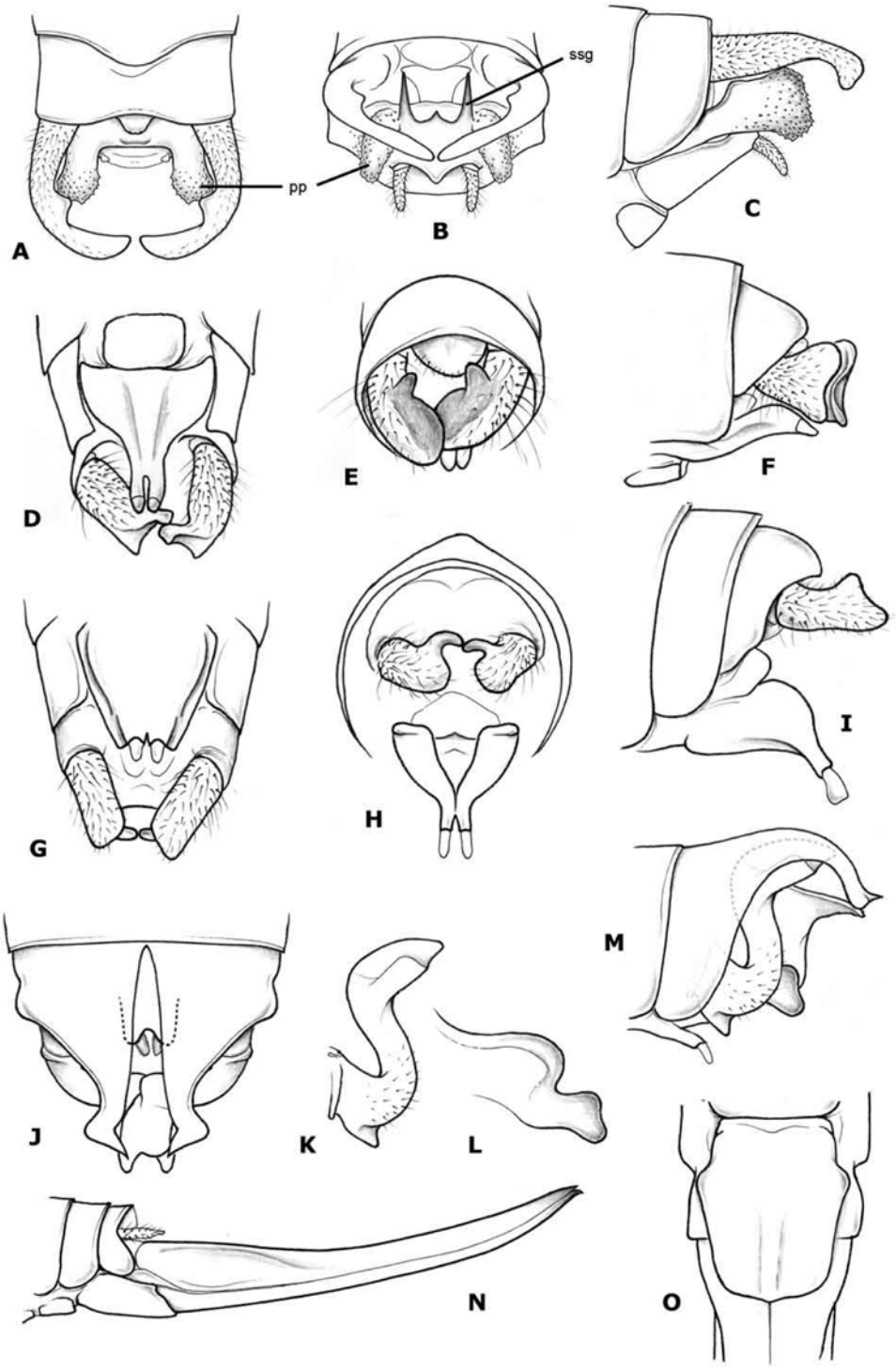

FIGURE 2. *Proamytta spinifera*: A. male cerci, dorsal view; B. ditto, posterior view; C. ditto, lateral (pp – paraprocts; ssg – spines of subgenital plate); *Xiphidiola lobaticerca*: D. male cerci, ventral view; E. ditto, posterior view; F. ditto, lateral view; *X.hokei*: G. male cerci, ventral view; H. ditto, posterior view; I. ditto, lateral view; *Anepitacta wrightae*: J. male 10th tergite; K. male circus, lateral view; L. male epiproct; M. male cerci and 10th tergite, lateral view; N. ovipositor; O. female subgenital plate.

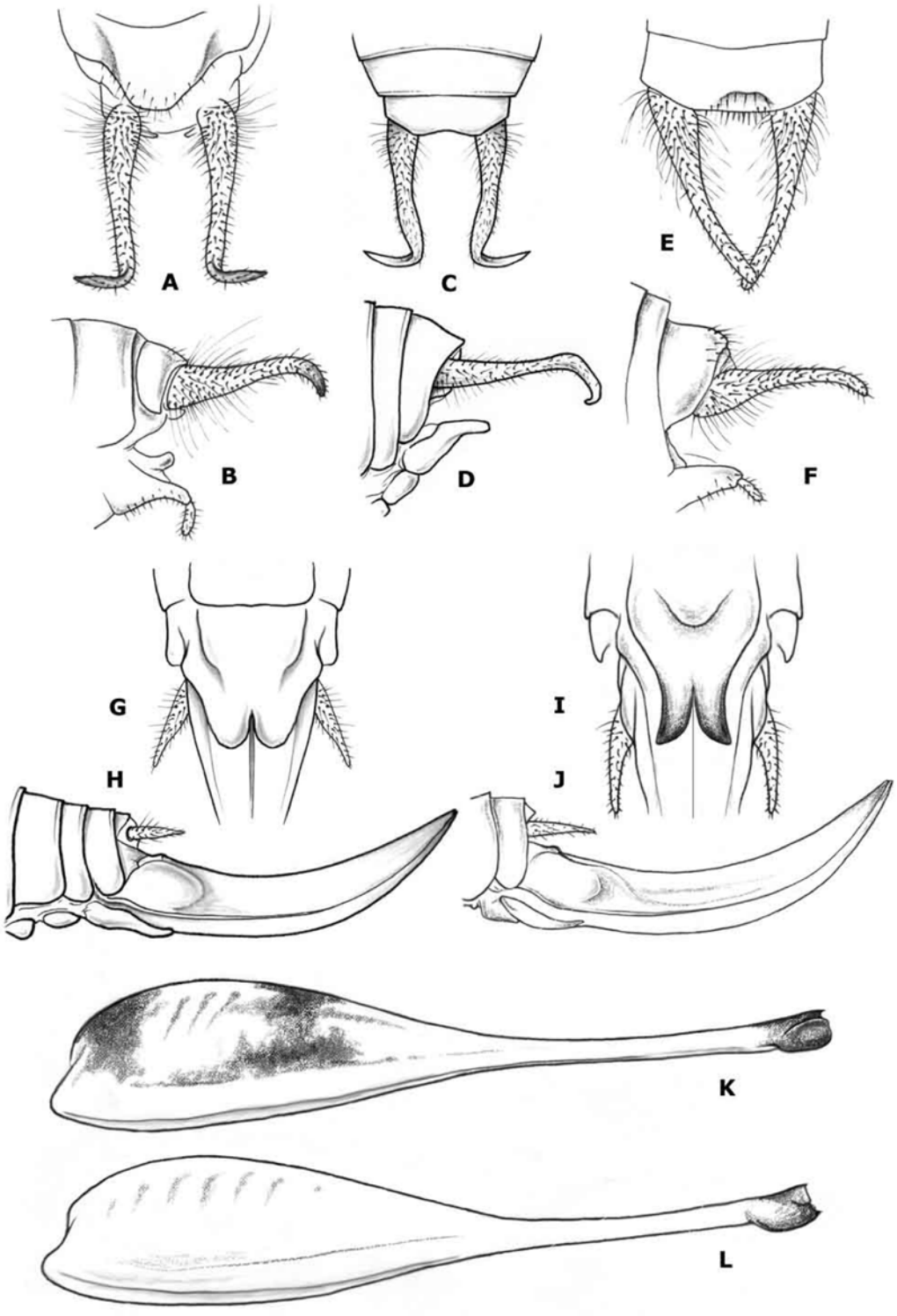

FIGURE 3. *Brachyamytta mcculloughae*: A. male cerci, ventral view; B. ditto, lateral view; K. hind femur; *B. maculipes*: C. male cerci, dorsal view; D. ditto, lateral view; G. female subgenital plate; H. ovipositor; *B. rapidoaestima*: E. male cerci, dorsal view; F. ditto, lateral view; I. female subgenital plate; J. ovipositor; L. hind femur.

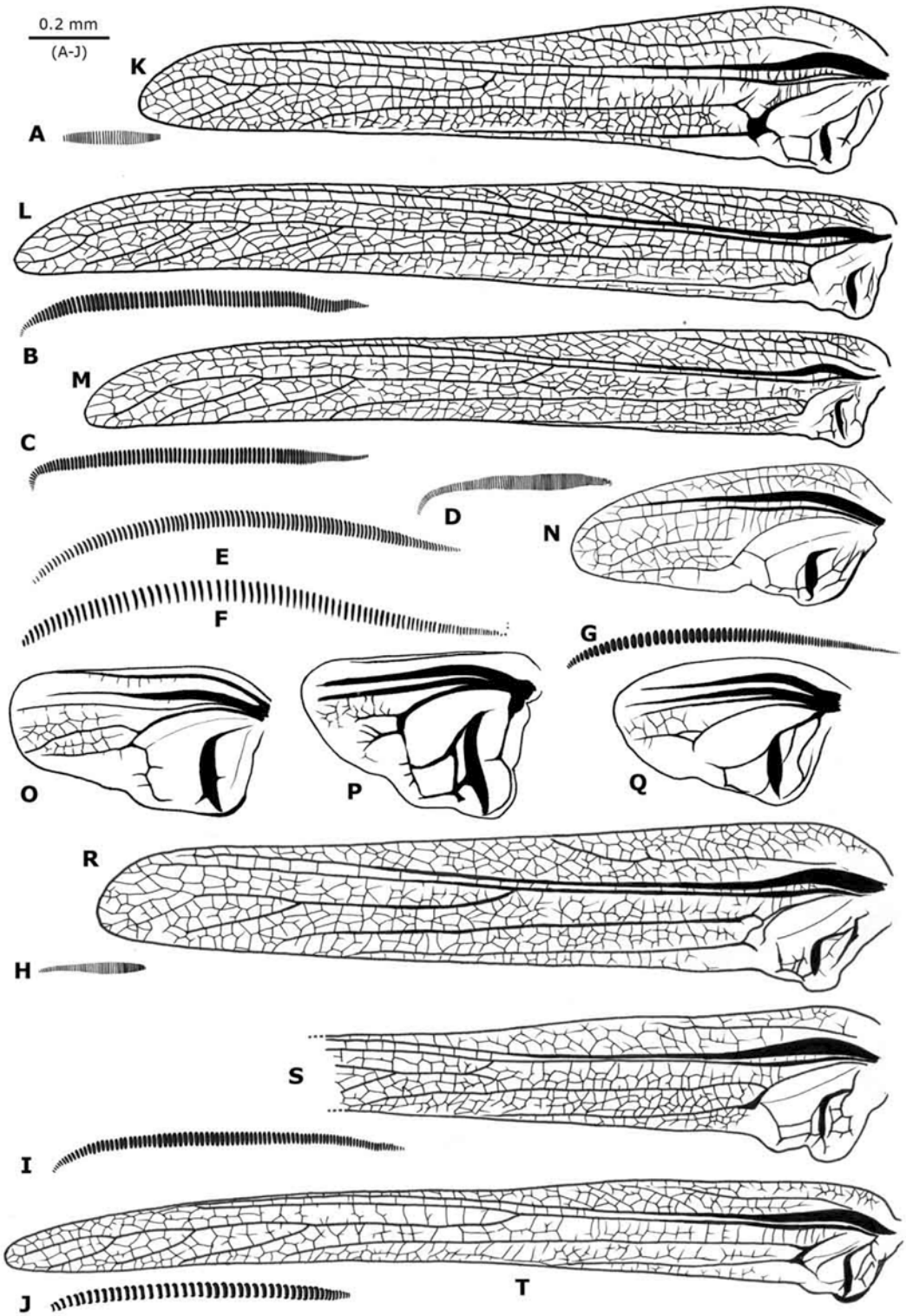

FIGURE 4. A–J. Stridulatory files: A. *Proamytta spinifera*; B. *Amyttopsis palmulicerca*; C. *X. bakowskii*; D. *Anepitacta wrightae*; E. *Brachyamytta rapidoaestima*; F. *B. mcculloughae*; G. *B. maculipes*; H. *Amyttosa insectivora*; I. *Xiphidiola-hokei*; J. *X. lobaticerca;* K–T. Left tegmina of males: K. *Proamytta spinifera*; L. *Amyttopsis palmulicerca*; M. *X. bakowskii*; N. *Anepitacta wrightae*; O. *Brachyamytta rapidoaestima*; P. *B. mcculloughae*; Q. *B. maculipes*; R. *Amyttosa insectivora*; S. *Xiphidiola hokei*; T. *X. lobaticerca.*

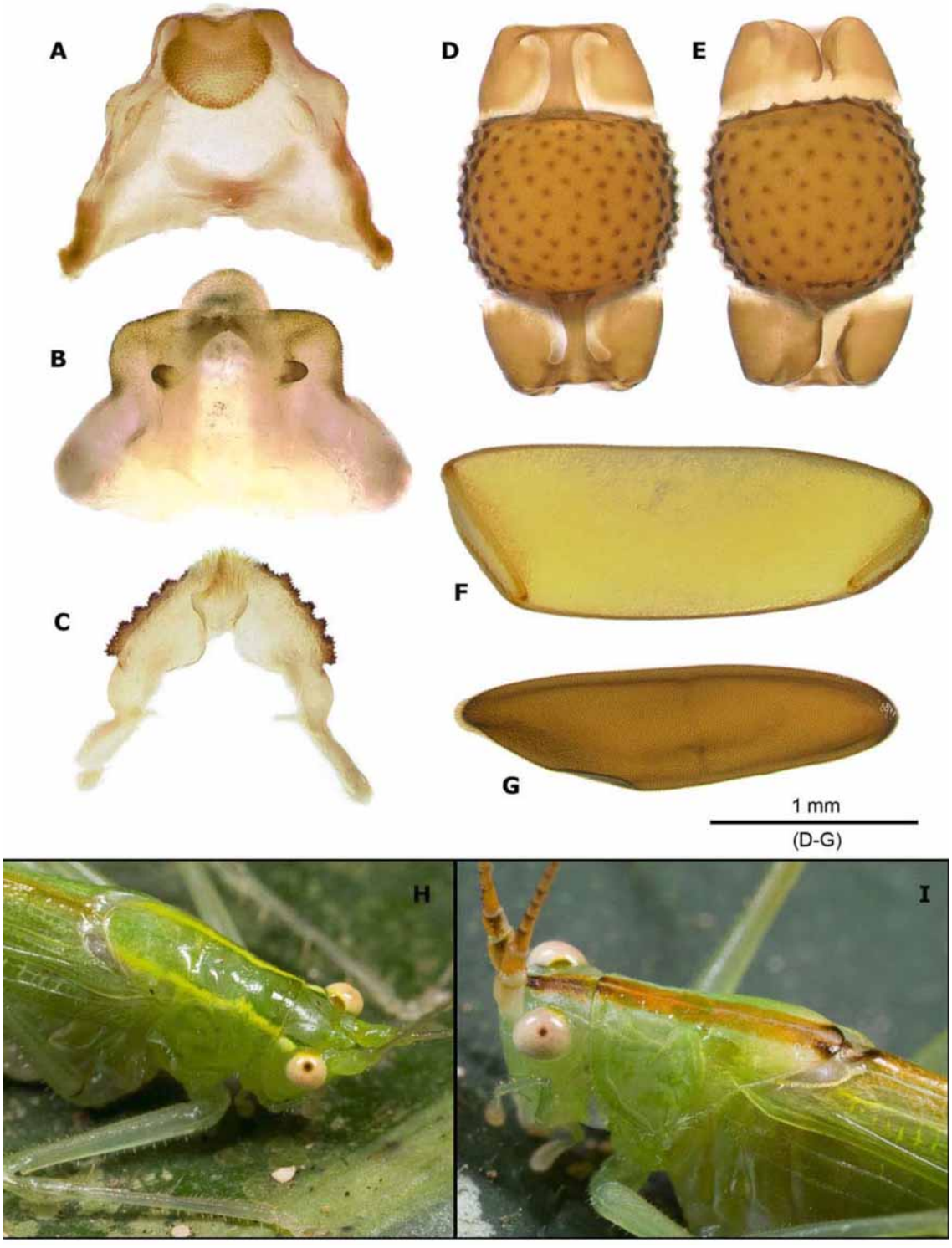

FIGURE 5. A–C. Epiphallus: A. *Anepitacta wrightae*; B. *Amyttopsis palmulicerca*; C. *A. bakowskii*; D–G. Eggs: D & E. *Amyttosa insectivora*; F. *Gonamytta occidentalis*; G. *Brachyamytta maculipes*; H–I. Male pronota: H. *G. occidentalis*; I. *Anepitacta guentheri*.

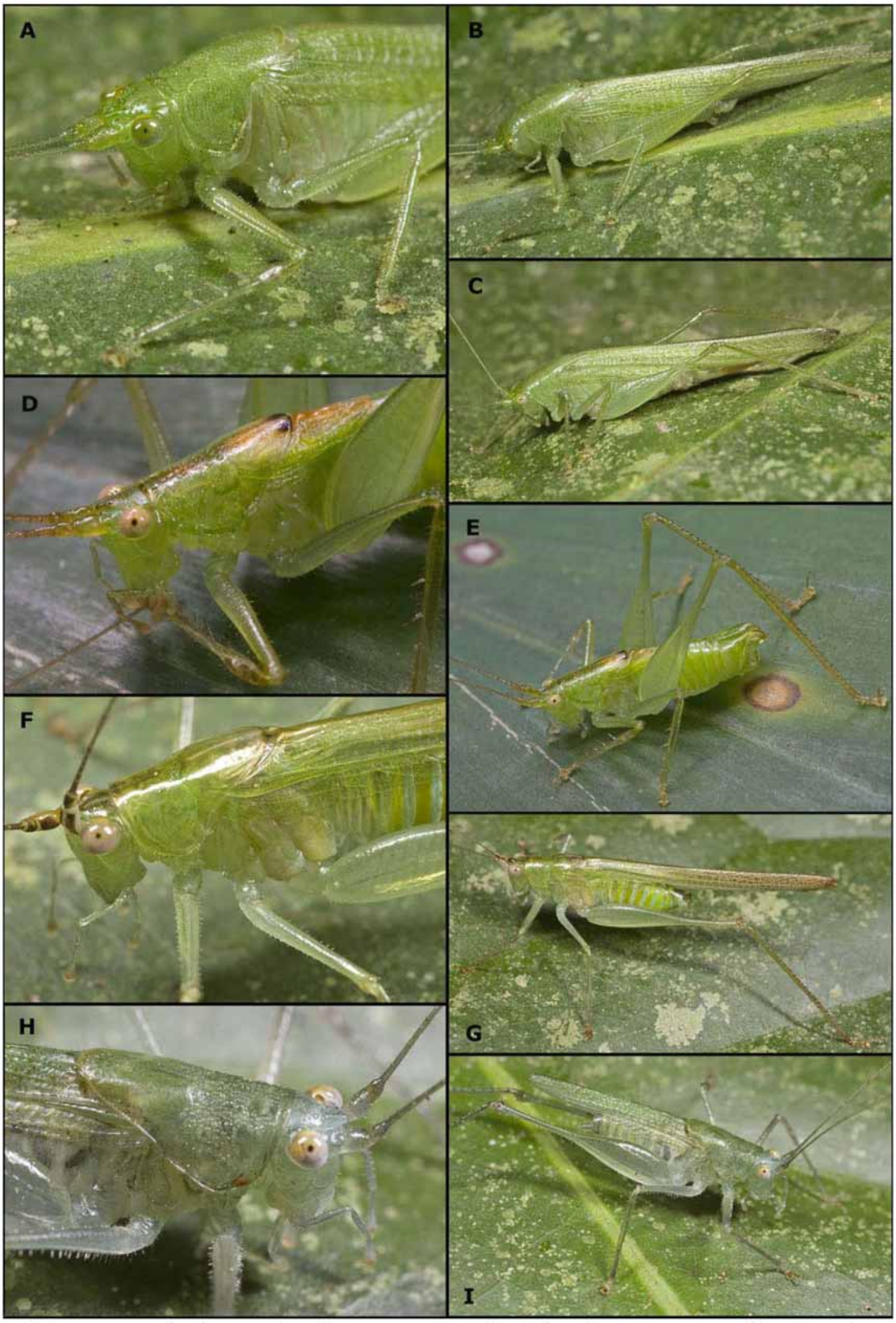

FIGURE 6. *Amyttopsis palmulicerca*: A. male pronotum; B. male; C. female; *Anepitacta wrightae*: D. male pronotum; E. male; *Xiphidiola lobaticerca*: F. male pronotum; G. male; *X. hokei*: H. male pronotum; I. male.

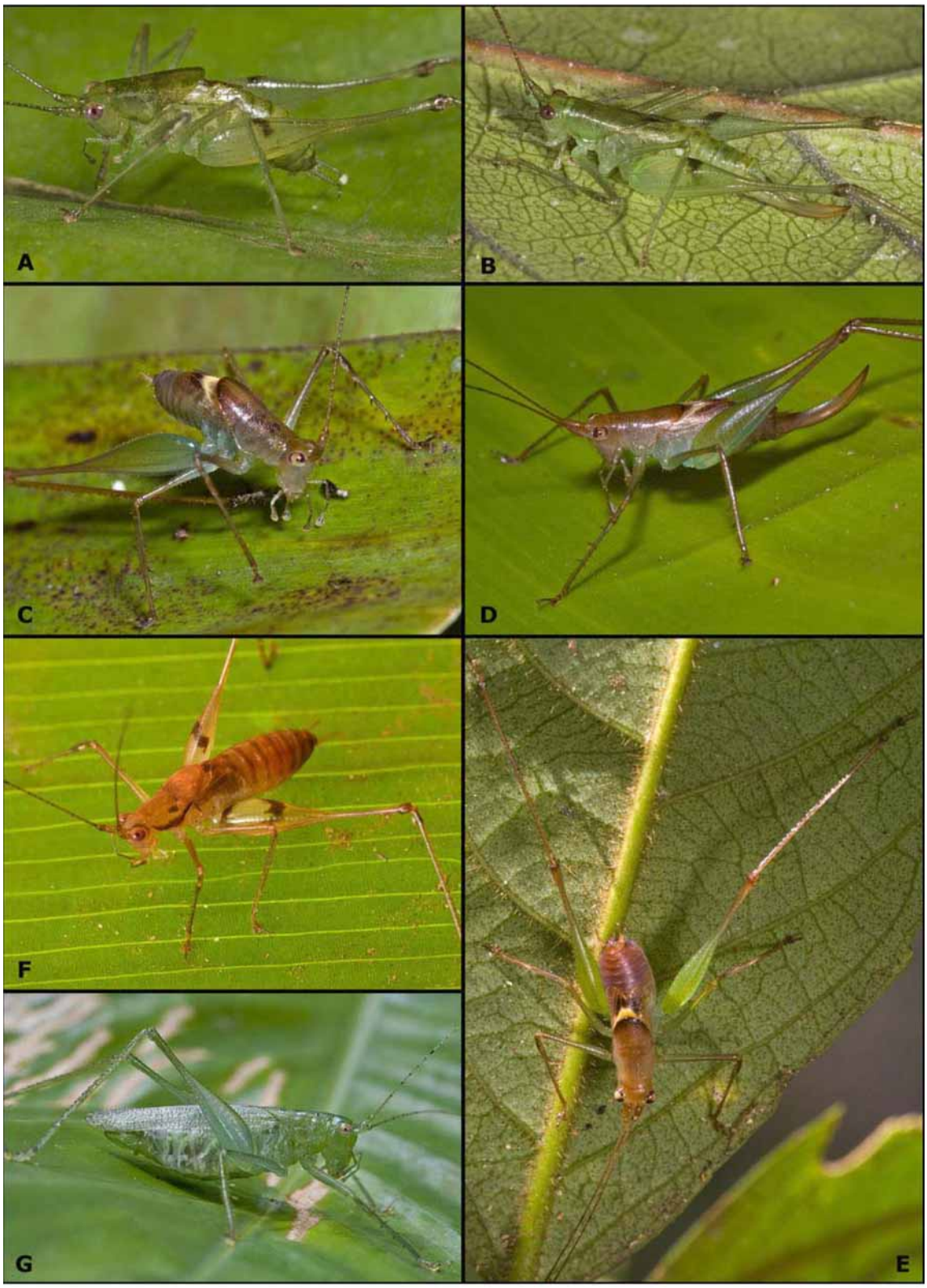

FIGURE 7. *Brachyamytta maculipes*: A. male; B. female; *B. rapidoaestima*: C. male; D. female; E. male in a daytime resting position; *B. mcculloughae*: F. male; *Amyttosa insectivora*: G. female.