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# A taxonomic revision of the Neotropical genus *Aegimia* Stål, 1874 (Orthoptera, Tettigoniidae, Phaneropterinae)

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## Abstract

*Aegimia* Stål, 1874, a Neotropical katydid genus of the Phaneropterinae (Orthoptera: Tettigoniidae), is revised based on the examination of 106 specimens from Mexico, Costa Rica, Panama, Colombia and Brazil. The genus is recognized by a long sword-shaped fastigium, mid- and hindtibiae strongly flattened, and leaf-shaped tegmina. The following species are redescribed: *A. catharinensis* Piza, 1950, *A. cultrifera* Stål, 1874 and *A. elongata* Rehn, 1903. Two new species are described: *Aegimia maculifolia* sp. nov. (from Costa Rica, Panama and Colombia) and *Aegimia venarecta* sp. nov. (from Costa Rica). Geographic distribution of *A. cultrifera* is expanded to Costa Rica. The female of *A. catharinensis* remains unknown. A pictorial key to all species is presented and details of the male genitalic characters described and illustrated.

## Key words

*Aegimia catharinensis*, *Aegimia cultrifera*, *Aegimia elongata*, *Aegimia maculifolia*, *Aegimia venarecta*, katydids, key, new species

## Introduction

To date, *Aegimia* Stål, 1874 (Tettigoniidae, Phaneropterinae) has been recognized to include three valid species (Eades *et al.* 2011). They are diagnosed by the combination of greatly enlarged fastigium of vertex and frons that form a large "rostrum", the presence of wide lobes on the mid and hind tibiae, and strongly flattened mid and hind femora (Bruner 1915). These insects exhibit a remarkably leaf-like appearance, are light green in life, and their hindwings hidden under their tegmina when in repose (Nickle 1992).

The genus was erected as a monotypic taxon to include *A. cultrifera* Stål, 1874, described based on a male collected in Cordova, Mexico. Later, Rehn (1903) listed this species from Teocelo, Vera Cruz, Mexico, and Mayaudón (1969) described the male and female genitalia of this species. The second species, *A. elongata* Rehn, 1903, was described based on a single male from Central America, and a female was subsequently described by Hebard (1927) based on specimens from Bugaba, Chiriqui, Panama and La Florida, Costa Rica. The third species, *A. catharinensis* Piza, 1950, was described based on one male from Ribeirão do Engenho, Itaúna Valley, Espírito Santo, Brazil. The fourth species, *A. alvarengai* Costa Lima & Campos-Seabra, 1956, was described based on three male specimens from Cachimbo, Pará, Brazil and it was subsequently synonymized with *A. catharinensis* (Costa Lima 1958).

In addition to the type localities, species of *Aegimia* were also recorded from Colombia (Montealegre *et al.* 1993) and Costa Rica (Barranco 2010, Eades *et al.* 2011).

The little biological information found in the literature for *Aegimia* is related to the almost perfect petiole-like appearance of the fastigium (Belwood 1990, Nickle 1992) and its use in crypsis: the insects remain motionless during the day, with the head pressed against the substrate (usually branches of trees and shrubs), making them difficult to detect for predators. Belwood (1990) also reported that if disturbed, individuals of *Aegimia* rock and teeter as they walk, mimicking the appearance of leaves moving in the breeze. No bioacoustic data are available for *Aegimia* species.

Species identification within the genus has been based on the number of projections on the midtibiae: absent in *A. catharinensis*, three in *A. elongata*, and two in *A. cultrifera*. As the number of projections within the species is subject to a significant polymorphism, this has frequently led to erroneous identifications. Also, the published descriptions of *Aegimia* species are rather abbreviated and without informative illustrations, which contributes to difficulties identifying its species. To help remedy this situation, this study presents a taxonomic revision of the genus based on morphological structures, and provides comprehensive descriptions of all its species.

## Material and methods

A total of 106 specimens (98 males and 8 females) of *Aegimia* from Mexico, Costa Rica, Panama, Colombia and Brazil were examined. The specimens were obtained from the following institutions:

NHRS - "Naturhistoriska Riksmuseet" Swedish Museum of Natural History, Stockholm, Sweden.

USNM - United States National Museum, Washington, D.C., USA.

MZLQ - Museu de Zoologia Luiz de Queiróz, Departamento de Zoologia da Escola Superior de Agricultura Luiz de Queiróz, Piracicaba, São Paulo, Brazil.

IOC - Coleção Entomológica do Instituto Oswaldo Cruz, Rio de Janeiro, Rio de Janeiro, Brazil.

CZPB - Coleção Zoológica Prof. Paulo Bührnheim, Departamento de Biologia, Universidade Federal do Amazonas, Manaus, Amazonas, Brazil.

FMNH - Field Museum of Natural History, Chicago, IL, USA.

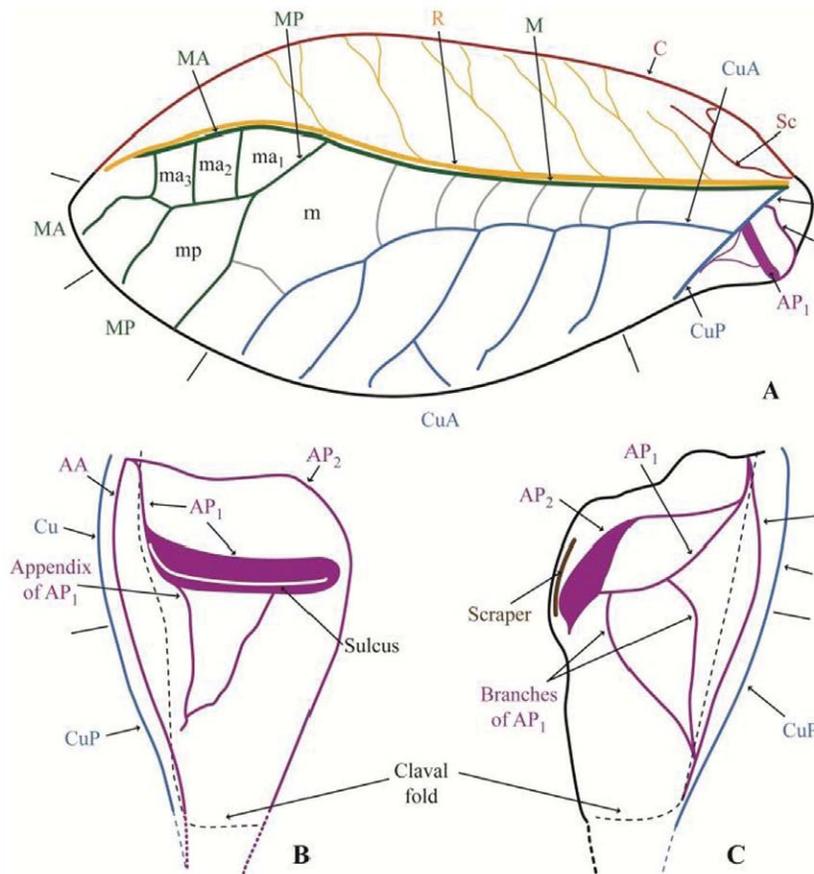
INBio - Instituto Nacional de Biodiversidad, Santo Domingo, Heredia, Costa Rica.

INPA - Invertebrate Collection of Instituto Nacional de Pesquisas da Amazônia, Manaus, Amazonas, Brazil.

MEFLG - Museo Entomológico Francisco Luis Gallego, Universidad Nacional de Colombia, Medellín, Colombia.

MPEG - Museu Paraense Emílio Goëldi, Belém, Pará, Brazil.

MZSP - Museu de Zoologia da Universidade de São Paulo, São Paulo, Brazil.



**Fig. 1.** Tegminal vein and cell nomenclature used for Tettigoniidae, Phaneropterinae. A. Left tegmen, male; B. Anal region of left tegmen, detail of stridulatory apparatus in dorsal view; C. Anal region of right tegmen, dorsal view. Anterior anal vein (AA), posterior anal vein (AP), costal vein (C), cubital vein (Cu), anterior cubital vein (CuA), posterior cubital vein (CuP), median vein (M), anterior median vein (MA), posterior median vein (MP), median cell (m), anterior median cell (ma), posterior median cell (mp), radial vein (R), subcostal vein (Sc). For color version, see Plate IV.

a camera, Leica DFC 295, attached to a stereomicroscope, Leica M205 C. The total number of teeth (Nt), including those with irregular morphology and irregular distribution, minimum spacing at highest tooth density (Dt-Min) (See a of Fig. 2), maximum width of the teeth (Wt-Max) (See b of Fig. 2) and the total length of the stridulatory file (LSF) (See c of Fig. 2) were measured from the digital image, processed by the imaging software Leica Application Suite LAS V3.6. Basal and apical ends of the stridulatory file were ignored for measuring the spacing between teeth due to irregular morphology of the teeth. The total length of the stridulatory file was measured along its median line from the first basal tooth to the last apical tooth (See c of Fig. 2).

The specimens were measured using the methodology of Carbonell (1996), with the following modifications:

Body length (BL): distance from frons to apex of tegmen.

Head width (HW): maximum dorsal distance between external surfaces of compound eyes.

Head width behind the eyes (LWBE): maximum dorsal distance between posterior margins of compound eyes.

Interocular distance (ID): minimum dorsal distance between internal borders of compound eyes.

Fastigium verticis (FV) and fastigium of frons (FF): distance between apex of fastigium and an imaginary line between dorsal borders of eyes.

Head and pronotum length (H+PL): distance, measured dorsally, from frons to posterior margin of pronotum.

Pronotal lateral lobes height (PLLH): distance, measured medially, from dorsal to ventral margin.

Pronotal lateral lobes width (PLLW): distance, measured laterally, from anterior to posterior margin.

Pronotal disc length (PDL): distance, measured dorsally, from anterior to posterior margin.

Pronotal disc width (PDW): maximum dorsal distance between lateral surfaces of pronotum.

Tegmen length (TgL), femur length ( $FL_{i,ii,iii}$ ), tibia length ( $TbL_{i,ii,iii}$ ): appendage length, measured from proximal to distal ends.

Tegmen width (TgW): maximum distance between anterior and posterior margins of tegmen.

Femur width ( $FW_{i,ii,iii}$ ) and tibia width ( $TbW_{i,ii,iii}$ ): maximum width measured along dorsal surface.

Ovipositor length (OL): distance between anterior edge of subgenital plate and posterior edge of ventral valve, measured along lateral surface and parallel to longitudinal body axis.

Ovipositor height (OH): vertical distance between ventral edge of ventral valve and ovipositor apex.

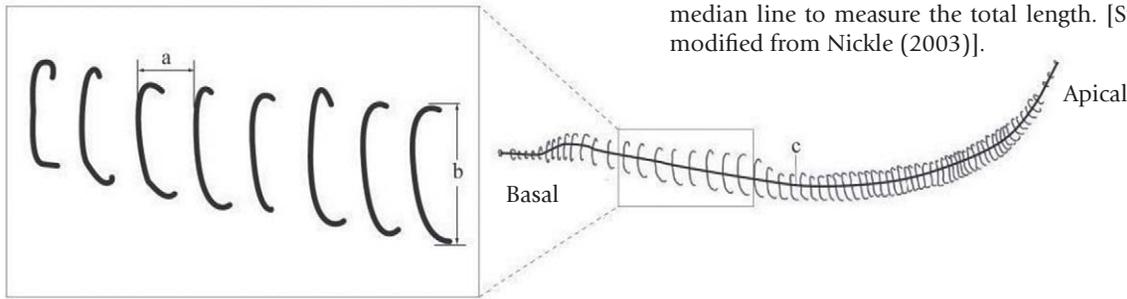
UNAM - Universidad Nacional Autónoma de México, Colección Nacional de Insectos, Instituto de Biología, México.

Specimens not types were identified by comparison with the type material. The specimens were examined using a stereomicroscope LEICA WILD MZ8. Pinned specimens were relaxed and their left tegmen and hindwing extended for the venation analysis and to allow a detailed view of the stridulatory apparatus.

For genitalic examinations, at least two male specimens of each species were placed in a hydration chamber to soften and facilitate dissection of the abdomen. The amount of time in the hydration chamber varied according to specimen size, but was always more than 24h. After rehydration of the soft tissues, the abdomen was cut between tergite VII and VIII, and the extracted genitalic structures treated following Cummings' protocol (1992), which uses lactic acid (85%) at high temperature for the maceration of soft tissues, keeping membranes and sclerotized parts intact. After maceration the structures were transferred to a depression slide filled with glycerin and examined under a stereomicroscope LEICA WILD M3Z with transmitted light. After the examination, the terminalia were placed in a microtube filled with glycerin, and pinned to the respective specimen.

The terminology used to characterize the genitalia follows Snodgrass (1937) and Desutter-Grandcolas (2003). The venation nomenclature follows Desutter-Grandcolas (2003), with modifications to the anal area proposed here (Fig. 1); the nomenclature of major veins follows Kukulová-Peck (1983). A modified venation terminology for the anal area of the tegmen is adopted here (Fig. 1A-C) in order to better understand and diagnose the species.

For the analysis of the stridulatory apparatus, images of the ventral view of the sound-producing structures were captured using



**Fig. 2.** Scheme of the stridulatory file measurements. a. Space between teeth; b. Greatest width of stridulatory file; c. Continuous median line to measure the total length. [Stridulatory file drawing modified from Nickle (2003)].

Ovipositor width (OW): maximum distance between upper edge of dorsal valve and lower edge of ventral valve.

A digital caliper DIGIMESS, 8" long with a 0.01 mm resolution was used to measure the following structures: BL, TL, TW, FL<sub>iii</sub>, TL<sub>iii</sub>. Other measurements were performed using a micrometric ocular lens coupled to a stereomicroscope LEICA MZ8. For each magnification, the measurement of the ocular lens was multiplied by a correction factor obtained by comparison with a micrometered slide, WILD Heerbrugg 310345.

The following ratios are used in the species descriptions:

Tegminal index (TgW/TgL): maximum width divided by maximum length.

Median tibia index (TbW<sub>ii</sub>/TbL<sub>ii</sub>): maximum width divided by

maximum length.

Posterior tibia index (TbW<sub>iii</sub>/TbL<sub>iii</sub>): maximum width divided by maximum length.

Stridulatory file index (Nt/LSF): number of teeth on the stridulatory file divided by its length (LSF), in millimeters.

All drawings were made as pencil sketches using a WILD 308700 camera lucida attached to a LEICA WILD M3Z stereomicroscope. These sketches were scanned at a resolution of 300 dpi, and processed using a vector editing software (Adobe Illustrator CS5). Photographs of whole specimens were captured using a Nikon D3000 digital camera.

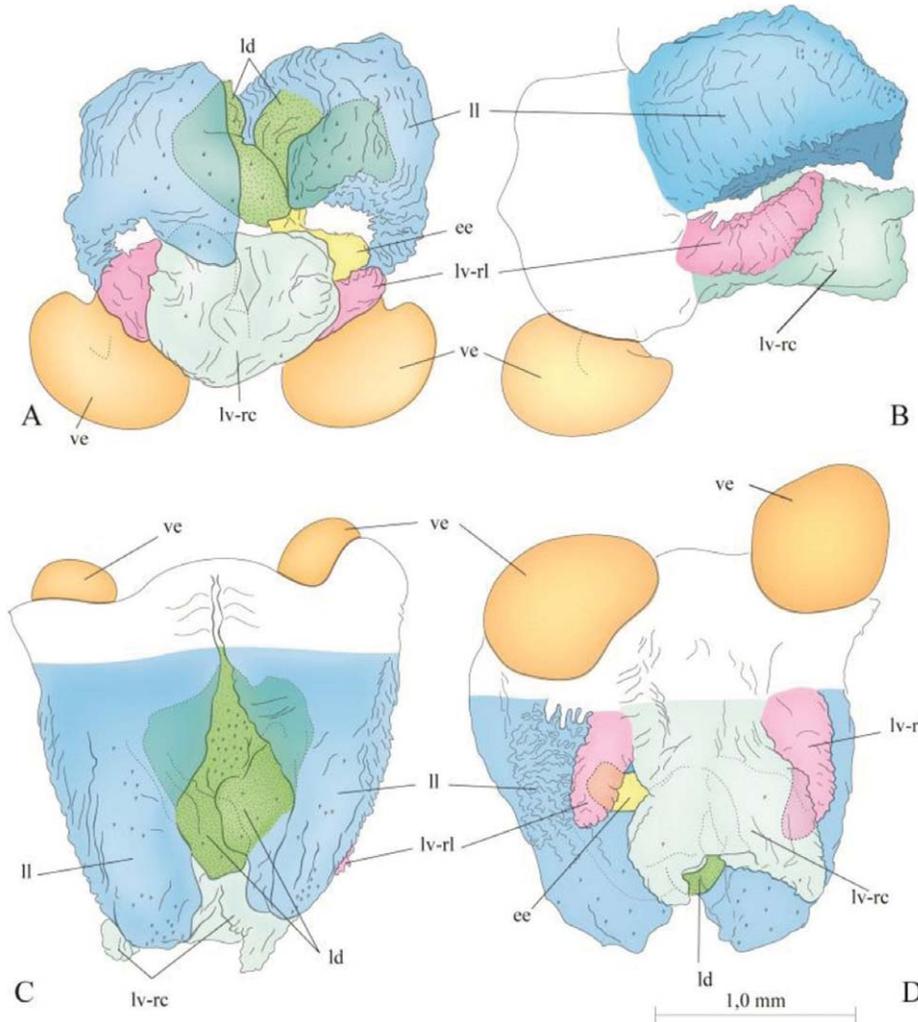
Photographs of morphological structures were captured using a LEICA DFC 295 digital camera attached to a LEICA M205 C stereomicroscope.

The images were processed using digital image processing software Leica Application Suite LAS V3.6. The tegmen was photographed in parts and the partial images merged using the image processing software Arc Soft Panorama Maker 5 Pro.

The map with the geographic records of the species was generated using the software DIVA Gis version 7.1.1. Collecting sites indicated on the map are based on the labels of the material examined, excluding sites of which the exact location is not known or uncertain. The locations listed in the Distribution sections of the descriptions are based on the material examined.

Material examined sections are formatted following Papavero (1994), with the following modifications:

a) supplemental information is presented in brackets "[ ]";



**Fig. 3.** *Aegimia* male genitalia. Example of *Aegimia cultrifera*. A. Posterior view; B. Lateral view; C. Dorsal view; D. Ventral view. Ectophallic evagination (ee), lateral lobe (ll), dorsal lobe (ld), ventral lobe - central region (lv-rc), ventral lobe - lateral region (lv-rl), ejaculatory vesicle (ve). All drawings to same scale. For color version, see Plate IV.

b) data labels of the type material were transcribed verbatim, with the "/" separating the information from each label; "/" indicate the reverse side of the label; "( )" denote information about color, form and label printing; "{ }" denote data correction; and the second "( )" enclose the number, sex, and origin of the museum type material;

c) for other specimens, the country, state or province, and locality were transcribed verbatim from the label;

d) geographic coordinates are presented as dd° mm'ss". Much of the material from INBio carries Lambert coordinates; these are accompanied by recalculated coordinates in dd° mm'ss" placed in "[]."

## Descriptions

### *Aegimia* Stål, 1874

(Figs 4-10)

*Aegimia* Stål, 1874: 20. Type species: *Aegimia cultrifera* Stål, 1874 (by monotypy); Brunner von Wattenwyl 1878: 18, 115 (diagnosis); 1891: 9 (citation); Saussure & Pictet 1897: 315 (citation); Kirby 1906: 409 (catalog); Nickle 1992: 150 (key); Montealegre, Gonzalez & Carrejo 1993: 43 (Universidad del Valle's collection); Otte 1997: 153 (catalog); Eades *et al.* 2011 (*online* catalog); Chamorro-Rengifo *et al.* 2011: 19 (check-list from Colombia).

**Diagnosis.**—Body length 40 to 70 mm, general leaf-like appearance, color green in life, fastigium of frons projected dorso-anteriorly into long, sword-like shape; tegmen oval to ellipsoidal; hindwing placed beneath tegmen when in repose; mid- and hindtibia strongly flattened.

**Male redescription.**—**Head:** conical in frontal view (Figs 4D, 5D, 6C; 7D, 8D); oblique in lateral view (Figs 4C, 5C, 6D, 7C, 8C). Eyes semicircular, anterior margin rounded, posterior margin almost straight (Figs 4C, 5C, 6D, 7C, 8C). Frons with three frontal carinae between antennal sockets (Figs 4C, 5C, 6D, 7C, 8C). Median ocellus circular, in depression on fastigium of frons (Figs 4D, 5D, 6C; 7D, 8D). Fastigium of frons punctate; blade-like in lateral view (Figs 4C, 5C, 6D, 7C, 8C); in frontal view lanceolate, with external borders elevated (Figs 4C, 5C, 6D, 7C, 8C); triangular in cross section. Fastigium of vertex subtriangular in dorsal view, projecting beyond antennal bases, apex bifid with small median apical sulcus. Antennal socket in lateral view drop-like, with small projection ventrally. Antenna almost reaching apex of abdomen; scape cylindrical, inner margin with spiniform projection (Figs 5D, 6C, 8D); pedicel cylindrical, half as long and half as wide as scape. Lateral ocellus subrectangular, inconspicuous, adjacent to dorsal margin of antennal socket. Clypeus trapezoidal; labrum with apex slightly rounded. First and second palpomere of maxillary palp cylindrical, subequal in length and shape, third one slightly more than twice as long as first; fourth palpomere half as long as third, with narrower basis, fifth slightly clavate, length equal to sum of second and third palpomeres. First and second palpomere of labial palp cylindrical, second slightly longer than first; third slightly clavate, with membranous ventral area.

**Thorax:** pronotal disc trapezoidal, flat, anterior margin narrow and concave, posterior margin convex with small medial sinus; suture that splits prozona from meso- and metazona incomplete; meso- and metazona not separated by suture; median furcal suture Y-like. Lateral lobe of pronotum almost perpendicular to pronotal disc (Figs 4C, 5C, 6D, 7C, 8C); humeral sinus present; marginal

fold inconspicuous. Thoracic auditory spiracle oval, partially or completely hidden under lateral lobe of pronotum, close to half as high as lateral lobe of pronotum. Pro-episternum with anterior margin pointed, ventral margin S-shaped. Pro-epimeron not evident. Prosternum subangular, with precoxal bridge V-shaped, arched.

**Legs.** **Foreleg:** procoxal spine present. Femur laterally flattened, dorsal surface convex, ventral surface sulcate, anteroventral margin with spines evident, posteroventral margin unarmed, genicular lobes rounded, unarmed. Tibia with dorsal apical surface slightly concave, with angular borders; all margins with small spines, except anterodorsal margin; cuticular fold covering half of tympanic opening on both sides. Basal tarsomere semicylindrical, second one with small lateral projection and dorsal apical margin with two short spiniform projections; third tarsomere with lateral lobes well developed; fourth tarsomere cylindrical, flattened dorsoventrally, with a length equal to sum of median dorsal portion of first and second tarsomeres. **Midleg:** (Figs 4I, 5K, 6J, 7K, 8J) midfemur similar to forefemur. Tibia strongly flattened, expanded, as wide as or wider than midfemur; arrangement of the spines as in foretibia; apical cross section subsquare. Tarsus similar to foretarsus. **Hindleg:** (Figs 4J, 5L, 6K, 7L, 8K) femur laterally compressed, expanded, usually twice as wide as forefemur; dorsal margin slightly convex, ventral margin nearly straight, anteroventral margin sulcate, serrated, with noticeable spines; apex slightly narrower than basis of femur. Tibia distinctly flattened, expanded, as wide as or wider than hindfemur; anterior surface slightly concave, with angled edges slightly projecting and covered with small spines; cross-section in apical area subsquare. Hind tarsus similar to foretarsus.

**Wings:** tegmen oval to ellipsoidal, maximum width nearly half of tegmen length; apex of tegmen, when in repose, exceeds 2 to 3× abdomen length; anterior margin slightly convex; posterior margin convex. Veins R and M close to each other, parallel, fused near apex. Vein M branching in apical third. **Left tegmen:** (Figs 4E, 5E, 6E, 7E, 8E) stridulatory vein AP<sub>1</sub> well developed, swollen, with conspicuous groove (sulcus). **Right tegmen:** (Figs 4G, 5H, 6H, 7H, 8H) space between veins AA, AP<sub>1</sub> and second branch of AP<sub>1</sub> subtriangular, membranous, hyaline, forming mirror. Reticulate venation outside the mirror's region present. Vein AP<sub>2</sub> swollen apically. **Hindwing:** hidden under tegmen when in repose; apex of remigium folded.

**Abdomen:** medial dorsal portion of tergites II to VIII forming a longitudinal keel. Mid-dorsal posterior margin of T-III to T-VIII with small sinus. Tergite X unmodified, covered with sparse bristles. **Terminalia:** epiproct triangular, covering paraproct in posterior view (Figs 4K, 6M, 7M, 8L). Cerci densely covered with bristles; apex slightly curved upward, with sclerotized apical tooth (Figs 4K, 5N, 6L, 6M, 7M, 7N, 8L, 8M). Subgenital plate with sparse bristles, subtriangular in ventral view, apex with V-shaped median groove (sulcus), and median keel in apical half (Figs 4L, 5N, 7N, 8M); styli small, conical, with distinct and small setae. Phallus (Fig. 3) completely membranous, without sclerotized part. Lateral lobe well-developed, with scattered setae throughout, concentrated in apical dorsal region; lateral lobe may be swollen and in dorsal view, can hide ventral lobe. Dorsal lobe covered partially by lateral lobe in dorsal view; with setae more concentrated in dorsal middle portion (Fig. 3C) and with rough surface composed of small, fold-like striae. Ectophallic evagination (Figs 3A, 3D) in ventral portion of dorsal lobe. Ventral lobe (Fig. 3D) subdivided into: a) central region, with well developed median dorsal groove that likely accommodates an ectophallic evagination (observed in one specimen); with sparse setae, but not as frequent as in dorsal lobe and in lateral lobes; and with two small, lateral projections; and b) lateral region, with two small subcylindrical lobes, one on each side of central region;

wrinkled, without visible setae on its surface. Size and position of ejaculatory vesicle varies greatly in relation to phallus.

*Female*.—Similar to male but differs in the following aspects: overall size approximately 20% greater than that of males. Ratio of tegmen length to width greater than in male. Left tegmen without specialized stridulatory apparatus, anal area with reticulate venation (Figs 5F, 6F, 7F, 8F). In ventral view, veins with small denticles, punctate throughout anal area. Right tegmen with some translucent swollen veins in anal area; in dorsal view, anal margin with small teeth in crossveins of irregular morphology. Epiproct triangular, but relatively smaller than in males, covering paraproct in posterior view. Cerci conical, smaller than in males, almost straight and without apical sclerotized tooth (Figs 5O, 6N, 7O, 8N). Ovipositor strongly curved upwards at nearly right angle (Figs 5O, 6N, 7O, 8N). Dorsal valvulae about three times wider than ventral valvulae; anterior margin straight in its vertical portion, with rectangular small teeth for almost its entire length; posterior margin convex and without teeth. Ventral valvulae with anterior margin concave, without teeth; posterior margin convex, with rectangular small teeth in apical portion. Subgenital plate subtriangular in ventral view (Figs 5P, 6O, 7P, 8O).

*Comments*.—*Aegimia* is the only Phaneropterinae genus with the fastigium frontal as long as or longer than the frons height, and the fastigium of vertex extending beyond the antennal basis. Within the Phaneropterinae, the Dysoniini *Markia* White, 1862, *Apolinaria* Rehn, 1950 and *Lichenodraculus* Braun, 2011 have a similarly distinctive fastigium, but unlike *Aegimia*, their fastigium of vertex is longer than the fastigium of frons and spiniform shaped. Other important characters of *Aegimia* are the expansions of mid- and hindtibiae. Some species of Steirodontini, especially those of *Cnemidophyllum* Rehn, 1917 have mid- and hindtibia flattened, but not as strongly and distinctively as in *Aegimia*. *Agaurella mirabilis* (Brunner von Wattenwyl, 1891) also has legs with expansions, but in this species it is the apical portion of the fore- and middle femur and tibia that are flattened, and not the basal region of the mid- and hindtibiae, as seen in *Aegimia*. Based on the combination of these synapomorphies it is very likely that *Aegimia* forms a monophyletic lineage within the subfamily Phaneropterinae.

Brunner von Wattenwyl (1878) proposed the group Aegimiae, containing the only species known at that time, *Aegimia cultrifera*. With the exception of Mayaundón (1969) and Eades *et al.* (2011), other authors, including Rehn 1903 and Piza 1950, have ignored the group proposed by Brunner von Wattenwyl. In this particular case, the group Aegimiae can be treated as synonymous with the genus, and thus the group Aegimiae is not considered in this work. Three species of *Stilpnochlora* Stål, 1873 (Phaneropterinae) from Mexico were differentiated using the phallus morphology (Mayaundón 1963). In 1969, Mayaundón presented a comparative study of the genitalia of different genera of Phaneropterinae, and considered the phallus to be an important structure for understanding the taxonomy of the subfamily. However, this structure has been rarely used in the taxonomic work on the group.

In this work, all specimens examined showed intraspecific differences in phallus morphology, and finding species-specific characteristics of the phallus proved impossible within the genus *Aegimia*. Its characteristics, however, are diagnostic for the entire genus. The genitalia of *Aegimia cultrifera* were studied by Mayaundón (1969). He illustrated the phallus and ejaculatory vesicle in dorsal and in ventral views, making it possible to recognize the two regions of the ventral lobe, but this author did not report the existence of an

ectophallic evagination.

The preparation, the age and kind of specimen preservation, as well as the sexual maturity of the individual can influence the morphology of the genitalic structure. In the light of this, the morphology of the phallus is not recommended for use as a diagnostic character for species of *Aegimia*.

*Distribution*.—Mexico, Costa Rica, Panama, Colombia, Brazil (Fig. 10).

*Aegimia catharinensis* Piza, 1950  
(Figs 4, 9, 10)

*Aegimia catharinensis* Piza 1950: 103; Paschoal & Barros 1977: 239 (type catalog); Chamorro-Rengifo & Braun 2010: 44 (type catalog); Eades *et al.* 2011 (online catalog).

*Aegimia alvarengai* Costa Lima & Campos-Seabra 1956: 133; Costa Lima 1958: 231 (synonym); Eades *et al.* 2011 (online catalog).

*Type locality*.—Brazil: state of Espírito Santo, Vale do Itaúna, Ribeirão do Engano.

*Diagnosis*.—Body length 57 to 63 mm (males). Midtibia with dorsal margin of expansion serrated or almost smooth. Hindtibia with dorsal margin strongly concave in apical region. Stridulatory vein straight, perpendicular to body axis. Stridulatory file with 270 to 305 teeth, maximum width varies from 0.14 to 0.16 mm; minimum distance between teeth ~0.015 mm.

*Redescription*.—(Holotype ♂) (Fig. 4A) **Head**: subocular carina small, inconspicuous, occupying one third of distance from ventral margin of eye to epistomal suture (Figs 4C, 4D). Frons with conspicuous and salient black dots. Fastigium of frons with dark dots, some of them saliently elevated (Fig. 4D). Fastigium of vertex with dark brown dots, sparse at medial dorsal region and absent at sulcus. Apex of all flagellomeres dark (dark-brown to black), some of them completely dark (dark-brown to black), of varying length. Occiput with dark dots, concentrated in lateral region. Gena with conspicuous black tubercles. Clypeus without markings. Third and fourth maxillary palpomeres with dark-brown spot in apical dorsal region. Second labial palpomere with black spot in apical dorsal region.

**Thorax**: pronotal disc with two black tubercles near central gap in suture that separates prozona from meso- and metazona; small dark brown dots concentrated on lateral region and close to medial sinus; a few tubercles dispersed over whole pronotal disc. Lateral carina slightly raised. Lateral lobe of pronotum covered with lighter tubercles; marginal fold slightly salient on ventral margin with two salient black dots on anterior and on posterior margin (Fig. 4C). Thoracic auditory spiracle with ventral margin exposed in lateral view. Meso- and metapleura not covered by tegmen when it is in repose, with small conspicuous tubercles. Mesosternum destroyed by pin. Meso- and metasternum with black spots occupying almost entire surface.

**Legs**: **Foreleg**. Femur with 4-5 spines anteroventrally; anterior surface with 3-4 inconspicuous dots arranged along midline; dorsal and anterior region covered with dark dots. Tarsus covered with dark dots (brown and black) on its dorsal surface. **Midleg**. (Fig. 4I) Tibia twice as wide as midfemur, with semicircular expansion at basal two thirds, anterodorsal margin serrated with 3-4 small projections; tibia covered with sparse black and brown dots forming complete band in basal portion (the beginning of tibial expansion) and incomplete band in apical portion of expansion. **Hindleg**. (Fig. 4J)

Femur with small, black dots on anteroventral margin; internal and external genicular lobe somewhat pointed, unarmed. Tibial expansion strongly convex (almost semicircular), occupying almost entire length of tibia, leaving only dorsal apex unmodified; maximum width of tibia about 1.5× width of hindfemur; tibia covered with small black dots, more densely concentrated at edges; bigger dots present on anterodorsal margin.

**Wings:** tegmen ellipsoidal, with apex slightly rounded, maximum width slightly less than half of tegmen's length (Fig. 4E). Apex of tegmen, when tegmina in repose, extends 3 times abdomen's length past abdomen's apex. Costal area narrow, occupying almost 1/3 of maximum tegmen width, with small black dots. Anterior margin almost straight at basal two thirds, apical third slightly convex; posterior margin slightly convex. Vein R with inconspicuous branches. Veins R and M straight in first half; in second half R and M slightly sinuous, fusing at level of cell  $m_2$ . First branch of M forming acute angle of approximately 45°. Veins CuA and M running almost parallel until CuA diverges in direction of posterior margin, close to cell  $m$ ; 4 conspicuous crossveins present between M and CuA. Cell  $m$  unmarked; cell  $mp$  with light-brown, indistinct spot; apical medial cells with conspicuous black dots. **Left tegmen.** Stridulatory vein  $AP_1$  straight in dorsal view, perpendicular in relation to body; its appendix branching off its base (Fig. 4F); stridulatory file 6.02 mm long, its maximum width 0.15 mm, with 305 teeth, minimum distance between teeth about 0.015 mm (Figs 4H, 9A); proximal apex of file forming right angle in relation to its central portion, central and apical regions almost straight; file widest in its central region; shortest distances between teeth in central region of file, with nearly uniform distances between teeth throughout its length, except near file's apices (Fig. 9A); distal end with 29 thicker teeth; irregular teeth at distal and proximal ends with greater intertooth distances. **Right tegmen.**  $AP_1$  vein inclined, almost straight, reaching  $AP_2$  vein at apical level of scraper (Fig. 4G);  $AP_1$  without teeth ventrally.

**Abdomen:** mid-dorsal posterior margin of tergites II-IX with small sinus. Sternites I and II with two black oval spots in the middle. Pleura with black dots close to lateral margin of sternites.

*Holotype condition.*— In good condition, color faded.

*Female.*—Unknown.

*Variations.*—Of other specimens examined, some of them varied in the following characteristics: **Head:** Frons and fastigium of frons with red, white, green and/or black dots. Gena with dark green and/or black tubercles. First and second maxillary palpomere with red dots. Clypeus with red, green and/or black dots close to epistomal suture. **Thorax:** marginal fold not evident, with sparse and salient dots. Lateral lobe of pronotum with two to three salient black dots on its anterior margin; 1-3 salient black dots on posterior margin. **Legs:** forefemur with anteroventral 4-6 spines (most commonly 4); 3-5 inconspicuous or conspicuous dots on midline of anterior surface. Midtibia with 3-7 serrated projections or anterodorsal margin almost smooth; apical band on midtibia sometimes incomplete or absent. Hindfemur with genicular lobe bearing 1 spine (variation between right and left femur). **Wings:** veins R and M fused in middle or beyond middle of cell  $ma_1$ , but never before basal half; 3-7 conspicuous crossveins between M and CuA. Cell  $m$  with inconspicuous light brown spot. **Left tegmen.** 14 to 17 broader teeth at apical end of stridulatory file. For measurements of stridulatory file see Table 3. **Right tegmen.**  $AP_1$  vein, in ventral view with few small teeth, with irregular morphology, grouped in proximal and distal regions. **Abdomen:** sternites and tergites with sparse red,

green and/or brown dots.

*Comments.*— In the description of *A. catharinensis*, Piza listed the type locality as "Ribeirão do Engenho, Vale do do Itauna, E. do Espírito Santo". However, Ribeirão do Engenho was probably a mistake of the author, because this small stream is not located in the Itauna Valley— it belongs in the Guarapari Basin, and the correct name of the type locality is "Ribeirão do Engano", as stated on the holotype label. The description of *A. catharinensis* is one of the few publications in which Piza included illustrations, and this work presents a schematic drawing of midtibia and hindleg projection. However, the midtibia shape does not exhibit the characteristic of an almost semicircular shape with anterodorsal margin serrated, a shape which is unique within the genus (see below).

The holotype of *A. alvarengai* was examined at the IOC, but it was not possible to get all measurements and to analyze the stridulatory file in detail. Its general appearance and the external morphology was studied and compared with paratypes. The holotype and paratypes have the same locality (Brazil, State of Pará, Cachimbo), date and collector data. External morphology of the three specimens being identical, we are confident that the entire type series belongs to the same species. The stridulatory file of one paratype specimen was analyzed and its morphology is very similar to other Amazonian specimens (one from the state of Pará and 17 from the state of Amazonas), but different to the file of the holotype of *A. catharinensis*. The holotype has 305 teeth, whereas Amazonia's specimens have 273 to 282 teeth, and the former has twice as many thicker teeth in the distal region (29 versus 14-17 teeth). However, the ratio of the number of teeth to the file's total length is similar to those of Amazonian specimens and southeastern specimens.

Unfortunately only one specimen from the Atlantic Forest region was available for this study. Field collections near the type locality are needed to verify if all specimens of *A. catharinensis* in this region exhibit the same pattern in stridulatory file as that found in the holotype. Only the confirmation of this morphological variation and association with bioacoustical data of Amazonian and Atlantic specimens will allow one to determine if *A. alvarengai* and *A. catharinensis* are distinct species. Other taxonomic tools, such as cytogenetic data and molecular sequences, can also assist in this task.

*A. catharinensis* is distinguished from other species by a semi-circular expansion of the midtibia, with the anterodorsal margin serrated or almost smooth, and a semicircular expansion of the hindtibia, with the dorsal margin at the apex distinctly concave. In addition, the apical region of the tegmen is rounded, unlike that in *A. elongata*, which is acuminate.

Montealegre (1997), in his unpublished thesis, reported specimens of two *Aegimia* species from Colombia, and presented a habitus drawing and brief diagnosis of both species. He described *Aegimia* sp. 1 as having the tegmen elongate and spotless, and the midtibia with a smooth projection. These characteristics apply to *A. catharinensis* and it is possible that it occurs in Colombia. Unfortunately, we have not been able to examine these specimens, and must thus consider *A. catharinensis* currently as restricted in its distribution to Brazil.

*Distribution.*— **Brazil:** Pará, Amazonas (new record), Espírito Santo (Fig. 10).

*Type material examined.*—Holotype ♂ of *A. catharinensis*, MZLQ: Rib.[eirão] do Engano E.S. [Espírito Santo], Vale do Itauna, Trav. [assos] e Santos [leg.], 09.x.[19]42. (Rectangular label, white paper,

typewritten) / *Aegimia catharinensis* ♂ Piza tipo (Rectangular label, white paper with blue border, handwritten) / MZLQ-I0042, E.[scola] S.[uperior de] A.[gricultura] Luiz de Queiroz - U.[niversidade de] S.[ão] P.[aulo], ZOOLOGIA, Piracicaba - S.P., Brasil. (Square label, white paper, printed, except by handwritten number). Holotype ♂ of *A. alvarengai*, IOC: [Brasil], Cachimbo, Est.[ado] do Pará, Travassos & Alvarenga [leg.], 16/21.vi.[19]55. (Rectangular label, white paper, printed) / *Aegimia alvarengai* Costa Lima det. (Rectangular label, white paper, printed and handwritten) / Holotipo (Rectangular label, white paper with backside red, printed) / 5811 (Rectangular label, white paper, printed). 2 Paratypes ♂ of *A. alvarengai* (IOC): same data as holotype, and number 5811 on both (Rectangular label, white paper, printed).

*Additional material examined.*—BRASIL, AM[azonas], Itacoatiara, Faz. [enda] Aruanã, [Rodovia] AM 010, km 215, Coleta de 04:00 as 05:00h, 25-26.ix.1992, (Motta, C.S.; Peralta, F.A.; Hutching, R.S.G.; Teles, B.R.; Hamada, N. [leg.]), [02°57'00" S; 58°54'00" W] (1♂INPA); Madeireira MIL, Área P, 10.xi.1999, (Vidal [leg.]), [02°45'10" S; 58°39'11" W] (1♂MZSP); *idem*, 29-30.xi.2005, Arm.[adilha] Luminosa móvel, (J.A. Rafael; R.J.P. Machado; A. Silva Filho [leg.]), [02°45'10" S; 58°39'11" W] (1♂INPA); Presidente Figueiredo, Estrada de Balbina, km 24, 01-12.ix.2002, Arm.[adilha] de luz mista, (Felipe Xavier; Barbosa, U.C.[leg.]), [02°01'05" S; 59°49'60" W] (1♂INBio); [Rodovia] AM 240, km 24, [Ramal São Francisco], 04-08.ix.2008, Lençol com luz mista, (F.F. Xavier Filho, T.K. Krolow, G. Lourido [leg.]), [02°01'05" S; 59°49'60" W] (1♂UNAM); *idem*, 29-31.x.2008, Arm.[adilha] Luz [no] solo, (J.A. Rafael; F.F. Xavier Filho; G. Lourido; R.J.P. Machado; E. Amat [leg.]), [02°01'05" S; 59°49'60" W] (1♂INPA; 1♂MPEG; 1♂MZSP); Estrada de Balbina, km 12, Igarapé Santuário, 19-30.ix.2003, (Francisco F. Xavier Filho; J.M. Vidal [leg.]), [02°03'36" S; 59°55'35" W] (1♂INPA); Manaus, ZF-2, km 14, Torre [de monitoramento], 35m de altura, 20-23.xi.2009, (F.F. Xavier Filho [leg.]), [02°35'21" S; 60°06'55" W] (1♂INPA); *idem*, 40m de altura, 26.x.2003, Arm.[adilha] Luz (lençol), (J.A. Rafael; F.F. Xavier Filho; A.S. Filho [leg.]), [02°35'21" S; 60°06'55" W] (1♂INPA; 1♂UNAM); *idem*, 35m de altura, 12-15.x.2004, Lençol - Luz mista e BLB [black light bulb], (J.A. Rafael, C.S. Mota, F.F. Xavier Filho, A. Silva Filho & S. Trovisco [leg.]), [02°35'21" S; 60°06'55" W] (1♂FMNH; 1♂INBio; 1♂INPA); *idem*, Estrada ZF-2, 01.xi.2005, Arm.[adilha] Luz móvel (J.A. Rafael, F.F. Xavier Fº, R. Machado, A.A. Agudelo, Y.K. Dantas [leg.]), (1♂NHRS); Bairro Cidade Nova, 28.vi.1982, (Cristóvão da Costa [leg.]), [03°01'21" S; 59°58'05" W] (1♂UFAM); PA[rá], Serra Norte, Pojuca [Igarapé], 18.iv.1985, (Márcio Zanuto [leg.]), [06°00'00" S; 50°20'00" W] (1♂MPEG ORT 16000580).

*Aegimia cultrifera* Stål, 1874  
(Figs 5, 9, 10)

*Aegimia cultrifera* Stål, 1874: 46; Brunner von Wattenwyl 1878: 145, figs 37a, 37b (genus definition, species redescription); Saussure & Pictet 1898: 315 (citation); Rehn 1903: 19 (taxonomy); Kirby 1906: 409 (catalog); Mayaudón 1969: 64, Figs 3a, 19, 20 (female and male genitalia); Eades *et al.* 2011 (online catalog).

*Type locality.*— Mexico: Cordova {probably Córdoba, Veracruz}.

*Diagnosis.*—Body length 45 to 55 mm (males) and 55 to 60 mm (females). Midtibia with 2, rarely 3, pointed projections on anterodorsal margin. Expansion of hindtibia occupying two basal thirds of tibia length, and maximum width equal to width of hindfemur.

Stridulatory vein inclined in relation to the longitudinal axis of the body, and slightly concave. Stridulatory file with 160 to 200 teeth, maximum width varies from 0.20 to 0.25 mm; minimum distance between teeth around 0.025 mm.

*Redescription.*—(Holotype ♂)(Fig. 5A). **Head:** subocular carina present, reaching from ventral margin of eyes to epistomal suture (Fig. 5D). Frons and fastigium of frons with inconspicuous green and dark-brown dots (Figs 5C, 5D). Fastigium of vertex with apex rounded in dorsal view (possibly an abnormality of this specimen), with black and dark-brown apical dots, sulcus absent. Some flagellomeres slightly darker than others. Occiput without dots. Gena with three small, inconspicuous tubercles. Clypeus without dots. **Thorax:** pronotal disc with brown dots in lateral region, and sparse green dots in median region, medial sinus white. Lateral carina well developed. Lateral lobe of pronotum smooth; marginal fold not evident, with green dots salient and sparse throughout; one black dot on lower third of anterior and posterior margins (Fig. 5C). Thoracic auditory spiracle with ventral margin exposed in lateral view (Fig. 5C). Meso- and metapleura not covered by tegmen when in repose, with small inconspicuous tubercles.

**Legs. Foreleg:** femur anteroventrally 4-8 spines. Tibia with dark, red to black spots on anterodorsal and dorsal margins. Tarsus covered with dark, brown and black dots on dorsal surface. **Midleg:** (Fig. 5K) maximum width of tibia about 1.5× that of midfemur, with subtriangular expansion at basal half; anterodorsal margin with 2 acuminate, downward-directed projections, apical slightly longer than basal projection. Tibia brown, covered with dark brown and black spots. **Hindleg:** (Fig. 5L) femur with internal and external genicular lobes pointed, armed with 1 spine on ventral margin; anterior surface concave. Tibia with convex expansion, occupying basal 2/3 of tibia length; maximum width of tibia about 1.2× that of femur. Tibia with small black spots, more densely concentrated on edges.

**Wings:** tegmen suboval (Fig. 5E), with apex slightly acuminate when in repose, surpassing abdomen by twice its length. Costal area occupying 1/3 of maximum width of tegmen. Veins CuA and M running parallel until CuA diverges near half the length of the tegmen, forming an angle of about 120° towards posterior margin. Eight or more conspicuous crossveins between M and CuA. Cell m with brown spot, C-shaped; cell mp with dark brown spot. **Left tegmen:** stridulatory vein AP<sub>1</sub> inclined in relation to body axis, slightly concave and its appendix branching off the base (Fig. 5G); in ventral view, stridulatory file 4.55 mm long, 0.23 mm wide, with 198 teeth; minimum distance between them about 0.025 mm (Fig. 5I); file slightly concave, widest centrally, decreasing in width proximad and distad; teeth most densely spaced in central portion of file, their spacing increasing towards proximal and distal apices; all teeth of similar thickness, with irregular morphology at the proximal end of the file (Figs 5G, 9B). **Right tegmen:** (Fig. 5H) AP<sub>1</sub> vein inclined, slightly concave, reaching AP<sub>2</sub> vein halfway along scraper; AP<sub>1</sub> without ventral teeth.

**Abdomen:** no visible marks.

*Holotype condition.*— In good condition, color slightly faded.

*Female description.*— (n=3) (Fig. 5B) Similar to male, except: maximum tegmen width greater than half of tegmen length (Fig. 5F). Two specimens without conspicuous spot in cell m. Right tegmen with almost all crossveins on anal margin with small dorsal teeth in dorsal view. Teeth with spiniform projection in their apical portion.

*Variations*.—Other specimens examined varied in the following characteristics: **Head**: frons and frontal fastigium with red dots. Fastigium of vertex with apex slightly bifid. Occiput with sparse red or brown dots. Gena without tubercles in 2 specimens from Costa Rica. Clypeus with red dots close to epistomal suture. Apex of labrum slightly truncate. The first and second maxillary palpomeres with red dots. **Thorax**: pronotal disc with sparse green, red or brown dots, never salient; 2 conspicuous dots, brown, green or red, close to interruption in suture that separates prozona from meso- and metazona. Marginal fold with red or brown dots. Pro-episternum with red dots, its ventral margin truncate. **Legs**: forefemur anteroventrally with 4-8 spines. Midfemur with indistinct dots on anterolateral surface. Midtibia projection: basal posterior margin with 1 big or small projection, but never larger than principal projections; 1 or 2 small projections on ventral posterior margin. Hindfemur with internal and external genicular lobes with 2 spines on ventral margin in some specimens from Mexico and Costa Rica. **Wings**: right tegmen: AP<sub>1</sub> vein, in ventral view, with small apical and basal teeth, with morphology similar to that of left tegmen. For measurements of stridulatory file see Table 3. **Abdomen**: sternites and tergites with sparse red, green or brown dots.

*Comments*.—The principal characteristic of *A. cultrifera* is the stridulatory vein's inclined position in relation to the main axis of the body. The expansion of the midtibia, subtriangular and with 2-3 acuminate projections, is similar to that of *Aegimia maculifolia* sp. nov. The expansion of the hindtibia, as wide as hindfemur and occupying two basal thirds of the hindtibia length, is similar to that of *A. venarecta* sp. nov. However, the combination of the features of both tibiae (mid- and hind-), combined with the lack of dark conspicuous flagellomeres, distinguishes *A. cultrifera* from other species of the genus.

The male tegmina are relatively wider than in other species, with the index of tegmen width to length (TW/TL) > than 0.50.

The morphology of the stridulatory file (Figs 5J, 9B) among specimens from Costa Rica and Mexico differs in the following aspects: in Costa Rican specimens the total number of teeth varies between 160 and 170, and the maximum width of the file is 0.190 to 0.200 mm; this is lower than in Mexican specimens, which display the values 180-200 and 0.230 to 0.250 mm, respectively; but the ratio of number of teeth to the file's length is almost the same in both populations.

Due to the small number of specimens available for this study (four for each locality) and the lack of bioacoustic data, it is difficult to argue that the morphometric differences of the stridulatory file are sufficient to define two distinct species. The differences found may be attributed to populational variations.

*Distribution*.—**Mexico**: Cordova {probably Córdoba, Veracruz}, Veracruz, Chiapas; **Costa Rica** (new record): Guanacaste (Fig. 10).

*Type material examined*.—Holotype ♂ NHRS: Typus (rectangular label, red paper, printed) / MEXICO, Cordova {probably Córdoba} (rectangular label, white paper, printed and handwritten) / *Aegimia cultrifera* Stål (rectangular label, white paper, handwritten) / NRM-ORTH0009197 (rectangular label, white paper, printed).

*Additional material examined*.—MEXICO. Veracruz. Los Tuxtlas, Santiago Tuxtla, cerro El Vigía, 21.viii.1964 (without collector) [18° 28' 00" N; 95° 18' 00" W] (1♂ UNAM); Est.[ación] de Biol.[ogía Tropical] Los Tuxtlas, 16-18.iv.1988 (without collector) [18° 28' 00" N; 95° 18' 00" W] (1♀ INPA); Est.[ación de] Biol.[ogía]

Tróp.[ical] Los Tuxtlas, 8.vii.1989, colecta nocturna, trampa luz, J. L. (Colúio, W. Rojas [leg.]) [18° 28' 00" N; 95° 18' 00" W] (1♂ INPA); *Chis*. [Chiapas], Palenque, (without date, nor collector), colecta diurna, (A. Neri Garcia-Aldrete [leg.]) [(1♂ UNAM). COSTA RICA, *Prov. [incial] Guanacaste*, Santa Rosa National Park, 300m, 20-31.v.1982, (D. H. Janzen & W. Hallwachs [leg.]) [10° 50' 00" N; 85° 36' 00" W] (1♂ INPA INB0003885565); *idem*, 10-12.iii.1982, (1♀ INBio INB0003875608); *idem*, .xi.1982, (1♂ INBio INB0003885666); *idem*, iv.1983, (1♀ INPA INB0003981238); *idem*, xii.1983, (1♂ INBio INB0003981282); *idem*, i.1984, (2♂ INBio INB0003981246, INBio INB0003981251); *idem*, iv.1984, (1♂ INBio INB0003981269); Estacion Maritza, 600m, W[est] side Volcan Orosi, 17.vii.1987, (D. H. Janzen & W. Hallwachs [leg.]) [10° 57' 00" N; 85° 30' 00" W] (1♂ INPA INB0003876994); 3km NO [Noroeste] de Nacaome, 100m. P.[arque] N.[acional] Barra Honda, 13-5.x-xi.1992, (M. Reyes [leg.]) (386000N; 239000W) [10° 10' 00" N; 85° 22' 00" W] (1♂ INBio CRI000810597).

#### *Aegimia elongata* Rehn, 1903

(Figs 6, 9, 10)

*Aegimia elongata*, Rehn 1903: 19; Kirby 1906: 409 (catalog); Hebard 1927: 84 (female description); Nickle 1992: 144, 147, fig. 15; Baranco 2010: 511 (faunistic data); Eades *et al.* 2011 (online catalog); Chamorro-Rengifo *et al.* 2011: 19 (check-list from Colombia).

*Type locality*.—Central America.

*Diagnosis*.—Body length varies from 55 to 65 mm (males), 70 mm (female). Thoracic auditory spiracle completely hidden under lateral lobe of pronotum in lateral view. Midtibia with rounded projections. Expansion of hindtibia occupying almost its entire length, dorsal margin slightly concave in the apex of hindtibia. Stridulatory vein straight, perpendicular to longitudinal axis of the body. Stridulatory file with 260 to 310 teeth, maximum width varies from 0.19 to 0.23 mm; minimum distance between teeth around 0.015 mm.

*Redescription*.—(Holotype ♂) (Fig. 6A): **Head**: subocular carina inconspicuous (Figs 6C, 6D). Frons with salient concolorous and dark brown dots. Fastigium of frons with dark dots, some salient (Figs 6C, 6D). Fastigium of vertex with dark brown dots, except in sulcus and sparse in middle dorsal region. Almost all flagellomeres completely or partially darkened, dark-brown to black; between two completely dark flagellomeres there are three to eight bright or partially dark flagellomeres. Holotype without apical region of right antenna, and almost all flagellomeres of left antenna lost. Occiput with dark dots concentrated in lateral region. Gena with conspicuous concolorous tubercles (Fig. 6D). Clypeus without dots. Third and fourth maxillary palpomeres dorsally with dark brown spot at apex. **Thorax**: pronotal disc with dark brown dots concentrated in lateral region and close to medial sinus; tubercles throughout pronotal disc, more evident in medial region. Lateral carina slightly raised. Lateral lobe of pronotum with tubercles, slightly concave in dorsal region, anterior margin straight, with one salient black dot; first half of ventral margin slightly concave, forming angle of about 125° with anterior margin; second half and posterior margin convex; posterior margin with one salient black dot in ventral third; marginal fold with sparse and salient dots (Fig. 6D). Thoracic auditory spiracle completely hidden in lateral view (Fig. 6D). Meso- and metapleura not covered by tegmen when in repose, with small, conspicuous tubercles.

**Legs**. **Foreleg**: femur anteroventrally with 5 spines. Tibia with dark

dots on anterodorsal and dorsal margins. Tarsus covered with dark dots on dorsal surface. **Midleg:** (Fig. 6J) tibia almost 1.5× as wide as midfemur; with convex expansion with 2-3 salient projections on anterodorsal margin, margin expanded in basal two thirds; apex of projections rounded, with ventral margin slightly acuminate; anterodorsal margin, in basal and apical portion, with inconspicuous pointed projection. Tibia with sparse brown and black dots, forming band in apical portion of tibial expansion, and dots concentrated in anterodorsal margin in basal portion. **Hindleg:** both missing in holotype. The following description is based on Costa Rican specimens: femur with small sparse tubercles on anterior surface; anteroventral margin with black dots; internal and external genicular lobes pointed, with 1-2 spines on ventral margin. Tibia with convex expansion, occupying almost entire length of tibia; dorsal margin slightly concave in apical portion; maximum width about 1.5× that of hindfemur. Tibia with small black dots, concentrated on edges; a few big black dots on anterodorsal margin. **Wings:** tegmen ellipsoidal (Fig. 6E), with apex slightly acuminate; maximum width a little less than half its length. Costal area narrow, occupying < one third maximum tegmen width. Anterior margin almost straight at basal two thirds, apical third slightly convex. Posterior margin slightly convex. Vein R with inconspicuous branches. Veins R and M running straight in first half of tegmen; in second half R and M slightly sinuous, fusing at half length of cell  $ma_1$ . First branch of M forming an acute angle, close to 45°. Veins CuA and M running almost parallel until CuA diverges close to half length of tegmen, forming an angle of about 140° with posterior margin. Three to four conspicuous crossveins between M and CuA. Cell m without apparent markings. Cell mp with inconspicuous light brown spot. Apical medial cells with conspicuous black dots. **Left tegmen:** stridulatory vein  $AP_1$  straight in dorsal view, perpendicular in relation to longitudinal body axis; its appendix branching off at its base (Fig. 6F). Stridulatory file not visible in holotype due to the position of the tegmen – it was not extended to keep the specimen's integrity. See section "Variations".

**Abdomen:** very contracted, with medial dorsal portion visible only in tergites III to X. Tergites III to VIII with median keel, with more acuminate elevation on tergites III and IV; tergites III to VIII with small sinus at mid-dorsal posterior margin. It was not possible to discern the spot pattern due to the preservation status of the specimen.

**Holotype condition.**—Hindlegs lost; apical region of right antenna lost, almost all flagellomeres lost on left antenna. Original color completely faded. Specimen has dark-brown coloration of entire body, with blackened hindwings. The specimen was probably preserved in alcohol before being pinned.

**Female description.**— (n=1) (Fig. 6B) Similar to male. Pronotal disc with two tubercles lighter than pronotal surface, close to interruption of suture that separates prozona from meso- and metazona. Midtibia with 4-5 projections, similar to holotype. Tegmen slightly wider than half its length. Apical third of tegmen straight (Fig. 6F). Veins R and M apparently fusing in apical portion of cell  $m_1$ . Right tegmen with crossveins on anal margin, with small teeth in dorsal view. Teeth with spiniform projection in their apical portion.

**Variations.**—Of other specimens examined some varied in the following characteristics: **Head:** frons and fastigium of frons sometimes with red, white, green and/or black dots. Gena with white, green and/or red tubercles. First and second maxillary palpomeres with red dots; third and fourth maxillary palpomeres with dark (brown) spot in apical dorsal region in all studied specimens. Second labial

palpomere dorsally with dark apical spot. **Thorax:** pronotal disc with two tubercles (usually lighter than pronotum surface), close to interruption of suture that separates prozona from meso- and metazona. Meso- and metapleura hidden under tegmen when in repose, with small tubercles. Pro-, meso- and metasternum with big, red spots; meso- and metasternum with some salient spots. **Legs:** forefemur with 4-6 spines anteroventrally (6 most common); 3-4 small tubercles on midline of anterior surface. Midtibia cylindrical, in one specimen from Costa Rica (INB0003981137) without the expansion characteristic of the species. Midtibia projections with variable shape, but never acuminate; projections concentrated in apical half. Left hindtibia without expansion and shorter than foretibia in female from Costa Rica (CRI000259352). **Wings:** apex of tegmen, when in repose, exceeds 3× abdomen length. Veins R and M can be fused in apical portion of cell  $ma_1$ , but never before half its length. Three to six conspicuous crossveins between M and CuA. Cells m and mp with inconspicuous, small, light brown spots. **Left tegmen:** stridulatory file 4.92 mm long, maximum width 0.212 mm, with 285 teeth, and with minimum distance among them about 0.016 mm (Figs 6I, 9C; Table 3); proximal end of file forming right angle in relation to central portion of file, with teeth widely spaced and of irregular morphology; central region straight; proximal end slightly convex; width of central region of file usually constant along almost its entire length; shortest distance between teeth in central region of file, with nearly constant value throughout its length, except near file ends (Figs 6I, 9C). **Right tegmen:** (Fig. 6H)  $AP_1$  vein inclined, almost straight, reaching vein  $AP_2$  at apical level of the scraper.  $AP_1$  vein, in ventral view, may contain several small teeth of irregular morphology. **Abdomen:** tergites II to IV with keel at medial dorsal portion, tergite II not visible in holotype. All specimens examined, except holotype, with sternites and tergite with sparse red, green and/or brown dots. Pleura with salient green dots.

**Comments.**—The diagnostic features proposed by Rehn (1903) for *A. elongata* were: stridulatory vein straight; lateral carina of pronotum raised, midtibia with three projections and auditory prothoracic spiracle smaller than in *A. cultrifera*. Based on these features, especially the straight stridulatory vein and the midtibia with three projections, numerous specimens have been misidentified as *A. elongata*. All misidentified specimens examined in this study were previously identified as *A. elongata*. However, by comparison with the holotype, it was confirmed that all of them belong to *Aegimia maculifolia* sp. nov. described below. Furthermore, all specimens identified in this work as *A. elongata* were not identified previously at the specific level, which shows that the number of projections on the midtibia and a straight stridulatory vein alone are not sufficient to identify *Aegimia* species.

Several features of *A. elongata* are similar to *A. catharinensis*, among them the size, shape and pattern of tegmen spots. Both can be differentiated by characters presented in the key. The number of teeth in the stridulatory file is similar in both species: *A. elongata* 260-310, *A. catharinensis* 270-305; but the file of *A. catharinensis* has distinct morphology: the most distal teeth of its file have the same thickness (transverse tooth dimension) as the central region teeth; the maximum width of teeth is larger in *A. elongata* (Fig. 9C) than in *A. catharinensis* (Fig. 9A).

There is a label "Synonym of *A. cultrifera* Stål det. Grant [19] '63" in the holotype pin, but there is no publication proposing *A. elongata* as a synonym of *A. cultrifera*. However, the two species are morphologically distinct as seen in the diagnoses of both species.

**Distribution.**—**Costa Rica:** Provinces Heredia, Limón, Guanacaste.

There are published records of *A. elongata* from Colombia and Panama, but these records actually correspond to *Aegimia maculifolia* sp. nov. (see details in "Comments" of *Aegimia maculifolia* sp. nov.).

*Type material examined*.—Holotype ♂, USNM. aec. 27355 Cent. [ral] Americ[a] (rectangular label, white paper, handwritten) / Type No. USNM (rectangular label, red paper, printed) / *Aegimia elongata* Type. Rehn (rectangular label, white paper, handwritten) / Synonym of *A. cultrifera* Stål det. Grant [19]63 (rectangular label, white paper, handwritten).

*Additional material examined*.—COSTA RICA, Prov. [íncia] Guanacaste, Est. [ación] Maritza, 600m, Lado oeste del Volcan Orosi, viii.1990, II curso Parataxonomos, (without collector), (373000N;326900W) [10°57'00"N; 85°29'00"W] (1♀INBio CRI000259352); Santa Rosa National Park, 300m, i.1983, (D. H. Janzen & W. Hallwachs [leg.]), [10°50'00"N; 85°36'00"W] (1♂INPA INB0003885706); *idem*, iii.1983 (1♂INPA INB0003885746); Casa Oeste, Cerro El Hacha, 12km SE La Cruz, i.1988, (E. Espinosa [leg.]), [11°00'00"N; 85°33'00"W] (1♂INBio INB0003981137); Prov. [íncia] Heredia, 10km SE La Virgen, 450-550m, 16.ii.2003, Transect, INBio-OET-ALAS transect, (Wagner [leg.]), [10°20'00"N; 84°05'00"W] (1♂INBio INB0003226453); *idem*, (1♂INBio INB0003226455); Prov. [íncia] Limón, R. [eserva] B. [iológica] Hitoy Cerere, Est. [ación] Hitoy Cerere, 125m.22-26.vi.2003, [colecta] Libre, #73431, (M. A. Zumbado, M. Solis [leg.]), (643470N;184500W) [09°40'00"N; 83°01'00"W] (1♂INBio INB0003705898).

*Aegimia maculifolia* sp. nov.

(Figs 7, 9, 10)

*Aegimia elongata*, Belwood 1990: 10, fig. 11 (misidentification).  
*Aegimia* sp. 1, Montealegre-Z., R. Gonzalez & Carrejo. 1993: 42, 43, fig. 1. (Universidad del Valle's collection).

*Type locality*.—Costa Rica, Province Alajuela, San Ramón. Est. [ación] Biol. [ológica] Villa Blanca. 1115m.

*Etymology*.—From Latin, *macula* = spot, mark; and *folium* = leaf. Refers to tegmen similar to leaf with spot on cell m, common in males.

*Diagnosis*.—Body length 48 to 58 mm (males) and 65 to 72 mm (females). Cell m with conspicuous dark spot in males. Midtibia with 2-3 acuminate anterodorsal projections. Hindtibia projections occupying almost its entire length and distally slightly concave. Stridulatory vein straight, perpendicular to longitudinal axis of the body, when in repose. Stridulatory file with 160 to 250 teeth, maximum width varies from 0.17 to 0.20 mm and minimum distance between teeth from 0.015 to 0.025 mm.

*Description*.—(Holotype ♂) (Fig. 7A): **Head**: subocular carina occupying half the distance between eye ventral margin and epistomal suture (Fig. 7D). Frons with distinctive red dots with black centers (Fig. 7D). Fastigium of frons with dark dots, some of them salient (Fig. 7D). Fastigium of vertex covered with dark brown dots, absent in sulcus, sparse in medial dorsal region. Antenna with some flagellomeres completely black, intercalated with 4-8 partially dark or completely light ones, forming equidistant dark rings, more evident at apical half. Holotype with a few apical flagellomeres missing. Occiput without dark dots. Gena with 3-4 conspicuous tubercles, with same color as gena. Clypeus with small red dots near epistomal suture. Three proximal maxillary palpomeres with red dots.

**Thorax**: pronotal disc with 2 salient black tubercles near to interruption of suture that sets off prozona from meso- and metazona; lighter medial sinus, almost white; small dark-brown and black dots, concentrated laterally and close to medial sinus, small concolorous tubercles dispersed over the disc. Pronotal carina slightly raised. Lateral lobe of pronotum dorsally slightly concave, with concolorous tubercles and a salient black dot at ventral third of each anterior and posterior margin (Fig. 7A-C). Thoracic auditory spiracle with ventral margin exposed in lateral view. Meso- and metapleura not covered by tegmen when in repose, with small inconspicuous tubercles. Meso- and metasternum with small and inconspicuous red spots.

**Legs**. **Foreleg**: femur anteroventrally with 5 conspicuous spines. Tibia dorsally covered with dark dots. Tarsus dorsally covered with dark dots. **Midleg**: (Fig. 7K) maximum width of tibia twice that of midfemur, with subtriangular expansion at basal two thirds, this expansion with 2 smaller basal projections and two bigger ones pointed downward, the apical projection slightly more acute than basal, apical region of anterodorsal margin with a little projection on the left tibia, this absent in right tibia. Tibia covered with sparse brown and black dots, forming a band on basal region of the expansion, a stripe in apex of tibia, and a spot in the center of the expansion. **Hindleg**: (Fig. 7L) Femur with internal and external genicular lobes pointed, with 1 ventral spine, right internal genicular lobe unarmed. Tibia with convex expansion, occupying almost entire tibia length; dorsal apex slightly concave, almost straight; maximum tibia width about 1.5× that of hindfemur; tibia covered with small black dots, more concentrated on edges; some big dots at anterodorsal margin. **Wings**: tegmen suboval, with apex acuminate, maximum width close to half its length (Fig. 7E). Apex of tegmen, when in repose, exceeding by almost 2.5× length of abdomen. Costal area a little wider than one third of the maximum tegmen width, covered with small black dots. Anterior margin almost straight at basal two thirds and apical third inclined at an angle of ~ 140°. Posterior margin convex. Vein R with 9 almost equidistant branches. Veins R and M running straight until close to apex, fusing at the level of the middle of cell ma. First branch of M forming an acute angle, around 45°. Veins CuA and M running almost parallel until CuA fork, forming an angle of about 140° with posterior margin. Seven conspicuous crossveins between M and CuA. Cell m with a big and conspicuous dark brown suboval spot. Cell mp with small circular dark brown spot. Apical medial cells with inconspicuous dark dots. **Left tegmen**: stridulatory vein AP<sub>1</sub> in dorsal view straight, almost perpendicular to longitudinal body axis, its appendix branching close to its base (Fig. 7G); in ventral view stridulatory file 4.08 mm long, maximum width 0.20 mm, 176 teeth with minimum distance among them about 0.025 mm (Figs 7I, 9D); file with proximal area concave, central and distal regions straight; maximum width in central region of file, intertooth distances are practically constant in the file's central region and for almost its entire length; shortest distance between teeth in central region of file, with practically constant value throughout its length; teeth at both ends of file with morphology irregular and greater distances between them (Figs 7I, 9D). **Right tegmen**: AP<sub>1</sub> vein inclined, slightly concave, reaching AP<sub>2</sub> vein near middle of the scraper (Fig. 7H). AP<sub>1</sub> vein, in ventral view, with a few small teeth of irregular morphology, concentrated at basal region of vein.

**Abdomen**: sternites and pleura with inconspicuous small red spots.

*Holotype condition*.—In good condition. Color slightly faded. Black spot, probably caused by parasitoid, occupying pleura and ventral region of abdominal tergites T-V and T-VI.

**Description of female.**—(n= 2) (Fig. 7B) Similar to male, except: apex of tegmen, when in repose, exceeding twice abdomen length. Costal area with apical region wider than basal (Fig. 7F); anterior margin almost straight, apical third inclined by an angle of about 90° (Fig. 7F). Veins R and M fused at basal portion of cell  $m_2$ . Cell m spotless. Right tegmen with almost all crossveins on anal margin with small teeth in dorsal view. Teeth with spiniform projection in their apical portion.

**Variations.**—Of other specimens examined some varied in the following characteristics: **Head:** frons and fastigium of frons with red, white, green and/or black dots, always conspicuous and abundant. Occiput in 5 paratypes with inconspicuous dots. Gena with 3-15 conspicuous white, green, red and/or black tubercles. In some specimens clypeus with black or green dots. Fourth maxillary palpomere in all paratypes with dark apical dorsal spot. **Thorax:** inconspicuous tubercles close to the suture interruption that demarcates prozona from meso- and metazona. Central region of pronotal disc with conspicuous or inconspicuous tubercles. Two conspicuous and salient dots at each anterior and posterior margin of lateral lobe of pronotum. Lateral lobe covered with conspicuous concolorous tubercles. Meso- and metapleural region not covered by tegmen bearing conspicuous tubercles. Meso- and metasternum with conspicuous or inconspicuous spots. **Legs:** forefemur with 3-6 spines, 5 most frequent; along midline of internal surface conspicuous, almost equidistant dots. Midfemur with equidistant dots at midline on anterior surface. Midtibia with indistinct dark central spot and/or transverse dark stripe at base. Usually hindleg with genicular lobe unarmed or with a little inconspicuous spine. **Wings:** 7 to 12 branches in vein R, 9 most common, with difference in left and right tegmen. Veins R and M fused at apical portion of cell  $ma_1$ , but never before its middle. In one paratype from Costa Rica R and M fused at level of  $ma_2$ . Six to 12 conspicuous crossveins between M and CuA. **Left tegmen:** all paratypes from Colombia, all from Panama and one from Costa Rica (INB0004128003) with stridulatory file morphology different from holotype (Figs 7H, 9E): basal end of file slightly concave, maximum width in the central region, usually with a nearly constant width for entire length. Apical end with 22 to 29 thick teeth, with larger distance between them compared to adjacent region. Tooth interval shortest apically except thick teeth. The distance gradually increases from the apical to basal region. For measurements of stridulatory file see Table 3. **Right tegmen:** AP<sub>1</sub> vein slightly concave to almost straight. Paratypes from Panama and from Colombia, AP<sub>1</sub> vein reaching AP<sub>2</sub> at apical level of scraper. AP<sub>1</sub> vein in basal region with a few small teeth of irregular morphology. Sometimes teeth absent. **Abdomen:** Tergites, pleura and sternites with sparse red, green and/or brown dots.

**Comments.**—Virtually all specimens of *A. maculifolia sp. nov.* from the INBio collection that were examined in the course of this study had been previously identified as *A. elongata*, based on Belwood (1990), who presented a photo of *A. maculifolia sp. nov.* identified as *A. elongata*. Nickle (1992) presented a list of all Tettigoniidae recorded from Panama, including *A. elongata*. However, his *A. elongata* drawing (Fig. 10:15, p. 151), despite not having the spot at cell m (females of *A. maculifolia sp. nov.* do not show this spot), shows projections on the midtibia similar to *A. maculifolia sp. nov.* and shows a subocular carina (inconspicuous in *A. elongata*). Montealegre *et al.* (1993) published a list of Phaneropterinae from Universidad del Valle's collection, Colombia; they listed two morphotypes of *Aegimia*, and presented a habitus drawing of *Aegimia sp. 1*. Based on their drawing, it is possible to infer that *Aegimia sp. 1* is similar

to *A. maculifolia sp. nov.* based on the spotted cell m and midtibia projections. Later, Montealegre (1997), in his unpublished thesis, listed again two distinct species of *Aegimia* from Valle del Cauca, Colombia. He presented a habitus drawing and a brief diagnosis of these species. One species was identified as *A. elongata*, but the drawing appears to be that of *A. maculifolia sp. nov.*

*A. maculifolia sp. nov.* is easily distinguished from *A. elongata* by the cell m in males having a conspicuous spot and midtibia projections being acuminate: in *A. elongata* there is no spot and the projections are rounded. Although females do not possess the conspicuous spot in cell m, the mid- and hind tibiae projections are identical to those of males. Another feature that facilitates recognition of females is their having the costal area significantly wider than the basal area, and forming an angle of almost 90° in relation to the basal costal margin.

There are two distinct stridulatory file morphologies in *A. maculifolia sp. nov.* (Figs 9D, 9E): in specimens from Costa Rica the basal region has a slightly concave file and the distal and central regions are rather straight; the central region has the width and the distance between teeth almost constant, with minimum distances from 0.022 to 0.025 mm (Fig. 9D, Table 3). In specimens from Colombia, Panama and in one specimen from southern Costa Rica (INB0004128003), not only the proximal region but the entire file is slightly concave; the central region has the widest teeth and the distance between teeth decreases towards the distal end, with the minimum distance about 0.015 mm. Another difference between these two morphologies is in the apex of the file, which has 22 to 29 teeth thicker than the remaining teeth of the file, absent in specimens from Costa Rica (Fig. 9E, Table 3). When these thicker teeth are present, the minimum tooth distance is found in a region next to these distinct apical teeth. The number of teeth, the distance between them, the presence/absence of thicker teeth in the apical region, and the density of teeth per mm are different between the localities (Table 3). Due to the small number of specimens (11), and the lack of bioacoustic data, it is difficult to argue if the differences in stridulatory file are sufficient to define two species. For the time being we attribute these differences to population variation.

**Distribution.**—**Costa Rica:** Provinces Guanacaste, Puntarenas, Alajuela, Heredia, Limón; **Panama:** Isla Barro Colorado; **Colombia:** Antioquia, Cundinamarca, Valle del Cauca (Fig. 10).

**Type material examined.**—Holotype: COSTA RICA, Prov.[íncia] Alajuela, San Ramón. Est.[ación] Biol.[ógica] Villa Blanca. 1115m. 18 MAY 6 JUN 2009. R. Rojas [leg.]. Colecta Libre. L\_N\_242482\_483371 #97133 [12° 12'00"N; 84° 35'00"W] (Rectangular label, white plastic, printed)/INB0004224112 INBIOCRI COSTA RICA (Rectangular label, white plastic, printed, with barcode)/*Aegimia maculifolia* Dias, Rafael & Naskrecki, Holotype ♂ (Rectangular label, red paper, printed). (Holotype ♂, INBIO).

**Paratypes.**—(21♂♂; 2♀♀): COSTA RICA, Prov. [íncia] Alajuela, Guatuso, P.[arque] N.[acional] Teuorio {Tenório}. Est.[ación] El Pílon. 700-800m, 18-30.vi.2009, Colecta Libre, #96553, (J. A. Azofeifa [leg.]), (427913N; 298212W) [10° 42'00"N; 84° 59'00"W] (2♂INBio INB0004211428, INB0004211427; 1♂INPA INB0004211429); Prov.[íncia] Guanacaste, Santa Cecilia, Casa Roberto, Estacion. {Estación} Pitilla, 500m, 7 km S, v.1988, GNP Biodiversity Survey, (without collector), (11° 00'18"N; 85° 25'33"W) (1♂INBio CRI001011949; 1♂INPA INB0004178821); Estac.[ión] Pitilla, 700m, 9kmS, iii.1989, GNP Biodiversity Survey, (without collector), (380200N; 330200W) [11° 00'18"N; 85° 25'33"W] (1♂IN-

Bio CRI000136254); *idem*, 21-21.iii-iv.1989, (1, Fêmea, INBio CRI000091635); *idem*, iii.1990, (P. Rios, C. Moraga & R. Blanco [leg.]), (1♂ INBio CRI000193954); *idem*, P.[arque] N.[acional] Guanacaste, 10-17.vi.1992, (C. Moraga [leg.]), (1♂ INBio CRI000821719); *Prov. [íncia] Heredia*, San Jose, Est.[ación] El Ceibo, Braulio Carrillo, P.[arque] N.[acional] 400-600m, xi.1989, (R. Aguilar & M. Zumbado [leg.]), (527700N, 256500W) [10° 19' 00" N; 84° 04' 00" W] (1♂ INBio CRI000135658); Finca Naranjo Valenciana, 2m {km} sur Pueblo Nuevo Sarapiquí, 90m, 2-22.vii.1992, (M. Ortiz [leg.]), (523750N; 271800W) [10° 27' 00" N; 84° 06' 00" W] (1♂ INPA CRI000685559); *idem*, 9-30.xi.1992, (1♂ INBio CRI000820823); *Prov. [íncia] Limón*, Rio Sardinias, 10m. R.[efugio] N.[acional] de F.[auna] S.[ilvestre] Barra del Colorado, ix.1992, (F. Araya [leg.]), (564700N; 291500W) [10° 38' 00" N; 83° 44' 00" W] (1♂ INBio CRI000819432); Veragua Rainforest, Restaurant, 400-440m, vii.2008, Tp.[Trampa] Luz Mercurio, #94683, (R. Villalobos [leg.]), (625230N; 212220W) [(1♂ INPA INB0004163465); *Prov. [íncia] Puntarenas*, Golfito, Jiménez, Est.[ación] El Tigre, Area Administrativa, 47m, 12-13.xi.2007, Tp.[Trampa] Luz., L\_S\_277800\_529600#92864, (J. A. Azoifeifa [leg.]), [08° 32' 00" N; 83° 23' 00" W] (1♂ INPA INB0004128003); *idem*, 17-18.xi.2007, Tp.[Trampa] Luz, #92869, (J. A. Azoifeifa [leg.]), (529600N; 277800W) (1♂ INBio INB0004128085); PAN-AMÁ, Barro Colorado I. [isla], Canal Zone, 2.ii.19]59, at light, (H. S. Dybas [leg.]), (1♂ FNHM); *idem*, 3.ii.19]59, (1♂ FNHM); *idem*, 12.x.19]59, (1♂ INPA); *idem*, 20-30.i.19]59, (without collector), (1♂ FNHM); COLÔMBIA, Ant. [ioquia], Porce, En: Habitación, iv.1983, (R. Vélez [leg.]), (1♂ MEFLG); Cund. [inamarca], La Vega, En: Naranjo [Laranjeira], ix.1963, (Gallego [leg.]), [5° 0' 0" N, 74° 21' 0" W] (1♀ MEFLG); [Valle del Cauca], Cali, 1035 metros, iii.1960, (Dirings [leg.]), [03° 25' 00" N; 76° 31' 00" W] (1♂ MZSP).

*Aegimia venarecta* sp. nov.

(Figs 8-10)

*Type locality*.—Costa Rica: Province Guanacaste, Estación Pitilla, 680 m, 8 km S.[outh] Santa Cecilia.

*Etymology*.—From Latin, *vena* = vein; and *recta* = right. Refers to the MA and MP fork forming an almost right angle.

*Diagnosis*.—Body length 43 to 51 mm (males) and 51 to 55 mm (females). MA and MP veins forming an angle of almost 90°. Appendix of stridulatory vein branching beyond its basis. Stridulatory file with 124 to 144 teeth, maximum width varies from 0.20 to 0.25 mm and minimum distance between teeth around 0.020 mm.

*Description*.—(Holotype ♂) (Fig. 8A):

**Head**: subocular carina conspicuous, reaching epistomal suture (Fig 7P). Frons and fastigium of frons with inconspicuous sparse red and dark-brown dots. Fastigium of frons with black dorsal apex. Fastigium of vertex with small black and dark-brown dots, absent in sulcus, concentrated on apex. Antenna with apical portion of the last and the fifth from last apical flagellomeres slightly darker. Occiput without dots. Gena without tubercles. Clypeus with red dots close to epistomal suture. Labrum red, apex with small medial sinus. First and second maxillary palpomeres with red dots; apex of fifth palpomere dark, black.

**Thorax**: pronotal disc with dots in central region, slightly darker than surface, but inconspicuous; white medial sinus with red dots nearby. Pronotal carina lighter than pronotal disc, not raised. Lateral lobe of pronotum smooth, posterior margin slightly convex, almost straight; a dark-red dot at ventral third of each anterior and

posterior margin (Fig. 8A-C). Marginal fold slightly evident, with sparse dots along its entire extension. Thoracic auditory spiracle with ventral margin exposed in lateral view (Fig. 8C). Meso- and metapleura without tubercles.

**Legs**: **Foreleg**: femur anteroventrally with 4-5 spines. Tibia covered with dark dots (red to black) on anterodorsal margin. Tarsus dorsally without dots. **Midleg**: (Fig. 8J) tibia slightly wider than midfemur, with convex expansion at basal two thirds; anterodorsal margin brown with dark dots, three projections slightly acuminate with apex downwards; basal anterodorsal region with lighter spot (almost white), close to beginning of expansion; anterior surface green, without dots. **Hindleg**: (Fig. 8K) femur with internal and external genicular lobes pointed, with one small spine on ventral margin. Tibia covered with small black dots; with convex expansion, occupying basal two thirds of tibia; maximum tibia width equal to hindfemur width.

**Wings**: tegmen suboval (Fig. 8E), with apex slightly acuminate. Apex of tegmen, when in repose, exceeds twice abdomen's length. Costal area occupying almost one third of the maximum tegmen width. Vein R with 8 conspicuous branches. Veins R and M almost straight, fusing close to basal region of cell  $m_2$ . First branch of M forming an angle of almost 90° relative to posterior margin. Vein CuA diverges gradually from M over almost entire length. Seven conspicuous crossveins between M and CuA. Cell m with small conspicuous light brown spot in the center of cell. **Left tegmen**: (Fig. 8E) stridulatory vein  $AP_1$  in dorsal view, almost perpendicular to longitudinal axis of body, slightly concave in its basal portion, its appendix branching beyond its base (Fig. 8G); in ventral view, stridulatory file 3.58 mm long, maximum width 0.215 mm, 125 teeth with the same thickness and minimum distance between them about 0.028 mm (Figs 8I, 9F); file with basal area slightly concave, central and apical regions almost straight; maximum width in basal third of file, decreases towards both basal and apical ends; shortest distance between teeth occurs in apical region of file then increases gradually toward the basal region (Figs. 8I, 9F). **Right tegmen**:  $AP_1$  vein inclined, slightly concave, reaching  $AP_2$  vein at the apical half of the scraper (Fig. 8H).  $AP_1$  vein, in ventral view, without teeth.

**Abdomen**: tergites and sternites covered with small red dots.

*Holotype condition*.—In good condition. Color slightly faded.

*Description of female*.—(n=2) (Figs 8B, 8F) Similar to male. Tegmen width greater than half of tegmen length.

*Variations*.—The other specimens examined, or part of them, varied in the following characteristics: **Head**: fastigium of vertex with inconspicuous dots throughout, but these never salient. Antenna with 2 or 3 apical flagellomeres slightly darker in apical region. Ocellus white, conspicuous in specimens with color not faded. Labrum not red and without sinus in some specimens. Paratype n° INB0003241311, with fifth right maxillary palpomere shorter than the fourth palpomere. Apex of fifth maxillary palpomere not dark in almost all paratypes. **Thorax**: lighter dots on pronotal disc and lateral carina are visible only in specimens that still retain a little original color. Marginal fold of lateral lobe of pronotum without dots in some paratypes, but with salient dots on ventral third in anterior and in posterior margin. **Legs**: forefemur anteroventrally with 4 to 7 spines. Paratype n° CRI000552862, from Costa Rica, with left forefemur without spines. Foretibia with small light spot (usually white) in basal region of anterodorsal margin in specimens with color not faded. Midtibia with 3 to 5 slightly acuminate projections on anterodorsal margin. Tibia brown in paratype INBIO CRI000132365, with sparse dark dots

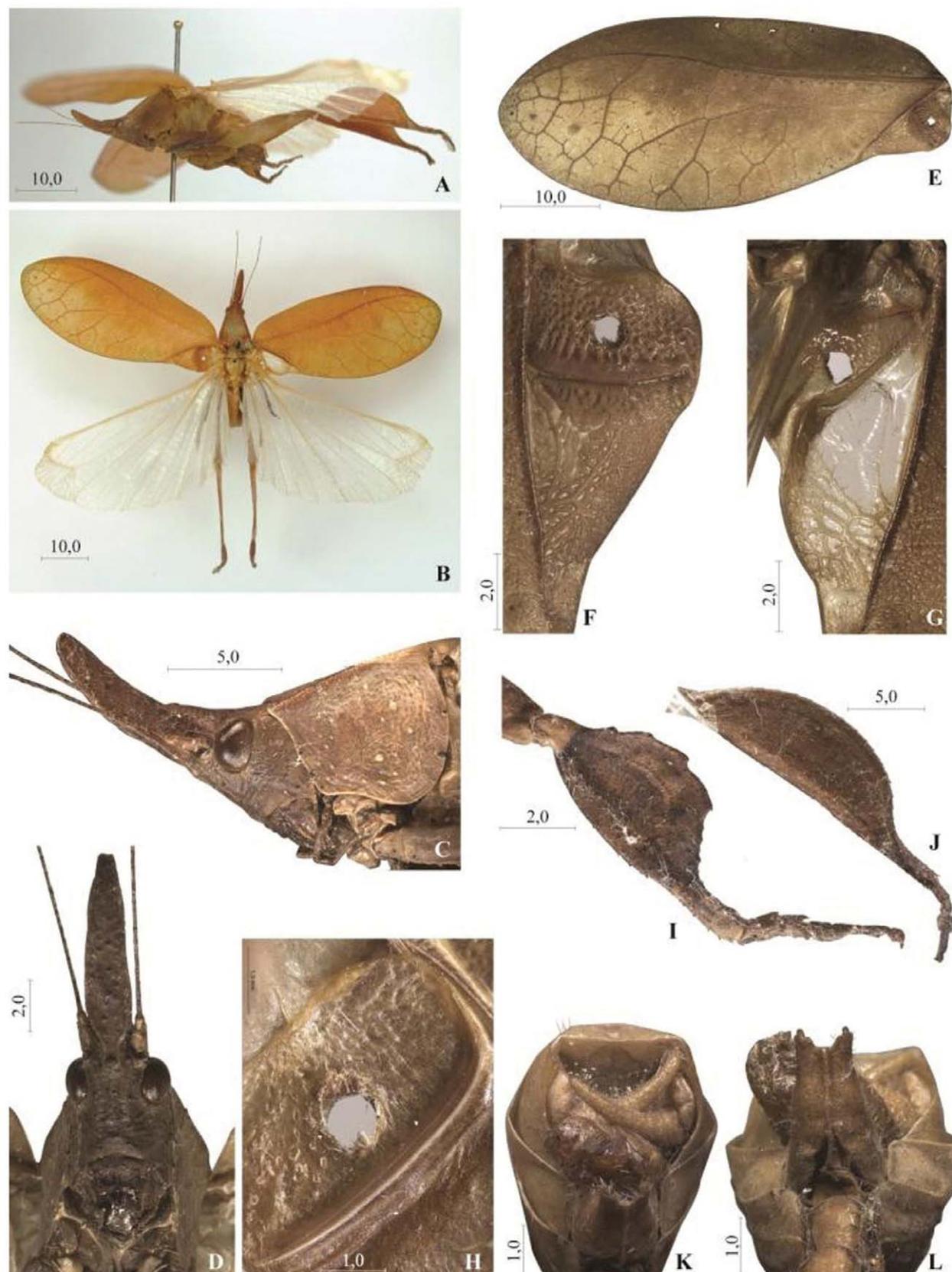
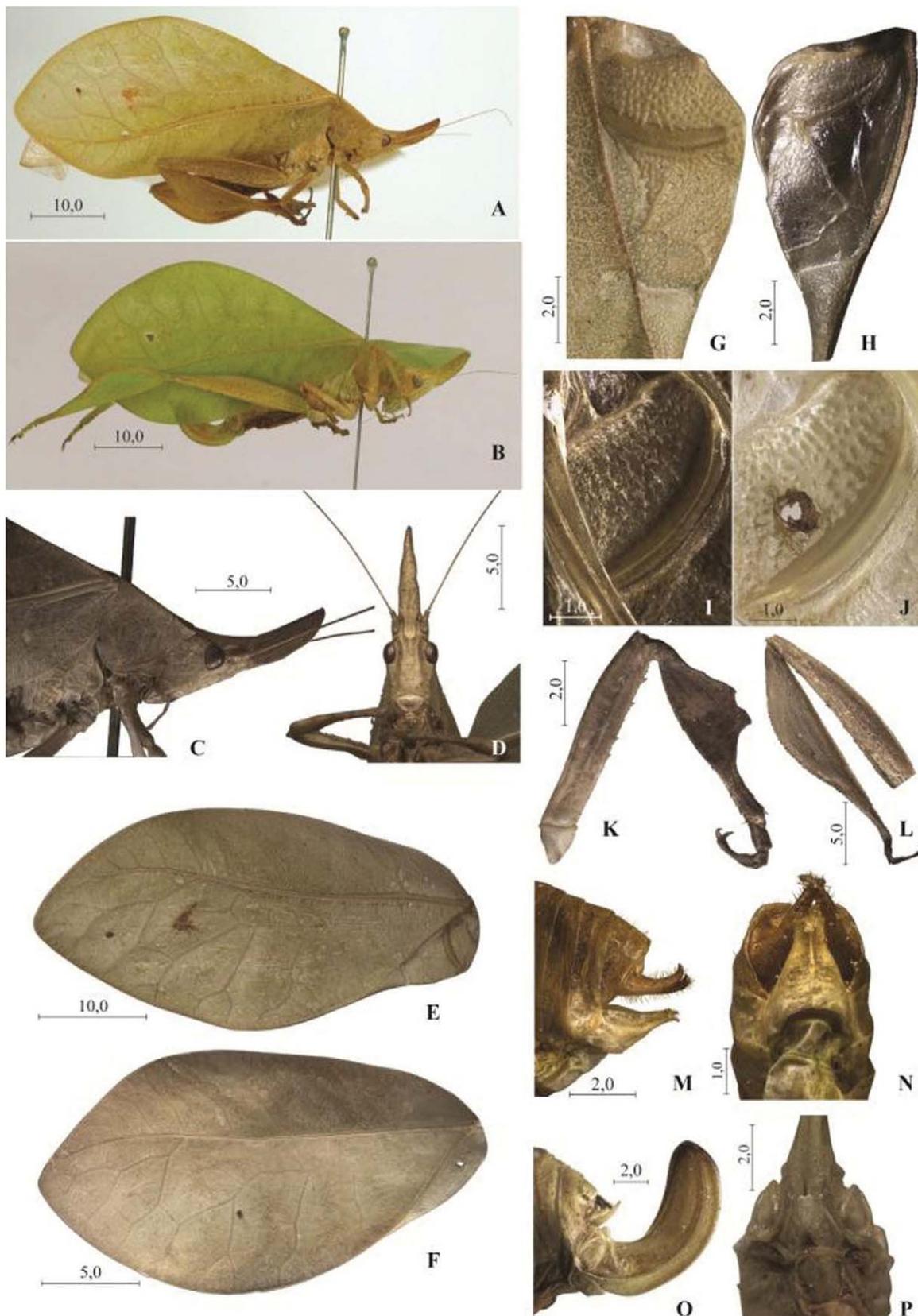


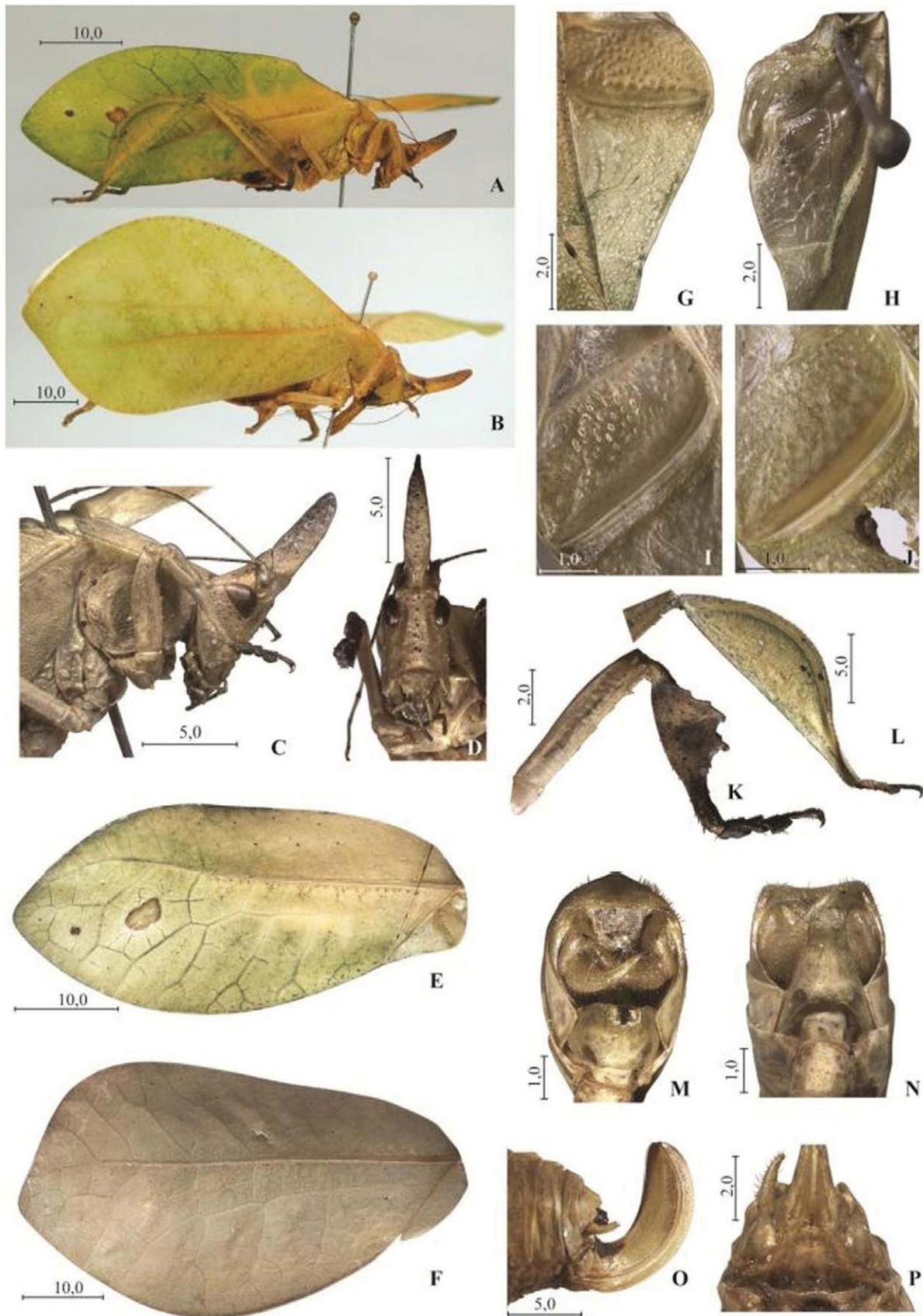
Fig. 4. *Aegimia catharinensis*. (Holotype ♂ MZLQ). A. Body, lateral view - tegmen expanded; B. Body, dorsal view; C. Head and pronotum, lateral view; D. Head, frontal view; E. Left tegmen, dorsal view; F. Stridulatory area in detail, dorsal view; G. Anal region of right tegmen, mirror, dorsal view; H. Stridulatory file, ventral view of left tegmen; I. Midtibia and midtarsus, lateral view; J. Hindtibia and hindtarsus, lateral view; K. Terminalia, posterior view; L. Terminalia, ventral view. Scales in millimeters.



**Fig. 5.** *Aegimia cultrifera*. (A, C-E, G-I, K, L: Holotype ♂ NHRS); B, F, O, P: female specimen; J, M, N: male specimen from Costa Rica). A, B. Body, lateral view, left wings extended; C. Head and pronotum, lateral view; D. Head, frontal view; E, F. Left tegmen, dorsal view; G. Stridulatory area in detail, dorsal view; H. Anal region of right tegmen, mirror; I. Stridulatory file, ventral view of left tegmen; J. Stridulatory file, specimen from Costa Rica; K. Midleg, lateral view; L. Hindleg, lateral view; M. Male terminalia, lateral view; N. Male subgenital plate in detail, ventral view; O. Ovipositor, lateral view; P. Female subgenital plate in detail, ventral view. Scales in millimeters.



Fig. 6. *Aegimia elongata*. (A, C, D, G, J, L, M. Holotype ♂ USNM); B, E, N, O. female from Costa Rica; E, H, I, K. male from Costa Rica). A, B. Body, lateral view, left wings extended; C. Head, frontal view; D. Head and pronotum, lateral view; E, F. Left tegmen, dorsal view; G. Stridulatory area in detail, dorsal view; H. Anal region of right tegmen, mirror; I. Stridulatory file, ventral view of left tegmen; J. Midleg, lateral view; K. Hindleg, lateral view; L. Male terminalia, lateral view; M. Male terminalia, posterior view; N. Ovipositor, lateral view; O. Female subgenital plate in detail, ventral view. Scales in millimeters.



**Fig. 7.** *Aegimia maculifolia* sp. nov. (A, C-E, G-I, K-N: Holotype ♂ INBio; B, F, O, P: Paratype ♀ INBio; J: Paratype ♂ from Panama FMNH). A, B. Body, lateral view - left wings extended; C. Head and pronotum, lateral view; D. Head, frontal view; E, F. Left tegmen, dorsal view; G. Stridulatory area in detail, dorsal view; H. Anal region of right tegmen, dorsal view; I, J. Stridulatory file, ventral view of left tegmen; K. Midleg; L. Hindtibia; M. Terminalia, posterior view; N. Terminalia, ventral view; O. Ovipositor, lateral view; P. Subgenital plate, ventral view. Scales in millimeters.

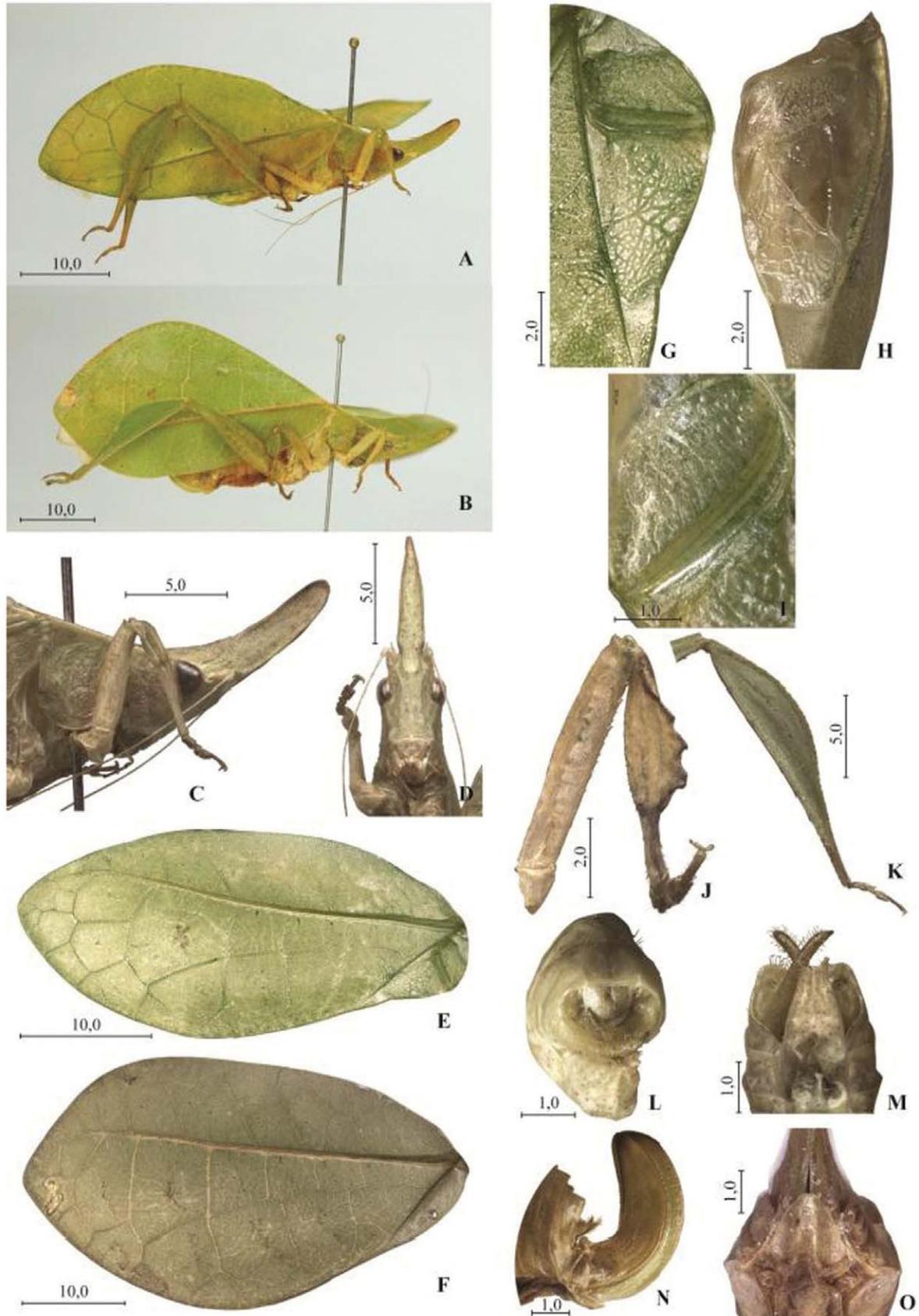


Fig. 8. *Aegimia venarecta* sp. nov. (A, C-E, G-M: Holotype ♂ INBio; B, F, N, O: Paratype ♀ INBio). A, B. Body, lateral view, left wings extended; C. Head and pronotum, lateral view; D. Head, frontal view; E, F. Left tegmen, dorsal view; G. Stridulatory area in detail, dorsal view; H. Anal region of right tegmen, dorsal view; I. Stridulatory file, ventral view of left tegmen; J. Midleg; K. Hindtibia; L. Terminalia, posterior view; M. Terminalia, ventral view; N. Ovipositor, lateral view; O. Subgenital plate, ventral view. Scales in millimeters.

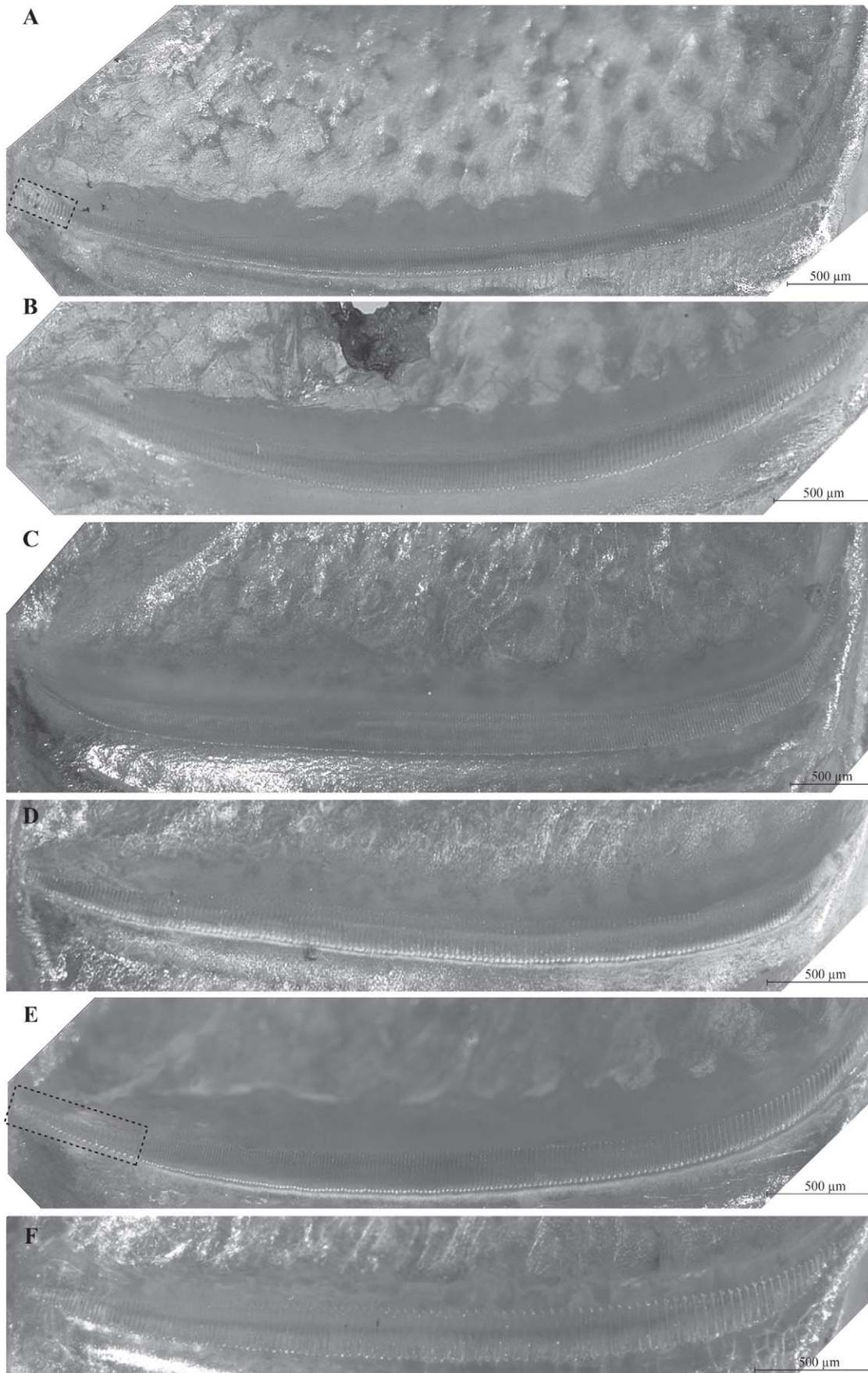


Fig. 9. Stridulatory files in detail. Apical end to left. A. *A. catharinensis* (Amazonas, Brasil); B. *A. cultrifera* (Costa Rica); C. *A. elongata* (Costa Rica); D. *A. maculifolia* sp. nov. (Holotype - Costa Rica); E. *A. maculifolia* sp. nov. (Paratype - Panama). F. *A. venarecta* sp. nov. (Paratype - Costa Rica). Dashed rectangle in C and F highlights the thicker apical teeth with wider spacing than in the adjacent region.

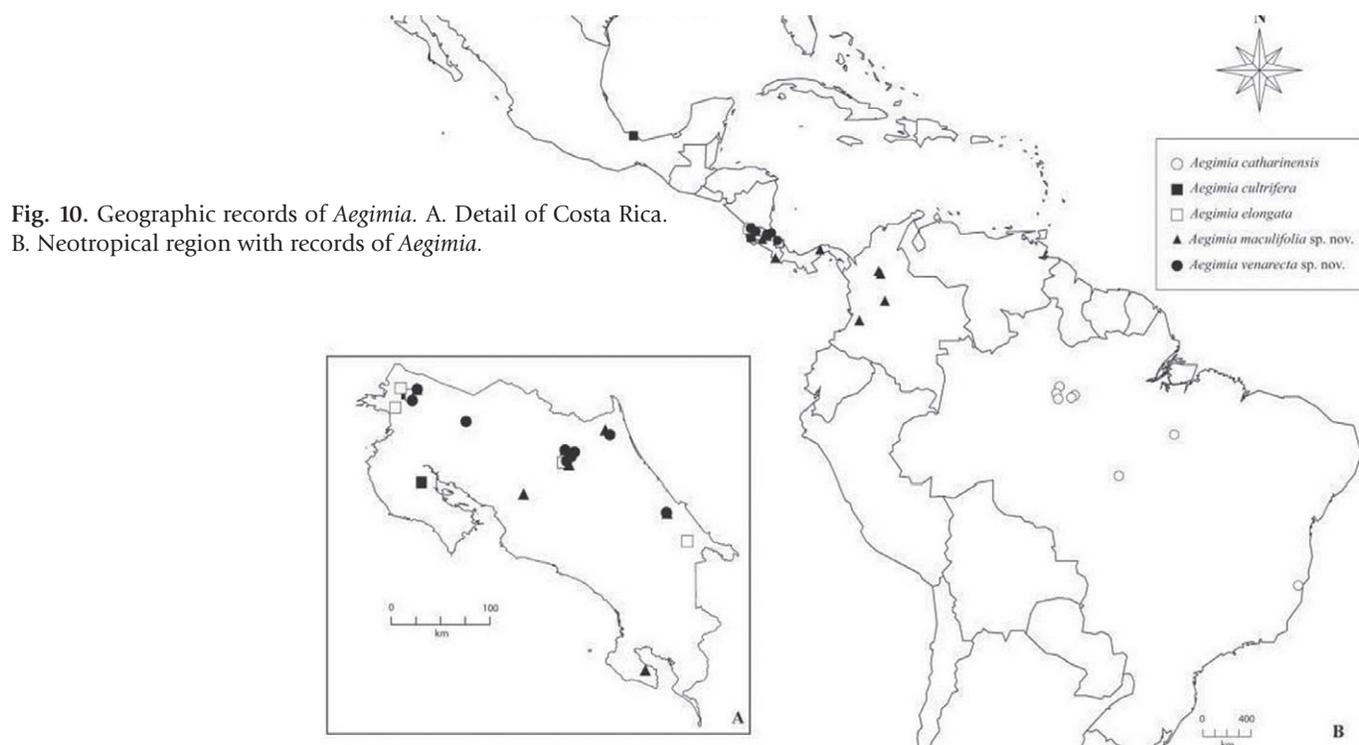


Table 1. Holotype measurements (mm), males.

		<i>A. cultrifera</i>	<i>A. elongata</i>	<i>A. catharinensis</i>	<i>A. maculifolia</i> sp. nov.	<i>A. venarecta</i> sp. nov.
Head	BL	54.55	59.35	-	54.50	47.85
	HW	3.30	4.00	4.00	3.35	3.50
	LWBE	3.00	3.75	3.85	3.05	3.00
	ID	1.90	2.15	2.30	1.80	2.05
	FV	2.15	2.60	2.75	2.30	2.50
Pronotum	FF	7.20	7.10	7.70	6.75	7.35
	H+PL	14.65	16.00	17.45	-	14.55
	PLLH	5.40	6.40	6.25	5.60	4.80
	PLLW	5.70	6.40	6.75	6.20	5.10
	PDL	7.90	8.90	9.50	8.25	6.55
Tegmen	PDW	5.90	6.40	6.80	5.80	4.90
	TgL	40.20	45.05	44.00	43.35	34.15
	TgW	20.15	19.42	18.95	19.10	15.35
Foreleg	TgL/TgW	0.50	0.43	0.43	0.44	0.45
	FL <sub>i</sub>	5.70	6.30	6.60	5.85	5.30
	FW <sub>i</sub>	1.50	1.70	1.70	1.50	1.30
	TbL <sub>i</sub>	7.20	7.70	7.95	7.10	6.45
Midleg	TbW <sub>i</sub>	1.10	1.10	1.20	1.20	1.00
	FL <sub>ii</sub>	6.70	7.70	8.10	6.55	6.20
	FW <sub>ii</sub>	1.30	1.50	1.50	1.30	1.20
	TbL <sub>ii</sub>	6.95	7.90	8.00	7.20	6.25
	TbW <sub>ii</sub>	2.00	2.60	3.00	2.60	1.50
Hindleg	TbW <sub>ii</sub> /FW <sub>ii</sub>	1.54	1.73	2.00	2.00	1.25
	FL <sub>iii</sub>	17.60	-	19.20	18.40	16.25
	FW <sub>iii</sub>	3.00	-	3.70	3.60	2.75
	TbL <sub>iii</sub>	18.25	-	20.15	18.60	17.10
	TbW <sub>iii</sub>	3.70	-	6.00	5.25	3.10
Stridulatory file	TbW <sub>iii</sub> /FW <sub>iii</sub>	1.23	-	1.62	1.46	1.13
	Nt	198	-	305	176	125
	Nt - Apical <sup>(*)</sup>	-	-	29	-	-
	Dt-Min	0.024	-	0.015	0.025	0.028
	Wt-Max.	0.230	-	0.150	0.200	0.215
	LSF	4.54	-	6.02	4.08	3.58
	Nt/LSF	43.7	-	50.6	43.1	34.9

(\*) Number of thicker teeth in (apical) distal region of the stridulatory file with distance between them distinct from the whole file (see Figs 9A and 9E).

Table 2. Female specimen measurements (mm).

Specimens(*)	<i>A. cultrifera</i>			<i>A. elongata</i>	<i>A. maculifolia</i> sp. nov.		<i>A. venarecta</i> sp. nov.		
	#1	#2	#3	#4	#5	#6	#7	#8	
BL	60.25	58.30	62.25	70.30	71.93	65.45	-	54.35	
Head	HW	4.00	4.20	4.00	4.80	4.10	3.80	3.95	4.15
	LWBE	3.80	3.85	3.90	4.60	4.10	3.70	3.70	3.75
	ID	2.45	2.55	2.40	2.85	2.45	2.05	2.50	2.55
	FV	2.50	2.10	2.50	3.00	3.00	2.45	2.85	2.95
	FF	7.35	7.00	8.95	10.50	9.60	8.75	8.80	8.50
Pronotum	H+PL	16.65	16.55	18.70	19.00	19.20	17.45	-	16.30
	PLLH	6.20	6.25	6.50	8.15	6.70	8.15	5.40	5.40
	PLLW	6.40	6.25	6.40	7.75	7.05	8.95	5.65	5.55
	PDL	8.70	8.50	8.95	10.55	9.60	9.35	7.50	7.45
	PDW	6.50	6.35	6.70	9.30	7.05	6.75	5.35	5.40
Tegmen	TgL	46.10	43.65	45.35	53.45	54.10	50.25	38.85	38.35
	TgW	25.75	24.55	27.40	28.70	30.45	29.55	22.50	22.40
	TgL/TgW	0.56	0.56	0.60	0.54	0.56	0.59	0.58	0.58
Foreleg	FL <sub>i</sub>	6.65	7.80	6.55	8.20	7.20	6.75	6.00	6.05
	FW <sub>i</sub>	1.80	1.75	1.70	2.20	2.00	1.90	1.50	1.50
	TbL <sub>i</sub>	7.60	8.20	7.90	9.35	8.70	8.40	7.05	7.10
	TbW <sub>i</sub>	1.05	1.10	1.10	1.45	1.30	1.30	0.95	1.00
Midleg	FL <sub>ii</sub>	7.75	8.20	7.50	10.15	8.00	8.50	7.20	7.50
	FW <sub>ii</sub>	1.50	1.50	1.50	2.10	1.60	1.75	1.45	1.35
	TbL <sub>ii</sub>	7.80	8.50	7.80	9.90	9.20	8.40	7.50	7.50
	TbW <sub>ii</sub>	2.50	2.70	2.70	3.20	3.50	3.00	2.10	2.30
	TbW <sub>ii</sub> /FW <sub>ii</sub>	1.67	1.80	1.80	1.52	2.19	1.71	1.45	1.70
Hindleg	FL <sub>iii</sub>	19.20	20.50	20.95	25.10	23.15	21.80	17.75	18.55
	FW <sub>iii</sub>	3.80	3.65	3.95	4.20	5.25	4.60	3.10	3.60
	TbL <sub>iii</sub>	-	22.15	21.10	24.50	23.60	22.20	19.20	18.72
	TbW <sub>iii</sub>	-	4.40	5.30	-	6.35	6.40	3.70	3.60
	TbW <sub>iii</sub> /FW <sub>iii</sub>	-	1.21	1.34	-	1.21	1.39	1.19	1.00
Ovipositor	OL	7.20	7.05	8.00	7.80	7.20	8.00	6.10	6.20
	OH	10.90	9.75	9.90	11.10	10.70	10.50	9.40	9.00
	OW	3.80	3.60	3.75	3.90	3.70	3.50	3.30	3.40

(\*) Specimens measured identification: #1 - INBio INB0003875608; #2 - INPA INB0003981238, #3 - INPA; #4 - INPA CRI000259352; #5 - MEFLG; #6 - INBio CRI000091635; #7 - INBio CRI000054488 and #8 - INPA CRI000235476.

and light spot in basal anterodorsal region, close to the beginning of tibial expansion. Hindfemur with internal and external genicular lobes without spines in some specimens. **Tegmen:** vein R with 7 to 9 conspicuous branches. Veins R and M fusing at half the length of cell  $ma_1$ . Three to 7 conspicuous crossveins between M and CuA. Cell m with inconspicuous spot in a few specimens with general color not faded. Measurements of stridulatory file see Table 3.

**Comments.**—The specimens of *A. venarecta* sp. nov. are the smallest and most delicate within the genus and can be recognized by the following characters: the fork of MA and MP forming an almost 90° angle; the appendix of stridulatory vein AP<sub>1</sub> branching beyond its base; gena and pronotum without tubercles; flagellomeres without conspicuous dark ring. The number of file teeth is the smallest for the genus. The shape of the hindtibia is similar to that of *A. cultrifera*, but the expansion of midtibia is unique within the genus. Females are similar to males and are easily recognized by the tegmen venation, especially the veins M and CuA, and the expansions of the mid and hindtibiae. Lack of dark flagellomeres and gena without tubercles are also typical of the females of this species.

**Distribution.**—Costa Rica: Guanacaste, Alajuela, Heredia, Limón (Fig. 10).

**Type material examined.**—**Holotype:** Estacio{ó}n Pitilla, 680 m,

8 km S.[outh] Santa Cecilia, Alajuela Pv. [Provincia] {probably Province Guanacaste, not Alajuela}, COSTA RICA, Feb[ruary] 1988. A. Chacon & M. Espinosa [leg.]. (Rectangular label, white paper, printed)/INB0003981265, INBIOCRI COSTA RICA (Rectangular label, white plastic, printed, with barcode)/*Aegimia venarecta*, Dias, Rafael & Naskrecki, Holotype ♂ (Rectangular label, red paper, printed). (Holotype ♂ INBIO).

**Paratypes.**—(35 ♂; 2 ♀): COSTA RICA, Prov.[incia] Heredia, 10km SE La Virgen, 450-550m, 19.iii.2003, Transect, INBio-OET-ALAS transect, (J. Rota, MV [leg.]), (10°20'00"N; 84°05'00"W) (1♂INBio INB0003241311; 1♂INPA INB0003241312); Est.[ación] Biol.[ógica] La Selva, 50-150m, 8-25.iii.1999, INBio-OET - Area Laboratorio L/00/594, (without collector), (10°26'N; 84°01'W) (1♂INPA CRI002723514); *idem*, xii.2000, (1♂INBio CRI002625517); Est. [ación] Magsassay, 200m, P.[arque] N.[acional] Brulio Carrillo, vi.1990, (E. Alcazar [leg.]), (531100N; 264600W) [10°24'00"N; 84°02'00"W] (1♂INBio CRI000222648); *idem*, x.1990, (R. Aguilar [leg.]), (1♀ INPA CRI000235476); *idem*, i.1991, (M. Barrelier [leg.]), (1♂INBio CRI000298517); *idem*, ii.1991, (M. Barrelier [leg.]) (1♂INBio CRI000641262); *idem*, (A. Fernandez [leg.]), (1♂INBio CRI000402746); Finca Naranja Valenciana, 2km sur Pueblo Nuevo Sarapiquí, 90m, 9-30.xii.1992, (M. Ortiz [leg.]), (523750N; 271800W) [10°27'00"N; 84°06'00"W] (2♂INBio CRI000783163, CRI000820821; 1♂INPA CRI000783162); Prov.[incia] Guanacaste,

Table 3. Measurements of stridulatory file.

Species	Locality	N	Total number of teeth				Number of teeth in apical region(*)				Minimum distance between teeth [mm]			
			$\bar{x}$	dP	Vmax	Vmin	$\bar{x}$	dP	Vmax	Vmin	$\bar{x}$	dP	Vmax	Vmin
<i>A. catharinensis</i>	Brazil (ES)	1	305.0	na	na	na	29.0	na	na	na	0.015	na	na	na
	Brazil (AM, PA)	9	275.0	3.6	282	270	15.3	1.1	17	14	0.015	<0.001	0.016	0.015
<i>A. cultrifera</i>	Mexico	4	187.8	8.3	198	181	na	na	na	na	0.025	0.001	0.025	0.024
	Costa Rica	4	167.8	5.9	174	160	na	na	na	na	0.022	0.002	0.023	0.020
<i>A. elongata</i>	Costa Rica	5	285.0	12.8	307	274	na	na	na	na	0.016	0.001	0.017	0.015
<i>A. maculifolia</i>	Costa Rica	5	171.8	9.0	182	158	na	na	na	na	0.024	0.001	0.025	0.022
<i>sp. n.</i>	Colombia (2)													
	Panama (3)	6	202.0	24.9	251	183	25.3	2.3	29	22	0.015	0.000	0.015	0.015
	Costa Rica (1)													
<i>A. venarecta sp. n.</i>	Costa Rica	11	131.5	6.3	144	124	na	na	na	na	0.021	0.002	0.025	0.020

Species	Locality	N	Maximum width of teeth [mm]				File length [mm]				Total number of teeth/file length [mm]			
			$\bar{x}$	dP	Vmax	Vmin	$\bar{x}$	dP	Vmax	Vmin	$\bar{x}$	dP	Vmax	Vmin
<i>A. catharinensis</i>	Brazil (ES)	1	0.150	na	na	na	6.02	na	na	na	50.6	na	na	na
	Brazil (AM, PA)	9	0.146	0.010	0.160	0.135	5.37	0.13	5.64	5.17	51.2	1.4	53.1	49.1
<i>A. cultrifera</i>	Mexico	4	0.238	0.010	0.250	0.230	4.76	0.35	5.27	4.51	39.7	4.2	43.7	34.3
	Costa Rica	4	0.197	0.008	0.205	0.186	4.15	0.16	4.38	4.03	40.5	1.7	42.9	38.8
<i>A. elongata</i>	Costa Rica	5	0.212	0.014	0.230	0.190	4.92	0.11	5.03	4.78	58.0	2.4	61.0	54.5
<i>A. maculifolia</i>	Costa Rica	5	0.189	0.011	0.200	0.170	3.96	0.14	4.09	3.76	43.4	2.1	46.3	40.8
	Colombia (2)													
	Panama (3)	6	0.177	0.017	0.205	0.165	4.00	0.38	4.65	3.58	50.4	2.6	54.0	47.6
<i>A. venarecta sp. n.</i>	Costa Rica	11	0.217	0.014	0.252	0.198	3.67	0.14	3.92	3.37	35.9	1.8	39.5	34.2

(\*) Number of thicker teeth in the distal region of the stridulatory file with distance between them distinct from the whole file (Figs 9A, 9E); na = not applicable.

P.[arque] N.[acional] Guanacaste, Est.[ación] Pitilla, 9km S Santa Cecilia, 5-30.vii.1988, [colecta] Manual (Red./Libre), (Espinoza, C. Chavez [leg.]), (380200N; 330200W) [10°59'00"N; 85°25'00"W] (1♂INBio INB0003355219); Est.[ación] Pitilla, 700m, 9km S Santa Cecilia, v.1988, GNP Biodiversity Survey, (without collector), (1♀INBio CRI000054488); *idem*, vii.1988, (without collector), (1♂INBio CRI000129440; 2♂INPA CRI000088064, CRI000129469); *idem*, viii.1988, (10°59'26"N; 85°25'40"W) (1♂INBio CRI001011947); *idem*, ix.1988, (1♂INBio CRI000152590); *idem*, xi.1988 (2♂INBio CRI001011951, CRI001011948); *idem*, i.1989, (2♂INBio CRI001011950, CRI000110501); *idem*, 21-21.iii-iv.1989, (2♂INBio CRI000091734, CRI000091625); *idem*, x.1989, (C. Moraga & P. Rios [leg.]), (1♂INBio CRI000132365); *idem*, xi.1989, (C. Moraga & R. Rios [leg.]), (2♂INBio CRI000152817, INBio CRI000152882); *idem*, iii.1990, (R. Rios, C. Moraga & R. Blanco [leg.]), (2♂INBio CRI000193937, CRI000193936); Grande de Liberia, R. Gongora, 700m, 6km NE de Queb. ii.1992, III curso Parataxon.[omo], (without collector), (376250N; 319700W) [10°53'00"N; 85°27'00"W] (1♂INBio CRI000425557); *Prov.[íncia] Alajuela*, P.[arque] N.[acional] Volcáu Tenorio, Estación El Pilón, 700-800m., 10-11.v.2005, Tp.[Trampa] Luz, (J. Azofeifa [leg.]), (427913N; 298212W) [10°42'00"N; 84°59'00"W] (1♂INBio INB0003945665); *idem*, P.[arque] N.[acional] Volcáu Teuorio {Tenorio}. Est.[ación] El Pilou {Pilón}. 700-800m, 27.iv.2007, Libre [colecta], #91134, (J.A. Azofeifa [leg.]), (427913N; 298212W) [10°42'00"N; 84°59'00"W] (1♂INBio INB0004076624); *Prov.[íncia] Limón*, Sector Cerro Cocori, Fca. de E. Rojas, 150m, 26-24.iii-iv.1992, (F.A. Quesada [leg.]), (567500N; 286000W) [10°35'00"N; 83°42'00"W] (1♂INBio CRI000767305); Veragua Rainforest, La Isla, 400-440m, 21.ii.2008, Colecta Libre, de día, #95131, (J. Mata [leg.]), (625230N; 212220W) [09°55'00"N; 83°11'00"W] (1♂INBio INB0004176017); Veragua Rainforest,

Restaurant, 400-440m, viii.2008, Tp. [Trampa] Luz Mercurio, (R. Villalobos [leg.]), (625230N; 212220W) [09°55'00"N; 83°11'00"W] (1♂INBio INB0004165286).

*Measurements.*—See Tables 1-3.

## Discussion

The number of known species of *Aegimia* has been increased from three to five in this study. However, this increase may not reflect the real diversity of this group, since it is based on specimens deposited in insect collections. Field collection should increase the number of species, especially in regions where there are no specialists working on the group, which is the case in Brazil.

The venation of the tegmen, including the anal region, is valuable in the taxonomy of *Aegimia*. Although historically neglected, the venation of the anal region may be taxonomically important in other groups of the family.

Although the number of projections upon the midtibia shows intraspecific variation, the shape of the expansion is generally constant. The morphology of mid- and hindtibia, when analyzed together, allows the identification of all species of this genus.

Only with the use of additional taxonomic tools, such as cytogenetics, molecular data and bioacoustics, will it be possible to say whether the differences in the stridulatory file, considered here as intraspecific variation, correspond to distinct species.

As in Grant's work (1964) morphometrics alone did not produce good results for species recognition. In almost all measured structures there were overlapping values between several species.

The terminalia of *Aegimia*, including the phallus and ejaculatory vesicle, did not appear to provide good taxonomic characters

to separate species in this study, but this should not preclude their use in future studies of the genus.

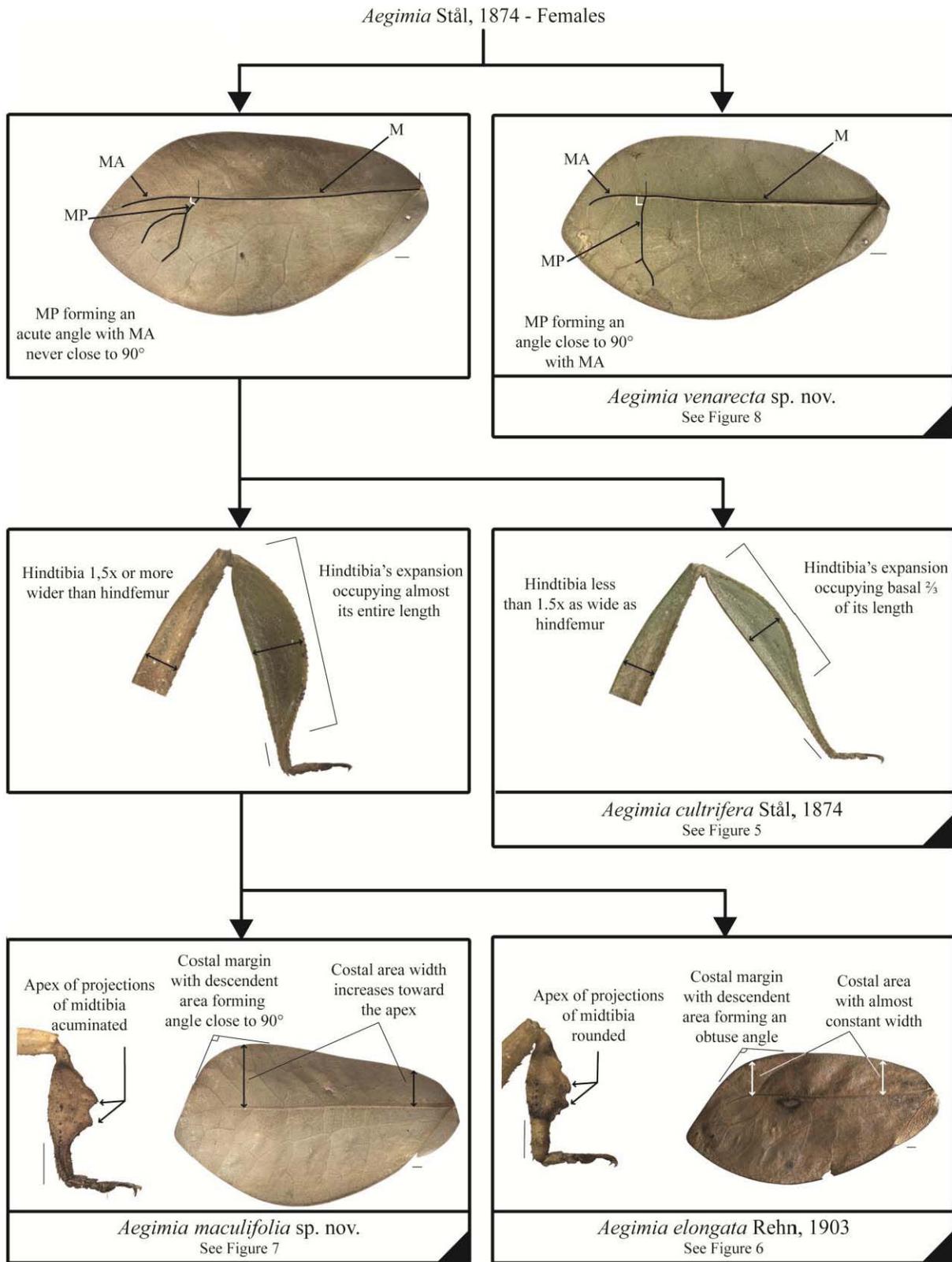
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## References

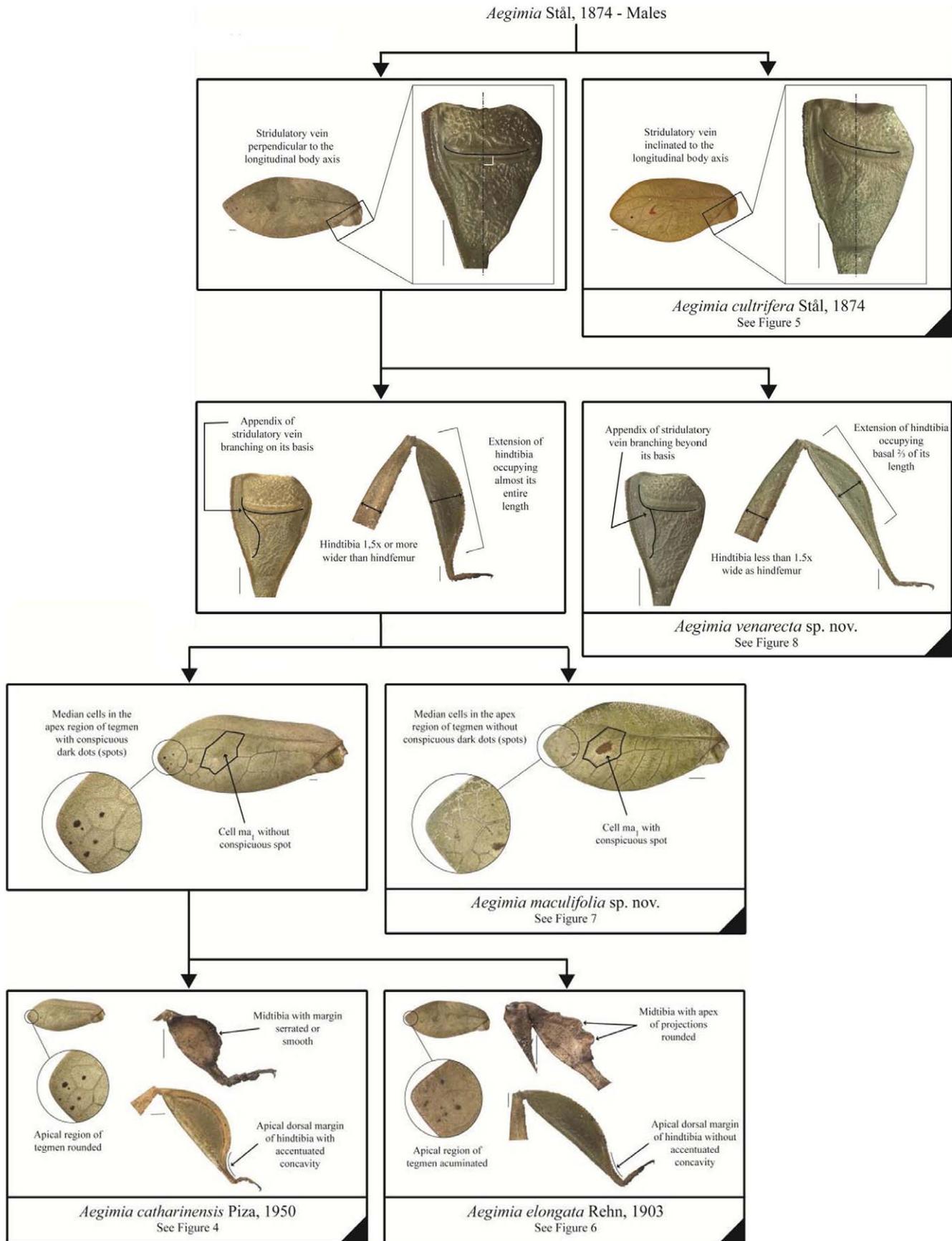
- Barranco P. 2010. Ortópteros de la Reserva Biológica Alberto Manuel Brenes (San Ramón, Costa Rica). I. Anostomatidae y Tettigoniidae (Orthoptera: Ensifera). Boletín de la Sociedad Entomológica Aragonesa, 46: 509-517.
- Belwood J.J. 1990. Anti-predator defences and ecology of neotropical forest katydids, especially the Pseudophyllinae, pp. 8-26. In: W. J. Bailey, Rentz D.C.F. (Eds) The Tettigoniidae: Biology, Systematics and Evolution. Springer-Verlag, Berlin. 395 pp.
- Braun H. 2011. The little lichen dragon—an extraordinary katydid from the Ecuadorian Andes (Orthoptera, Tettigoniidae, Phaneropterinae, Dysoniini). Zootaxa 3032: 33-39.
- Bruner L. 1915. Notes on tropical American Tettigoniidae (Locustodea). Annals of the Carnegie Museum 9: 284-404.
- Brunner von Wattenwyl C. 1878. Monographie der Phaneropteriden. Wien. 403pp.
- Brunner von Wattenwyl C. 1891. Addimenta zur Monographie der Phaneropteriden. Verhandlungen der Kaiserlich-Königlichen Zoologisch-Botanischen Gesellschaft in Wien 41:1-196.
- Carbonell C.S. 1996. Revision of the genus *Orthoscapheus* Bruner 1906, with description of a new species (Acrididae, Ommatolampinae, Abracrini). Journal of Orthoptera Research 5: 37-41.
- Chamorro-Regifo J., Braun H. 2010. The Tettigoniidae (Orthoptera) described by Salvador de Toledo Piza Jr. and deposited in the collection of the University of São Paulo, Escola Superior de Agricultura "Luiz de Queiroz", Brazil. Zootaxa 2635: 41-66.
- Chamorro-Rengifo J., Cadena-Castañeda O.J., Braun H., Montealegre-Z. F., Romero R.L., Marquez F.H.S., Gonzales R. 2011. Checklist and new distribution records of katydids (Orthoptera: Tettigoniidae) from Colombia. Zootaxa 3023: 1-42.
- Costa Lima A. 1958. *Aegimia alvarengai* Lima, sinônimo de *A. catharinensis* Piza. Revista Brasileira de Entomologia 8: 231.
- Costa Lima A., Campos-Seabra C.A. 1956. Alguns Ortopteróides da Amazônia. Anais da Academia Brasileira de Ciências 28: 133-135.
- Cumming J.M. 1992. Lactic acid as an agent for macerating Diptera specimens. Fly Times 8: 7.
- Desutter-Grandcolas L. 2003. Phylogeny and the evolution of acoustic communication in extant Ensifera (Insecta, Orthoptera). Zoologica Scripta 32: 525-561.
- Eades D.C., Otte D., Cigliano M.M., Braun H. 2011. Orthoptera Species File Online. Version 2.0/4.0 <<http://Orthoptera.SpeciesFile.org>>. [Access in ii.2011]
- Grant H.J. 1964. A revision of the genera *Ceraia* and *Euceraia* with notes on their relationship to *Scudderia*. Proceedings Academy of Natural Sciences 116: 29-117.
- Hebard M. 1927. Studies in the Tettigoniidae of Panama (Orthoptera). Transactions American Entomological Society 53: 79-156.
- Kirby W.F. 1906. A Synonymic Catalogue of Orthoptera (Orthoptera Saltatoria, Locustidae vel Acridiidae). Vol. II Orthoptera Saltatoria. Part I. (Achetidae et Phasgonuridae). British Museum (Natural History), London. 562pp.
- Kukalová-Peck J. 1983. Origin of the insect wing and wing articulation from the arthropodan leg. Canadian Journal of Zoology 61: 1618-1669.
- Mayaudón C.M. 1963. Estudio morfológico de tres especies de *Stilpnochlora* (Orthoptera: Tettigoniidae). Anales del Instituto de Biología, Universidad Nacional Autónoma de México, Serie Zoológica 34: 275-283.
- Mayaudón C.M. 1969. Estudio comparativo de los genitales externos y de los cromosomas de algunos grupos de la subfamilia Phaneropterinae (Orthoptera, Tettigoniidae) de Mexico. Anales del Instituto de Biología, Serie Zoológica 40: 55-102.
- Montealegre F. 1997. Estudio de la fauna de Tettigoniidae (Orthoptera, Ensifera) del Valle del Cauca. Tese (Título de Biólogo Entomólogo), Facultad de Ciencias, Departamento de Biología, Universidad del Valle, Cali, Colombia, Marzo de 1997. 266pp. [Unpublished, PDF available at: [http://www.utm.utoronto.ca/~monteale/docs/FMontealegre\\_BSc\\_thesis.pdf](http://www.utm.utoronto.ca/~monteale/docs/FMontealegre_BSc_thesis.pdf)]
- Montealegre F., González R., Carrejo N. 1993. Los Phaneropterinae (Orthoptera: Tettigoniidae) presentes en la colección entomológica de la Universidad del Valle. Boletín del Museo de Entomología de la Universidad del Valle 1: 41-51.
- Nickle D.A. 1992. Katydids of Panama (Orthoptera: Tettigoniidae), p. 142-184. In: Quintero & Aiello (Eds) Insects of Panama and Mesoamerica: Selected Studies. Oxford University Press, Oxford. 720pp.
- Nickle D.A. 2003. New neotropical species of the genus *Phlugis* (Orthoptera: Tettigoniidae: Meconematinae). Journal Orthoptera Research 12: 37-56.
- Otte D. 1997. Tettigoniidae. Orthoptera Species File 7: 373 pp.
- Papavero N. 1994. Fundamentos Práticos de Taxonomia Zoológica: coleções, bibliografia, nomenclatura. 2ª ed. São Paulo, Editora da Universidade Estadual Paulista. 285 pp.
- Paschoal A.D., Barros O.N.F. 1977. Catálogo dos tipos depositados no Museu de Zoologia da Escola Superior de Agricultura "Luiz de Queiroz", I: Insecta. Revista de Agricultura (Piracicaba) 52: 237-251.
- Piza S.T. 1950. Um novo Phaneropterídeo brasileiro do gênero *Aegimia*. Anais da Escola Superior de Agricultura "Luiz de Queiroz" 7: 103-104.
- Rehn, J.A.G. 1903. A contribution to the knowledge of the Orthoptera of Mexico and Central America. Transactions American Entomological Society 29: 1-34.
- Rehn J.A.G. 1917. Some critical notes on the giant katydids forming the group Steirodonta (Orthoptera, Tettigoniidae, Phaneropterinae). Entomological News 28: 107-122.
- Rehn J.A.G. 1950. Studies in the Group Dysoniinae (Aphidniinae of Authors) (Orthoptera: Tettigoniidae: Phaneropterinae). Transactions American Entomological Society 75: 271-320.
- Saussure H., Pictet A. 1898. Family Locustidae, p. 285-457. In: Biologia Centrali-Americana, Orthoptera. Vol. 1. Th. Bannwarth Lith. et Imp. Vienna.
- Stål C. 1874. Recensio Orthopterorum. Revue critique des Orthoptères décrits par Linné, De Geer et Thunberg. 2 Locustina: 121 pp.
- Snodgrass R.E. 1937. The male genitalia of orthopteroid insects. Smithsonian Miscellaneous Collections 96: 1-107.
- White A. 1862. Class V. – Insects (Insecta). In: Richardson J. (Ed.). The museum of natural history, with introductory essay on the natural history of the primeval world: being a popular account of the structure, habits, and classification of the various departments of the animal kingdom, quadrupeds, birds, reptiles, fishes, shells, and insects, including the insects 2: 175-284.

Appendix 1. Pictorial key for adult female specimens of *Aegimia*, except *A. catharinensis* (still unknown).



Scale bar = 2.00 mm.

Appendix 2. Pictorial key for adult male specimens of *Aegimia*.



Scale bar = 2.00 mm.