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Phylogenetic analysis and systematics of the *Acrapex unicolora* Hampson species complex (Lepidoptera, Noctuidae, Noctuinae, Apameini), with the description of five new species from the Afrotropics

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Abstract. Ten morphologically similar species of *Acrapex* Hampson, 1891 (Lepidoptera, Noctuidae, Noctuinae, Apameini) from Central and Eastern Africa are reviewed, including five new species: *Acrapex kafula* le Ru sp. nov., *A. kavumba* le Ru sp. nov., *A. kiakouama* le Ru sp. nov., *A. miscantha* le Ru sp. nov. and *A. simillima* le Ru sp. nov. Evidence is provided to transfer the monotypic genus *Poecopa* Bowden, 1956 to the genus *Acrapex*. Host plants of five species are recorded, some of them for the first time. *Acrapex kavumba* sp. nov., *A. miscantha* sp. nov. and *A. simillima* sp. nov. were found on one host plant each. *Acrapex mediopuncta*, previously reported in West Africa from *Pennisetum purpureum* Schumach., *Rottboellia compressa* L., *Setaria megaphylla* (Steud) Dur. & Schinz. and *Sorghum arundinaceum* (Desv.) Stapf, was only found from *S. megaphylla* in Central Africa. Larvae of *Acrapex unicolora* were collected on *Andropogon gayanus* Kunth, *Chrysopogon zizanoides* (L.) Roberty, *Cymbopogon schoenanthus* subsp. *proximus* (Hochst. ex A.Rich.) Maire & Weller, *Cymbopogon pospischiilii* (K.Schum.) C.E.Hubb., *Hyparrhenia diplandra* (Hack.) Stapf and *Setaria sphacelata* (Schumach.) Moss. We also conducted molecular phylogenetic analyses (using maximum likelihood) and molecular species delimitation analyses on a comprehensive sample of 61 specimens belonging to eight of the studied species. Molecular phylogenetic analyses provided additional evidence of the synonymy of *Acrapex* and *Poecopa*, whereas molecular species delimitation analyses support the validity of the five newly described species and unravel another potential new species, only collected in the larval stage.

Keywords. *Acrapex*, Afrotropical Region, Apameini, Noctuidae, Sesamiina.


Introduction

Among the African noctuid stem borers of the subtribe Sesamiina (Lepidoptera, Noctuidae, Noctuinae, Apameini) the genus *Acrapex* Hampson, 1891 consists of about 90 species that are mostly distributed in the Afrotropical region (Le Ru et al. 2014). Until recently, very little was known about *Acrapex* host preferences as specimens had been obtained mainly from light trap collections. Extensive surveys conducted since 2004 (Le Ru et al. 2006 a, 2006b; Ong’amo et al. 2006, 2013, 2014; Ndemah et al. 2007; Matama-Kauma et al. 2008; Moolman et al. 2014) in several sub-Saharan countries, targeting wild habitats rich in Poaceae and combining infested host plant collections and light traps, allowed us to obtain several hundred specimens of *Acrapex*. A recent study by Le Ru et al. (2014) focused on a
small group of morphologically related species belonging to subsets of two (groups B and C) of the four morphological groups that have been defined by Berio (1973) based on male genitalia. The latter study unravelled no less than six new species, thus suggesting that the species diversity of *Acrapex* in Sub-Saharan Africa is greatly underestimated (Le Ru et al. 2014).

In the present study, we focus on a species complex that consists of *A. unicolora* Hampson, 1910 and nine morphologically related species (five of which are new to science). These species constitute another subset of group B as defined by Berio (1973); the other subset corresponds to the *A. stygiata* (Hampson, 1910) group (Le Ru et al. 2014). Our subset of interest (hereafter referred to as the *A. unicolora* group) consists of *A. cuprescens* (Hampson, 1910), *A. malagasy* Viette, 1967, *A. parvaclara* Berio, 1973, *A. unicolora*, *A. mediopuncta* (Bowden, 1956) comb. nov., *A. kafula* le Ru sp. nov., *A. kavumba* le Ru sp. nov., *A. kiakouama* le Ru sp. nov., *A. miscantha* le Ru sp. nov. and *A. simillima* le Ru sp. nov. It is characterised by the following combination of characters: (i) valve short and broad at basal half, cucullus rounded and tufted, with medium size hairs; (ii) coastal margin slightly broadened on the inner side and produced into a tooth-shaped spine, pointed and slightly curved inwardly; (iii) juxta large, plate-like, widening to the top without sclerotisation; (iv) aedeagus short, stout, slightly curved, with two lateral areas adorned with short setae; (v) vesica hand-shaped, with a tuft of cornutus, needle-shaped.

For this study we include the description of the five new species which have been cross-checked against all *Acrapex* types preserved in museums to avoid the coinage of synonymies. We also provide a supplemental description for five species of the *A. unicolora* group, with female genitalia presented for the first time for *A. cuprescens*, *A. parvaclara* and *A. unicolora*. Finally, we conduct phylogenetic analyses on a multi-marker molecular dataset (four mitochondrial gene fragments and two nuclear gene fragments) to explore species boundaries and investigate the phylogenetic placement of several species.

**Material and methods**

**Sampling**

Sampling of visually damaged grasses (Poales) in Eastern and Southeastern Africa was conducted over ten years (2004–2014) to collect the larval stages of noctuid stem borers within their wild host plants (Le Ru et al. 2006a, 2006b). Larvae were reared on an artificial diet (Onyango & Ochieng’Odero 1994) until pupation and the emergence of adults (Le Ru et al. 2006a, 2006b). A total of 271 larvae belonging to the group of interest were sampled in the localities listed in Table 1. In addition, 185 adults from this species group were collected in light traps set up in Cameroon, Kenya, the Republic of the Congo, Tanzania, Uganda and Zambia. The morphological study is based on 72 adult specimens belonging to 10 *Acrapex* species collected in 46 localities in seven countries: Cameroon, the Democratic Republic of the Congo, Kenya, the Republic of the Congo, Tanzania, Uganda and Zambia (see also Le Ru et al. 2014). Plant specimens were identified by Simon Mathenge (Botany Department, University of Nairobi, Kenya).

**Morphological study**

Genitalia were dissected after immersion of the end of the abdomen in a boiling 10% potash bath for a few minutes, then cleaned, immersed in absolute alcohol for a few minutes and mounted on slides in Euparal (after separating the aedeagus from the rest of the genitalia in the male).

Collected insects were identified by comparison with types and specimens housed in the following institutions:

BMNH = Natural History Museum, London, UK
MCSN = Museo Civico di Storia Naturale di Milano, Milan, Italy
Table 1. Localities at which specimens of the *Acrapex unicolora* group were collected. [continued on next page]

<table>
<thead>
<tr>
<th>Country</th>
<th>Locality</th>
<th>Latitude</th>
<th>Longitude</th>
<th>Altitude (m.a.s.l.)</th>
<th>Acrapex species</th>
</tr>
</thead>
<tbody>
<tr>
<td>Angola</td>
<td>Ndalatando</td>
<td>09°18'14&quot; S</td>
<td>14°55'03&quot; E</td>
<td>827</td>
<td><em>A. unicolora</em></td>
</tr>
<tr>
<td>Cameroon</td>
<td>Babessi</td>
<td>06°01'56&quot; N</td>
<td>10°33'07&quot; E</td>
<td>1203</td>
<td><em>A. parvaclara</em></td>
</tr>
<tr>
<td></td>
<td>Ndop</td>
<td>05°58'40&quot; N</td>
<td>10°24'25&quot; E</td>
<td>1182</td>
<td><em>A. parvaclara</em></td>
</tr>
<tr>
<td>Sanaga River</td>
<td></td>
<td>04°22'23&quot; N</td>
<td>11°15'10&quot; E</td>
<td>388</td>
<td><em>A. kafula</em> sp. nov.</td>
</tr>
<tr>
<td>Tapare</td>
<td></td>
<td>06°02'16&quot; N</td>
<td>14°23'59&quot; E</td>
<td>870</td>
<td><em>A. mediopuncta</em></td>
</tr>
<tr>
<td>Wete-Wete</td>
<td></td>
<td>04°04'25&quot; N</td>
<td>09°01'15&quot; E</td>
<td>30</td>
<td><em>A. mediopuncta</em></td>
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<tr>
<td>Democratic Republic of the Congo</td>
<td>Yayoli</td>
<td>00°49'34&quot; N</td>
<td>24°18'45&quot; E</td>
<td>374</td>
<td><em>A. mediopuncta</em></td>
</tr>
<tr>
<td>Kenya</td>
<td>Kakamega Forest</td>
<td>00°22'32&quot; N</td>
<td>34°53'40&quot; E</td>
<td>1430</td>
<td><em>A. simillima</em> sp. nov.</td>
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<tr>
<td></td>
<td>Ruiru-Aukland</td>
<td>01°05'04&quot; S</td>
<td>36°55'37&quot; E</td>
<td>1595</td>
<td><em>A. kafula</em> sp. nov.</td>
</tr>
<tr>
<td></td>
<td>Ruma Main Gate</td>
<td>00°38'17&quot; S</td>
<td>34°20'13&quot; E</td>
<td>1254</td>
<td><em>A. kafula</em> sp. nov.</td>
</tr>
<tr>
<td></td>
<td>Ruma Sindo</td>
<td>00°36'18&quot; S</td>
<td>34°16'03&quot; E</td>
<td>1221</td>
<td><em>A. kafula</em> sp. nov.</td>
</tr>
<tr>
<td>Malawi</td>
<td>Mlanje Plateau</td>
<td>15°58'47&quot; S</td>
<td>35°35'50&quot; E</td>
<td>1850</td>
<td><em>A. unicolora</em></td>
</tr>
<tr>
<td>Republic of the Congo</td>
<td>Bidoua</td>
<td>03°28'26&quot; S</td>
<td>13°24'48&quot; E</td>
<td>484</td>
<td><em>Acrapex</em> sp.</td>
</tr>
<tr>
<td></td>
<td>Forêt de Loudima</td>
<td>04°04'38&quot; S</td>
<td>12°57'59&quot; E</td>
<td>142</td>
<td><em>A. unicolora</em></td>
</tr>
<tr>
<td></td>
<td>Kalakundu</td>
<td>04°22'09&quot; S</td>
<td>13°40'31&quot; E</td>
<td>325</td>
<td><em>A. unicolora</em></td>
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<tr>
<td></td>
<td>Lac Loubi</td>
<td>04°53'40&quot; S</td>
<td>11°55'32&quot; E</td>
<td>4</td>
<td><em>A. kiakouama</em> sp. nov.</td>
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<tr>
<td></td>
<td>Lac Nanga</td>
<td>04°53'48&quot; S</td>
<td>11°56'37&quot; E</td>
<td>2</td>
<td><em>A. kiakouama</em> sp. nov., <em>A. unicolora</em></td>
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<td></td>
<td>Maloukou Trechot</td>
<td>03°59'58&quot; S</td>
<td>15°35'15&quot; E</td>
<td>585</td>
<td><em>A. unicolora</em></td>
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<tr>
<td></td>
<td>Rivière de la Léfini</td>
<td>02°54'30&quot; S</td>
<td>15°37'47&quot; E</td>
<td>320</td>
<td><em>A. kafula</em> sp. nov.</td>
</tr>
<tr>
<td>Tanzania</td>
<td>Akafilo</td>
<td>09°23'53&quot; S</td>
<td>34°49'17&quot; E</td>
<td>1922</td>
<td><em>A. unicolora</em></td>
</tr>
<tr>
<td></td>
<td>Iboya</td>
<td>09°25'32&quot; S</td>
<td>35°03'41&quot; E</td>
<td>1664</td>
<td><em>A. unicolora</em></td>
</tr>
<tr>
<td></td>
<td>Igima</td>
<td>09°13'14&quot; S</td>
<td>34°46'29&quot; E</td>
<td>1888</td>
<td><em>A. unicolora</em></td>
</tr>
<tr>
<td></td>
<td>Igominyi</td>
<td>09°27'14&quot; S</td>
<td>34°57'42&quot; E</td>
<td>1668</td>
<td><em>A. unicolora</em></td>
</tr>
<tr>
<td></td>
<td>Itambo</td>
<td>09°12'51&quot; S</td>
<td>34°46'38&quot; E</td>
<td>1888</td>
<td><em>A. unicolora</em></td>
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<tr>
<td></td>
<td>Kifanyia</td>
<td>09°33'27&quot; S</td>
<td>35°06'15&quot; E</td>
<td>1675</td>
<td><em>A. unicolora</em></td>
</tr>
<tr>
<td></td>
<td>Kifanya 3</td>
<td>09°30'55&quot; S</td>
<td>35°04'59&quot; E</td>
<td>1685</td>
<td><em>A. unicolora</em></td>
</tr>
<tr>
<td></td>
<td>Lilomwi</td>
<td>09°36'12&quot; S</td>
<td>35°10'53&quot; E</td>
<td>1555</td>
<td><em>A. unicolora</em></td>
</tr>
<tr>
<td></td>
<td>Lukumburu</td>
<td>09°40'03&quot; S</td>
<td>35°16'54&quot; E</td>
<td>1299</td>
<td><em>A. kafula</em> sp. nov., <em>A. unicolora</em></td>
</tr>
<tr>
<td></td>
<td>Masumbo-Ifunda</td>
<td>08°02'04&quot; S</td>
<td>35°28'45&quot; E</td>
<td>1752</td>
<td><em>A. unicolora</em></td>
</tr>
<tr>
<td></td>
<td>Mbizi Forest</td>
<td>07°54'33&quot; S</td>
<td>31°40'29&quot; E</td>
<td>2147</td>
<td><em>A. unicolora</em></td>
</tr>
<tr>
<td></td>
<td>Ngongwa</td>
<td>09°29'40&quot; S</td>
<td>35°03'08&quot; E</td>
<td>1662</td>
<td><em>A. unicolora</em></td>
</tr>
<tr>
<td></td>
<td>Sao Hill 2</td>
<td>08°27'25&quot; S</td>
<td>35°10'02&quot; E</td>
<td>1845</td>
<td><em>A. kavumba</em> sp. nov., <em>A. unicolora</em></td>
</tr>
<tr>
<td></td>
<td>Talia</td>
<td>09°16'11&quot; S</td>
<td>35°03'41&quot; E</td>
<td>1734</td>
<td><em>A. unicolora</em></td>
</tr>
<tr>
<td></td>
<td>Wino</td>
<td>09°44'30&quot; S</td>
<td>35°18'20&quot; E</td>
<td>1444</td>
<td><em>A. unicolora</em></td>
</tr>
<tr>
<td></td>
<td>Yakobi</td>
<td>09°24'41&quot; S</td>
<td>34°56'22&quot; E</td>
<td>1693</td>
<td><em>A. unicolora</em></td>
</tr>
<tr>
<td>Uganda</td>
<td>Bwindi Forest</td>
<td>01°01'05&quot; S</td>
<td>29°45'32&quot; E</td>
<td>2203</td>
<td><em>A. simillima</em> sp. nov.</td>
</tr>
<tr>
<td></td>
<td>Itojo</td>
<td>00°50'33&quot; N</td>
<td>30°13'08&quot; E</td>
<td>1070</td>
<td><em>A. kafula</em> sp. nov., <em>A. parvaclara</em></td>
</tr>
<tr>
<td></td>
<td>Kanga-Bukama</td>
<td>00°12'54&quot; S</td>
<td>30°05'37&quot; E</td>
<td>1277</td>
<td><em>A. parvaclara</em></td>
</tr>
<tr>
<td></td>
<td>Katonga</td>
<td>00°01'35&quot; S</td>
<td>32°00'57&quot; E</td>
<td>1151</td>
<td><em>A. parvaclara</em></td>
</tr>
<tr>
<td></td>
<td>Kayanga- Kalinzu Forest</td>
<td>00°22'02&quot; S</td>
<td>30°06'43&quot; E</td>
<td>1447</td>
<td><em>A. simillima</em> sp. nov., <em>A. parvaclara</em></td>
</tr>
<tr>
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<td>Kazizi</td>
<td>00°33'52&quot; N</td>
<td>30°49'07&quot; E</td>
<td>1251</td>
<td><em>A. micantha</em> sp. nov.</td>
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<td></td>
<td>Kibale E Forest</td>
<td>00°38'45&quot; N</td>
<td>30°24'16&quot; E</td>
<td>1565</td>
<td><em>A. simillima</em> sp. nov.</td>
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<tr>
<td></td>
<td>Mihungwa</td>
<td>00°21'20&quot; N</td>
<td>30°01'32&quot; E</td>
<td>1756</td>
<td><em>A. simillima</em> sp. nov.</td>
</tr>
</tbody>
</table>
MNHN = Muséum national d’Histoire naturelle, Paris, France
MRAC = Royal Museum for Central Africa, Tervuren, Belgium
NMKE = National Museum of Kenya, Nairobi, Kenya
PM = Pretoria Museum, Pretoria, South Africa
TMSA = Ditsong National Museum of Natural History, Pretoria, South Africa

The holotypes of the new species were deposited in MNHN and paratypes were deposited in MNHN and NMKE.

### DNA Extraction and Sequencing

For this study, 67 specimens of *Acrapex* were selected for the molecular analyses, including 60 individuals from the *A. unicolora* group. We also included one representative of the *A. stygiata* species group (*A. stygiata*) and five representatives of the *A. albivena* species group (*A. albivena* Hampson, 1910, *A. salmona* Le Ru, 2014, *A. sporobola* Le Ru, 2014, *A. syscia* Fletcher, 1961 and *A. yakoba* Le Ru, 2014).

As outgroups, we included representatives of four other genera in the subtribe Sesamiina based on the results of several molecular studies (Toussaint et al. 2012; Le Ru et al. 2014). DNA was extracted from hind legs using Qiagen DNAeasy tissue kits (Qiagen, Hilden, Germany). Polymerase chain reaction (PCR) amplifications were conducted for four mitochondrial gene fragments: a 681 bp region of the cytochrome c oxidase subunit I (COI), 1038 bp of cytochrome b (Cytb), 389 bp of the ribosomal 12S RNA (12S) and 539 bp of the ribosomal 16S RNA (16S). Two nuclear gene regions were also sequenced: 835 bp of the 28S ribosomal DNA (28S) and 1230 bp of the elongation factor-1α (EF1α). For both genes we used the primers and settings detailed in Kergoat et al. (2012). Resulting PCR products were processed by the French sequencing center Genoscope using a BigDye v. 3.1 sequencing kit and Applied 3730xl sequencers. Both strands were sequenced for all specimens to minimize PCR artefacts and ambiguities. Sequences of complementary strands were automatically edited and reconciled using Geneious v. 5.1 software (available from [www.geneious.com](http://www.geneious.com/)). All the sequences generated in this study were deposited in GenBank (see Appendix for the accession numbers). Unlike the sequences of coding genes (COI, Cytb and EF1α), the sequences of ribosomal genes (12S, 16S and 28S) were variable in length. Their alignment was accomplished using MAFFT v. 7 (Katoh & Standley 2013) with default option settings. For all protein-coding genes, we used Mesquite v. 3.04 (available from [www.mesquiteproject.org](http://www.mesquiteproject.org)) to check the coding frame for possible errors or stop codons. The combination of the six gene fragments resulted in a combined dataset of 71 specimens and 4712 aligned characters.
Phylogenetic and molecular species delimitation analyses

Maximum likelihood (ML) was used to infer phylogenetic relationships on the combined dataset. To improve phylogenetic accuracy we carried out partitioned analyses (Nylander et al. 2004). Partitions and substitution models were determined using PartitionFinder v. 1.1.1 (Lanfear et al. 2012), based on the corrected Akaike information criterion (AICc). Maximum Likelihood analyses were carried out with the recently developed IQ-TREE (Nguyen et al. 2015), using the web server at http://iqtree.cibiv.univie.ac.at/. IQ-TREE optimises the ML search by focusing on local optima and comparing them to find the best ML tree, and it has been shown to potentially outperform other ML programs (Nguyen et al. 2015). Based on the AICc results we used four partitions (Table 2), with the corresponding models of substitutions being determined using the Auto function on the IQ-TREE web server, following the authors’ recommendations. Clade support was then assessed under IQ-TREE using ultrafast bootstrap replicates (Minh et al. 2013) (1000 replicates were used); nodes supported by bootstrap values (BV) ≥ 70% were considered strongly supported following Hillis & Bull (1993).

For molecular species delimitation procedures, we relied on Poisson-tree-processes (PTP) analyses (Zhang et al. 2013). With the PTP model, speciation or branching events are modelled in terms of number of substitutions (represented by branch lengths). This approach has the advantage of not requiring the inference of an ultrametric tree, which is usually a time-consuming and potentially error-prone process (Astrin et al. 2012; Tang et al. 2014); it has also recently been used in several noctuid groups, providing relevant results from a morphological and ecological point of view (Le Ru et al. 2014, 2015; Dumas et al. 2015). Corresponding analyses were conducted on the web server of the Exelixis Lab (http://species.h-its.org/ptp/), with default settings and using the best ML tree from the IQ-TREE analysis.

Results

Morphological study

After having cross-checked against museum types to avoid coincidence of synonymies, we provide morphological evidence that Acrapex Hampson, 1894 and the monotypic Poecopa Bowden, 1956 are synonyms, with Acrapex being the senior synonym. We also establish that Acrapex cuprescens (Hampson, 1910) and Acrapex rufidorsata (Hampson, 1910) comb. nov. are synonyms and that Acrapex unicolora (Hampson, 1910), Acrapex brunneosa Bethune-Baker, 1911, Busseola fuscantis Hampson, 1918, Acrapex simplex Janse, 1939, Acrapex hemiphlebia (Hampson, 1914) and Acrapex quadrata Berio, 1973 are synonyms as well. We present descriptions of five new species: A. kafula sp. nov. and A. kavumba sp. nov. from Zambia; A. kiakouama sp. nov. from the Republic of the Congo; A. miscantha sp. nov. from Uganda; A. simillima sp. nov. from Kenya and Uganda. We also provide a supplemental description of the previously described species, with male and female genitalia presented for the first time for A. parvaclara and A. unicolora.
**Taxonomy**

Order Lepidoptera Linnaeus, 1758  
Family Noctuidae Latreille, 1809  
Subfamily Noctuidae Latreille, 1809  
Tribe Apameini Boisduval, 1828  
Subtribe Sesamiina Fibiger & Goldstein, 2005

Genus **Acrapex** Hampson, 1891

**Acrapex cuprescens** (Hampson, 1910)  
Figs 1A–F, 2A–I, 3A

*Busseola cuprescens* Hampson, 1910: 162.  
*Busseola ruviolata* Hampson, 1910: 163.

**Acrapex cuprescens** – Poole 1989: 19 (recombination, catalogue).  

**Diagnosis**

Male easily separated from males of other species of the group by the short and stout, slightly curved aedeagus and the vesica with a tuft of needle-shaped, horizontally oriented cornutus (Fig. 2I); female easily separated from females of other species of the group by the small sclerotized area of the ductus bursae on ostial side, half the length of the ductus bursae, and with the ventral plate of the ostium bursae sclerotized, slightly bilobate and invaginated on the back side (Fig. 3A).

**Material examined**

**Holotype**


**Other material**

NIGERIA: 1 ♂, same locality as holotype; ♀, holotype of *Busseola ruviolata*, Niger Province, Minna, 30 Sep. 1910, coll. Scott Macfie, 1911-269 (BMHN, Agrotidae genitalia slide 2273).

**Description**

The descriptions of the external features of the male holotype and of the female holotype of *B. ruviolata*, by Hampson (1910) were accurate. The male looks very similar to the female; however, the general shape of the female’s fore wing is more elongated at the apex (Figs 1A–B, E–F). Descriptions of the genitalia of both sexes were not provided by Hampson (1910).

WINGSPAN. 20 mm (2 ♀♀); 30 mm (1 ♀).

**Male genitalia** (Fig. 2A, I). Uncus long, widening in distal third, truncated at apex, tufted with long hairs on upper side. Tegumen with medium-sized rounded penniculi, vinculum pointed, with medium-sized triangular saccus, valves short and broad, cucullus rounded and tufted, with medium-sized hairs, coastal margin slightly broadened on inner side and produced into a strong, tooth-shaped spine, rounded pointed and slightly curved inwardly; juxta large, plate-like, widening to the top without sclerotisation. Aedeagus short, stout, slightly curved, with two lateral areas adorned with short setae; hand-shaped vesica with a tuft of needle-shaped, horizontally oriented cornutus.
Fig. 1. Adults of species of *Acrapex*. – **A–F.** *A. cuprescens* (Hampson, 1910). **A.** ♂, upper side. **B.** ♂, under side. **C.** ♂, original labels from BMNH. **D.** ♀, original labels from BMNH. **E.** Upper side. **F.** Under side. – **G–J.** *A. kafula* le Ru sp. nov. **G.** ♂, upper side. **H.** ♂, under side. **I.** ♀, upper side. **J.** ♀, under side. Scale bars = 3 mm.
FEMALE GENITALIA (Fig. 3A). Corpus bursae short and globular, without signum; ductus bursae short, one third as long as corpus bursae, with a small sclerotized area on ostial side, half length of ductus bursae; ductus seminalis from basal part of bursa; ventral plate of ostial bursae sclerotized, slightly bilobate and

invaginated on back side, dorsal plate large, broad and weakly sclerotized. Ovipositor lobes relatively short and wide (twice as long as wide), with bluntly pointed apex, dorsal surface bearing numerous short and stout setae.

**Bionomics**

Biology unknown.

**Distribution**

Nigeria. Only known from the type locality. The record is from lowland rain forest and secondary grassland (Mosaic #11) (White 1983) (Fig. 4), belonging to the Sudanian bioregion (Linder et al. 2012) (Fig. 5).

![Images of female genitalia of species of Acrapex](image-url)  
**Fig. 3.** Female genitalia of species of Acrapex. A. *A. cuprescens* (Hampson, 1910). B. *A. kafula* le Ru sp. nov. C. *A. kiakouama* le Ru sp. nov. D. *A. mediopuncta* (Bowden, 1956). E. *A. miscantha* le Ru sp. nov. F. *A. parvaclara* Berio, 1973. G. *A. simillima* le Ru sp. nov. H. *A. unicolora* (Hampson, 1910). Scale bars = 1 mm.
Acrapex kafula Le Ru sp. nov.
urn:lsid:zoobank.org:act:B727D00A-7E31-4B44-9B33-E6DC82D548B2
Figs 1G–J, 2B, J, 3B

**Diagnosis**
Male easily separated from males of other species of the group by the shovel-shaped uncus (at the apex) and the distal part of the aedeagus (grooved-shaped), with the vesica having a basal tuft of needle-shaped cornutus, pointed downward (Fig. 2B, J). Female easily separated from females of other species of the group by the very short ductus bursae, with a strongly sclerotised funnel-shaped connection with the ostium; antrum sclerotized, with a large, broad ventral plate, slightly bilobate, widening to the front, the anterior part shaped like a thin lip and more sclerotized than the posterior part, slightly concave (Fig. 3B).

**Etymology**
Named after the village of Kafulo in Zambia.

**Type material**

**Holotype**

**Paratypes**
KENYA: 2 ♂♂, 2 ♀♀, Nyanza Province, edge of Ruma Park, 00°36.293' S, 34°16.046' E, 1221 m a.s.l., 14 Nov. 2012, ex light trap, B. Le Ru leg. (MNHN, gen. prep. LERU Bruno/G511-G513-G529); 1 ♂, Central Province, Ruiru Aukland, 01°05.063' S, 36°55.621' E, 1595 m a.s.l., Jun. 2011 (MNHN).
UGANDA: 2 ♂♂, Western Region, Itojo, 00°50.546' N, 30°13.131' E, 1070 m a.s.l., 22 May 2014, ex light trap (MNHN, gen. prep. LERU Bruno/G714).
ZAMBIA: 1 ♂, same date and locality as holotype, ex. light trap, B. Le Ru leg. (MNHN, gen. prep. LERU Bruno/G178); 1 ♀, same date and locality as holotype, ex light trap (MNHN, gen. prep. LERU Bruno/G165).

**Description**
Both sexes look similar; however, general shape of female fore wing more elongated at apex than in male and fore wings paler in females (Fig. 1G–J); antennae bright fuscous dorsally and ochreous ventrally, filiform in female and slightly ciliate in male; flagellum adorned dorsally with black scales, palpus cupreous brown, eyes fuscous. Head and base of thorax brown, thorax becoming gradually fuscous; legs brown-ringed with buff, buff on inner surface; abdomen fuscous, irrorated with buff scales.
FORE WING. Ground colour ochreous in both sexes, suffused with fuscous scales, more heavily along veins and costal area, particularly in males; reniform indicated by a few white scales, preceded by some brown scales; longitudinal brown median fascia along lower external margin of cell, ending obliquely at apex; veins below cell adorned with white, fuscous and brown scales; postmedial row of white spots on veins; row of black elongated spots between veins on margin; fringe whitish externally, fuscous suffused with brown internally. Underside of fore wing with ground colour fuscous, densely suffused with brown scales.

HIND WING. Ground colour white, veins slightly irrorated, with fuscous scales, costa and apex more heavily suffused with fuscous scales; hind wing of males much more suffused with fuscous scales than in females; fringe white, suffused with fuscous and adorned with narrow fuscous line. Underside of hind wing white, suffused with fuscous scales but much more heavily on costa and apex; veins slightly irrorated, with fuscous scales.

WINGSPAN. 18–22 mm (6 ♂♂); 21–25 mm (5 ♀♀).

MALE GENITALIA (Fig. 2B, J). Uncus long, widening in distal third, shovel-shaped at apex, tufted with long hairs on upper side. Tegumen with medium-sized rounded penniculi, vinculum pointed, with medium-sized triangular saccus, valves short and broad, cucullus rounded and tufted with medium-sized hairs,

Fig. 4. Distribution map of sampled specimens of Acrapex Hampson, 1891.
coastal margin slightly broadened on inner side and produced into strong, tooth-shaped spine, strongly sclerotized at apex, pointed and slightly curved inwardly; juxta large, plate-like, without sclerotisation. Aedeagus short, slightly curved, with two lateral areas adorned with short setae; hand-shaped vesica with basal tuft of needle-shaped cornutus, pointed downward.

**Female genitalia** (Fig. 3B). Corpus bursae elongated ovoid and globular without signa; ductus bursae very short, with strongly sclerotised, funnel-shaped connection with ostium; antrum sclerotized, with large, broad ventral plate, slightly bilobate, widening to the front, anterior part shaped like a thin lip, more sclerotized than posterior part, slightly concave; dorsal plate small, weakly sclerotized. Ovipositor lobes relatively short (2.2 times as long as wide), with pointed apex, dorsal surface bearing numerous short and stout setae.

**Bionomics**

Biology unknown. The moths were caught in a light trap in grasslands near marshes.

**Distribution**

Cameroon, Kenya, the Republic of the Congo, Tanzania, Uganda and Zambia. Moths were found in a mosaic of lowland rainforest and secondary grassland (Mosaic #11), in a mosaic of Zambezian dry evergreen forest and wetter miombo woodland (Mosaic #21), in a mosaic of East African evergreen bushland and secondary Acacia wooded grassland (Mosaic #45) and in undifferentiated montane vegetation (Mosaic #19) (White 1983) (Fig. 4), belonging to the Congolian and Zambezian bioregions (Linder *et al.* 2012) (Fig. 5).

*Acrapex kavumba* Le Ru sp. nov.

urn:lsid:zoobank.org:act:17B55911-C7C0-4733-B131-D9C0C59FE72A

Figs 2C, K, 6A–B

**Diagnosis**

Males easily separated from males of other species of the group by the spoon-shaped cucullus and the turn of the hand-shaped vesica being adorned with a large tuft of needle-shaped cornutus (Fig. 2C, K).

![Fig. 5. Major bioregions, modified after Linder *et al.* (2012).](image-url)
Etymology
Named after the village of Kavumba in Zambia.

Type material

Holotype

Paratypes


Description
Only the male is known (Fig. 6A–B); antennae cupreous brown dorsally and ochreous ventrally, slightly ciliate; flagellum adorned dorsally with white scales, palpus cupreous brown, adorned with white scales, eyes fuscous. Head and base of thorax brown, thorax becoming gradually ochreous; legs brown-ringed with white; abdomen brown irrorated with fuscous scales, extremity of abdomen densely suffused with buff scales.

Fore wing. Ground colour dark ochreous, suffused with fuscous and brown scales, more heavily along veins and in costal area; reniform indicated by few white scales, preceded by some brown scales; longitudinal brown median fascia along lower external margin of cell, ending obliquely at apex; veins below cell adorned with white, fuscous and brown scales; postmedial row of white spots on veins; row of black elongated spots between veins on margin; fringe whitish externally, ochreous suffused with brown internally. Underside of fore wing with ground colour brown, suffused with fuscous scales on costa.

Hind wing. Uniformly brown; fringe white suffused with fuscous and adorned with narrow fuscous line. Underside of hind wing brown, suffused with fuscous scales.

Wingspan. 21–23 mm (4 ♂♂).

Male genitalia (Fig. 2C, K). Uncus long, widening in distal third, truncated at apex, tufted with long hairs on upper side. Tegumen with medium-sized rounded peniculi, vinculum pointed, with medium-sized triangular saccus, valves short and broad, cucullus spoon-shaped and tufted with medium size hairs, coastal margin slightly broadened on inner side and produced into narrow, straight, long lobe, roundly pointed; juxta oblong, pear-shaped, with long and wide neck, elongate bifid. Aedeagus short, slightly curved, with two lateral areas adorned with short setae; turn of hand-shaped vesica with large tuft of needle-shaped cornutus.

Bionomics
One larva was collected at the bottom of a stem of a Hyparrhenia sp. growing in grasslands near marshes (Table 3); like many species of Acrapex, A. kavumba sp. nov. is a markedly hygrophilous species. Unfortunately, no pictures were taken before pupation. All the moths were caught in a light trap in grasslands near marshes.
Distribution
Tanzania and Zambia. The records are from a mosaic of Zambezian dry evergreen forest and wetter miombo woodland (Mosaic #21) (White 1983) (Fig. 4), belonging to the Zambezian bioregion (Linder et al. 2012) (Fig. 5).

**Acrapex kiakouama** Le Ru sp. nov.

urn:lsid:zoobank.org:act:5FD4E344-68BA-423B-AF86-347CAD502914

Figs 2D, L, 3C, 6C–F

**Diagnosis**
Male easily separated from males of other species of the group by the uncus being shovel-shaped at the apex and by the large, plate-like juxta, with a narrow pyriform base and a long and widening, slightly sclerotised neck (Fig. 2D); female easily separated from females of other species of the group by having the antrum strongly sclerotized, with a large, broad ventral plate, bilobate, widening to the front, anterior part shaped like a fleshy lip, the posterior part concave (Fig 3C).

**Etymology**
Named after Kiakouama, the technician who collected this species in the Republic of the Congo.

**Type material**

**Holotype**

**Paratypes**
REPUBLIC OF THE CONGO: 4 ♀♀, same date and locality as holotype, ex light trap, B. Le Ru leg. (MNHN, gen. prep. LERU Bruno/G533-G537-G781); 4 ♂♂, same date and locality as holotype, ex light trap, B. Le Ru leg. (MNHN, gen. prep. LERU Bruno/G536); 1 ♂, Kouilou Province, Lac Loubi, 04°53.573' S, 11°55.535' E, 4 m a.s.l., 16 Apr. 2013, ex light trap, B. Le Ru leg. (MNHN).

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**Table 3. Host plants on which larvae of the Acrapex unicolora group were collected.**

<table>
<thead>
<tr>
<th>Acrapex species</th>
<th>Host plant species</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. kavumba sp. nov.</td>
<td>Hyparrhenia sp.</td>
</tr>
<tr>
<td>A. mediopuncta</td>
<td>Pennisetum purpureum Schumach.</td>
</tr>
<tr>
<td></td>
<td>Rottboellia compressa L.</td>
</tr>
<tr>
<td></td>
<td>Setaria megaphylla (Stead) Dur. &amp; Schinz.</td>
</tr>
<tr>
<td></td>
<td>Sorghum arundinaceum (Desv.) Stapf</td>
</tr>
<tr>
<td>A. miscantha sp. nov.</td>
<td>Miscanthus violaceus (K. Schum.) Pilg.</td>
</tr>
<tr>
<td>A. simillima sp. nov.</td>
<td>Setaria megaphylla (Stead) Dur. &amp; Schinz.</td>
</tr>
<tr>
<td>A. unicolora</td>
<td>Andropogon gayanus Kunth</td>
</tr>
<tr>
<td></td>
<td>Chrysopogon zizanoides (L.) Roberty</td>
</tr>
<tr>
<td></td>
<td>Cymbopogon giganteus Chiov.</td>
</tr>
<tr>
<td></td>
<td>Cymbopogon nardus (L.) Rendle</td>
</tr>
<tr>
<td></td>
<td>Hyparrhenia diplandra (Hack.) Stapf</td>
</tr>
<tr>
<td></td>
<td>Setaria sphacelata (Schumach.) Moss</td>
</tr>
</tbody>
</table>

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**Description**

Both sexes look similar; however, the general shape of the female fore wing is more elongated at the apex than in the male and is paler (Fig. 6C–F); antennae bright ochreous dorsally and ochreous ventrally, filiform in female and slightly ciliate in male; flagellum adorned dorsally with grey scales, palpus ochreous grey, eyes fuscous brown. Head and base of thorax bright brown, thorax ochreous; legs ochreous, ringed with grey white; abdomen grey.

**FORE WING.** Ground colour bright ochreous in both sexes, suffused with fuscous and brown scales, more heavily along veins and costal area, particularly in male; reniform indicated by few white scales, surrounded by some brown scales; longitudinal brown median fascia along lower external margin of cell, ending obliquely at apex; veins below cell adorned with white and fuscous scales; row of black elongated spots between veins on margin; fringe grey externally, ochreous suffused with fuscous internally. Underside of fore wing with ground colour ochreous, densely suffused with brown scales.

**HIND WING.** Ground colour pale ochreous in male, more whitish in female; veins slightly irrorated, with fuscous scales, costa and apex more heavily suffused with fuscous scales; hind wing of male much more suffused with fuscous scales than that of female; fringe pale ochreous, suffused with fuscous and adorned with narrow fuscous line. Underside of hind wing pale ochreous in male, more whitish in female, suffused with brown scales but much more heavily on costa and apex; veins slightly irrorated with pale fuscous scales.

**WINGSPAN.** 16–18 mm (4♂♂); 20–23 mm (7♀♀).

**MALE GENITALIA** (Fig. 2D, K). Uncus long, widening in distal third, shovel-shaped at apex, tufted with long hairs on upper side. Tegumen with medium-sized rounded peniculi, vinculum pointed, with medium-sized triangular saccus, valves short and broad, cucullus rounded and tufted, with medium-sized hairs, coastal margin slightly broadened on the inner side and produced into strong tooth-shaped spine, strongly sclerotized at apex, pointed and curved inwardly; juxta large, plate-like, base pyriform, without sclerotization, with long and widening, slightly sclerotized neck. Aedeagus short, slightly curved, with two lateral areas adorned with short setae; hand-shaped vesica with basal tuft of needle-shaped cornutus, pointed obliquely downward.

**FEMALE GENITALIA** (Fig. 3C). Corpus bursae long and globular, without signa; ductus bursae very short, with strongly sclerotized funnel-shaped connection with ostium; antrum strongly sclerotized, with large, broad ventral plate, bilobate, widening to the front, anterior part shaped like a fleshy lip, posterior part concave; dorsal plate small, weakly sclerotized. Ovipositor lobes relatively short (2 times as long as wide), with pointed apex, dorsal surface bearing numerous short and stout setae.

**Bionomics**

Biology unknown. The moths were caught in a light trap in grasslands near marshes.

**Distribution**

Republic of the Congo. Known from two close localities only in the Kouilou region, south coast of Pointe Noire. Moths were found in a mosaic of lowland rain forest and secondary grassland (Mosaic #11A) (White 1983) (Fig. 4), belonging to the Congolian bioregion (Linder et al. 2012) (Fig. 5).

*Acrapex malagasy* Viette, 1967

Figs 2E, M, 6G–I


**Diagnosis**
Easily separated from other species of the group by the large, plate-like juxta, with the base slightly flattened, without sclerotization, with a long and widening neck, ending on each side in a rounded apex, on both sides tufted with small-sized hairs (Fig. 2E).

**Material examined**

**Holotype**

**Paratype**
MADAGASCAR: 2 ♂♂, same locality and date as holotype (MNHN); 3 ♂♂, same locality as holotype, 8 Nov. 1954, P. Viette leg. (MNHN, gen. prep. 4438).

**Description**
The description of the external features of the holotype by Viette (1967) was accurate (Fig. 6G–H).

**Wingspan.** 17–20 mm (♂♂) according to Viette (1967); however, only one specimen is preserved in MNHN.

**Male genitalia** (Fig. 2E, M). (After Viette 1967) Additional description: juxta large, plate-like, base slightly flattened, without sclerotization, with long and widening neck, ending on each side in rounded apex, on both sides tufted with small-sized hairs; aedeagus short, stout, not curved, with two lateral areas adorned with short setae; hand-shaped vesica with tuft of needle-shaped cornutus, pointed obliquely downward.

**Bionomics**
Biology unknown.

**Distribution**
Madagascar. Only known from the type locality. The record is from secondary grassland replacing upland and montane forest (Mosaic #18) (White 1983) (Fig. 4), belonging to the Sudanian bioregion (Linder et al. 2012) (Fig. 5).

**Acrapex mediopuncta** (Bowden, 1956) comb. nov.
Figs 2F, N, 3D, 7A–E

**Poecopa mediopuncta** Bowden, 1956: 418–420, figs 6–9.

**Poecopa mediopuncta** – Poole 1989: 818 (catalogue).

**Diagnosis**
Male easily separated from males of other species of the group by the broadly based, stout, strongly curved cornutus, pointed downward at a right angle (Fig. 2N); female easily separated from females of other species of the group by the small sclerotized area at the base of the ductus bursae and the weakly sclerotized antrum (Fig. 3D).

**Material examined**

**Holotype**
**Allotype**

**Paratype**
GHANA: 1 ♂, same locality and date as allotype; 12 paratypes of both sexes were recorded in the original description; only one was found in BMNH.

**Other material**

**Description**
The descriptions of the external features of the male holotype and female allotype by Bowden (1956) were accurate. The male looks very similar to the female; however, the general colour of the fore wing is a little bit darker in the male than in the female (Fig. 7A–D).

**Wingspan.** 20–32 mm (3 ♂); 33 mm (1 ♀).

**Male and female genitalia** (Figs 2F, N, 3D). The genitalia of both sexes were described by Bowden (1956) with sufficient detail; however, it should be added that the vesica of the aedeagus is hand-shaped with a stout, broadly based, strongly curved cornutus, pointed downward at a right angle.

**Bionomics**
*Acrapex mediopuncta* is a markedly forest species inhabiting open patches of grasses along forest roads. Larvae collected in Ghana were reported from *P. purpureum*, *R. compressa*, *S. arundinaceum* and *S. megaphylla* (Bowden 1956) (Table 3). The few larvae collected in Cameroon, the Democratic Republic of the Congo and the Republic of the Congo by our group were all from *S. megaphylla*; unfortunately, no pictures were taken before pupation. Larvae were collected at the bottom of young stems and were always solitary. Typically, plants exhibiting signs of infestation by *A. mediopuncta* larvae have a curled, brown, central leaf. No pupae were found in the stems, and therefore the borers probably pupate in the soil near exit holes.

**Distribution**
Cameroon, the Democratic Republic of the Congo, Ghana and the Republic of the Congo. The records are from Guineo-Congolian rain forests, lowland rain forests and secondary grassland vegetation mosaics (Mosaics #1–3) (White 1983) (Fig. 4), belonging to the Congolian bioregion (Linder *et al.* 2012) (Fig. 5).

**Acrapex miscantha** Le Ru sp. nov.
urn:lsid:zoobank.org:act:A4657886-D162-4D14-BCD4-46C7A02CC426
Figs 3E, 7F–G

**Diagnosis**
Female easily separated from females of other species of the group by the strongly curved and tooth-shaped ovipositor lobes (Fig. 3E).

**Etymology**
Named after the host-plant *Miscanthus violaceus* (K.Schum.) Pilg. in Uganda.
Material examined

Holotype
UGANDA: ♀, Occidental Province, Kyenjojo, Kazizi, 00°33.865' N, 30°49.117' E, 1251 m a.s.l., 24 May 2014, ex larva (in stems of Miscanthus violaceus), B. Le Ru leg. (MNHN, gen. prep. LERU Bruno/G734).

Fig. 7. Adults of species of Acrapex. – A–E. A. mediopuncta (Bowden, 1956). A. ♂, upper side. B. ♂, under side. C. ♀, upper side. D. ♀, under side. E. ♀, original labels from BMNH. – F–G. A. miscantha le Ru sp. nov. F. ♂, upper side. G. ♀, under side. Scale bars = 10 mm.
Description (Fig. 7F–G)
Antennae fuscous dorsally and ochreous ventrally, filiform; flagellum adorned dorsally with black scales, palpus fuscous, eyes black. Head and base of thorax black, thorax ochreous; legs fuscous suffused with white scales, ringed with white; abdomen fuscous, dorsally suffused with grey scales, black ventrally, suffused with grey scales.

Fore wing. Ground colour dark ochreous, suffused with fuscous, black and white scales, more heavily along veins and costal area; reniform indicated by few white scales, surrounded by some black scales; irrorated ochreous median area extended on distal side to termen; longitudinal grey median fascia along lower external margin of cell, ending obliquely at apex, adorned with two black elongated spots between veins; veins below cell adorned with grey, white and black scales; fringe grey white, slightly suffused with fuscous. Underside of fore wing with ground colour grey white, suffused with fuscous and some brown scales, more heavily on costa and close to termen.

Hind wing. Ground colour white, strongly suffused with fuscous scales; veins slightly irrorated with fuscous scales, costa and apex more heavily suffused with fuscous scales; fringe grey white, suffused with fuscous. Underside of hind wing grey-white, suffused with fuscous scales, but much more heavily on costa and apex; veins slightly irrorated with fuscous scales.

Wingspan. 22 mm (1 ♂).

Female genitalia (Fig. 3E). Corpus bursae elongated ovoid and globular, without signa; ductus seminalis from base of bursae; ductus bursae about one third length of corpus bursae, not sclerotised on bursa side, widening and sclerotised on ostial side; antrum narrow, band-like, slightly sclerotised, leaning on back and adorned with very narrow and strongly sclerotised plate divided in two in the middle. Ovipositor lobes relatively short (2 times as long as wide), with dorsal surface bearing numerous short and stout setae, apex of each lobe strongly curved and tooth-shaped.

Bionomics
Larvae were collected at the bottom of stems of *M. violaceus* growing in grasslands near marshes (Table 3); as many *Acrapex* species, *A. miscantha* sp. nov. is a markedly hygrophilous species. Unfortunately, no pictures were taken before pupation.

Distribution
Uganda. Only known from the holotype locality in Occidental Province close to Kyenjojo. This species was found in a mosaic of East African evergreen bushland and secondary *Acacia* wooded grassland (Mosaic #45) (White 1983) (Fig. 4), belonging to the Congolian bioregion (Linder *et al*. 2012) (Fig. 5).

*Acrapex parvaclara* Berio, 1973
Figs 2G, O, 3F, 8A–D

*Acrapex parvaclara* Berio, 1973: 150–152, fig. 33.


Diagnosis
Male easily separated from males of other species of the group by the small rounded protuberance on each side of the apex of the juxta and by the small curved, hand-shaped vesica (Fig. 2G, O); female easily separated from females of other species of the group by the strongly sclerotized antrum, with a
large, broad ventral plate, slightly bilobate, widening to the front, the anterior part shaped like a thin lip, the posterior part concave (Fig. 3F).

**Material examined**

**Holotype**


**Paratypes**

DEMOCRATIC REPUBLIC OF THE CONGO: 2 ♂♂, Sankuru, Dimbelenge, Apr. 1951, Dr Fontaine leg. (MNHN); 1 ♂, Sankuru, Lac Hukauda, Nov. 1951, Dr Fontaine leg. (MNHN); 1 ♂, Kindu, Dr Russo leg. (MNHN); 1 ♂, Katanga, Kimbai, Dec. 1925, Ch. Seydel leg. (MCSN).

**Other material**

CAMEROON: 1 ♀, Northwest Region, Babessi, 06°01.926' N, 10°33.112' E, 1203 m a.s.l., Dec. 2013, ex light trap (MNHN, gen. prep. LERU Bruno/G636); 1 ♂, Northwest Region, Ndop, 05°58.670' N, 10°24.410' E, 1182 m a.s.l., 4 Dec. 2013, ex light trap (MNHN, gen. prep. LERU Bruno/G605).

UGANDA: 1 ♂, Kalinzu Forest, T.H.E. Jackson leg., B.M.E Afr. Exp. B.M. 1985-203 (BMNH, Noctuidae genitalia slide 2466); 1 ♀, South Buganda Region, Katonga, 00°01.577' S, 32°00.958' E, 1151 m a.s.l., 28 May 2014, ex light trap (MNHN, gen. prep. LERU Bruno/G715); 3 ♀♀, Western Region, Itojo, 00°50.546' N, 30°13.131' E, 1077 m a.s.l., 21 May 2014, ex light trap (MNHN, gen. prep. LERU Bruno/G712).


**Redescription** (Fig. 8A–D)

Both sexes look similar; however, the general shape of the female fore wing is more elongated at the apex than in the male and fore wings are also paler in females; antennae ochreous, filiform in female, slightly ciliate in male; flagellum fuscous, adorned dorsally with black scales, palpus fuscous, eyes brown. Head and base of thorax fuscous, thorax ochreous; legs ochreous, ringed with white; abdomen fuscous, suffused with grey scales.

**FORE WING.** Ground colour ochreous, suffused with fuscous, black and white scales, more heavily along veins and costal area; reniform indicated by few white scales, surrounded by some black scales; row of black elongated spots on veins in front of reniform; longitudinal fuscous median fascia along lower external margin of cell, ending obliquely at apex; veins below cell adorned with fuscous scales; row of black elongated spots between veins on margin; fringe white, slightly suffused with fuscous. Underside of fore wing with ground colour ochreous, strongly suffused with fuscous and some brown scales, more heavily on costa and close to termen.

**HIND WING.** Ground colour white in female, white ochreous in male, suffused with fuscous scales; veins slightly irrated with fuscous scales, costa and apex more heavily suffused with fuscous scales; fringe white, suffused with fuscous. Underside of hind wing white, suffused with fuscous scales, but much more heavily on costa and apex; veins slightly irrated, with fuscous scales.

**WINGSPAN.** 18–22 mm (5 ♂♂); 23–25 mm (5 ♀♀).
MALE GENITALIA (Fig. 2G, O). Uncus long, widening in distal third, tapering in truncate apex, tufted with long hairs on upper side. Tegumen with medium-sized rounded penniculi, vinculum pointed, with medium-sized triangular saccus, valves short and broad, cucullus rounded and tufted with medium-sized hairs, coastal margin slightly broadened on inner side and produced into strong, tooth-shaped spine, sclerotized at apex, pointed and slightly curved inwardly; juxta large, plate-like, base slightly flattened, without sclerotization, with long and widening bilobate neck, ending on each side with small, rounded protuberance. Aedeagus short, slightly curved, with two lateral areas adorned with short setae; curved, hand-shaped vesica with basal tuft of needle-shaped cornutus, pointed obliquely downward.

FEMALE GENITALIA (Fig. 3F). Corpus bursae long and globular, without signum; ductus bursae very short, with strongly sclerotised funnel-shaped connection with ostium; antrum strongly sclerotized, with large, broad ventral plate, slightly bilobate, widening to the front, anterior part shaped like thin lip, posterior part concave; dorsal plate small, weakly sclerotized. Ovipositor lobes relatively short (2 times as long as wide), with bluntly pointed apex, dorsal surface bearing numerous short and stout setae.

Bionomics
Biology unknown. The moths were caught in a light trap in grasslands near woodlands.

Distribution
Cameroon, the Democratic Republic of the Congo, Uganda and Zambia. Known from several localities at medium altitude between 1000 and 1200 m a.s.l. Moths were found in a mosaic of lowland rainforest and secondary grassland (Mosaic #11) and from a mosaic of Zambezian dry evergreen forest and wetter miombo woodland (Mosaic #21) (White 1983) (Fig. 4), belonging to the Congolian and to the Zambezian bioregion respectively (Linder et al. 2012) (Fig. 5).

**Acrapex simillima** Le Ru sp. nov.

*urn:lsid:zoobank.org:act:336CE140-8928-451F-A33F-CC74CBBEF930*

Figs 3G, 8E–F, 9A

Diagnosis
Female easily separated from females of other species of the group by the sclerotized, band-like ventral plate, strongly concave on the front (Fig. 3G).

Etymology
The species epithet refers to the close similarity of the wing pattern with that of *A. mediopuncta* (Bowden, 1956).

Material examined
**Holotype**

**Paratypes**
KENYA: 2 ♀♀, Western Province, Kakamega Forest, 00°22.530' N, 34°53.660' E, 1430 m a.s.l., May 2007, ex larva (in stem of *Setaria megaphylla*), B. Le Ru leg. (MNHN, gen. prep. LERU Bruno/G31).

UGANDA: 3 ♀♀, same date and locality as holotype, ex light trap, B. Le Ru leg. (MNHN, gen. prep. LERU Bruno/G32, G770).
Description (Fig. 8E–F)

Antennae ochreous, filiform; flagellum ochreous, palpus ochreous, eyes black. Head and base of thorax brown, thorax ochreous; legs brown, suffused with ochreous scales, ringed with ochreous; abdomen ochreous, suffused with fuscous scales.

Fore wing. Ground colour bright ochreous, suffused with dark ochreous and fuscous scales, more heavily between veins and on costal area; reniform indicated by few white scales, surrounded by some black scales; longitudinal brown median fascia along lower external margin of cell, ending obliquely at apex, adorned with two black elongated spots between veins; row of black elongated spots between veins on margin; fringe ochreous, suffused with brown. Underside of fore wing with ground colour ochreous, heavily suffused with fuscous and brown scales.

Hind wing. Ground colour grey white, strongly suffused with fuscous scales, more heavily on costa and apex; veins slightly irrorated, with fuscous scales; fringe grey white, suffused with fuscous. Underside of hind wing grey white, suffused with fuscous scales, but much more heavily on costa and apex; veins slightly irrorated, with fuscous scales.

Wingspan. 26–32 mm (7 ♀ ♂).

Larval L5 instar (Fig. 9A). Length 20–25 mm, width 2.5 mm; head smooth, black, prothoracic shield brown; body with ground colour dark pink, pinacula and caudal plate black. Young larvae very similar to mature ones.

Female genitalia (Fig. 3G). Corpus bursae elongated, ovoid and globular, without signa; ductus seminalis from base of bursae; ductus bursae about less than half length of corpus bursae, not sclerotised on bursa side, widening and slightly sclerotised on ostial side; antrum ovoid, with sclerotized, band-like ventral plate, strongly concave on front; ovipositor lobes relatively short (2 times as long as wide), with bluntly pointed apex, dorsal surface bearing numerous short and stout setae.

Bionomics

Acrapex simillima sp. nov. is a markedly forest species, inhabiting open patches of grasses along forest roads. Larvae were all collected at the bottom of young stems of S. megaphylla (Table 3) and were always solitary. Typically, plants exhibiting signs of infestation by A. simillima sp. nov. larvae have a curled, brown central leaf. One pupa was found in a stem; however, as in most species of Acrapex, most larvae probably pupate in the soil near exit holes.

Distribution

Kenya and Uganda. The records are from Guineo-Congolian rain forests (Mosaic #1) (White 1983) (Fig. 4), belonging to the Congolian bioregion (Linder et al. 2012) (Fig. 5).
**Acrapex unicolora** (Hampson, 1910)
Figs 2H, P, 3H, 8G–J, 9B

*Calamistis unicolora* Hampson, 1910: 279, pl. 143, fig. 12.
*Acrapex brunneoosa* Bethune-Baker, 1911: 517.
*Busseola hemiphlebia* Hampson, 1914: 161.
*Busseola fuscantis* Hampson, 1918: 153.
*Acrapex simplex* Janse, 1939: 359.
*Acrapex quadrata* Berio, 1973: 150, fig. 35.

*Acrapex simplex* – Poole 1989: 21 (catalogue).

**Diagnosis**

Male easily separated from males of other species of the group by the pointed apex of the uncus, the ridge-like, roundly pointed expansion of the coastal margin and by the aedeagus having no vesica (Fig. 2H, P); female easily separated from females of other species of the group by the ductus bursae, which are widening and sclerotised on the ostial side, and by the narrow, band-like, slightly sclerotised antrum (Fig. 3H).

**Material examined**

**Holotype**

**Other material**
ANGOLA: 2 ♂♂, N'Dalla Tando, N Angola, 2700 ft, 26 Nov. 1908, Dr W.J. Ansorge leg. (BMNH, Noctuidae genitalia slide 2480).


REPUBLIC OF THE CONGO: 1 ♂, Kouilou Department, Lac Nanga, 04°31.005’ S, 12°04.172’ E, 35 m a.s.l., 17 Apr. 2013, ex light trap, B. Le Ru leg. (MNHN, gen. prep. LERU Bruno/G538); 2 ♂♂.


**Redescription** (Fig. 8G–J)

The sexes look similar; however, the general shape of the female fore wing is more elongated at the apex than in the male; antennae fuscous, filiform in female and slightly ciliate in male; flagellum fuscous, adorned with grey scales, palpus fuscous, suffused with grey scales, eyes fuscous brown. Head and base of thorax brown, thorax dark ochreous; legs brown, suffused with grey scales, ringed with grey; abdomen fuscous, suffused with grey scales.

**Fore wing.** Ground colour dark ochreous, suffused with fuscous and black scales, more heavily along veins, termen and costal area; reniform indicated by few white scales, surrounded by some brown scales; row of black elongated spots on veins in front of reniform; longitudinal brown median fascia along lower external margin of cell, ending obliquely at apex; veins below cell adorned with fuscous brown and white scales; row of black elongated spots between veins on margin; fringe fuscous, slightly suffused with brown. Underside of fore wing with ground colour grey, suffused with fuscous scales, more heavily on costa and close to termen.

**Hind wing.** Ground colour white in female, white ochreous in male, heavily suffused with fuscous scales in male; veins heavily irrorated, with fuscous scales, costa and apex more heavily suffused with fuscous scales; fringe grey, suffused with fuscous. Underside of hind wing grey, suffused with fuscous scales, but much more heavily on costa and apex; veins slightly irrorated, with fuscous scales.

**Wingspan.** 20–23 mm (8 ♂♂); 22–28 mm (7 ♀♀).

**Larval L5 instar** (Fig. 9B). Length 20–25 mm, width 2.5 mm; head smooth, dark brown, prothoracic shield brown; body with ground colour pink, pinacula and caudal plate dark brown. Young larvae very similar to mature ones.

**Male genitalia** (Fig. 2H, P). Uncus long, widening in distal third, tapering in pointed apex, tufted with long hairs on upper side. Tegumen with medium-sized rounded penniculi, vinculum pointed, with medium-sized triangular saccus, valves short and broad, eucusillus rounded and tufted, with medium-sized hairs, coastal margin slightly broadened on inner side and produced into ridge-like expansion, roundly pointed and slightly curved inwardly; large juxta, plate-like, base slightly flattened, without sclerotization, with long and widening neck, slightly bilobate at apex, ending on each side with rounded expansion; aedeagus short, slightly curved.

**Female genitalia** (Fig. 3H). Corpus bursae elongated, ovoid, without signa; ductus bursae about one-third length of corpus bursae, not sclerotised on bursa side, widening and sclerotised on ostial side. Antrum narrow, band-like, slightly sclerotised. Ovipositor lobes short (2 times as long as wide), with bluntly pointed apex, dorsal surface bearing numerous short and stout setae.
**Bionomics**

*Acrapex unicolora* is a markedly hygrophilous species of banks of streams, rivers and marshes. Larvae were collected in Tanzania from *A. gayanus, Chrysopogon zizanoides* (L.) Roberty, *Cymbopogon schoenanthus* subsp. *proximus* (Hochst. ex A.Rich.) Maire & Weller, *Cymbopogon pospischilii* (K. Schum.) C.E.Hubb., *Hyparrhenia diplandra* (Hack.) Stapf and *S. sphacelata* (Schumach.) Moss (Table 3). Larvae were collected at the bottom of young stems and were always solitary. Typically, plants exhibiting signs of infestation by *A. unicolora* larvae have a curled, brown central leaf. No pupae were found in stems and therefore borers probably pupate in the soil near exit holes.

**Distribution**

Angola, the Democratic Republic of the Congo, Malawi, Nigeria, the Republic of the Congo, Tanzania, Zambia and Zimbabwe. Known from many localities from sea level to 2147 m a.s.l. Moths were found in a mosaic of lowland rain forest and secondary grassland (Mosaic #11A), a mosaic of Zambezian dry evergreen forest and wetter miombo woodland (Mosaic #21), wetter Zambezian miombo woodland (Mosaic no 25) and undifferentiated montane vegetation (Mosaic #19) (White 1983) (Fig. 4), belonging to the Congolian and to the Zambezian bioregion, respectively (Linder et al. 2012) (Fig. 5).

**Remarks**

It is worth highlighting that the records of *Acrapex hemiphlebia* by Janse (1939) correspond to specimens from a different species that is not yet described and related to *Acrapex albivena* Hampson, 1910.

**Phylogenetic and molecular species delimitation analyses**

Maximum likelihood analyses performed with IQ-TREE yielded a well-supported topology (49 of the 70 nodes supported by BV ≥ 70%; see Fig. 10), especially when considering interspecific relationships (17 of the corresponding 18 nodes supported by BV ≥ 70%). The only representative of *A. mediopuncta* (formerly *P. mediopuncta*) is recovered in a derived position among other members of the genus *Acrapex*. Members of the *A. albivena* species group are recovered as sister to the *unicolora* group (*A. albivena, A. salmona, A. sporobola, A. syscia* and *A. yakoba*), with a high support (BV of 96%), while the only representative of the *stygiata* species group (*A. stygiata*) is found as sister to both the *albivena* and *unicolora* group (BV of 100%).

Results of the PTP molecular species delimitation are congruent with the results of the morphological study. Interestingly, PTP analyses highlight the existence of a potential new species referred to as *Acrapex* sp. SECOG7537 (Fig. 10). This specimen corresponds to a unique larva collected in the Republic of the Congo on *Pennisetum unisetum* (Nees) Benth.

**Discussion**

The ten species treated here make up a morphologically homogeneous group; this contradicts the statement made by Tams & Bowden (1953) about the isolation of the genus *Poecopa*. Indeed, the male genitalia of *A. mediopuncta* show the typical male characteristics of the *A. unicolora* group, namely the short and broad valves, the coastal margin slightly broadened on the inner side and produced into a spine and the short and stout aedeagus with a hand-shaped vesica with needle-shaped cornutus. The synonymy of *Poecopa* with *Acrapex* at the generic level is also entirely supported by the results of the phylogenetic analyses, which recover *A. mediopuncta* in a derived position within the clade encompassing all *A. unicolora* representatives. Although the ten species revised and described here present a very similar wing pattern and colour, they are easily separated with both male and female genitalia; the vesica is the most useful character to identify the males and the ventral plate of the antrum allows a clear identification of the different females. However the group is composed of two ecological sub-groups, with
Fig. 10. Maximum likelihood tree resulting from the analysis of the combined dataset carried out with IQ-TREE. Support of major nodes is displayed as BV (only BV > 50% are shown). On the right, corresponding adult habitus (for species belonging to the *A. unicolora* species group) are also included for illustrative purposes. Results of PTP analyses are figured using coloured branches and vertical side bars. Putative molecular species clusters are indicated using transitions between blue-coloured branches to red-coloured branches (vertical bars are also informative).
A. mediopuncta and A. simillima sp. nov. as markedly forest species inhabiting open patches of grasses in Guineo-Congolian rain forests of the Congolian bioregion and all the other species markedly hygrophilous of banks of streams, rivers and marshes in Zambezian miombo woodland belonging to the Zambezian bioregion. While A. unicolora, A. kafula sp. nov. and A. parvaclara are recorded from East Africa to western areas of Central Africa, our results suggest restricted distributions for all six other species. Despite extensive surveys in more than 16 sub-Saharan countries, we did not collect any species of the A. unicolora group in the Southern or Somalian Bioregions (Linder et al. 2012).

We report here for the first time a host-plant association of A. unicolora to different species of Andropogonae and to one Paniceae, S. sphacelata, and of A. miscantha sp. nov. to another Andropogonae, M. violaceus. The potential new species collected in the Republic of the Congo was also reared from another species of Andropogonae, Pennisetum unisetum. Although we did not record any host plant association for other species of the group, considering that the grasses of the miombo woodland are normally members of the Andropogonae (McClanahan & Young 1996), we can hypothesize that most of the species should be associated to species of that tribe. This is also consistent with the pattern of host-plant associations that were demonstrated for other species of Acrapex (the albivena and stygiata species groups), which were exclusively reared from Andropogonae (Le Ru et al. 2014).

As all recorded Acrapex larvae, the four Acrapex species of the A. unicolora group collected in the field as larvae came from host plants belonging to the Sesamia-like species as defined by Le Ru et al. (2006b). They are morphologically similar, with ground colour pinkish buff, without any markings. The feeding habits of the four species are similar, with the typical symptom of plant attack being death of the central tiller, often referred to as ‘dead heart’. In addition, as for Acrapex spp. (Le Ru et al. 2014), we always found the larvae solitary in the stems. We speculate that Acrapex larvae typically fed on more than one stem before completing their development. We suspect that the larvae disperse when they reach the fourth instar. No pupae were found in stems, and therefore borers probably pupate in the soil.

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References


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