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## **A review of the genus *Odontopacha* AURIVILLIUS, 1909 (Lepidoptera: Lasiocampidae)**

**Alexey M. PROZOROV & Vadim V. ZOLOTUHN**

### **Abstract**

The genus *Odontopacha* AURIVILLIUS, 1909 is divided into three genera, two of which are described as new: *Hapsimachogonia* nov.gen. (type-species *Leipoxais hapsimachus* HERING, 1928) and *Soligena* nov.gen. (type-species *Odontopacha spissa* TAMS, 1929). Three new species and one subspecies are described: *Hapsimachogonia cavuata* nov.sp., *Hapsimachogonia esociformae* nov.sp., *Soligena juna* nov.sp. and *Soligena juna volta* nov. ssp. The following new synonymy is established: *Leipoxais hapsimachus* HERING, 1928 = *Odontopacha phaula* TAMS, 1929, nov.syn. The known distributions of all taxa are mapped. The lectotype of *Leipoxais hapsimachus* HERING, 1938 is designated.

Key words: Lepidoptera, Lasiocampidae, *Odontopacha*, Africa, taxonomy, new taxa, new synonymy

### **Zusammenfassung**

Die Gattung *Odontopacha* AURIVILLIUS, 1909 wird in drei Gattungen unterteilt, wovon hier zwei als neu beschrieben werden: *Hapsimachogonia* nov.gen. (Typusart *Leipoxais*

*hapsimachus* HERING, 1928) und *Soligena* nov.gen. (Typusart *Odontopacha spissa* TAMS, 1929). Drei neue Arten und eine neue Unterart werden beschrieben: *Hapsimachogonia cavuata* nov.sp., *Hapsimachogonia esociformae* nov.sp., *Soligena juna* nov.sp. and *Soligena juna volta* nov.ssp. Die folgende neue Synonymisierung wird vorgenommen: *Leipoxais hapsimachus* HERING 1928 = *Odontopacha phaula* TAMS, 1929 nov.syn. Verbreitungskarten aller Taxa werden gegeben und der Lectotypus von *Leipoxais hapsimachus* HERING, 1938 wird designiert.

## Introduction

AURIVILLIUS (1909) erected the new genus *Odontopacha* with the type-species *Odontopacha fenestrata* AURIVILLIUS, 1909 from Tanzania (fig. 2). *O. fenestrata* was considered to be a very distinct species because of its strongly dentate external margin (odonto = dentate), with an oblique practically diagonal pattern and a particularly small transparent window in the forewing (fenestratus = bearing a window). Amongst the other African lasiocampids, only the genus *Mimopacha* AURIVILLIUS, 1902 also has transparent windows on its forewings.

The genus remained monotypic for only two years until STRAND (1911) described *Odontopacha kilwana* based on a single female from the Tanzanian village of Kilwa. The holotype specimen was deposited in the National Museum in Szczecin, Poland, which was largely destroyed during Second World War. Fortunately we know what it looked like since it was figured in SEITZ's "Die Gross-Schmetterlinge der Erde" (fig. 11; orig. in vol. 14, pl. 40, row a). This female had a dentate external margin and black discal dot on its forewing similar to *O. fenestrata*, but it had a transversal unmodified wing pattern and lacked any transparent wing window. Two more species were described in the genus with the passage of time; they were placed in *Odontopacha* because of their small size and external similarities of wing shape. They were *O. phaula* and *O. spissa*, both described by TAMS (1929). The species *O. phaula* was described after two males (fig. 7) and five females; whereas *O. spissa* was based on a single male (fig. 20).

Another species that belongs to the *Odontopacha*-complex was wrongly described in the genus *Leipoxais* HOLLAND, 1893 as *L. hapsimachus* HERING, 1928 (fig. 5). Although this species is externally similar to *O. phaula* its correct systematic position is assessed below.

The genitalia of both sexes, which are strongly informative for generic and specific determination, were not previously examined except by W. H. T. TAMS, who dissected the male and female paratypes of *O. phaula* from the Natural History Museum (London), but did not publish images of these. Consequently the genitalia of the *Odontopacha*-complex were studied and figured as part of this study.

We supposed that all mentioned species are belonging to different genera because of their external and internal distinction.

In total over 90 specimens of these rather rare moths were examined and 47 genitalia preparations were made. In the listing of material examined, the text of the original labels is given in the following order: locality name, coordinates (latitude, longitude),

altitude (in metres), date (in format dd.mm.yyyy), and name of collector. Important data absent on a label are shown in square brackets. The abbreviations of museums or collections where specimens are deposited are given, together with the number of genitalia slides in brackets. The order of specimens in "Further material examined" corresponds with the geographical location of African countries from North to South and from West to East.

The genitalia preparations were made using standard dissecting techniques and mounted in Euparal on glass slides. The preparations were photographed under magnification using an Olympus Camedia C-750 camera with a Soligor Adapter Tube for Olympus and Slide Duplicator for Digital 10 diopters modified for object glasses. All figures in the article were produced by the senior author using Adobe Photoshop CS; some images of atypical moths were altered to improve perception.

The following abbreviations are used for museums and private collections where material was examined (in alphabetical order):

CMNH.....Carnegie Museum of Natural History (Pittsburgh, PA, USA),  
 CAS.....Private collection of Anton Skrobotov (Moscow, Russia),  
 CFA.....Private collection of François Aulombard (Saint Côme-du-Mont, France),  
 CJJ.....Private collection of late John Joannou (bequeathed to the Ditsong National Museum of Natural History, Pretoria, RSA),  
 CMSW.....Private collection of Manfred Ströhle (Weiden, Germany),  
 CPB.....Private collection of Patrick Basquin (Yvetot-Bocage, France),  
 CRG.....Private collection of Roy W. Goff (Kotu, Gambia),  
 EMEM.....Entomological Museum of Ulf Eitschberger (Marktleuthen, Germany),  
 MCSN.....Museo Civico di Storia Naturale "G. Doria" (Genova, Italia),  
 MHNG.....Muséum d'Histoire Naturelle (Geneva, Switzerland),  
 MNHN.....Muséum National d'Histoire Naturelle (Paris, France),  
 MWM.....Entomological Museum of Thomas J. Witt (Munich, Germany),  
 NHML.....The Natural History Museum (London, UK),  
 RMCA.....Royal Museum for Central Africa (Tervuren, Belgium),  
 SMFG.....Senckenberg Museum (Frankfurt am Main, Germany),  
 USPU.....Ulyanovsk State Pedagogical University (Russia),  
 ZMNB.....Museum für Naturkunde (Berlin, Germany),  
 ZSM.....Zoologische Staatssammlung (Munich, Germany).

Sequences of the mitochondrial gene cytochrome c oxidase I (658 bp) were used here for the DNA review. They are kept in the base of sequences of "The Barcode of Life Data System" international project (BOLD, URL: <http://www.boldsystems.org/>) in authors' projects LBEOW and LBEOA. DNA analyses were conducted using MEGA version 5 (TAMURA et al., 2011). Two phylogenetic trees were chosen to elucidate the relationships of the complex under consideration. The first tree was built using the Maximum-Likelihood method (ML), and the second using the Neighbor-Joining method (NJ). The bootstrap tests were done with 1000 replications; DNA evolution was modeled using the TN93 model (TAMURA & NEI, 1993), and all three codon positions were used as well as noncoding sites. The trees were rooted on *Lasiocampa quercus* (LINNAEUS, 1758) – the type species of the type genus of the family, and the supposedly related species *Cosmotriche lobulina* ([DENIS & SCHIFFERMÜLLER], 1775).

## Systematic part

The following taxonomic scheme is accepted in this article:

*Odontopacha* AURIVILLIUS, 1909

*Odontopacha fenestrata* AURIVILLIUS, 1909

*Hapsimachogonia* nov.gen.

*Hapsimachogonia hapsimachus* (HERING, 1928) nov.comb.

= *Odontopacha phaula* TAMS, 1929 nov.syn.

*Hapsimachogonia kilwana* (STRAND, 1911) nov.comb.

*Hapsimachogonia cavuata* nov.sp.

*Hapsimachogonia esociformae* nov.sp.

*Soligena* nov.gen.

*Soligena spissa* (TAMS, 1929) nov.comb.

*Soligena juna* nov.sp.

*Soligena juna volta* nov.ssp.

### ***Odontopacha* AURIVILLIUS, 1909**

Arkiv för Zoologi, 5, 22. Type-species: *Odontopacha fenestrata* AURIVILLIUS, 1909, by original monotypy.

**R e - d e s c r i p t i o n :** Male forewing length 12–13 mm; female 17–18 mm. Ground colour of wings varies from light to dark greyish-brown. Outer margin of forewing is dentate and embedded on R5–M1. Forewing pattern: discal dot in R-Cu cell, two dark irregularly curved rather oblique fasciae (submarginal fascia crenulate and vague), small apical transparent window; hind wing pattern only consists of light vague submarginal fascia. The Kenyan population is generally darker, with a browner ground colour.

**W i n g v e n a t i o n** (fig. 32): On the forewing R1 and R4 are free; R4 originates from the middle of the R5+M1 fork. R2+R3 are situated on the long stalk (1/2 of branch) as well as R5+M1 (almost 1/3 of branch). M2 and M3 arise from the lower corner of discal cell. CuA1 and CuA2 are free. CuP is reduced. 1A and 2A are completely fused and their basal fork is absent. On the hind wing R1 fuses with Sc and forms a small accessory cell between Sc and R; two short humeral veins arise from Sc (only one humeral vein is figured in the original description). M1 arises from R. The length of M2+M3 fork is 1/3 of the branch length. CuA1 arises from the lower corner of the discal cell; CuA2 is free. CuP is completely reduced. Anal veins are presented by 1A+2A and 3A.

**M a l e g e n i t a l i a :** (figs 35–36). Uncus and gnathos are absent. Tegumen is band-shaped, without modification. Valvae are short, finger-shaped, apically pointed. Juxta is reduced to a membranous ring surrounding aedeagus. Vinculum is elongated forming a saccus with apical sclerotization. Aedeagus is short, tubular, C-shaped, apically more heavily sclerotized, without an apical spur. Vesica is small, bag-shaped without cornuti.



Vinculum bears singular distal lobe. 8th sternum is divided distally into two claw-shaped lobes. 8th tergum is unmodified.

**F e m a l e g e n i t a l i a** (fig. 54): Papillae anales are rounded and covered by short elastic chaetae. Apophyses posteriores and anteriores are elongated and equal in size. Lamellae antevaginalis and postvaginalis are accreted, trapezium-shaped. Ostium is ovoid. Ductus bursae is short, not sclerotized. Bursa copulatrix is large, ovoid, and bears four signi looking like the teeth of a saw.

**D i a g n o s i s** : The genus is diagnosed from the following characters: small size; dark ground colour; fore wing pattern is modified to diagonal; presence of a singular transparent window at fore wing apex in both sexes; pattern of underside of wings is similar to that of upperside; distal parts of valvae, distal process of vinculum and 8th sternum are pointed and highly sclerotized in male genitalia; presence of four signi in bursa copulatrix in the female genitalia; localised distribution from southeastern to eastern Africa.

Diagonal pattern of the fore wing, transparent window at its apex in both sexes, single distal process of vinculum and presence of signi on bursa copulatrix may be considered as autapomorphies of the genus.

**D i s t r i b u t i o n** : Kenya, Tanzania, Malawi, Mozambique and RSA.

**G e n u s s t o r e** : The genus is monotypic.

### ***Odontopacha fenestrata* AURIVILLIUS, 1909 (Figs 1–4)**

*Odontopacha fenestrata* AURIVILLIUS, 1909, Arkiv för Zoologi 5, 22 (fig. 49). Type locality: [Tanzania] "Deutsch Ostafrika: Lindi". Holotype (by monotypy): female (ZMNB) [examined].

**D e s c r i p t i o n a n d d i a g n o s i s** The major characters are detailed in the generic description and diagnosis.

**B i o n o m i c s** : Information about the preimaginal stages or hosts is absent. Moths are known from altitudes up to 2 500 m and were collected during the periods of April–May and October–January.

**D i s t r i b u t i o n** (fig. 62): Kenya, Tanzania, Malawi, Mozambique and RSA.

**D N A a n a l y s i s** : The two specimens from Kenya investigated for COI (LBE-OW958-11 and LBEOW959-11) are placed separately from one another in both phylogenetic trees (figs 70–71) and with a significant divergence (ca 1.5 %). Despite this divergence the specimens cannot be separated from the facies or the genitalia, except to the extent that they are somewhat paler and inhabit the northernmost range of the species' distribution. They are treated as falling within the nominate subspecies until more specimens can be studied to understand the scope of variation of the species.

**M a t e r i a l e x a m i n e d** : 16 males, 8 females. **T y p e m a t e r i a l e x a m i n e d** :

Holotype female: [Tanzania] "Deutsch Ostafrika: Lindi" (ZMNB). **F u r t h e r m a t e r i a l e x a m i n e d** : **K e n y a**: 2 males, Kenya SE, SW of Voi, 08–12.12.2009, leg. Snižek (MWM); male, female, Kenya, Südküste, Buda Forest, 13–17.04.1995, leg. Dr Politzar (ZSM, GU LAS-10-048, LAS-10-049); male, Kenya, South Coast, Buda Forest, 0 m, 07.01.1995, leg. Dr Politzar (MWM); female, Kenya, Südküste, Marenje Forest, 01.05.1996, leg. Dr Politzar (ZSM); male, Kenya, Kibwezi, 01–03.05.1992, leg. Dr Politzar (ZSM); male, 2 fe-

males, Kenya E, E of Mwingi, W of Enguni, 01.12.2010, leg. Snizek (MWM). **Tanzania:** male, Tanzania: Arusha Region, Mt. Meru, Miriakamba Hut, 03°13,770'S, 036°47.980'E, 2500 m, 19.10.2004 [leg. local collector] (MWM, GU 16932); female, Tanzania: Iringa Region, Kipengere Mts., Lugenge Moorland, 09°24.864'S, 034°34.822'E, 2060 m, 10.01.2006, leg. local collector (ZSM); male, Tanzania: Tanga Region, fort d'Amani, 05°04.084'S, 038°38.497'E, 950 m, 27.10.2004 [leg. local collector] (MWM); female, Tanzania: Morogoro Region, Mikesse Hills, 06°40.154'S, 037°57.577'E, 420 m, 28.11.2005 [leg. local collector] (ZSM); 2 males, Tanzania: Tanga Region, savane de Kisangiro, 03°36.192'S, 037°32.293'E, 750 m, 23.10.2004 [leg. local collector] (MWM, ZSM). **Malawi:** male, E. Africa, S. Malawi, Nsanje District, 125 km S Blantyre, Mwabvi Wildlife Reserve, 16°39'20"S, 35°03'02"E, 127 m, 10.12.2010, V. Kovtunovich, P. Ustjuzhanin (USPU). **Mozambique:** 3 males, 1 female, Mozambique, Zambeze river, 32 km S Caia, M'phingwe Camp, 85 m, 15.04.2001, leg. R. Yakovlev (CAS). **RSA:** male, R.S.A., Transvaal, Pullen-Farm, 30 km SE Nelspruit, 24–26.11.2004, leg. W. Mey (ZMNB ); male, RSA, Ndumu Game Reserve, 26°54'S, 32°16'E, 32 m, 15.12.2003, leg. H. S. Staude (CJJ).

### ***Hapsimachogonia* nov.gen.**

Type-species: *Leipoxais hapsimachus* HERING, 1928, here designated.

**Description:** Small sized moths with only dimensional sexual dimorphism. Forewing length is 14–17 mm in males and 17–19 mm in females. Ground colour varies from yellowish brown (*H. kilwana*) and light cream (some *H. hapsimachus*) to brown (*H. hapsimachus*, *H. cavuata* nov.sp., and *H. esociformae* nov.sp.). The outer margin of the male forewing is smooth (*H. hapsimachus*, *H. kilwana*) or dentate and embedded on R5–M1 (*H. cavuata* nov.sp., *H. esociformae* nov.sp.); the female's outer margin is always dentate. The outer margin of the hind wings is smooth in all species. The forewing pattern consists of submarginal fascia, two dark medial fasciae with yellow outlining and dark dot in R-Cu cell; the pattern of hind wings consists of medial and submarginal fasciae. The pattern of underside varies in different species. Shape of fascia on hind wing underside differs from that of the upper side – medial fascia is crenulate, not smooth.

**Wing venation** (fig. 33): In the forewing R1 and R4 are free; R4 originates from the top corner. R2+R3 are on the short stalk (almost 1/7 of branch) as well as R5+M1 (1/5 of branch). M2 arises from the same place with the lower corner of discal cell. M3, CuA1 and CuA2 are free. CuP is reduced. 1A and 2A are completely fused. On the hind wing R1 fuses with Sc and forms a small accessory cell between Sc and R; one humeral vein arises from Sc to margin of wing. M1 arises from the same place with R1. The length of M2+M3 fork is 1/8 of the branch length. CuA1 arises from the lower corner of discal cell; CuA2 if free. CuP is reduced to short vein in the middle of distance between the base of wing and its margin. Anal veins are presented by 1A+2A and 3A.

**Male genitalia:** Uncus and gnathos are reduced. Tegumen is band-shaped, joined with vinculum by a membrane. Socii are of different size, covered by elastic chaetae. Valvae are of different shape, depending on a species. Anellus presents and bears two distal lobes. Juxta is column-shaped, fused with aedeagus, which is very long, slender, C-shaped, and strongly sclerotized. Saccus is wide, can bear a pair of lateral processes and distally fuses with 8th sternum by a membrane (fig. 41, shown by an arrow). 8th sternum is modified, bears a pair of distal processes and has elongated apodemes.

**F e m a l e g e n i t a l i a :** Papillae anales are rounded and covered by middle-sized chaetae. Apophyses posteriores and anteriores are elongated and equal in size. Lamellae antevaginalis and postvaginalis are fused together to different formation depending on species. Ostium is round. Ductus bursae is short, not sclerotized. Bursa copulatrix is large, ovoid and without signi.

**D i a g n o s i s :** The genus may be diagnosed from the following characters: small size; dark ground colour and unmodified transversal wing pattern; pattern of underside of wings differs from upperside; anellus bears distal lobes, aedeagus is narrow and C-shaped; 8th sternum with apodemes and distal processes; lamellae vaginales are accreted.

The presence of an anellus with distal lobes in the male genitalia is an autapomorphy of the genus.

**D i s t r i b u t i o n :** Gambia, Guinea, Liberia, Ivory Coast, Burkina Faso, Ghana, Togo, Nigeria, Cameroon, Central African Republic, Gabon, Republic of the Congo, Ethiopia, Kenya and Tanzania.

**G e n u s s t o r e :** Four species included: *H. hapsimachus* (HERING, 1927) nov.comb., *H. kilwana* (STRAND, 1911) nov.comb., *H. cavuata* nov.sp., *H. esociformae* nov.sp. For diagnosis and identification of all the species refer to identification table below.

**E t y m o l o g y :** The generic name consists of *hapsimachus* = name of type-species, and gonos = the birth (Greek).

Identification table for *Hapsimachogonia* species:

Character	Taxa				
	<i>hapsimachus</i>		<i>kilwana</i>	<i>cavuata</i>	<i>esociformae</i>
	light	dark			
<b>Postmedial fascia of fore wing</b>	smooth	crenulate	smooth	smooth	smooth
<b>External margin of male fore wing</b>	straight	straight	straight	rather dentate	dentate
<b>Valvae</b>	Y-shaped	Y-shaped	Y-shaped	reduced	long claw-shaped, covered by dents
<b>Apex shape of anellus lobes</b>	undivided	undivided	undivided	bifurcate	undivided
<b>Sacculus processes</b>	absent	absent	absent	thick	claw-shaped
<b>Shape of 8<sup>th</sup> sternum processes</b>	claw	claw	claw	thick	pliers-shaped
<b>Ostium</b>	narrow	narrow	narrow	large	unknown
<b>Range in Africa</b>	West	West	East	Central	Central

***Hapsimachogonia hapsimachus* (HERING, 1928), nov.comb. (Figs 5–10)**

*Leipoxais hapsimachus* HERING, 1928, Mitteilungen aus dem Zoologischen Museum in Berlin, 14, 495 (pl. 1, fig. 11). Type locality: "S. Kamerun, Ngoko-Station". Lectotype: male (ZMNB), here designated [examined].

= *Odontopacha phaula* TAMMS, 1929 nov.syn., Annals and Magazine of Natural History, 10 (3), 153. Type locality: "Kamerun, Efulen". Holotype (by original designation): male (CMNH) [examined].

**R e - d e s c r i p t i o n o f i m a g o :** The species is highly polymorphic; two colour morphs are known: the lighter one with cream-coloured wings (figs 9–10) and the darker form with brown wings (figs 5–8). The darker form has crenulated fasciae on the forewing, with the submarginal fascia weakly pronounced, and a pale area between the postmedial and submarginal fasciae (fig. 8); the hind wing has strongly blurred fasciae; the underside pattern on fore and hind wings consists of crenulated submarginal and postmedial fasciae and a dark discal dot. The lighter form has a smooth postmedial fascia on the upper side of the forewing, with other parts of the pattern similar to the darker form. Some known specimens have intermediate characters. The external margin of the male forewing is rather straight, whereas in the female it is dentate.

**M a l e g e n i t a l i a** (figs 37–39): Similar to those of *H. kilwana* (figs 40–42). Socii are large and of trapezoidal shape. Valvae are elongate, Y-shaped, apically pointed. Lobes of anellus are medium sized and not bifurcated apically. Saccus does not have any processes. 8th sternum bears a pair of short claw-shaped processes.

**F e m a l e g e n i t a l i a** (figs 59–60): Identical to those of *H. kilwana* (figs 57–58). Lamellae vaginales are accreted and resemble a thick letter "H". The ostium is very narrow.

**B i o n o m i c s :** Imagoes are known from altitudes of 400–500 m, with the darker form caught in August–March, and the lighter form in April, August, September and from November to January.

**D i s t r i b u t i o n** (fig. 63): Gambia, Guinea, Liberia, Ivory Coast, Burkina Faso, Ghana, Togo, Nigeria, Cameroon, Central African Republic and Republic of the Congo.

**T a x o n o m i c n o t e s :** 1. The paler and darker phenotypes are considered to fall within the same species, although they are quite different externally and there are intermediate phenotypes. DNA extraction and analysis is one of the possibilities to resolve this issue, but unfortunately all the lighter specimens are rather old (mostly from the 1980's) and suitable DNA cannot be extracted. Consequently the issue will only be resolved when fresh material is available for sequencing.

2. The lectotype of the species is here designated. It is a male bearing five labels (character "|" divides lines): 1. Red rectangle with typed text "Type"; 2. Blue rectangle with typed text "S.-Kamerun | Ngoko-Stat. | Hösemann S."; 3. White rectangle with hand-written text "*Leipoxais | hapsimachus* | m. Type" and typed "det. Mart. Hering"; 4. Brownish rectangle with text written by a pencil "Ngoko-Stat. | 5.IV.02"; 5. White with printed text "MN-Berlin | LASIOCAMPIDAE | 2010-008". The specimen is designated with a red rectangle label with printed text: "Lectotype | *Leipoxais | hapsimachus* | HERING, 1928 | des. Proz. et Zolt., 2015".

3. The new synonymy established here is based on examination of the type specimens of *H. hapsimachus* and *O. phaula*. *H. hapsimachus* was described within *Leipoxais* and was therefore overlooked by TAMS when describing his *O. phaula*. They are similar externally (figs 5 and 7), and in genitalia (figs 37 and 38) and they were both caught in Cameroon.

**M a t e r i a l e x a m i n e d**: 52 males, 26 females. **T y p e m a t e r i a l e x a m i n e d**: male, lectotype of *Leipoxais hapsimachus* HERING, 1928, S Cameroon, Ngoko-Stat., 05.02.1902, leg. Hösemann (ZMNB, GU 2010-008); male, holotype of *Odon-topacha phaula* TAMS, 1929, Cameroon, Efulen, 30.12.1918, leg. H. L. Weber (CMNH, GU 2008-21); male, paratype of *Odon-topacha phaula* TAMS, 1929, Cameroon, Efulen, 14.03.1923, leg. H. L. Weber (NHML); female, paratype of *Odon-topacha phaula* TAMS, 1929, Cameroon, Efulen, 06.04.1923, leg. H. L. Weber (NHML). **F u r t h e r m a t e r i a l e x a m i n e d**. **Gambia**: male, Gambia, Tanji, 13°22'N, 16°46'W, leg. R. W. Goff (CRG); 3 males, Gambia, Abuko Nature Reserve, 11.2007, leg. R. W. Goff (CRG). **Guinea**: male, Guinée, Conakry, Forêt classée de Diecke, 09.2004, leg. E. Vingerhoedt (RMCA). **Liberia**: male, Liberia, Putu Range, 5.6672° N, 8.18694° E, 20.12.2010–05.01.2011, leg. Sz. Sáfíán, E. Zakar (RMCA). **Ivory Coast**: female, Ivory Coast, Forêt de Tai, 05.08.85, leg. Dr Politzar (EMEM); male, Elfenbeinküste, Siderodougou, 27.04.1977, leg. Dr Politzar (EMEM). **Burkina Faso**: 3 males, 2 females, Obervolta, Bobo Dioulasso, 09.11.1974, 10.11.1974, 12.10.1976, 07.12.1982, leg. Dr Politzar (ZSM, GU LAS-10-056); 5 males, 3 females, Obervolta, Bobo Dioulasso, 18.12.1974, 1.01.1975, 27.08.1981, 15.09.1981, 06.10.1981, 19.12.1981, 10.10.1982, 07.12.1982, leg. Dr Politzar (EMEM); male, female, Obervolta, Folonzo, 28.11.1981, 05.12.1981, leg. Dr Politzar (EMEM); male, Obervolta, Folonzo, Comoe, 10.09.1978, leg. Dr Politzar (ZSM); 2 males, 4 females, Obervolta, Folonzo am Fluß Comoe, 22.11.1984, 21.12.1984, 22.10.1985, 3.11.1985, 31.12.1985, leg. Dr Politzar (GU LAS-10-059); 5 males, 3 females, Obervolta, Folonzo am Fluß Comoe, 16.11.1984, 22.11.1984, 04.12.1984, 07.09.1985, 09.09.1985, 03.11.1985, 08.11.1985, 18.12.1985, leg. Dr Politzar (EMEM); male, Obervolta, Voltaquellen, Kourinyon, 29.09.1976, leg. Dr Politzar (ZSM); male, Obervolta, Voltaquellen, Kourinyon, 28.09.1976, leg. Dr Politzar (EMEM). **Ghana**: male, Ghana, Eastern Region, Bunso Arboretum, 31.10.2009, leg. Sz. Sáfíán, A. Walker, S. Davey, R. Onstein (RMCA). **Togo**: male, female, Togo, Aretonou, 16.11.1978, leg. Dr Politzar (EMEM); male, Togo, Aretonou, 16.11.1978, leg. Dr Politzar (ZSM); male, Togo, Bismarckburg, 20.07.–20.09.90, leg. R. Büttner (ZMNB). **Nigeria**: male, N. Nigeria, Jemaa, 15.10.1971, leg. Dr Politzar (ZSM, LAS-10-060); male, 2 females, N-Nigeria, Kaduna, 08.09.1970, 28.09.1970, 01.09.1971, leg. Dr Politzar (ZSM, LAS-10-055); 2 males, female, N. Nigeria, Kaduna, 04.08.1970, 20.11.1970, 02.12.1970, leg. H. Politzar (EMEM); male, [Nigeria], Obina, 20.06.1907 (MCSN). **Cameroon**: female, N. W. Kamerun, Moliwe b[ei]. Victoria, 12.1907, leg. Maltzan (ZMNB); female, [Cameroon] Lolodorf, 1991 (MHNG). **Central African Republic**: 10 males, female, R.C.A., Prefecture de la Lobaye, Mbata, 01–17.08.1969, leg. J. Plante (MHNG, GU 2011-01, 2011-02, 2011-03, 2011-04, 2011-05, 2011-06). **Republic of the Congo**: male, female, Congo, d'Odzala Parc National, 1°00'N, 15°00'E, 450 m, 29.01.–03.03.1997, leg. S. Murzin & V. Siniaev (MWM, GU 16.931); 3 males, 2 females, Odzala Nat. Park, 400-500 m, 29.01.–03.03.1997, leg. Siniaev & Murzin (MWM, GU 16.929); female, Congo, D'Odzala Parc National, 1°00'N, 15°00'E, 450 m, 29.01.–03.03.1997, leg. S. Murzin & V. Siniaev (SMFG).

***Hapsimachogonia kilwana* (STRAND, 1911) nov.comb. (Figs 11–13)**

*Odontopacha kilwana* STRAND, 1911, Stettiner entomologische Zeitung, 72, 373. Type locality: [Tanzania] "Kilwa". Holotype: [female] "ein Exemplar" (National Museum, Szczecin, Poland – possibly lost during the World War II).

**R e - d e s c r i p t i o n :** Ground colour is yellowish-brown. Medial fasciae are smooth in both sexes; other parts of the pattern are similar to the darker form of *H. hapsimachus*. External margin of the male forewing is rather straight, whereas that of the female is dentate.

**M a l e g e n i t a l i a** (figs 40–42): Virtually identical to those of *H. hapsimachus* (figs 37–39).

**F e m a l e g e n i t a l i a** (figs 57–58): identical those of *H. hapsimachus* (figs 59–60), but significantly smaller.

**B i o n o m i c s :** Specimens are known from altitudes of 475–2 100 m and were collected in the periods of October–January and of April–July. In Tanzania it has been found in the Savanna biome.

**D i s t r i b u t i o n** (fig. 64): Ethiopia, Uganda, Kenya and Tanzania.

**T a x o n o m i c n o t e s :** 1. The holotype female was originally deposited in the National Museum, Szczecin, Poland. The museum was largely destroyed in 1944 during World War II, but part of the entomological collection was saved and later transported to the Museum of Zoology (Polish Academy of Science). The present head of this collection, Dr Dominika MIERZWA-SZYMKOWIAK, has not been able to find the holotype specimen thus far<sup>1</sup>. However, determination of species is still possible because the holotype female is figured in 14th volume of SEITZ'S "Die Gross-Schmetterlinge der Erde" (Tafel 40, a).

2. The genitalia of both sexes of *H. kilwana* are similar to *H. hapsimachus*, which is strange since its other congeners, *H. cavuata* and *H. esociformae*, are clearly different. We initially hypothesized that *H. kilwana* and *H. hapsimachus* were only subspecies of the same species. However a comparison of the COI sequences of the two taxa showed that *H. kilwana* is placed separately from *H. hapsimachus* on both trees (figs 70–71) and that their nucleotides differ by 2.38 %. This is strong evidence that they should be accorded specific status.

**M a t e r i a l e x a m i n e d :** 10 males, 5 females. **T y p e m a t e r i a l :** the holotype female has not been located, colour reproduction of this specimen appears in fig. 11. **F u r t h e r m a t e r i a l e x a m i n e d :** **E t h i o p i a :** male, Ethiopia, Arba Minch, 05°59'56"N, 37°32'54"E, 1380 m, 04–25.07.2010, leg. Ströhle (CMSW). **U g a n d a :** male, Uganda, Masindi, Butiaba, Budongo Forest Reserve, 1°42'57"N, 31°28'13"E, 1094 m, 24.11.2005, leg. J. G. Joannou (CJJ). **K e n y a :** 4 males, female, Kenya, Kibwezi, 700 m, 01–07.01.2000, 15–30.04.2001, 21.05.2002, leg. Dr Politzar (MWM, GU 17.067); 2 males, Kenya, Kibwezi, 20–31.05.1994, leg. Dr Politzar (ZSM, GU LAS-10-052); male, 2 females,

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<sup>1</sup> "Unfortunately, I cannot find the material (either family or species). We have renovation of building now. Part of the cabinets is not available. Perhaps the material in these cabinets. The collection will be open in September/October". (pers. comm. from Dr Dominika Mierzwa-Szymkowiak, 12th January 2011).

Kenya, South-Ukambani, 06.05.1996, 01.04.2001, leg. Politzar (ZSM, GU LAS-10-097); female, Süd-Ukambani, 28.05.–01.06.1995 [leg. Dr Politzar] (ZSM); male, Kenya, Kitale Forest, Mt. Elgon, 2100 m, 12.1985, leg. Wasike (ZSM). **Tanzania:** female, Tanzania, Tanga Region, savane près des Mts Pare Sud., 04°40.128'S, 38°05.872'E, 475 m, 24.10.2004 [leg. local collector] (ZSM, GU LAS-11-040); male, Tanzania, Kilimanjaro Region, North Pare Mts., Vumali, 04°01.850'S, 37°44.140'E, 1280 m, 02.11.2005 [leg. local collector] (ZSM, GU LAS-11-043).

***Hapsimachogonia cavuata* nov.sp. (Figs 14–16)**

**H o l o t y p e :** male, Congo, Odzala Nat. Park, 00°23'N, 14°50'E, 400–500 m, 29.01.–03.03.1997, leg. Siniaev, Murzin (MWM, GU 16.930). **P a r a t y p e s** (8 males, 1 female): male, Kamerun, Küstengebiet, Kribi, 03–06.02.1969, leg. Ströhle (CMSW); 2 males, W Gabon, Ogooué Marit., nr. Omboué, Campement Liambissi, 05–20.01.2010, leg. Fr. Aulombard (CFA, CPB); male, Congo, d'Odzala Parc National, 01°00'N, 15°00'E, 400–500 m, 29.01.–03.03.1997, leg. S. Murzin, V. Siniaev (MWM, GU 16.934); 4 males, female, Congo, Odzala Nat. Park, 00°23'N, 14°50'E, 400–500 m, 29.01.–03.03.1997, leg. Siniaev, Murzin (MWM, GU 16.933).

**D e s c r i p t i o n :** The ground colour is brown. The external margins of the male and female forewings are rather dentate than smooth, and cilia are dark brown. The pattern of the forewing upper side consists of a dark discal dot and three fasciae – the submarginal one is strongly blurred and weakly pronounced, the postmedial one is straight in female and slightly C-shaped in male, and the antemedial one is V-shaped (curved in the place of R1 root). The pattern of the hind wing upper side consists of two strongly blurred medial and submarginal fasciae. The pattern of the forewing underside consists of one crenulated medial fascia, and on the hind wing – a crenulated medial fascia and a dark discal dot, the field between the fasciae being darker than the space outside the fasciae.

**M a l e g e n i t a l i a** (figs 43–44): The tegumen bears a pair of claw-shaped processes. The socii are small and covered by short chaetae. The valvae are completely reduced. The lobes of the anellus are small and apically bifurcated. The aedeagus is long and slender, C-shaped, and fused with a column-shaped juxta. The saccus bears a pair of short finger-shaped lateral processes with rounded apices. The 8th sternum bears a pair of short apically rounded processes.

**F e m a l e g e n i t a l i a** (fig. 61): The papillae anales are rounded. The apophyses posteriores are somewhat longer than the apophyses anteriores. The lamellae vaginales are accreted and rhomb-shaped. The ostium is very wide and open (not covered by any projections). The bursa copulatrix is ovoid and without signi.

**B i o n o m i c s :** Moths were caught at altitudes of 400–500 m during January–March.

**D i s t r i b u t i o n** (fig. 65): Cameroon, Gabon and Republic of the Congo.

**E t y m o l o g y :** The name originates from the Latin combination "cavum atrum" which means "the black hole", because of the very large ostium in the female genitalia.



***Hapsimachogonia esociformae* nov.sp. (Figs 17–19)**

**H o l o t y p e :** male, Congo, Odzala Nat. Park, 00°23'N, 14°50'E, 400–500 m, 29.01.–03.03.1997, leg. Siniaev, Murzin (MWM, GU 16.935). **P a r a t y p e s** (4 males): male, Gabon, Ogooué-Lolo, Lastourville, 03.01.1992, leg. P. Basquin (CPB); male, Gabon, Libreville (MNHN); 2 males, Congo, d'Odzala Parc National, 01°00'N, 15°00'E, 400–500 m, 29.01.–03.03.1997, leg. S. Murzin, V. Siniaev (MWM, GU 20.083).

**D e s c r i p t i o n :** The ground colour is yellowish-greyish-brown. The external margin of the forewing is dentate. The pattern of forewing upper side consists of a dark discal dot and three fasciae – the submarginal one crenulated and dark, the postmedial one slightly S-shaped, and the antemedial one is V-shaped (curves in R1 root). The pattern of the hind wing upper side consists of two strongly blurred medial and submarginal fasciae. The pattern of the forewing and hind wing undersides consists of crenulated medial and submarginal fasciae and a dark discal dot. The female is unknown.

**M a l e g e n i t a l i a** (figs 45–46): The socii are small, and covered by short chaetae. The valvae are distinctly elongate, slender, strongly sclerotized and irregularly covered by dentations and teeth on all costal margins. The lobes of the anellus are elongated, not apically bifurcated. The aedeagus is very long and slender, C-shaped, and fused with a column-shaped juxta. The processes of the saccus are claw-shaped. The 8th sternum is pliers-shaped.

**B i o n o m i c s :** Moths were caught at altitudes of 400–500 m during January–March.

**D i s t r i b u t i o n** (fig. 66): Gabon and Republic of the Congo.

**E t y m o l o g y :** The valvae of the new species are very similar to the jaw of a pike (*Esox lucius* L.)

***Soligena* nov.gen.**

Type-species: *Odontopacha spissa* TAMS, 1929, here designated.

**D e s c r i p t i o n :** Small sized moths with only dimensional sexual dimorphism. Forewing length of males 13–15 mm and females 15–22 mm. Ground colour of forewing varies from yellowish-brown to orange-brown and pinkish-brown, hind wing is yellow. The outer margin of the forewing is dentate in both sexes and embedded on R5–M1, but the hind wing is smooth. The forewing upper side pattern consists of two smooth medial fasciae and a brown dot in R-Cu cell; the medial field is usually darker than the outer space of the wing; the pattern of the hind wings consists of a single medial fascia and a brown discal dot. The shape of the fascia on the hind wing underside differs from that of the upper side.

**W i n g v e n a t i o n** (fig. 34): On the forewing R1 and R4 are free; R4 originates from the upper corner of discal cell. R2+R3 are on the single stalk (almost 1/3 of branch) as well as R5+M1 (2/5 of branch). M2 rises from the lower corner of discal cell. M3, CuA1 and CuA2 are free. CuP is completely reduced. 1A and 2A are fused in the distance of 2/10 (from the base of wing) of the full length of branch 1A+2A. On the hind wing R1 fuses with Sc and forms a small accessory cell between Sc and R; humeral veins are absent. M1 arises from the same place as R1. The length of M2+M3 fork is 1/4 of the branch length. CuA1 arises from the lower corner of discal cell; CuA2 if free. CuP is completely reduced. Anal veins are represented by 1A+2A and 3A.



**Male genitalia** : The uncus and gnathos are absent. The tegumen is reduced to a pair of lateral claw-shaped processes. The valvae are also claw-shaped, pointed on top and swollen at the base. The juxta is column-shaped, fused with the aedeagus, and bears a pair of processes on the base; the shape of the processes depends on species – it can be finger- or hook-shaped. The aedeagus is tubular, swollen at the apex and pointed apically. The vesica is bag-shaped, and not covered by cornuti. The saccus is reduced. The 8th sternum and tergum have a membranous field.

**Female genitalia** : The papillae anales are oval-shaped, densely covered by elastic chaetae. The apophyses posteriores are longer than the apophyses anteriores. The lamella antevaginalis is triangle-shaped, and the lamella postvaginalis is trapezoid with medial reduction of sclerotization. The ostium is wide and ovoid. The ductus bursae is wide, and can bear two lateral semi-rings of sclerotization. The bursa copulatrix is wide, without signi.

**Diagnosis** : The genus may be diagnosed from the following characters: small size; mostly light ground colour and unmodified transversal wing pattern; pattern of underside of wings does not differ from upperside; tegumen is reduced medially and bears a pair of lateral processes, juxta has a pair of short processes; medial reduction of sclerotization in 8th sternum and tergum; lamellae vaginales are not accreted.

**Distribution** : Liberia, Burkina Faso, Ghana, Nigeria, Cameroon, Ethiopia, Somalia, Kenya, Tanzania, Zambia, Namibia and RSA.

**Genus store** : The genus includes two species: *S. spissa* (TAMS, 1929) nov.comb., and *S. juna* nov.sp.

**Etymology** : The name "soligena" means "born by the Sun".

### ***Soligena spissa* (TAMS, 1929) nov.comb. (Figs 20–21)**

*Odontopacha spissa* TAMS, 1929, Annals and Magazine of Natural History, 10 (3), 154. Type locality: "Kamerun, Efulen". Holotype (by original designation): male (CMNH) [examined].

**Diagnosis** : The species is externally similar to *S. juna* nov.sp., but differs from it in the genitalia. *S. spissa* has an undivided apex of tegumen processes, swollen juxtal processes and a serrate ventral side of aedeagus (figs 47–48), whereas *S. juna* nov.sp. has a bifurcate apex of tegumen processes, slender claw-shaped juxtal processes, which can be reduced, and the ventral side of aedeagus is not serrate (figs 49–52). These species also differ in their COI-sequence by 6.8–8.3 %. The female of this species is unknown.

**Bionomics** : Moths were caught in January and June.

**Distribution** (fig. 67): Liberia and Cameroon.

**Taxonomic notes** : Despite the name "spissa" having been attributed to all moths of the genus, study of the genitalia has shown that two different species are involved. The distribution of true *S. spissa* is limited to West Africa, where it is very localised and rare – known thus far from only two specimens. Most of the African continent is inhabited by a sibling-species, which is externally indistinguishable.

**Material examined:** 2 males. **Type material examined:** male holotype of *Odontopacha spissa* TAMS, 1929, Cameroon, Efulen, 12.06.1923, leg. H. L. Weber (CMNH, GU 2008-22). **Further material examined:** male, Liberia, Putu Range, La. 5.6672°, Lo. 8.18684°, 20.12.2010–05.01.2011, leg. Sz. Sáfian, E. Zakar (RMCA, GU 000018222).

***Soligena juna* nov.sp. (Figs 22–25, 28–29)**

**Holotype:** male, Kenya, Garissa, S of Bura, 26.04.2011, leg. Snižek (MWM). **Paratypes** (16 males, 18 females): **Ethiopia:** 1 male, Ethiopia, Arba Minch, 05°59'56"N, 037°32'54"E, 18–24.02.2010, leg. M. Ströhle (CMSW). **Somalia:** 1 male, Somalia, lake Baddona, 01.02.1989 (ZSM); 1 female, Somalia, Kisimayo, 29.03.1989 (ZSM); 1 female, Somalia, Kisimayo, 29.03.1989, leg. Dr Politzar (CMSW); 1 male, 2 females, Somalia, Caanole Fluß, 03.05.1983, 16–17.09.1987, 07.01.1988, leg. Dr Politzar (ZSM, LAS-10-054, GU LAS-10-062); 2 females, Somalia, Caanole Fluß, 18.10.1987, 10.01.1989, leg. Dr Politzar (EMEM); 2 females, Somalia, Caanole Fluß, 14.02.1988, 30.12.1988, leg. Dr Politzar (CMSW). **Kenya:** 1 male, 1 female, Kenya, Kibwezi, 700 m, 21.05.2002, leg. Dr Politzar (MWM); 1 female, Kenya, Kibwezi, 700 m, 01–05.05.1992, leg. Dr Politzar (ZSM); 2 males, 1 female, Kenya, South Coast, Marenche Forest, 0 m, 10.09–05.10.2001, leg. Dr Politzar (MWM); 2 females, Kenya NE, E of Garsen, W of Witu, 18–20.12.2009, 28.04.2011, leg. Snižek (MWM); 2 females, Kenya E, E of Mwingi, W of Enguni, 01.12.2010, leg. Snižek (MWM); 1 female, Kenya E, 202 km E Thika, Sosoma, 04.12.2010, leg. Snižek (MWM); 6 males, Kenya, South-Ukambani, 05.07.1995, 06.05.1996, 05.07.1996, 01.12.2000, leg. Dr Politzar (ZSM, GU LAS-10-053, LAS-10-058). **Tanzania:** 3 males, Tanzania, Pwani Region, Pugu Forest, 132 m, 29.11.2004, leg. local collector (ZSM); 1 female, Tanzania, Pwani Region, W Bagamoyo, Kipwangwa, 38 m, 06°25.231' S, 038°42.183' E, 18.03.2006, leg. Ph. Darge (ZSM); 1 female, [Tanzania] D. O. Africa, Kilimatinde, leg. Prittwitz (ZMNB). **Mozambique:** 1 male, Mozambique, Zambeze river, 32 km S Caia, M'phingwe Camp, 85 m, 15.04.2001, leg. R. Yakovlev (CAS). **Further material examined:** **Tanzania:** 1 male, Tanzania, Tanga Region, W Usambara, Magamba Forest, 04°44.009' S, 038°15.770' E, 1870 m, 29.10.2005, leg. Ph. Darge (ZSM, GU LAS-11-048). **Zambia:** 1 male, Zambia NW, 150 km S of Mwinilunga, 18.10.2008, leg. Snižek (MWM). **Namibia:** 1 male, Namibia, Caprivi, Katima Mulilo, 07–08.11.2007, leg. V. Richter (ZMNB); 1 female, Nordost-Namibia, Westl. Caprivi, Okavango-Region, Okavango-Ufer, 30 km SE der Popa-Wasserfälle, 1050 m, 27–29.01.1998, leg. de Freina (MWM, GU 16.928). **RSA:** 1 female, Südafrikanische Republik, Provinz Limpopo, Soutpansberg-Südhänge, 30 km W Louis Trichardt, Medike, 800–900 m, 28.11.–06.12.2009, leg. de Freina (MWM, GU 16.909); 1 female, RSA, Limpopo, Nylstrom, 14.12.2008, leg. Snižek (MWM); 2 females, RSA, KW Natal, Maputoland, Ndumo, Tembe Elephant Park, 29.12.2007, leg. Snižek (CMSW); 1 male, 1 female, RSA, Northam, Vlaknek Farm, 24°49'22"S, 27°12'52"E, 1000 m, 24.02.1996, 21.12.2001, leg. J. G. Joannou (CJJ); 1 male, RSA, Mkuze, Phinda Reserve, 27°47'52"S, 32°21'10"E, 26.09.1998, leg. J. G. Joannou (CJJ).

**Description:** The ground colour varies from yellowish-brown to brown and pinkish-brown. The external margin of both sexes is dentate. The forewing pattern consists of V- (curves on R1 root) or S-shaped antemedial fascia (curves on R1 root above and between CuA2 and 1A+2A below), a dark discal dot and an S-shaped postmedial fascia (curves between M1 and M2 above and between CuA1 and CuA2 below); the submarginal fascia is indistinguishable. The hind wing pattern consists of S-shaped medial fascia and a dark discal dot. The discal dots can be weakly pronounced.

**Male genitalia** (figs 49–51): The tegumen processes are claw-shaped and bifurcate on top, with both apices very small and pointed. The valvae are claw-shaped, pointed on top and swollen at the base. The juxta is column-shaped, fused with the ae-

deagus, and bears a pair of small claw-shaped processes at the base; processes can be reduced to small knobs. The aedeagus is tubular, swollen at its base and pointed apically; the ventral margin is not serrate. The vesica is bag-shaped, without cornuti. The saccus is reduced. The 8th sternum and tergum are with a medial membranous field (fig. 53).

**F e m a l e g e n i t a l i a** (fig. 56): The papillae anales are oval-shaped, densely covered by elastic chaetae. The apophyses posteriores are longer than the apophyses anteriores. The lamella antevaginalis is triangle-shaped, and the lamella postvaginalis is trapezoid with medial reduction of sclerotization. The ostium is wide and oval-shaped, covered by the lamella antevaginalis. The ductus bursae is wide with two lateral semi-rings of sclerotization. The bursa copulatrix is wide, without signi.

**D i a g n o s i s**: This species differs from *S. spissa* in the shape of the apex of the tegumen processes (undivided here, but bifurcated in *S. juna* nov.sp.), the juxtal processes (swollen in *S. spissa*, claw-shaped in *S. juna* nov.sp.) and the ventral margin of the aedeagus (serrate in *S. spissa*, smooth in *S. juna* nov.sp.). These species also differ in their COI-sequence by 3.14 %. The nominotypical subspecies differs from *S. juna volta* nov. ssp. in its female genitalia (pair of sclerotized semi-rings is absent in *S. juna volta* nov. ssp.), in distributional area (the nominotypical subspecies flies in East Africa, whereas *S. juna volta* nov.ssp. flies in West Africa) and they have 1.19 % of differing COI nucleotides.

**B i o n o m i c s**: Moths were caught at altitudes up to 1 870 m in January and March.

**D i s t r i b u t i o n** (fig. 68): Ethiopia, Somalia, Kenya, Tanzania, Zambia, Namibia and RSA.

**E t y m o l o g y**: The name of species is derived from the name of the Roman goddess Juno, wife of Jupiter.

**T a x o n o m i c n o t e s**: Some of moths are placed into "Further material examined" because their coloration is so different – several specimens from Tanzania, Namibia and RSA are pinkish and their medial fields are not darkened (figs 22–23). An in-depth sampling and analysis of DNA is needed to define their status more precisely. However, a geographically isolated population from West Africa is described below as a new subspecies.

### ***Soligena juna volta* nov.ssp. (Figs 26–27, 30–31)**

**H o l o t y p e**: male, [Burkina Faso] Obervolta, Folonzo am Fluß Comoe, 08.02.1986, leg. Dr Politzar (ZSM). **P a r a t y p e s** (28 males, 2 females): **Ghana**: 1 male, Ghana, Ashanti Region, 15 km ESE Ejura, 07°330' N, 01°256' W, 200 m, 25.11.2011, leg. V. Zolotuhin (MWM, 18.293); 1 female, Ghana, Ashanti Region, Kogyae Strict National Reserve, 07°311' N, 01°171' W, 200 m, 24.11.2011, leg. V. Zolotuhin (MWM). **Burkina Faso**: 13 males, Obervolta, Folonzo am Fluß Comoe, 04.12.1984, 11.11.1984, 22.11.1984, 20.12.1984, 21.12.1984, 15.02.1985, 22.10.1985, 03.11.1985, 01.12.1985, 17.01.1986, 18.02.1986, 27.11.1986, leg. Dr Politzar (ZSM, GU LAS-10-050, LAS-10-051, LAS-10-057); 12 males, 1 female, Obervolta, Folonzo am Fluß Comoe, 20.03.1975, 16.11.1984, 22.11.1984, 04.12.1984, 21.12.1984, 20.01.1985, 15.02.1985, 18.10.1985, 20.11.1985, 01.12.1985, 18.12.1985, 08.02.1986, 18.02.1986, leg. Dr Politzar (EMEM, GU 2011-137, 2011-138, 2012-001); 1 male, Obervolta, Folonzo am Fluß Comoe, 17.01.1975, leg. Dr Politzar (CMSW). **Nigeria**: 1 male, Nigeria, Jemaa, 20.03.1975. leg. Dr Politzar (ZSM); 1 male, Nigeria, Jemaa, 20.03.1975, leg. Dr Politzar (EMEM).

**Description:** The ground colour varies from yellowish-brown to brown. The external wing margin of both sexes is dentate. The forewing pattern consists of a V-shaped (curves on R1 root) antemedial fascia, a dark discal dot and an S-shaped postmedial fascia (curves between M1 and M2 above and between CuA1 and CuA2 below); the submarginal fascia is indistinguishable. The hind wing pattern consists of an S-shaped medial fascia and a dark discal dot. The discal dots can be weakly pronounced.

**Male genitalia** (fig. 52): The tegumen processes are claw-shaped and bifurcate on top, with both apices very small and pointed. The valvae are claw-shaped, pointed on top and swollen at the base. The juxta is column-shaped, fused with the aedeagus, bearing a pair of small claw-shaped processes at the base; processes can be reduced to small knob. The aedeagus is tubular, swollen at the apex and pointed apically; the ventral side is not serrate. The vesica is bag-shaped, and not covered by cornuti. The saccus is reduced. The 8th sternum and tergum have a medial membranous field.

**Female genitalia** (fig. 55): The papillae anales are oval-shaped, and densely covered by elastic chaetae. The apophyses posteriores are longer than the apophyses anteriores. The lamella antevaginalis is semicircle-shaped, and the lamella postvaginalis is rectangular with a medial reduction of sclerotization. The ostium is wide and ovoid, covered by the lamella antevaginalis. The ductus bursae is wide without lateral semi-rings of sclerotization. The bursa copulatrix is wide, without signi.

**Dianosis:** The subspecies differs from nominotypical *S. juna juna* in the female genitalia (pair of sclerotized semi-rings present in *S. juna juna*). Both subspecies are geographically widely separated and they have a 1.19 % difference in COI nucleotides.

**Bionomics:** Moths were caught in the period from October to March. They inhabit rocky and grassy savannas and are attracted to light sources during the first half of the night.

**Distribution** (fig. 69): Burkina Faso, Ghana and Nigeria.

**Etymology:** The name of the species is toponymical, originating from the previous name for Burkina-Faso of Upper Volta.

### **DNA-analysis (Figs 70–71)**

Both the ML and NJ trees are similar in topology; an optimal model for nucleotide NJ inference was chosen. It shows strong bootstrap support (>75 %) for more than half of the possible nodes and >50 % for more than two-thirds of the possible nodes.

This analysis refutes the monophyly of the *Odontopacha* auct., but if more related taxa are included into the scheme at a later stage it will probably provide more evidence of the paraphyly of the complex under consideration – here it is shown including the genus *Cosmotriche*.

On the phylogram, three lineages are distinct, with high basal support (100 for *Odontopacha*, 74 for *Soligena*, but only 32 for *Hapsimachogonia* – although there is 99 for *H. kilwana* + *H. hapsimachus*). These monophylies are also strongly supported with the morphological evidence presented above.

The monophyly of *Odontopacha* is clearly very strong. At the same time, within this clade, two strongly supported lineages are clear. They correspond to the northern and southern populations of the species, and display about 1.48 % of differences. This is quite a high value, sufficient to consider them as two different taxa, but no morphological evidence to support this hypothesis has been found. The Kenyan populations are somewhat darker, but this is not sufficient to separate them as a subspecies; no zoogeographic barriers exist between the populations and therefore we are considering them not to represent a separate subspecies, pending further evidence.

Monophyly of *Soligena* is also very strongly supported, with bootstrap value of 74. This is confirmed by the very special genitalia characteristic of both the species in this clade. *S. spissa* differs from *S. juna* by 3.14 %. *S. juna volta* nov.sp. only differs from *S. juna* by 1.19 %; however the wide geographic disjunction supports its diagnosis at the sub-specific level.

Although the monophyly of *Hapsimachogonia* is supported by both trees, its bootstrap support is rather low. All the species included in *Hapsimachogonia* appear to be long-branched taxa, and the bootstrap value for *H. kilwana* + *H. hapsimachus* is very high at 99. Morphologically all four species are closely related (refer to the generic diagnosis). Based on COI alone, these species only display a variation of 2.38 %.

In conclusion, our hypothesis of the polyphyly of *Odontopacha* auct. is confirmed by both phylograms. We predict that further phylogenetic study of the African lasiocampid genera will more clearly resolve the relationships between these genera.

### Acknowledgements

We are very thankful to curators and owners of museum and private collections which gave material for investigation at our disposal (in alphabetical order): François Aulombard (CFA), Patrick Basquin (CPB), late Georges Bernardi (MNHN), Ugo Dall'Asta (RMCA), Ulf Eitschberger (EMEM), Roy W. Goff (CRG), Axel Hausmann (ZSM), Martin Honey (NHML), John Joannou (CJJ), Bernard Landry (MHNG), Geoff Martin (NHML), Wolfram Mey (ZMNB), Joël Minet (MNHN), Wolfgang Nässig (SFMG), Roberto Poggi (MCSN), Jurate de Prins (RMCA), John Rawlins (CMNH), Manfred Ströhle (CMSW) and Thomas J. Witt (MWM).

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Authors' addresses:

Alexey M. PROZOROV  
Department of Zoology  
Ulyanovsk State Pedagogical University  
pl. 100-letiya Lenina, 4  
432700 Ulyanovsk, Russia  
sonitha@mail.ru

Vadim V. ZOLOTUHN  
Department of Zoology  
Ulyanovsk State Pedagogical University  
pl. 100-letia Lenina 4  
432700 Uljanovsk, Russia  
v. zolot@mail. ru

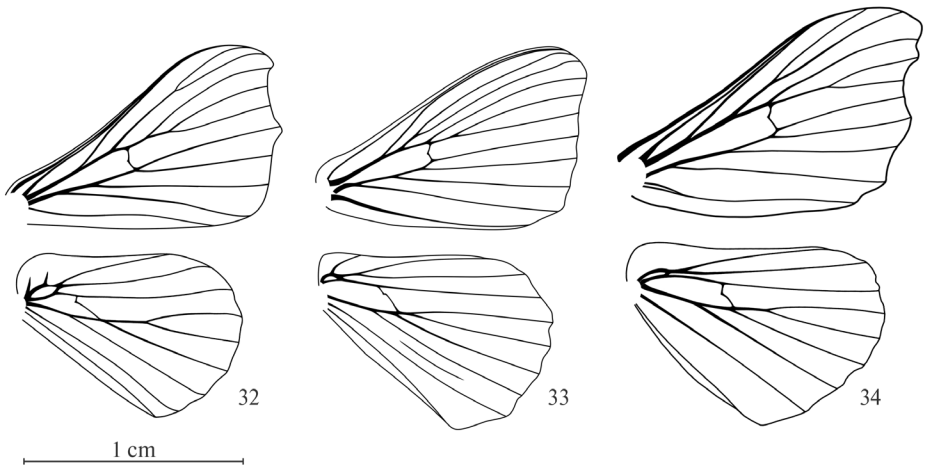
**Figs 1–19:** (1) *Odontopacha fenestrata* AURIVILLIUS, 1909, male, RSA, Transvaal, Pullen-Farm, 30 km SE Nelspruit, 24–26.11.2004, leg. W. Mey (ZMNB ); (2) *Odontopacha fenestrata* Aurivillius, 1909, female holotype, Deutsch Ost-Africa, Lindi (ZMNB ); (3) *Odontopacha fenestrata* AURIVILLIUS, 1909, male, Kenya, Südküste, Buda Forest, 13–17.4.1995, leg. Dr Politzar (ZSM, GU LAS-10-048); (4) *Odontopacha fenestrata* AURIVILLIUS, 1909, female, Kenya, Südküste, Buda Forest, 13–17.4.1995, leg. Dr Politzar (ZSM, GU LAS-10-049); (5) *Hapsimachogonia hapsimachus* (HERING, 1928), male holotype of *Leipoxais hapsimachus* Hering, 1928, S. Kamerun, Ngoko-Station, 5.4.[19]02, leg. S. Hösemann (ZMNB, GU 2010-008); (6) *Hapsimachogonia hapsimachus* (HERING, 1928), female, Congo, D’Odzala Parc National, 1°00’N.B., 15°00’E.L., 400–500 m, 29.01–3.03.1997, leg. S. Murzin & V. Siniaev (MWM, GU 16.931); (7) *Hapsimachogonia hapsimachus* (HERING, 1928), male holotype of *Odontopacha phaula* TAMS, 1929, Kamerun, Efulen, 30.12.1918, leg. H. L. Weber (CMNH, GU 2008-21); (8) *Hapsimachogonia hapsimachus* (HERING, 1928), male, R.C.A., Préfecture de la Lobaye, Mbata, 1–17.8.1969, leg. J. Plante (MHNG, GU 2011-05); (9) *Hapsimachogonia hapsimachus* (HERING, 1928), male, Obervolta, Bobo Dioulasso, 7.12.1982, leg. Dr Politzar (ZSM, GU LAS-10-056); (10) *Hapsimachogonia hapsimachus* (HERING, 1928), male, N-Nigeria, Kaduna, 8.9.1970, leg. Dr Politzar (ZSM, GU LAS-10-055); (11) *Hapsimachogonia kilwana* (STRAND, 1911), female holotype of *Odontopacha kilwana* STRAND, 1911, orig. from "Die Großschmetterlinge der Erde", Band 14, Tafel 14, a; (12) *Hapsimachogonia kilwana* (STRAND, 1911), male, Kenya, Kibwezi, 700 m, 21.5.2002, leg. Dr Politzar (MWM, GU 17.067); (13) *Hapsimachogonia kilwana* (STRAND, 1911), female, Kenya, Süd-Ukambani, 28.5.–1.06.2002, leg. Dr Politzar (ZSM); (14) *Hapsimachogonia cavuata* nov.sp., male holotype, Congo, Odzala Nat. Park, 0°23’N, 14°50’E, 400–500 m, 29.01.–03.03.1997, leg. Siniaev & Murzin (MWM, GU 16.930); (15) *Hapsimachogonia cavuata* nov.sp., female paratype, Congo, Odzala Nat. Park, 0°23’N, 14°50’E, 400–500 m, 29.01.–03.03.1997, leg. Siniaev & Murzin (MWM, GU 16.933); (16) *Hapsimachogonia cavuata* nov.sp., male paratype, Congo, D’Odzala Parc National, 1°00’N.B., 15°00’E.L., 400–500 m, 29.01–3.03.1997, leg. S. Murzin & V. Siniaev (MWM, GU 16.934); (17) *Hapsimachogonia esociformae* nov.sp., male holotype, Congo, D’Odzala Parc National, 1°00’N.B., 15°00’E.L., 400–500 m, 29.01–3.03.1997, leg. S. Murzin & V. Siniaev (MWM); (18) *Hapsimachogonia esociformae* nov.sp., male paratype, Congo, Odzala Nat. Park, 0°23’N, 14°50’E, 400–500 m, 29.01.–03.03.1997, leg. Siniaev & Murzin (MWM, GU 16.935); (19) *Hapsimachogonia esociformae* nov.sp., male paratype, Congo, Odzala Nat. Park, 0°23’N, 14°50’E, 400–500 m, 29.01.–03.03.1997, leg. Siniaev & Murzin (MWM, GU 20.083).



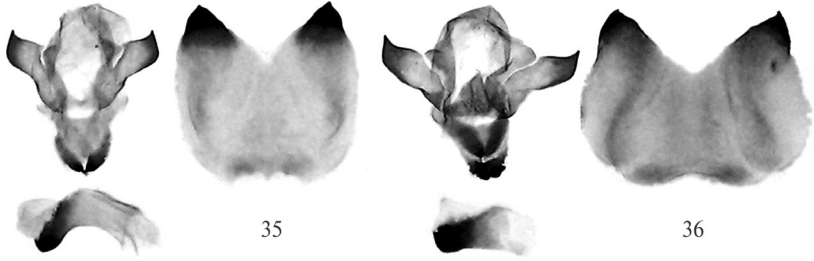


**Figs 20–31:** (20) *Soligena spissa* (TAMS, 1929), male holotype of *Odontopacha spissa* TAMS, 1929, Kamerun, Efulen, 12.6.1923, leg. H. L. Weber (CMNH); (21) *Soligena spissa* (TAMS, 1929), male, Liberia, Putu Range, La. 5.6672°, Lo. –8.18694, 20.12.–5.01.2011, leg. Sz. Sáfíán, E. Zakar (RMCA); (22) *Soligena juna* nov.sp., male, Tanzania: Tanga Region, W Usambara, Magamba Forest, 04°44.009'S, 038°15.778'E, 1870 m, 29.10.2005 (ZSM, GU LAS-11-048); (23) *Soligena juna* nov.sp., female, Nordost-Namibia, Westl. Caprivi, Okavango-Region, Okavango-Ufer, 30 km SE der Popa-Wasserfälle, 1050 m, 27–29.1.1998, leg. de Freina (MWM, GU 16.928); (24) *Soligena juna* nov.sp., male holotype, Kenya, Garissa, S of Bura, 26.4.2011, leg. Snižek (MWM, GU 16.928); (25) *Soligena juna* nov.sp., female paratype, Kenya, Kibwezi, 1–3.5.1992, leg. Dr Politzar (ZSM); (26) *Soligena juna volta* nov.ssp., male holotype, Obervolta, Folonzo am Fluß Comoe, 8.2.1986, leg. Dr Politzar (ZSM); (27) *Soligena juna volta* nov.ssp., female paratype, Obervolta, Folonzo am Fluß Comoe, 20.01.1985, leg. Dr Politzar (EMEM, GU 2012-001); (28) *Soligena juna* nov.sp., male paratype, Kenya, South-Ukambani, 1.12.2000, leg. Dr Politzar (ZSM, LAS-10-058); (29) *Soligena juna* nov.sp., female paratype, Somalia, Caanole Fluß, 3.5.1983, leg. Dr Politzar (ZSM, LAS-10-054); (30) *Soligena juna volta* nov.ssp., male paratype, Obervolta, Folonzo am Fluß Comoe, 17.01.1986, leg. Dr Politzar (ZSM, GU LAS-10-057); (31) *Soligena juna volta* nov.ssp., male paratype, Obervolta, Folonzo am Fluß Comoe, 3.11.1985, leg. Dr Politzar (ZSM, GU LAS-10-050).

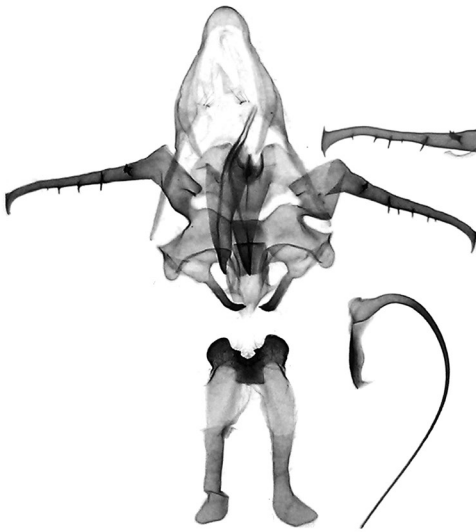
**Figs 32–34:** Wing venations. (32) *Odontopacha fenestrata* AURIVILLIUS, 1909; (33) *Hapsimachogonia hapsimachus* (HERING, 1928); (34) *Soligena juna volta* nov.ssp.



**Figs 35–42:** Male genitalia. **(35)** *Odontopacha fenestrata* AURIVILLIUS, 1909, Tanzania: Arusha Region, Mt. Meru, Mirikamba Hiut, 03°13.770'S, 036°47.980', 2 500 m, 19.10.2004 (MWM, 16.932); **(36)** *Odontopacha fenestrata* AURIVILLIUS, 1909, Kenya, Südküste, Buda Forest, 13–17.4.1995, leg. Dr Politzar (ZSM, GU LAS-10-048); **(37)** *Hapsimachogonia hapsimachus* (HERING, 1928), holotype of *Leipoxais hapsimachus* HERING, 1928, S. Kamerun, Ngoko-Station, 5.4.[19]02, leg. S. Hösemann (ZMNB, GU 2010-008); **(38)** *Hapsimachogonia hapsimachus* (HERING, 1928), holotype of *Odontopacha phaula* Tams, 1929, Kamerun, Efulen, 30.12.1918, leg. H. L. Weber (CMNH, GU 2008-21); **(39)** *Hapsimachogonia hapsimachus* (HERING, 1928), Obervolta, Folonzo am Fluß Comoe, 3.11.1985, leg. Dr Politzar (ZSM, GU LAS-2012-002); **(40)** *Hapsimachogonia kilwana* (STRAND, 1911), Kenya, Kibwezi, 20–31.05.1994, leg. Dr Politzar (ZSM, GU LAS-10-052); **(41)** *Hapsimachogonia kilwana* (STRAND, 1911), Kenya, Kibwezi, 700 m, 21.05.2002, leg. Dr Politzar (MWM, GU 17.067); **(42)** *Hapsimachogonia kilwana* (STRAND, 1911), Tanzania, Kilimanjaro Region, North Pare Mts., Vumali, 04°01.850'S, 37°44.140'E, 1280 m, 02.11.2005 [leg. local collector] (ZSM, GU LAS-11-043).



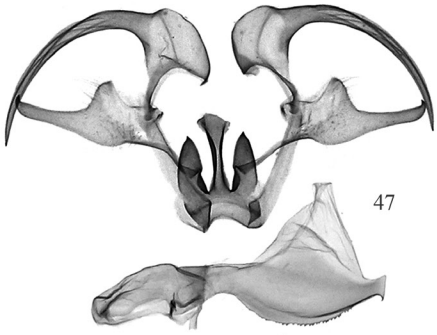
**Figs 43–46:** Male genitalia. **(43)** *Hapsimachogonia cavuata* nov.sp., holotype, Congo, Odzala Nat. Park, 00°23'N, 14°50'E, 400–500 m, 29.01.–03.03.1997, leg. Siniaev, Murzin (MWM, GU 16.930); **(44)** *Hapsimachogonia cavuata* nov.sp., paratype, Congo, d'Odzala Parc National, 01°00'N, 15°00'E, 400–500 m, 29.01.–03.03.1997, leg. S. Murzin, V. Siniaev (MWM, GU 16.934); **(45)** *Hapsimachogonia esociformae* nov.sp., paratype, Congo, Odzala Nat. Park, 00°23'N, 14°50'E, 400–500 m, 29.01.–03.03.1997, leg. Siniaev, Murzin (MWM, GU 16.935); **(46)** *Hapsimachogonia esociformae* nov.sp., paratype, Congo, d'Odzala Parc National, 01°00'N, 15°00'E, 400–500 m, 29.01.–03.03.1997, leg. S. Murzin, V. Siniaev (MWM, GU 20.083).



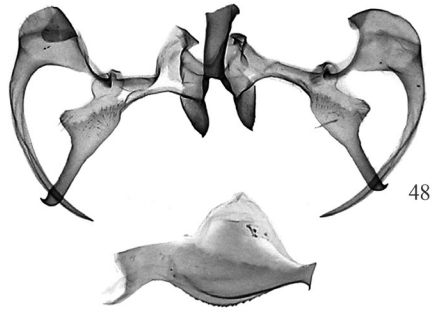


**Figs 47–53:** Male genitalia. **(47)** *Soligena spissa* (TAMS, 1929), holotype of *Odontopacha spissa* TAMS, 1929, Cameroon, Efulen, 12.06.1923, leg. H. L. Weber (CMNH, GU 2008-22); **(48)** *Soligena spissa* (TAMS, 1929), Liberia, Putu Range, La. 5.6672°, Lo. 8.18684°, 20.12.2010–05.01.2011, leg. Sz. Sáfíán, E. Zakar (RMCA, GU 000018222); **(49)** *Soligena juna* nov.sp., paratype, Kenya, South-Ukambani, 01.12.2000, leg. Dr Politzar (ZSM, GU LAS-10-058); **(50)** *Soligena juna* nov.sp., paratype, Somalia, Caanole Fluß, 16–17.09.1987, leg. Dr Politzar (ZSM, GU LAS-10-054); **(51)** *Soligena juna* nov.sp., Tanzania, Tanga Region, W Usambara, Magamba Forest, 04°44.009' S, 038°15.770' E, 1870 m, 29.10.2005, leg. Ph. DARGE (ZSM, GU LAS-11-048); **(52)** *Soligena juna volta* nov.ssp., paratype, Obervolta, Folonzo am Fluß Comoe, 04.12.1984, leg. Dr Politzar (EMEM, GU 2011-138); **(53)** *Soligena spissa* (TAMS, 1929), holotype of *Odontopacha spissa* TAMS, 1929, Cameroon, Efulen, 12.06.1923, leg. H. L. Weber (CMNH, GU 2008-22).





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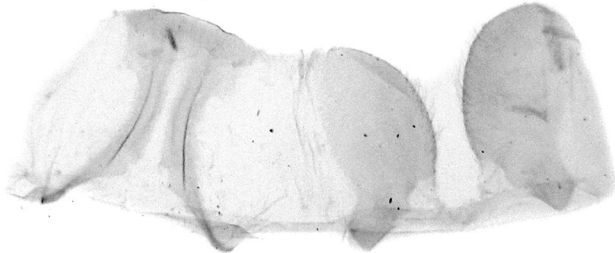
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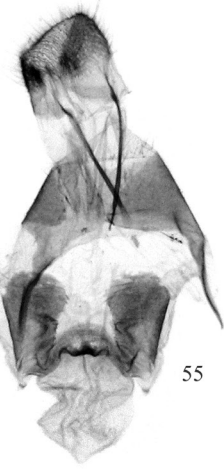


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**Figs 54–61:** Female genitalia. **(54)** *Odontopacha fenestrata* AURIVILLIUS, 1909, Kenya, Südküste, Buda Forest, 13–17.04.1995, leg. Dr Politzar (ZSM, GU LAS-10-049); **(55)** *Soligena juna volta* nov.sp., paratype, Obervolta, Folonzo am Fluß Comoe, 20.01.1985, leg. Dr Politzar (EMEM, GU 2012-001); **(56)** *Soligena juna* nov.sp., Nordost-Namibia, Westl. Caprivi, Okavango-Region, Okavango-Ufer, 30 km SE der Popa-Wasserfälle, 1050 m, 27–29.01.1998, leg. de Freina (MWM, GU 16.928); **(57)** *Hapsimachogonia kilwana* (STRAND, 1911), Kenya, South-Ukambani, 01.04.2001, leg. Politzar (ZSM, GU LAS-10-097); **(58)** *Hapsimachogonia kilwana* (STRAND, 1911), Tansanie, Tanga Region, savane près des Mts Pare Sud., 04°40.128'S, 38°05.872'E, 475 m, 24.10.2004 [leg. local collector] (ZSM, GU LAS-11-040); **(59)** *Hapsimachogonia hapsimachus* (HERING, 1928), Congo, d'Odzala Parc National, 1°00'N, 15°00'E, 450 m, 29.01.–03.03.1997, leg. S. Murzin & V. Siniaev (MWM, GU 16.931); **(60)** *Hapsimachogonia hapsimachus* (HERING, 1928), N-Nigeria, Kaduna, 08.09.1970, leg. Dr POLITZAR (ZSM, LAS-10-055); **(61)** *Hapsimachogonia cavuata* nov. sp., Congo, Odzala Nat. Park, 00°23'N, 14°50'E, 400–500 m, 29.01.–03.03.1997, leg. Siniaev, Murzin (MWM, GU 16.933).



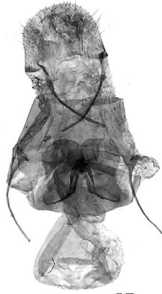
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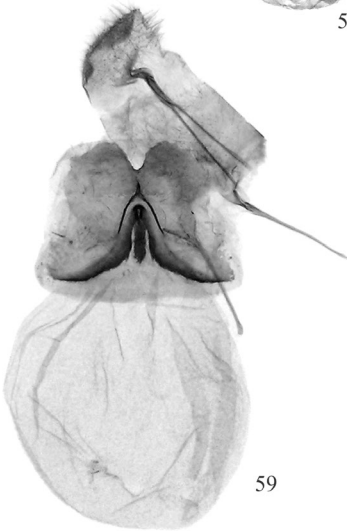
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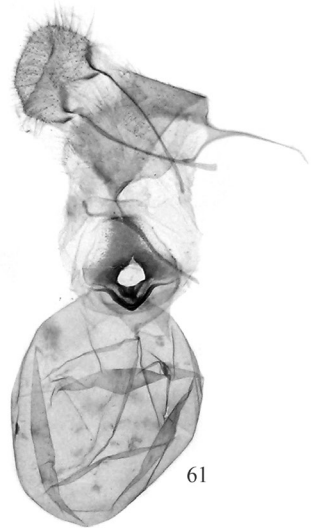
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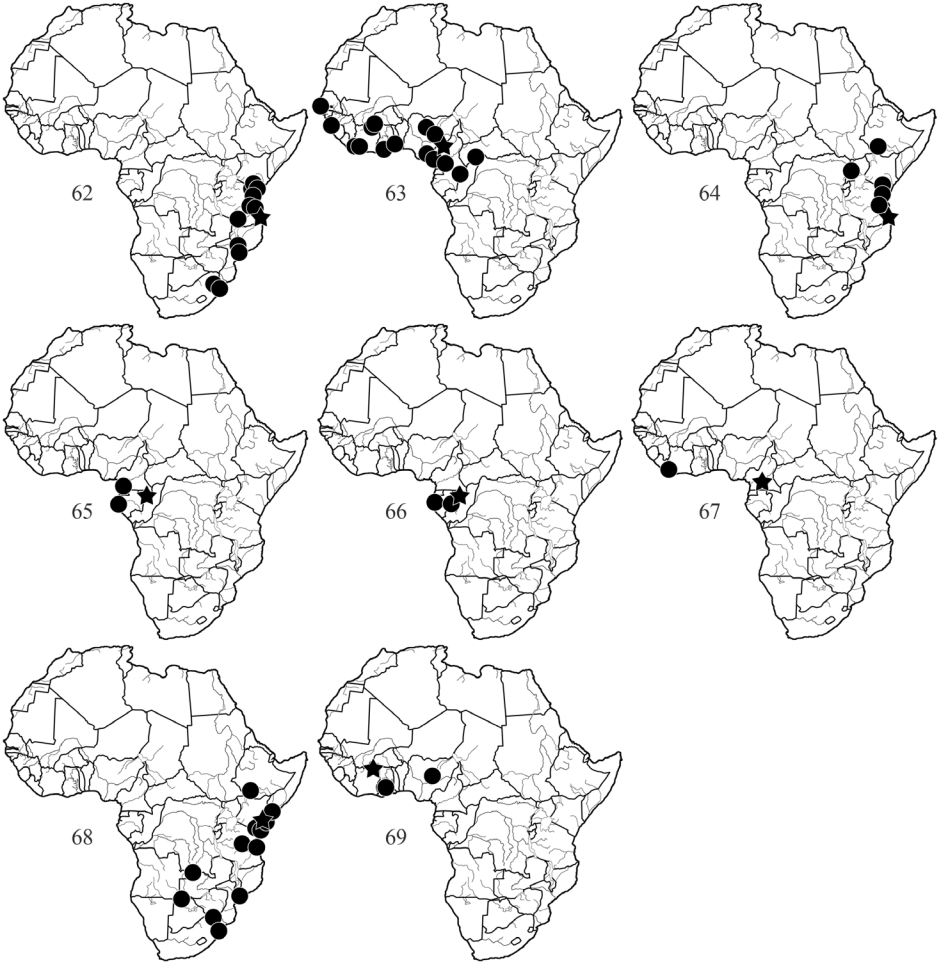


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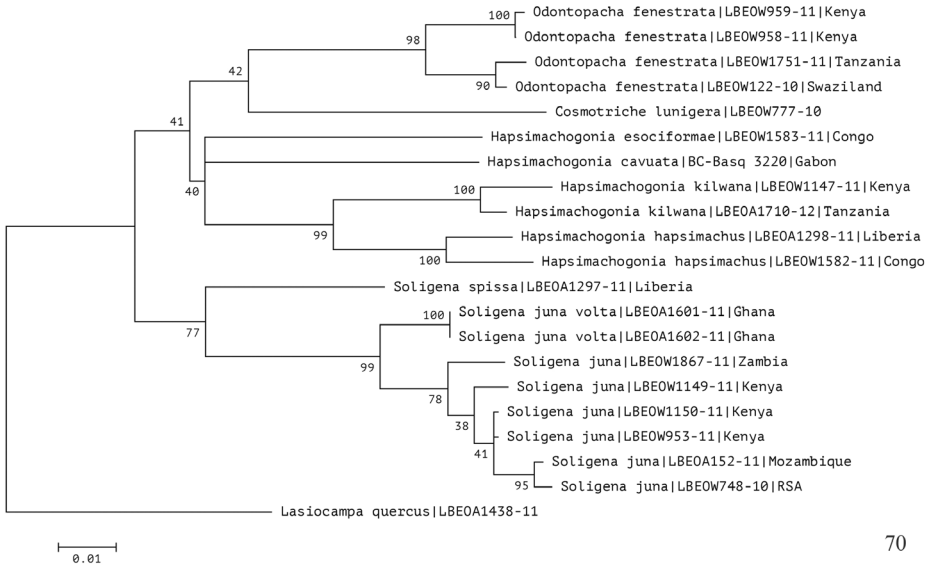


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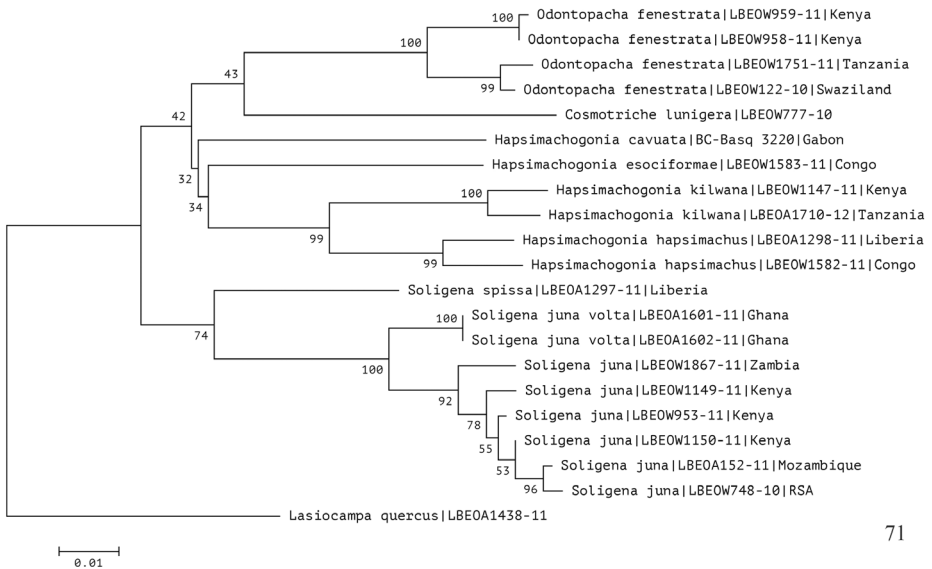
**Figs 62–69:** Distribution maps. **(62)** *Odontopacha fenestrata* AURIVILLIUS, 1909; **(63)** *Hapsimachogonia hapsimachus* (HERING, 1928); **(64)** *Hapsimachogonia kilwana* (STRAND, 1911); **(65)** *Hapsimachogonia cavuata* nov.sp.; **(66)** *Hapsimachogonia esociformae* nov.sp.; **(67)** *Soligena spissa* (TAMS, 1939); **(68)** *Soligena juna* nov.sp.; **(69)** *Soligena juna volta* nov.ssp.



**Figs 70–71:** Dendrogramms based on COI. **(70)** Maximum Likelihood method; **(71)** Neighbor-Joining method.



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Maximilian SCHWARZ, Konsulent f. Wissenschaft der Oberösterreichischen Landesregierung, Eibenweg 6,  
A-4052 Ansfelden, Austria; maximilian.schwarz@liwest.at.

Redaktion: Fritz GUSENLEITNER, Biologiezentrum Linz, f.gusenleitner@landesmuseum.at;  
Roland GERSTMEIER, Lehrstuhl f. Zoologie, TU München, gerstmei@wzw.tum.de;  
Thomas WITT, Tengstraße 33, D-80796 München, thomas@witt-thomas.com  
Berthold CLEWING, Akademischer Verlag München, avm@druckmedien.de;  
Harald SULAK, Museum Witt München, h.sulak@atelier-sulak.de;

Mitarbeiter: Karin TRAXLER, Biologiezentrum Linz, bio.redaktion@landesmuseum.at;  
Heike REICHERT, Museum Witt München, heike\_reichert66@web.de;  
Erich DILLER, Zool. Staatssammlung München, Erich.Diller@zsm.mwn.de.

Adresse: Entomofauna, Redaktion und Schriftentausch Thomas WITT, c/o Museum Witt München,  
Tengstr. 33, 80796 München, Deutschland, thomas@witt-thomas.com;  
Entomofauna, Redaktion c/o Fritz GUSENLEITNER, Lungitzerstr. 51, 4222 St. Georgen/Gusen,  
Austria, f.gusenleitner@landesmuseum.at.



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