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New species and new combinations in Afrotropical
Eucosmocydia Diakonoff, 1988 (Lepidoptera: Tortricidae:
Olethreutinae)

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New species and new combinations in Afrotropical *Eucosmocydia* Diakonoff, 1988 (Lepidoptera: Tortricidae: Olethreutinae)

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Abstract. Eight new species of *Eucosmocydia* Diakonoff are described and illustrated from the Afrotropical region: *E. pappeana* Brown and Razowski, **new species** (TL: Kenya); *E. deinbolliana* Brown and Razowski, **new species** (TL: Kenya); *E. ugandensis* Aarvik, **new species** (TL: Uganda); *E. lecaniodiscana* Brown and Razowski, **new species** (TL: Kenya); *E. nigeriana* Brown and Razowski, **new species** (TL: Nigeria); *E. pancoviana* Brown and Razowski, **new species** (TL: Kenya); *E. kirimiriana* Brown and Razowski, **new species** (TL: Kenya); and *E. macabensis* Brown and Razowski, **new species** (TL: Mauritius). Three additional species are transferred to the genus: *E. hymenosa* (Razowski, 2013), **new combination** (TL: Nigeria); *E. chlorobathra* (Meyrick, 1911), **new combination** (TL: Seychelles); and *E. trigonoptila* (Meyrick, 1921), **new combination** (TL: Mozambique). We also transfer to the genus *E. catamochla* (Meyrick, 1932), **new combination** (TL: Indonesia), the first species recorded outside the Afrotropical region. We recognize two species groups in *Eucosmocydia*, and this contribution focuses on the *oedipus* Diakonoff, 1988 group (n = 13 species), the males of which are characterized by a unique flattened lobe from the base of the hindwing. Six species from Kenya were reared exclusively from native fruit of Sapindaceae; *E. mixographa* (Meyrick) was formerly reported from Fabaceae and Euphorbiaceae.

Key words. Barcodes, genitalia, Kenya, Madagascar, Mauritius, Nigeria, Sapindaceae, Sierra Leone, South Africa, species groups.

ZooBank registration. urn:lsid:zoobank.org:pub:AE18CA26-20E8-48D3-ABD0-22A0D9891065

Introduction

Eucosmocydia was described by Diakonoff (1988) for the single species *E. oedipus* Diakonoff, 1988, from central Madagascar. Over the last decade, seven additional species have been either described in, or transferred to the genus by various authors (Guillermet 2012; Razowski and Wojtusiak 2012, 2014; Aarvik and Agassiz 2014;

Razowski and Karisch 2017). The type localities of these species are widely distributed across the Afrotropical Region, from Príncipe Island and Sierra Leone to Zimbabwe, Madagascar, and Réunion Island, but additional museum material indicates that the genus is more species rich and occurs more widely across southern Africa, with a single species described from Indonesia (*Eucosma catamochla* Meyrick, 1932), previously unrecognized as a member of the genus.

In his description of *Eucosmocydia oedipus*, the type species of the genus, Diakonoff (1988) indicated that the male has a “strong, flattened lobe” from the base of the hindwing, and this character now appears to represent a synapomorphy for a species group within the genus. Among the undetermined or undescribed Grapholitini reported by Brown et al. (2014) from Kenya is a large number of specimens that were recently recognized as members of *Eucosmocydia* on the basis of the male hindwing lobe. The purpose of this contribution is to describe these, along with three other new species that appear to be congeneric with the holotype of *Eucosmocydia oedipus*. Three previously described species are also newly transferred to the genus herein. There appears to be two species groups in *Eucosmocydia* (Table 1), and this contribution focuses on those species in which males possess the distinctive hindwing lobe.

Materials and Methods

The majority of the material examined in this study was reared from native fruit during projects funded by USAID (United States Agency for International Development), USDA (United States Department of Agriculture), and

Table 1. Species groups in *Eucosmocydia*, with countries of documented distribution; TL = country of type locality.

<i>oedipus</i> species group
<i>oedipus</i> Diakonoff, 1988: Madagascar (TL)
<i>pappeana</i> Brown and Razowski, sp. n. : Kenya (TL), South Africa
<i>mixographa</i> (Meyrick, 1939): Democratic Republic of Congo (TL), Nigeria
<i>pancoviana</i> Brown and Razowski, sp. n. : Kenya (TL)
<i>deinbolliana</i> Brown and Razowski, sp. n. : Kenya (TL)
<i>ugandensis</i> Aarvik, sp. n. : Uganda (TL)
<i>lecaniodiscana</i> Brown and Razowski, sp. n. : Kenya (TL)
<i>nigeriana</i> Brown and Razowski, sp. n. : Nigeria (TL)
<i>kirimiriana</i> Brown and Razowski, sp. n. : Kenya (TL)
<i>chlorobathra</i> (Meyrick, 1911), comb. n. : Kenya, Malawi, Seychelles (TL), South Africa, Tanzania
<i>macabensis</i> Brown and Razowski, sp. n. : Mauritius (TL)
<i>hymenosa</i> (Razowski, 2013) comb. n. : Nigeria (TL)
<i>trigonoptila</i> (Meyrick, 1921) comb. n. : Mozambique (TL)
<i>terreirana</i> species group
<i>salticola</i> Meyrick, 1913, comb. n. : South Africa (TL), Malawi, Kenya, Uganda
<i>prolixa</i> Razowski and Wojtusiak, 2012, syn. n. : Nigeria (TL)
<i>antidora</i> (Meyrick, 1920): Zimbabwe (TL)
<i>belouvensis</i> Guillermet, 2012: Réunion Island (TL)
<i>pharangodes</i> (Meyrick, 1920): “East Africa” (TL)
<i>terreirana</i> Razowski and Wojtusiak, 2014: São Tomé and Príncipe (TL), Gabon, Kenya
<i>larseni</i> Razowski and Karisch, 2017: Sierra Leone (TL)
<i>ipassaensis</i> Razowski and Bassi, 2018: Gabon (TL)
<i>zegieana</i> Razowski and Trematerra, 2018: Ethiopia (TL)
<i>catamochla</i> (Meyrick, 1932), comb. n. : Indonesia (TL)

Finland (the CHIESA project: Climate Change Impacts on Ecosystem Services and Food Security in Eastern Africa) in Kenya (Copeland et al. 2002, 2004, 2006, 2009, 2015; Adamski et al. 2010). The study sites and methods of sampling and rearing for that project are described in detail in Copeland et al. (2002, 2009) and are summarized as follows. Sampling was conducted at multiple sites, primarily east and west of the Great Rift Valley. Sites were selected to maximize the diversity of native plant species; fruits were sampled from indigenous canopy forests, open woodlands, shrub, dunes, and coral rag associations, at elevations from sea level to 3077 m above mean sea level. A single collection (indicated by a unique number, e.g., A&M #1234) consisted of all the fruit from a single plant species from a given site on a given day. Collections do not represent equal sampling effort because some fruits were much easier to find and collect than others. Specimens from elsewhere examined in this treatment were collected as adults, primarily at UV lights.

Holotypes from the Kenya fruit rearing projects will be deposited in the National Museums of Kenya (NMK), and representative specimens will be distributed among the collections of the International Centre of Insect Physiology and Ecology (ICIPE), Nairobi, Kenya; the United States National Museum of Natural History (USNM), Smithsonian Institution, Washington, DC, USA; and the Ditsong Museum, Pretoria (DMP), South Africa. Abbreviations for other depositories of specimens used in the text include the following: GBC, Graziano Bassi Collection, Geneva, Switzerland; MNHN, Museum National d'Histoire Naturelle, Paris, France; NHML, The Natural History Museum, London, U.K.; NHMO, Natural History Museum, University of Oslo, Norway; and RMCA, Royal Museum for Central Africa, Tervuren, Belgium. Because of the poor quality of some of the reared material from Kenya, not all conspecifics are included as paratypes; those lacking significant morphological features are listed as “additional specimens examined.” Other abbreviations used in the text are as follows: r.f. = reared from; BIN = barcode index number (Ratnasingham and Hebert 2013); and months of the year by the first three letters (e.g., Jan, Feb, etc).

Dissection methods followed those summarized by Brown and Powell (1991). Dissected genitalia were stained with chlorazol black and permanently mounted on glass slides using Canada balsam. Terms for morphological structures follow Komai (1999) and Horak (2006). The invaginated region within which the ostium is situated is referred to as the “pocket of the sterigma,” and it is anteriorly contiguous with a triangular or rounded, membranous antrum. Slide mounted genitalia were examined using dissecting and compound microscopes. Images of adults and genitalia were captured using a Canon EOS 5D digital SLR camera (Canon U.S.A., Lake Success, NY) mounted on a Visionary Digital BK Lab System (Visionary Digital, Palmyra, VA), and edited in Adobe Photoshop.

DNA barcodes based on the mitochondrial cytochrome oxidase I (COI) gene were generated using standard procedures at the Biodiversity Institute of Ontario, University of Guelph and Colorado State University from a leg of a pinned specimen (Hebert et al. 2003, 2013; Craft et al. 2010; Wilson 2012). Primers used for amplification and sequencing included LepF1, MLepF1, LepR1, MLepR2, C_LepFolF, and C_LepFolR (Hajibabaei et al. 2006, Hernández-Triana et al. 2014). Twelve species of *Eucosmocydia* were sequenced (Table 2): *E. lecaniodiscana* Brown and Razowski (n = 7), *E. nigeriana* Brown and Razowski (n = 3), *E. chlorobathra* (Meyrick) (n = 6), *E. kirmiriana* Brown and Razowski (n = 6), *E. pancoviana* Brown and Razowski (n = 2), *E. mixographa* (Meyrick) (n = 2), *E. deinbolliana* Brown and Razowski (n = 1), *E. pappeana* Brown and Razowski (n = 11), *E. salticola* (Meyrick) (n = 4), *E. terreirana* Razowski and Wojtusiak (n = 2). As outgroups we included sequences of *Grapholita chytranthusi* Razowski, 2019 (n = 1), an African species that feeds on Sapindaceae; *Namasia monitrix* (Meyrick, 1909) (n = 5), which at one time was included in *Eucosmocydia* (i.e., Razowski and Krüger 2007); *Neonamasia cryptica* Aarvik, 2014 (n = 4), a species in the putative sister genus to *Namasia* Diakonoff; *Thaumatotibia leucotreta* (Meyrick, 1913) (n = 1), a common Afrotropical Grapholitini; and *Thaumatovalva limbata* (Diakonoff, 1969) (n = 1) and *Thaumatovalva spinai* (Razowski and Trematerra, 2010) (n = 1), related Afrotropical Grapholitini. Sequences were trimmed to a length of 654 bp. Barcode index numbers (BINs; Ratnasingham and Hebert 2013) from Barcode of Life Data System (Biodiversity Institute of Ontario, University of Guelph) are given for each species.

The software Geneious Prime 2021.0.3 (Biomatters, Auckland, New Zealand) was used to align sequences with the MUSCLE algorithm (Edgar 2004). Bayesian inference and Maximum Likelihood (ML) analysis were conducted to determine species distinctness and relationships among them. The best nucleotide substitution model for the dataset was estimated using the software jModelTest2 (Darriba et al. 2012), based on the online version at the Cyberinfrastructure for Phylogenetic Research (CIPRES) website (Miller et al. 2010). The model

Table 2. Species identities, collecting location, collection dates, process ID numbers, GenBank accession numbers, and number of base pairs for specimens included in the molecular analysis.

Species	Location	Collection date	BOLD process ID	GenBank accession	# bp
<i>E. lecaniodiscana</i>	Kenya, Coast, Gede Forest	05 Jun 1999	AFTOR219-12	KJ592269	654
<i>E. lecaniodiscana</i>	Kenya, Nyanza, Western, Ungoye	10 Apr 2005	AFTOR247-12	KJ592420	654
<i>E. lecaniodiscana</i>	Kenya, Nyanza, Western, Ungoye	5 Jun 1999	AFTOR221-12	KJ592361	651
<i>E. lecaniodiscana</i>	Kenya, Nyanza, Western, Ungoye	10 Apr 2005	AFTOR246-12	KJ592191	654
<i>E. lecaniodiscana</i>	Kenya, Nyanza, Western, Ungoye	10 Apr 2005	AFTOR248-12	KJ592117	654
<i>E. lecaniodiscana</i>	Kenya, Coast, Gede Forest	05 Jun 1999	AFTOR218-12	KJ592252	654
<i>E. lecaniodiscana</i>	Kenya, Coast, Gede Forest	14 Feb 2002	AFRM137-14	OL434660	654
<i>E. nigeriana</i>	Nigeria, International Institute of Tropical Agriculture, Oyo	19 Jun 2006	EPNG3538-11	JN274910	654
<i>E. nigeriana</i>	Nigeria, International Institute of Tropical Agriculture, Oyo	18 Jun 2006	EPNG3849-11	OL434661	654
<i>E. nigeriana</i>	Nigeria, International Institute of Tropical Agriculture, Oyo	31 Mar 2006	EPNG3535-11	JN274907	654
<i>E. chlorobathra</i>	Kenya, Coast, Arabuko-Sokoke Forest	08 Jul 2001	PMANL2706-13	KJ592213	654
<i>E. chlorobathra</i>	Kenya, Coast, Shimba Hills	02 May 2001	PMANL2707-13	KJ592244	654
<i>E. chlorobathra</i>	Kenya, Coast, Arabuko-Sokoke Forest	08 Jul 2001	PMANL2705-13	KJ592136	603
<i>E. chlorobathra</i>	Kenya, Coast, Arabuko-Sokoke Forest	23 Jul 1999	PMANL2708-13	KJ592065	654
<i>E. chlorobathra</i>	South Africa, Mpumalanga, Kruger National Park, Skukuza	24 Nov 2017	SAFRA3874-18	N/A	642
<i>E. chlorobathra</i>	South Africa, Limpopo, Kruger National Park, Shangoni	21 Feb 2019	KMPOU121-19	N/A	654
<i>E. pappeana</i>	Kenya, Taita-Taveta, Taita Hills, Ronge-Nyika	08 Jul 2012	DAL267-12	KJ592168	654
<i>E. pappeana</i>	Kenya, Rift Valley, Western Highlands, Kitale-Marich Pass road	17 Dec 2005	AFTOR226-12	KJ592212	654
<i>E. pappeana</i>	Kenya, Central, Central Highlands, Naro Moru Lodge	04 Sep 2003	AFTOR223-12	KJ592164	654
<i>E. pappeana</i>	Kenya, Nyanza, Western Highlands, Gembe Hills	05 Dec 2004	AFTOR224-12	KJ592418	654
<i>E. pappeana</i>	Kenya, Taita-Taveta, Taita Hills, Ronge-Nyika	08 Jul 2012	DAL269-12	KJ592139	654
<i>E. pappeana</i>	Kenya, Taita-Taveta, Taita Hills, Ronge-Nyika	08 Jul 2012	DAL268-12	KJ592366	654
<i>E. pappeana</i>	Kenya, Rift Valley, Western Highlands, Kitale-Marich Pass road	17 Dec 2005	AFTOR227-12	KJ592413	654
<i>E. pappeana</i>	Kenya, Rift Valley, Western Highlands, Kitale-Marich Pass road	17 Dec 2005	AFTOR228-12	KJ592154	654
<i>E. pappeana</i>	Kenya, Nyanza, Western Highlands, Gembe Hills	05 Dec 2004	AFTOR225-12	KJ592427	654
<i>E. pappeana</i>	South Africa, Gauteng, Roodeplaat, Agricultural Research Centre	02 Feb 2015	N/A	OL804614	654
<i>E. pappeana</i>	South Africa, Gauteng, Roodeplaat, Agricultural Research Centre	02 Feb 2015	N/A	OL804615	654
<i>E. kimiriana</i>	Kenya, Eastern Central Highlands, Kimeriri Forest	08 Nov 2001	AFTOR232-12	KJ592116	651
<i>E. kimiriana</i>	Kenya, Eastern Central Highlands, Kimeriri Forest	17 Dec 2002	AFTOR234-12	KJ592173	654
<i>E. kimiriana</i>	Kenya, Eastern Central Highlands, Kimeriri Forest	21 Jan 2003	AFTOR233-12	KJ592157	654
<i>E. kimiriana</i>	Kenya, Eastern Central Highlands, Kimeriri Forest	21 Jan 2003	AFTOR231-12	KJ592081	654
<i>E. kimiriana</i>	Kenya, Eastern Central Highlands, Kimeriri Forest	21 Jan 2003	AFTOR229-12	KJ592245	654
<i>E. kimiriana</i>	Kenya, Eastern Central Highlands, Kimeriri Forest	21 Jan 2003	AFTOR230-12	KJ592384	654

Species	Location	Collection date	BOLD process ID	GenBank accession	# bp
<i>E. pancoviana</i>	Kenya, Taita-Taveta, Taita Hills, Kasigau forest	14 Oct 2012	PMANL2683-13	KJ592169	654
<i>E. pancoviana</i>	Kenya, Taita-Taveta, Taita Hills, Kasigau forest	14 Oct 2012	PMANL2684-13	KJ592149	654
<i>E. deinbolliana</i>	Kenya, Arabuko-Sokoka Forest	09 Jan 2000	AFTOR222-12	KJ592233	654
<i>E. mixographa</i>	Nigeria, Oyo, Ibadan	16 Jun 2006	EPNG3539-11	JN274911	654
<i>E. mixographa</i>	Nigeria, Oyo, Ibadan	30 Jun 2006	AFTOR305-12	KJ592233	633
<i>E. salticola</i>	South Africa, Western Cape, Oshoek River Farm	20–22 Jan 2016	LEPAF049-16	N/A	654
<i>E. salticola</i>	South Africa, Western Cape, Oshoek River Farm	20–22 Jan 2016	LEPAF050-16	N/A	654
<i>E. salticola</i>	Kenya, Rift Valley Province, Nakuru District	01 Dec 2010	N/A	OL804616	654
<i>E. salticola</i>	Kenya, Rift Valley Province, Laikipia district, Mpala Ranch	08 Dec 2010	N/A	OL804617	654
<i>E. terreirana</i>	Kenya, Machakos, Central Highlands	16 Feb 2003	PMANL2704-13	KJ592343	654
<i>E. terreirana</i>	Gabon, Ogooué Ivindo Province, Ipassa-Makokou Research Station	14–24 Mar 2015	N/A	OL804618	654
<i>G. chytranthusi</i>	Kenya, Coast, Buda Forest	24 Feb 2018	EPNG11391-19	OL434659	654
<i>Namasia monitrix</i>	South Africa, KwaZulu-Natal, Magale's Gate	12 Feb 2012	ETKL319-13	N/A	654
<i>Namasia monitrix</i>	South Africa, KwaZulu-Natal, Magale's Gate	12 Feb 2012	ETKL320-13	N/A	543
<i>Namasia monitrix</i>	South Africa, Gauteng, Roodeplaat, Agricultural Research Centre	02 Feb 2015	N/A	OL804610	654
<i>Namasia monitrix</i>	South Africa, Gauteng, Magaliesburg Nature Reserve	8–11 Feb 2015	N/A	OL804611	654
<i>Namasia monitrix</i>	Kenya, Kericho, Western Highlands, Mau Forest	03 Feb 2003	AFTOR204-12	KJ592253	654
<i>Neonamasia cryptica</i>	Kenya, Homa Bay Co., Gembe Hills	05 Dec 2004	AFMIC159-12	KJ592327	654
<i>Neonamasia cryptica</i>	South Africa, KwaZulu-Natal, eThekweni, Palmiet Nature Reserve	08 Nov 2011	PalmGr1Hemi17	N/A	654
<i>Neonamasia cryptica</i>	Kenya, Rift Valley Province, Laikipia district, Mpala Ranch	05 Dec 2010	N/A	OL804612	654
<i>Neonamasia cryptica</i>	Kenya, Homa Bay, Gembe Hills	05 Dec 2004	AFMIC159-12	KJ592327	654
<i>Neonamasia cryptica</i>	Kenya, Rift Valley Province, Laikipia district, Mpala Ranch	08 Dec 2010	N/A	OL804613	654
<i>Thaumatotibia leucotreta</i>	Kenya, Coast, Wundanyi	17 Feb 2002	AFTOR025-12	KJ592093	654
<i>Thaumatovalva limbata</i>	Kenya, Baringo, Northern Highlands, Mathews Range	18 Jan 2004	AFTOR114-12	KJ592202	654
<i>Thaumatovalva spinai</i>	Ethiopia, Dawro Zone, Omo Valley, Tarcha	16 Apr 2009	AFTOR474-14	KM896945	654

TIM2+G was predicted as the best estimator by the Bayesian Information Criterion (BIC) and Akaike Information Criterion (AIC). Bayesian inference was performed using MrBayes, and ML analysis was performed using PhyML, with both implemented as Geneious Prime plugins. Bayesian analysis was run with four Markov chains over 10,000,000 generations, with every 1,000th tree saved. The first 1,000 trees were discarded as burn-in. Support for nodes in the ML analysis was estimated by performing 1,000 bootstrap pseudoreplicates. Average distance within species and distance to the nearest neighbor were calculated as p-distances using algorithms generated by the Barcode of Life Data System (Ratnasingham and Hebert 2007).

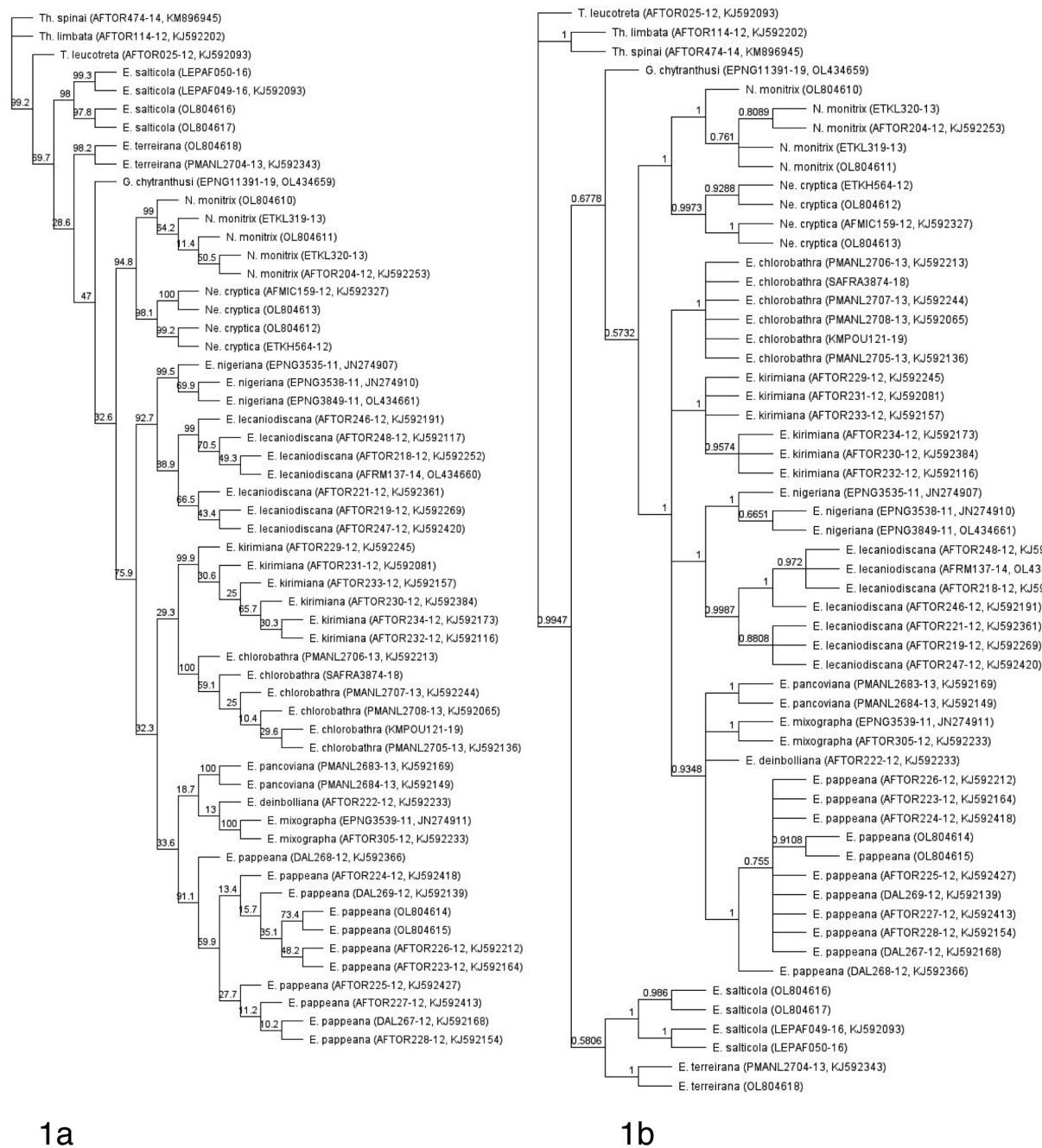


Figure 1. Molecular phylogenies of *Eucosmocydia* based on COI barcode sequences for 10 species of *Eucosmocydia* and the outgroups *Grapholita chytranthusi*, *Namasia monitrix*, *Neonamasia cryptica*, *Thaumatovalva limbata*, *Thaumatovalva spinai*, and *Thaumatotibia leucotreta*. BOLD process numbers are given next to species names. **a)** Maximum likelihood tree; node labels represent boot-strap support values. **b)** Bayesian consensus tree as derived using MrBayes; node labels represent posterior probabilities.

Results and Discussion

Molecular analyses. Both phylogenetic analyses (ML and Bayesian) led to tree topologies in which barcodes of all sampled species of the *oedipus* species group of *Eucosmocydia*, *Namasia*, and *Neonamasia* Aarvik form a well-defined monophyletic lineage. Figures 1a and 1b show the ML and Bayesian trees, respectively. Within this lineage, species of *Eucosmocydia* with a hindwing lobe (i.e., the *oedipus* species group) form a monophyletic lineage sister to *Namasia*+*Neonamasia*; and in both analyses, the *oedipus* species group plus *Namasia*+*Neonamasia* appears to be closer to *G. chytranthusi* than to the *terreirana* species group of *Eucosmocydia*. The analyses suggest that either *Namasia*+*Neonamasia* should be included within a broadened *Eucosmocydia*, or that species of *Eucosmocydia* that lack the hindwing lobe (i.e., *terreirana* species group) should be recognized as a separate genus. However, these results must be interpreted with caution because phylogenies based on the single gene COI are far from robust, and these results contradict convincing morphological data. Based on the limited molecular data and considerable morphological data, we take a conservative approach, provisionally accepting *Namasia* and *Neonamasia* as sisters, and species currently included in *Eucosmocydia* as two distinct species groups within that genus.

Systematics. The two species groups of *Eucosmocydia* (Table 1) share extremely similar male genitalia, but most species in the two groups differ slightly in female genitalia, forewing shape, and hindwing male features. Members of the *oedipus* species group, the subject of this treatment, usually have a slightly broader forewing; males always have a distinctive anal lobe (Fig. 12, 19) of the hindwing mentioned by Diakonoff (1988); and females have either a small lobe-like swell of the ductus bursae at its junction with the antrum, or a distinct bend in the ductus bursae in its posterior one-third (i.e., *E. chlorobathra*). Members of the *terreirana* species group usually have a slightly narrower forewing; males always lack the hindwing lobe, instead, having characteristically thickened scaling of the hindwing veins; and lack the lobe-like swelling at the junction of the ductus bursae and the antrum.

Most species of the *oedipus* species group are distinguished by a somewhat two-toned forewing pattern, with a paler basal 0.3–0.4 lacking distinct pattern elements and a darker apical 0.6–0.7 with complex maculation involving ill-defined fascia, blotches, and striae, and irregular patches of white scales on the under surface of the forewing. In the *terreirana* species group, the entire forewing usually has a pattern similar to the basal part of the forewing of the *oedipus* species group. Males of nearly all species of the *oedipus* species group have rather conspicuous black secondary scales on the abdomen and hindwing, resulting in sexual dimorphism that is subtle in some species and conspicuous in others.

The male genitalia of all *Eucosmocydia* have a rounded to oblong tegumen with wide lateral and apical parts, and with conspicuous, long, scattered setae, the latter possibly representing the fusion of the socii with the tegumen. No characters were recognized that convincingly separate the male genitalia of the two species groups.

In the female genitalia of species of the *oedipus* species group, the sterigma has a broad, semi-membranous, variably triangular region enclosing the ostium (i.e., pocket of the sterigma); at its anterior end (the apex of the triangle) it is slightly swollen (often bulblike) and weakly recurved, followed by a short, extremely narrow, frail portion of the ductus bursae. From there the ductus bursae gradually broadens anteriorly, increasing to about twice its width at the origin of the ductus seminalis, two-thirds to midway between the ostium and the intersection of the corpus bursae, with the distance somewhat species specific.

Species accounts for the *oedipus* species group

Eucosmocydia oedipus Diakonoff, 1988

Eucosmocydia oedipus Diakonoff 1988: 326, fig. 17, 32; Brown 2005: 335.

Remarks. *Eucosmocydia oedipus* Diakonoff, 1988 is the type species of *Eucosmocydia*. Although we have not examined the holotype, its identity is unambiguous from the original description. According to Diakonoff (1988), *E. oedipus* is a broad-winged species superficially resembling species of the genus *Grapholita* Treitschke. The “forewing is purplish-fuscous, closely and finely striated with pale cinerous (tip of scales).” Wingspan 10 mm. “Hind tibia glossy dark grey, a thick pencil of hair-scales dark grey-bronze, posterior tarsus glossy golden.” “Hind wing dorsal lobe grey, black-tipped.” The male genitalia (Diakonoff 1988: fig. 17) are typical of several species

of *Eucosmocydia*, differing from those of the species treated in the present contribution by an even higher tegumen. The valva is slender with a long cucullus, similar to that of *E. kirimiriana* (Fig. 27). Although Razowski and Trematerra (2008) reported *E. oedipus* from Mozambique, their illustration of the male genitalia does not agree with Diakonoff's (1988) figure. The cucullus of the valva in the specimen from Mozambique (Razowski and Trematerra 2008, fig. III, 10) is subrectangular, whereas the shape of the valva in the holotype of *E. oedipus* is more rounded and apically tapered. Presently, *E. oedipus* is known only from the holotype from Madagascar. DNA-barcode sequences and the life history are unknown.

Type. Holotype ♂, Central Madagascar, massif de l'Andringitra, plateau Soaindrana, 2070 m, 15 Jan 1958, P. Griveaud, genitalia slide 8461 (MNHN).

***Eucosmocydia pappeana* Brown and Razowski, new species**

Fig. 2, 3, 20, 28, 36, 37

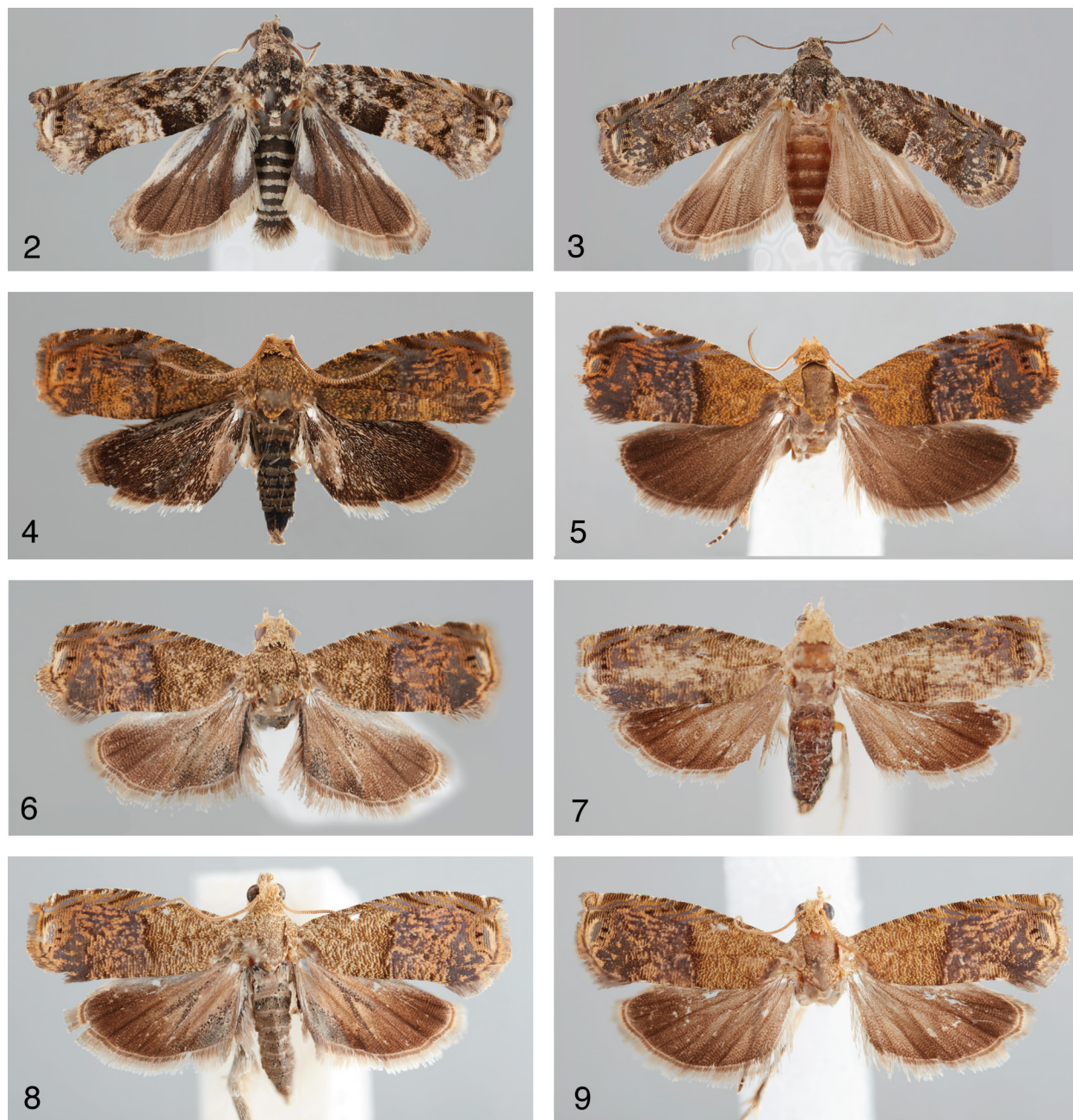
"Grapholitini sp. 6": Brown et al. 2014: 350.

Diagnosis. *Eucosmocydia pappeana* is the largest species of the genus (forewing length 6.0–7.0 mm), and males are the most easily distinguished superficially. The basal half of the forewing is much darker than in relatives, with black patches frosted with white scales. The hindwing has conspicuous linear white patches in the costal, discal, and subanal regions. Also, there is a tuft of specialized black scales laterally from the first abdominal segment. In the male genitalia the ventro-basal margin of the cucullus is more angled than in related species, where it is usually more rounded; the phallus is bent medially, rather than subterminally; and the dorsoposterior edge of the basal cavity of the valva is extended dorsally. In the female genitalia sternite 7 is distinctly elongate, and the cup-shaped anterior part of the sterigma is short.

Description. *Male.* *Head.* Scales of vertex and frons dark gray mixed with pale gray; labial palpus weakly upturned, length ca. 1.2 times diameter of compound eye, third segment exposed, scales of labial palpus and basal flagellomeres of antenna concolorous with vertex. *Thorax.* Notula and tegula mostly black with four ill-defined, small patches of ochreous scales. Forewing length 6.0–7.0 mm (n = 2); forewing (Fig. 2) slightly expanding terminad; costa weakly arched throughout; termen shallowly concave beneath apex, broadly convex in remainder; upperside ground color whitish, mixed with orange in posterior half of wing; pattern slightly two-toned, with dark basal 0.5 and paler distal 0.5; with large subsquare blotch from hind margin approximately 0.2–0.4 distance from base to tornus, representing dorsal part of median fascia, with a pair of short white lines at its outer margin, a few scattered, irregular, similarly colored blotches between blotch and costa; distal 0.5 of forewing with ground color pale brown with scattered black and gray scales; tornal blotch ill-defined; costal strigulae white, divisions brown; speculum near mid-termen dirty orange, with slender cream crescent-shaped mark with three or four black inner dots. Fringe pale brown. Hindwing dark brown with costa and subcosta white, an ill-defined white streak near middle of wing, and an elongate, slightly teardrop-shaped, white patch in subanal region. Fringe cream with brown basal line. *Abdomen.* Segment 7 (Fig. 28) with expanded sclerite at mid-venter of anterior margin, cone-shaped anteriorly, slightly rounded posteriorly. Genitalia (Fig. 20) with tegumen fairly broad; proximal part of valva and ventral edge of sacculus straight; dorsoposterior edge of basal cavity extending above costa; ventral lobe of cucullus distinct, rounded, dorsal lobe slender; phallus slender, bent, with small ventroterminal thorn; caulis from a distinct convexity.

Female. *Head and thorax.* Essentially as described for male, except forewing upperside darker with pattern less defined (i.e., less contrast between basal and distal halves) with ill-defined dorsal lines and paler brown blotch, fewer white scales (Fig. 3); and hindwing with indistinct traces of pale fasciae replacing white streaks in male. *Abdomen.* Lacking bands of white scales at posterior margin of segments. Venter of segment 7 with weakly sclerotized trapezoidal region. Genitalia (Fig. 36, 37) with postvaginal sterigma formed by two weak dentate lateral plates; triangular region surrounding ostium short, stout, with small rounded expansion at anterior end, giving rise to frail ductus bursae; colliculum distinct; ductus bursae slender in posterior 0.3, gradually broadening anteriorly, more abruptly at origin of ductus seminalis; ductus bursae approximately as long as corpus bursae; corpus bursae rounded, finely punctate, with a pair of curved, thornlike signa about equal in size.

DNA barcodes. There are nine sequences of this species (from Kenya) in BOLD (BIN: ABW2608), with an average distance of 0.59% among samples, and 3.69% distance to its nearest neighbor. Two barcoded specimens from



Figures 2–9. Adults of *Eucosmocydia*. 2) *E. pappeana*, male holotype. 3) *E. pappeana*, female paratype. 4) *E. deinbolliana*, male paratype. 5) *E. mixographa*, female. 6) *E. lecaniodiscana*, male holotype. 7) *E. lecaniodiscana*, female paratype. 8) *E. nigeriana*, male holotype. 9) *E. nigeriana*, paratype female.

South Africa are 99.69% similar to those from Kenya. Barcodes suggest that *E. pappeana* may be the sister to *E. mixographa*.

Types. Holotype ♂, Kenya, Coast Province, Ronge-Nyika, mixed shrub and grassland, –3.41022, 38.42447, 943 m, 8 Jul 2012, r.f. *Pappea capensis*, CHIESA 240, R. Copeland. Paratypes (8♂, 6♀). **Kenya:** Coast Province: Ronge-Nyika, mixed shrub and grassland, –3.41022, 38.42447, 943 m, 6 Jul 2012 (1♂, 1♀), r.f. *Pappea capensis*, CHIESA 240, R. Copeland. Kitale-Marich Pass road, 01°23.870'N, 35°29.477'E, 1510 m, 17 Dec 2005 (1♂, 3♀), r.f. *Pappea capensis*, A&M #3160, R. Copeland. Naro Moru Lodge, 0°09'N, 37°01'E, 1980 m, 4 Sep 2003 (1♂, 1♀),

r.f. *Pappea capensis*, A&M #2552, R. Copeland. **South Africa:** Gauteng: Pretoria East, 25°48'S, 28°22'E, 1000 m, 9 Nov 2004 (1♀), J. & W. DePrins (RMCA). Roodeplaat Ag. Res. Ctr., -25.6051, 28.3550, 2 Feb 2015 (5♂), J. Brown & T. Gilligan (USNM).

Distribution and biology. *Eucosmocydia pappeana* is known from South Africa and Kenya. The Kenyan specimens were all reared from *Pappea capensis* Eckl. & Zeyh. (Sapindaceae) (n = 9).

Etymology. The specific epithet refers to the genus of the host plant, *Pappea* Eckl. & Zeyh.

Remarks. Specimens from South Africa have a considerably smaller forewing length than those from Kenya, and the forewing pattern of males is less contrasting. However, the genitalia of both sexes and male secondary features are identical between the two groups of specimens (i.e., those from Kenya and South Africa), and the barcodes from South African specimens (n = 2) are 99.69% similar to those from Kenya (n = 9).

Eucosmocydia mixographa (Meyrick, 1939)

Fig. 5, 38

Laspeyresia mixographa Meyrick 1939: 51.

[Grapholitini unplaced] *mixographa*: Brown 2005: 366.

Eucosmocydia mixographa: Razowski et al. 2010: 29, fig. 47, 114.

Diagnosis. This species has a slightly more two-toned forewing than most species in the genus, with a densely checkered orange basal half and a darker distal half, with the halves conspicuously separated by a slightly arched, black median fascia extending from the costa to the hind margin. In facies, *E. mixographa* is most similar to *E. deinbolliana*, but in *E. mixographa* the basal half of the forewing is yellow-orange followed by blackish maculation, whereas in *E. deinbolliana* the basal half of the forewing is mostly brownish.

Redescription. *Male.* Not examined. *Female. Head.* Vertex and frons pale yellow-orange; labial palpus pale yellow-orange; antenna with narrow ring of pale-yellow scales on each flagellomere. *Thorax.* Not covered with orange-tipped brown scales; tegula long, with flat orange-tipped brown scales. Forewing (Fig. 5) length 4.5–4.8 mm (n = 2); forewing expanding terminad; distal half of costa bent; termen with shallow subapical notch, convex beneath notch; upperside ground color yellow-brown, tinged rust to middle; costal strigulae white, well developed beyond middle; speculum brown with orange marks, followed by whitish, convex line; basal area limited by concave brown line edged with white posteriorly; black-brown markings across wing followed by yellow-rust subterminal area; terminal area brown. Fringe brownish gray with some orange adjacent to speculum, darker brown towards tornus. Hindwing dark brown, fringe grey-brown. *Abdomen.* Genitalia (Fig. 38) with papillae anales slender, slightly expanded posteriorly; apophyses as described for genus; sterigma mostly membranous, with a pair of somewhat faint, weakly scobinate, oblong patches in post-ostial area, anterior margin of sterigma narrow crescent-shaped; ductus bursae long, slender; corpus bursae ovoid with a pair of thorn-shaped signa.

DNA barcode. There are two identical sequences of this species (BIN: AAU2217) in BOLD, both from Nigeria. In the ML tree (Fig. 1), *E. mixographa* is sister to *E. pappeana*.

Types. Lectotype ♀, Eala, Democratic Republic of the Congo, Mar 1936, Ghesquière; genital prep. 98060 L. Aarvik (RMCA). Paralectotype: Same data as holotype (1♂) (BMNH).

Additional specimens examined: **Nigeria:** Oyo State, Ibadan, International Institute of Tropical Agriculture, 7.5008°N, 3.9065°E, 240 m, 16 Jun 2006 (1♀), 30 Jun 2006 (1♀), G. M. Miller & T. M. Kuklenski, USNM slide 143,434 (USNM).

Distribution and biology. This species is known from the Democratic Republic of the Congo and Nigeria. Ghesquière (1940) reported “Caterpillars in immature pods of *Piptadenia africana* [H. f. (Fabaceae)] and fruits of *Mallotus oppositifolius* [Muell.-Arg. (Euphorbiaceae)] together with *Carposina impavida*” (Carposinidae). These observations suggest that *E. mixographa* may be a generalist scavenger in dead or decaying fruit tissues, and not a specialist, as its congeners appear to be.

Remarks. This species was described from two specimens, both from the Democratic Republic of the Congo. The lectotype was selected by Aarvik in 1998 but was not published until 2010 when Razowski et al. (2010) provisionally assigned the species to *Eucosmocydia* based on similarities of the genitalia with other African species of that

genus. The genitalia of the two females from Nigeria appear to closely match those of the lectotype, even though the forewing pattern of those two specimens differs slightly from that of the lectotype.

***Eucosmocydia pancoviana* Brown and Razowski, new species**

Fig. 10, 11, 19, 25, 33, 43

“Grapholitini sp. 22”: Brown et al. 2014: 351.

Diagnosis. In *E. pancoviana* both the forewing and hindwing are darker than in most other members of the genus, with more extensive leaden gray scaling in the distal half of the forewing. In the hindwing of the male, the costa is white and there is a narrow cream streak in the subanal region, which serve to distinguish it from other members of the group. The male genitalia are most similar to those of *E. kimiriana* with the basal 0.5 of the valva narrower than the distal, upcurved 0.5 (cucullus).

Description. *Male. Head.* Scales of vertex and frons grayish brown; labial palpus weakly upturned, length approximately 1.2 times diameter of compound eye, third segment exposed, scales of labial palpus and basal flagellomeres of antenna concolorous with vertex. *Thorax.* Notum and tegula brown, frosted with cream-tipped scales. Forewing (Fig. 10) length 4.5–5.0 mm (n = 5); forewing with costa weakly curved throughout, termen with shallow notch immediately below apex, rounded convex in remainder; upperside ground color dark brown, basal 0.33 with faint, irregular streaks of striae of cream scales; an irregular, dark brown, oblique line from basal 0.33 of hind margin bordering inner region; distal 0.66 of forewing with more complex pattern of irregular brown and leaden gray blotches, and orange striae; costal strigulae cream and gray, divisions black or brown, in some forming blackish dashes; speculum near mid-termen with extremely narrow, pale orange, crescent-shaped mark bordering wider leaden crescent, with three distinct black dots. Fringe pale brown. Hindwing dark brown, paler in costa and subcostal regions. Fringe pale cream with brown basal line. *Abdomen.* Brown with narrow cream band at distal margin of each segment. Segment 7 (Fig. 33) with expanded sclerite at mid-venter, rounded at anterior margin, with weakly subtriangular, median pointed process posteriorly. Male genitalia (Fig. 25) with tegumen broad, rounded, with sparse fine setae in dorso-posterior 0.6 representing fused socii; valva with costa upcurved in distal 0.7, venter with shallow, weakly curved concavity in basal 0.3 creating ill-defined “neck,” cucullus representing distal 0.5 of valva, rather broad; caulis long, rodlike, attached to phallus subbasally; phallus downcurved at ca. 0.6 distance from phallobase to apex, then weakly upcurved in distal 0.2.

Female. *Head and thorax.* Essentially as described for male, except hindwing uniformly brown (Fig. 11). *Abdomen.* Brown with narrow, ill-defined, pale line at distal edge of each segment. Genitalia (Fig. 43) with membranous, cup-shaped part of sterigma short; post-ostial sterigma broad, weakly sclerotized; sclerite of colliculum short, weak; ductus bursae slender to before middle where ductus seminalis originates; corpus bursae rounded, a pair of small, thorn-shaped signa.

DNA barcodes. There are two identical sequences of this species in BOLD (BIN: ACH7952), and *E. pancoviana* appears to be sister to *E. deinbolliana*.

Types. Holotype ♂, Kenya, Coast Province, Kasigau Forest, -3.82039, 38.66122, 1283 m, CHIESA 334, r.f. *Pancovia golungensis*, 14 Oct 2012, R. Copeland. Paratypes (11♂, 15♀). **Kenya:** Same data as holotype.

Distribution and biology. This species is known from a long series of specimens from Kasigau Forest, Kenya, where it was reared from *Pancovia golungensis* (Hiern) Exell & Mendonça (Sapindaceae).

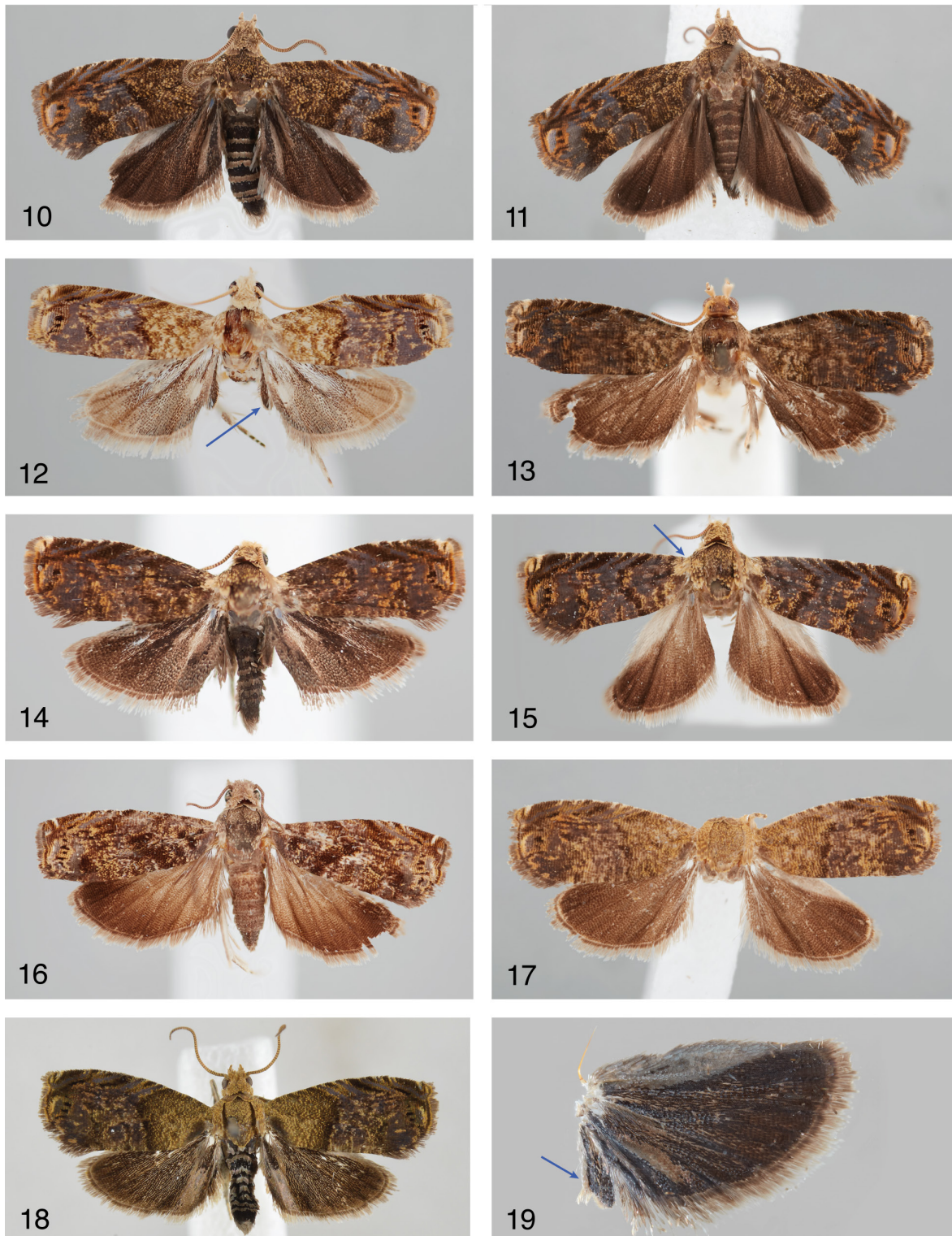
Etymology. The specific epithet refers to the genus of the host plant, *Pancovia* Willd.

***Eucosmocydia deinbolliana* Brown and Razowski, new species**

Fig. 4, 21, 30

“Grapholitini sp. 3”: Brown et al. 2014: 350.

Diagnosis. *Eucosmocydia deinbolliana* is morphologically most similar to *E. pancoviana*, with both the forewing and the hindwing mostly dark brown. It can be distinguished from the latter by the orange rather than leaden gray scales in the distal half of the forewing, and by the more expanded patch of pale scales on the undersurface of the hindwing. Males are easily distinguished by the shape of the sclerite of segment 7 (Fig. 30).



Figures 10–19. Adults of *Eucosmocydia*. **10)** *E. pancoviana*, male holotype. **11)** *E. pancoviana*, female paratype. **12)** *E. chlorobathra* (arrow indicates anal lobe of hindwing). **13)** *E. chlorobathra*, female paratype. **14)** *E. kimiriana*, male holotype. **15)** *E. kimiriana*, female paratype (arrow indicates diagnostic cream spot at base of wing). **16)** *E. macabensis*, female holotype. **17)** *E. hymenosa*, female holotype. **18)** *E. ugandensis*, male. **19)** Hindwing of *E. pancoviana* (arrow indicates anal lobe of hindwing).

Description. *Male. Head.* Scales of vertex and frons grayish brown; labial palpus weakly upturned, length approximately 1.2 times diameter of compound eye, third segment exposed, scales of labial palpus and basal flagellomeres of antenna concolorous with vertex. *Thorax.* Nota and tegula brown, frosted with cream-tipped scales. Forewing (Fig. 4) length 4.5 mm ($n = 1$); forewing with costa weakly curved throughout, termen with shallow notch immediately below apex, rounded convex in remainder; upperside ground color dark brown, basal 0.33 with faint, irregular streaks of striae of cream scales; an irregular, dark brown, oblique line from basal 0.33 of hind margin bordering inner region; distal 0.66 of forewing with more complex pattern of irregular brown and leaden gray blotches, and orange striae; costal strigulae cream and gray, divisions black or brown, some in forming blackish dashes; speculum near mid-termen with extremely narrow, pale orange, crescent-shaped mark bordering wider leaden crescent, with three distinct black dots. Fringe pale brown. Hindwing dark brown, paler in costa and subcostal regions. Fringe pale cream with brown basal line. *Abdomen.* Brown with narrow cream band at distal margin of each segment. Segment 7 (Fig. 30) with small subquadrate sclerite at mid-venter. Male genitalia (Fig. 21) with tegumen broad, rounded, with sparse fine setae in dorso-posterior 0.6 representing fused socii; valva with costa upcurved in distal 0.7, venter with shallow, weakly curved concavity in basal 0.3 creating ill-defined “neck,” cucullus representing distal 0.5 of valva, rather broad; caulis long, rodlike, attached to phallus subbasally; phallus downcurved at ca 0.6 distance from phallobase to apex, then weakly upcurved in distal 0.2.

Female. Unknown.

DNA barcodes. There is one sequence of this species in BOLD (BIN: ABW2619), and it suggests that *E. deinbolliana* is sister to *E. mixographa*.

Type. Holotype ♂, Kenya, Arabuko-Sokoke Forest, ca. 3°18.1'S. 39°59.14'E, 9 Jan 2000, A&M #418, R. Copeland, ICIPE/USAID, r.f. *Deinbollia borbonica*, USNM slide 153,700.

Distribution and biology. This species is described from the Arabuko-Sokoke Forest in Kenya. The holotype and only known specimen was reared from the fruit of *Deinbollia borbonica* Scheff. (Sapindaceae).

Etymology. The specific epithet refers to the genus of the host plant, *Deinbollia* Schumach. & Thonn.

Eucosmocydia ugandensis Aarvik, new species

Fig. 18, 22, 29

Diagnosis. This is a dark species with a forewing pattern as in *E. pancoviana* and the hindwing most similar to that of *E. deinbolliana*. It differs from these two species by the shape of the large, light patch extending to the dorsal margin in the anal area of the hindwing. The sclerite of segment 7 in the male differs from that of *E. deinbolliana* by its more subtriangular shape and rounded anterior margin (the margin is straight in *E. deinbolliana*).

Description. *Male. Head.* Frons whitish, vertex ochereous; labial palpus upturned, length approximately 1.2 times diameter of compound eye, third segment exposed, labial palpus and scape of antenna concolorous with vertex; antenna ringed brown and ochereous. *Thorax.* Nota and tegula with brown, yellow-tipped scales. Forewing (Fig. 18) length 4.0–4.5 mm ($n = 6$); forewing costa weakly curved throughout, termen with shallow notch immediately below apex, rounded convex in remainder; upperside ground color dark brown, basal third mottled with paler scales; an irregular, dark brown, oblique line from basal 0.33 of hind margin bordering inner region; distal 0.66 of forewing with more complex pattern of irregular brown and leaden gray blotches, and orange striae; costal strigulae yellow and gray, divisions black or brown, some forming blackish dashes; speculum near mid-termen, with three distinct black dots, terminally bordered with leaden gray, ochereous line between this and terminal line; terminal line leaden gray. Fringe gray with yellow basal line which is interrupted in tornal area. Hindwing upperside mainly covered with brownish black scales; anal area with pale brownish gray scales from basal third to dorsal margin; line of black scales borders anal margin. Fringe whitish at anal corner becoming more grayish towards apex; cilia line brownish grey. Underside of fore- and hindwing pale brownish gray, with deep black scaling forming longitudinal patches. Anal lobe on upperside white with narrow, black proximal line; underside white, with black patch in distal half and black proximal margin. Hind tibia with pencil of pale brownish gray hair-scales. *Abdomen.* Black with pale brownish gray band at distal margin of each segment. Segment 7 (Fig. 29) with rounded subtriangular sclerite at mid-venter. Male genitalia (Fig. 22) with tegumen broad, rounded, laterally with sparse fine setae; valva with costa nearly straight in basal three fifths, distally upcurved; venter with curved



Figures 20–27. Male genitalia of *Eucosmocydia*. **20)** *E. pappeana*, USNM slide 153,769. **21)** *E. deinbolliana*, USNM slide 153,700. **22)** *E. ugandensis*, slide NHMO 3762. **23)** *E. lecaniodiscana*, USNM slide 124,465. **24)** Male genitalia of *E. nigeriana*, USNM slide 153,740. **25)** Male genitalia of *E. pancoviana*, USNM slide 153,695. **26)** Male genitalia of *E. chlorobathra*, USNM slide 153,691. **27)** Male genitalia of *E. kimiriana*, USNM slide 143,441.

concavity – depth of concavity depending on position under the cover glass; cucullus representing distal half of valva, rather broad, becoming slightly narrower distally, dorsal margin broad, unspined; caulis long, rodlike, attached to phallus subbasally; phallus with slight subdistal constriction, distally tapered, with pointed apex.

Female. Unknown.

DNA barcodes. No sequence data are available for this species.

Types. Holotype ♂, Uganda, Kasese District: Kibale Nat. Park, [UTM] 36N TF 0582 6208, 1500 m, 19–24 Oct 2014, L. Aarvik & K. Larsen, genitalia slide NHMO 3762 (NHMO). Paratypes (5♂). **Uganda:** Same data as holotype, one with genitalia on slide NHMO 3761 (NHMO).

Distribution and biology. This species is known only from Kibale Forest in western Uganda. The specimens were attracted to light. Nothing is known about the species' early stages.

Etymology. The specific epithet refers to the country of the type locality.

Eucosmocydia lecaniodiscana Brown and Razowski, new species

Fig. 6, 7, 23, 31, 42

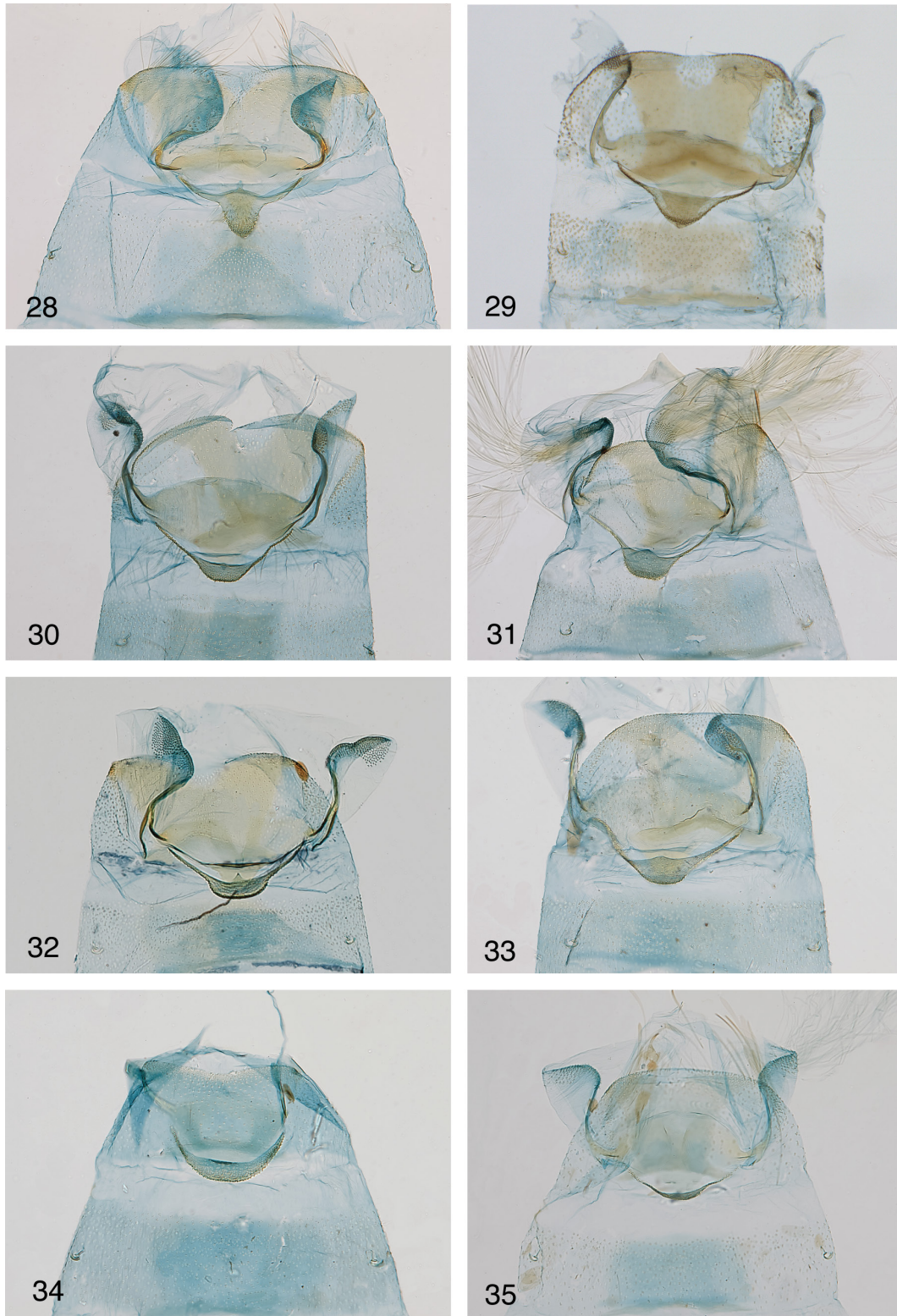
“Grapholitini sp. 5”: Brown et al. 2014: 350.

Diagnosis. Like several congeners, the forewing of *E. lecaniodiscana* has a slightly two-toned aspect, with the basal half paler, checkered brown and cream, and the distal half darker, with a complex pattern of striae, short dashes, and small patches of black, leaden gray, and orange-brown (Fig. 6, 7). In facies, *E. lecaniodiscana* most resembles the South African *E. trigonoptila* (Meyrick) and the Nigerian *E. nigeriana*. It differs from *E. trigonoptila* in having a perpendicular tornal line edging the speculum, and it is nearly indistinguishable from *E. nigeriana*, with rows of black scales on the hindwing (in the lower anal region and along some veins) of the male (Fig. 6).

The male genitalia of *E. lecaniodiscana* (Fig. 23) are most similar to those of *E. nigeriana* (Fig. 24) with the caulis long and rodlike, and the cucullus considerably more rounded than in other congeners. However, the ventral margin of the cucullus of *E. lecaniodiscana* is slightly longer and slightly less rounded than that of *E. nigeriana*. In *E. lecaniodiscana* the sclerite of abdominal segment 7 (Fig. 31) is slightly more trapezoidal than the somewhat flattened-crescent-shaped sclerite of *E. nigeriana* (Fig. 32) and that of *E. lecaniodiscana* lacks the tiny, posteriorly-directed, median triangular process of *E. nigeriana*.

In the female genitalia of *E. lecaniodiscana* (Fig. 42), the pocket of the sterigma is not as wide as in other congeners, and is more rounded and funnel-shaped anteriorly.

Description. *Male. Head.* Scales of vertex and frons pale gray mixed with cream; labial palpus weakly upturned, length approximately 1.2 times diameter of compound eye, third segment exposed, scales of labial palpus and basal flagellomeres of antenna concolorous with vertex. *Thorax.* Notum and tegula pale brown speckled with cream. Forewing (Fig. 6) length 5.0–5.5 mm (n = 5); forewing with costa gently arched throughout, termen weakly concave beneath apex, broadly convex in remainder; pattern slightly two-toned, with slender, ill-defined, brown, median line dividing basal 0.5 from distal 0.5, terminating before costa; upperside ground color in basal 0.5 yellowish cream, speckled with greyish brown; distal 0.5 with pattern more complex including small irregular patches of pale orange and brown, a larger leaden gray patch in tornus; brown median fascia from before mid-dorsum to subcostal area accompanied by a delicate parallel line from tornus followed by broad brown diffuse patch reaching speculum; speculum near mid-termen with slender, pinkish cream crescent-shaped mark and two black dots; costal strigulae cream, slender, divisions brownish, latter with two inner spots limited by whitish terminal line. Fringe orange-yellow with brown basal line. Forewing underside tan with alternating rows of black and cream scales in basal 0.75, except in costal region, vein at lower edge of discal cell and hind margin cream. Hindwing brown, paler in basal region, with scattered black scales in male. Fringe cream with brown basal line. *Abdomen.* Segment 7 (Fig. 31) with rounded-trapezoidal sclerite at mid-venter of anterior margin. Genitalia (Fig. 23) with tegumen slender, tapering terminad, pointed, with sparse fine setae in dorso-posterior 0.5 representing fused socii; valva narrowest in basal 0.5, ventral margin abruptly broadened and rounded at base of cucullus, costa and ventral margins of cucullus somewhat parallel-sided, rounded; caulis long, rodlike, from distinct convexity; phallus long, bent, curved terminally, with small terminal thorn, distinctly expanded at junction with caulis.



Figures 28–35. Abdominal segment 7 of males of *Eucosmocydia*. **28)** *E. pappeana*, USNM slide 143,426. **29)** *E. ugandensis*, NHMO slide 3762. **30)** *E. deinbolliana*, USNM slide 153,700. **31)** *E. lecaniodiscana*, USNM slide 153,704. **32)** *E. nigeriana*, USNM slide 153,740. **33)** *E. pancoviana*, USNM slide 153,695. **34)** *E. chlorobathra*, USNM slide 153,691. **35)** *E. kimiriana*, USNM slide 143,441.

Female. *Head and thorax.* Essentially as described for male, but hindwing uniformly dark brown (Fig. 7). *Abdomen.* Venter of segment 7 with broad, subsquare area of faint sclerotization. Female genitalia (Fig. 42) with a pair of bristly pads at posterior margin of segment 7; area surrounding ostium a broadly triangular pocket with irregularly rounded, slight expansion at anterior end, giving rise to frail part of ductus bursae; ductus bursae slender in posterior 0.5 broader in anterior 0.5 beginning at origin of ductus seminalis; corpus round with two thorn-shaped signa of similar size.

DNA barcodes. There are seven sequences of this species in BOLD (BIN: ABW2609) (three of which are outside the BIN with short sequences of 307bp, and were not included in analyses), with an average distance of 0.88% among samples, and a distance of 4.17% to the nearest neighbor, *E. nigeriana*.

Types. Holotype ♂, Kenya, Ungoye, 0°36.807'S, 34°05.371'E, 1159 m, 10 Apr 2005, r.f. *Blighia unijugata*, A&M #3102, R. Copeland, USNM slide 142,071 (USNM). Paratypes (6♂, 10♀). **Kenya:** Coast: Gede Forest, 3°18.57'S, 40°01.084'E, 5 Jun 1999 (5♂, 7♀), r.f. *Lecaniodiscus fraxinifolius*, KIP-14, R. Copeland. Gede Forest, 3°18.47'S, 40°01.05'E, 23 May 2000 (1♀), r.f. *Lecaniodiscus fraxinifolius*, KIP-571, R. Copeland. Mtwapa, 3°56.67'S, 39°46.35'E, 7 Jan 2000 (1♀), r.f., *Lecaniodiscus fraxinifolius*, KIP-310. Ungoye, 0°36.807'S, 34°05.371'E, 1159 m, 10 Apr 2005 (1♀), r.f. *Blighia unijugata*, A&M #3102, R. Copeland. Gongoni Forest, 4°24.23'S, 39°28.21'E, 15 Feb 2002 (1♂), r.f. *Haplocoelopsis africana*, ICIPE/USAID #1752, R. Copeland.

Additional specimens examined. **Kenya:** Gede Forest, 3°18.57'S, 40°01.084'E, 5 Jun 1999 (5 specimens) r.f. *Lecaniodiscus fraxinifolius*, KIP-14, R. Copeland. Gede Forest, 3°18.47'S, 40°01.05'E, 23 May 2000 (1♂), r.f. *Lecaniodiscus fraxinifolius*, KIP-571, R. Copeland. Ungoye, 0°36.807'S, 34°05.371'E, 1159 m, 10 Apr 2005 (1 no abd.), r.f. *Blighia unijugata*, A&M #3102, R. Copeland.

Distribution and biology. *Eucosmocydia lecaniodiscana* is known only from Kenya, where it was reared from *Lecaniodiscus fraxinifolius* Baker (n = 20), *Blighia unijugata* Baker (n = 3), and *Haplocoelopsis africana* F.G.Davies (n = 1) (all Sapindaceae).

Etymology. The specific epithet refers to the genus of the most commonly recorded host plant, *Lecaniodiscus* Planch. ex Benth.

Eucosmocydia nigeriana Brown and Razowski, new species

Fig. 8, 9, 24, 32, 39

Diagnosis. *Eucosmocydia nigeriana* is nearly indistinguishable from *E. lecaniodiscana* in facies, male secondary features, and genitalia. However, in the female genitalia of *E. nigeriana*, the somewhat parallel-sided anterior-most portion of the pocket of the sterigma is slightly shorter than that of *E. lecaniodiscana*. Also, the sclerite of abdominal segment 7 of the male (Fig. 32) has a small, median, triangular point, rather than rounded as in *E. lecaniodiscana* (Fig. 31). These slight differences in morphology are corroborated by differences in barcodes (see below).

Description. *Male.* *Head.* Scales of vertex and frons pale gray mixed with cream; labial palpus weakly upturned, length approximately 1.2 times diameter of compound eye, third segment exposed, scales of labial palpus and basal flagellomeres of antenna concolorous with vertex. *Thorax.* Notum and tegula pale brown speckled with cream. Forewing (Fig. 8) length 5.0–5.5 mm (n = 2); forewing with costa gently arched throughout, termen weakly concave beneath apex, broadly convex in remainder; pattern slightly two-toned, with slender, ill-defined, brown, median line dividing basal 0.5 from distal 0.5, terminating before costa; upperside ground color in basal 0.5 orange yellow, speckled with greyish brown; distal 0.5 with pattern more complex including small irregular patches of pale orange and brown, a larger leaden gray patch in tornus; costal strigulae cream, slender, divisions brownish; speculum near mid-termen with slender, pinkish cream crescent-shaped mark and two black dots. Forewing underside tan with alternating rows of black and cream scales in basal 0.75, except in costal region, hind margin cream. Fringe orange-yellow with brown basal line. Hindwing brown, paler in basal region, with scattered black scales in male. Fringe cream with brown basal line. *Abdomen.* Segment 7 (Fig. 32) with rounded-trapezoidal sclerite at mid-venter of anterior margin, with a small, median, triangular point on posterior margin. Genitalia (Fig. 24) with tegumen broad, ovoid, with sparse fine setae in dorso-posterior 0.5 representing fused socii valva narrowest in basal 0.5, ventral margin abruptly broadened and rounded at base of cucullus, costa and ventral



Figure 36–41. Female genitalia of *Eucosmocydia*. 36) *E. pappeana* from Kenya, USNM slide 153,686. 37) *E. pappeana* from South Africa, USNM slide 144,514. 38) *E. mixographa*, USNM slide 143,434. 39) *E. nigeriana*, USNM slide 153,741. 40) *E. chlorobathra* from Kenya, USNM slide 143,442. 41) *E. chlorobathra* from the Seychelles, USNM slide 153,749.

margins of cucullus somewhat parallel-sided, rounded; caulis long, rodlike; phallus somewhat evenly curved throughout, distinctly expanded at junction with caulis.

Female. *Head and thorax.* Essentially as described for male, but hindwing uniformly dark brown (Fig. 9). *Abdomen.* Venter of segment 7 with broad, subsquare area of faint sclerotization. Female genitalia (Fig. 39) with pair of ill-defined, bristly pads at posterior margin of segment 7; pocket of ostium triangular with irregularly rounded, slight expansion at anterior end, giving rise to frail part of ductus bursae; ductus bursae slender in posterior 0.5 broader in anterior 0.5 starting at origin of ductus seminalis; corpus round with two thorn-shaped signa of similar size.

DNA barcodes. There are three sequences of this species in BOLD (BIN: AAU2218), with an average distance of 0.1% among them, and a 4.01% distance to the nearest neighbor, *E. lecaniodiscana*.

Types. Holotype ♂, Nigeria, Oyo State, Ibadan, International Institute for Tropical Agriculture, 7.5008°N, 3.9065°E, 240 m, 19 Jun 2006, G. M. Miller & T. M. Kuklenski (USNM). Paratypes (1♂, 1♀). **Nigeria:** Oyo State, Ibadan, International Institute for Tropical Agriculture, 7.5008°N, 3.9065°E, 240 m, 14–31 Mar 2006 (1♀), S. E. Miller & T. M. Kuklenski, 18 Jun 2006 (1♂), T. M. Kuklenski & T. Olorode (USNM).

Distribution and biology. *Eucosmocydia nigeriana* is known only from Nigeria, where it was collected from ultraviolet light. Nothing is known of the early stages.

Etymology. The specific epithet refers to the country of the type locality.

Eucosmocydia kirimiriana Brown and Razowski, new species

Fig. 14, 15, 27, 35, 44

“Grapholitini sp. 7”: Brown et al. 2014: 350.

Diagnosis. *Eucosmocydia kirimiriana* shares a small ochereous patch at the apex of the forewing with *E. chlorobathra*. However, in *E. kirimiriana* the forewing is more uniformly patterned throughout with dark brown and orange, except for a small, pale gray-ochereous patch at the base of the forewing costa in both sexes (Fig. 14, 15), the latter of which serves to distinguish this species from its relatives. In the male genitalia, the cucullus is slightly longer with a less defined inner margin (more weakly and evenly rounded), and the phallus is slightly shorter than in related species.

Description. *Male.* *Head.* Scales of vertex and frons pale ochereous; labial palpus weakly upturned, length approximately 1.2 times diameter of compound eye, third segment exposed, scales of labial palpus and basal flagellomeres of antenna concolorous with vertex. *Thorax.* Notula mostly pale brown, tegula brownish ochereous. Forewing (Fig. 14) length 4.0–5.0 mm (n = 10); forewing with costa nearly straight, termen weakly concave beneath apex, convex in remainder; forewing pattern mottled throughout without distinct basal and distal halves; upperside ground color dark brown, with small patches and streaks of orange and dark gray scattered throughout, an ill-defined subbasal fascia formed by three or four dark brown to black spots, bordered by orange, angled slightly obliquely outward from hind margin ca. 0.3 distance from base to tornus, approaching a longer concolorous dash from costa near upper margin of discal cell; costal strigulae cream and gray, divisions black or brown, some in form of long blackish dashes; speculum near mid-termen with slender pale orange, crescent-shaped mark with two black dots. Fringe pale brown. Hindwing dark brown, paler in costa and subcostal regions. Fringe pale cream with brown basal line. *Abdomen.* Segment 7 (Fig. 35) with narrow, small, slightly curved sclerite at mid-venter of anterior margin. Genitalia (Fig. 27) with tegumen broad, ovoid, with sparse fine setae in dorso-posterior 0.6 representing fused socii; valva slender, with shallow, weakly curved concavity in basal 0.3 creating “neck,” cucullus representing distal 0.65 of valva; caulis short, broad; phallus evenly curved in distal 0.65, distinctly expanded at junction with caulis.

Female. *Head and thorax.* Essentially as described for male, except hindwing more uniformly brown, slightly paler in discal area, lacking secondary sex scales (Fig. 15). *Abdomen.* Dark brown. Genitalia (Fig. 44) with a pair of faint punctate regions at posterior margin of sternite 7; area surrounding ostium a shallow cup-shaped pocket; ductus bursae slender in posterior 0.5 (missing in preparation) broader in anterior 0.5 beginning at origin of ductus seminalis; corpus pear-shaped with two thorn-shaped signa of similar size.

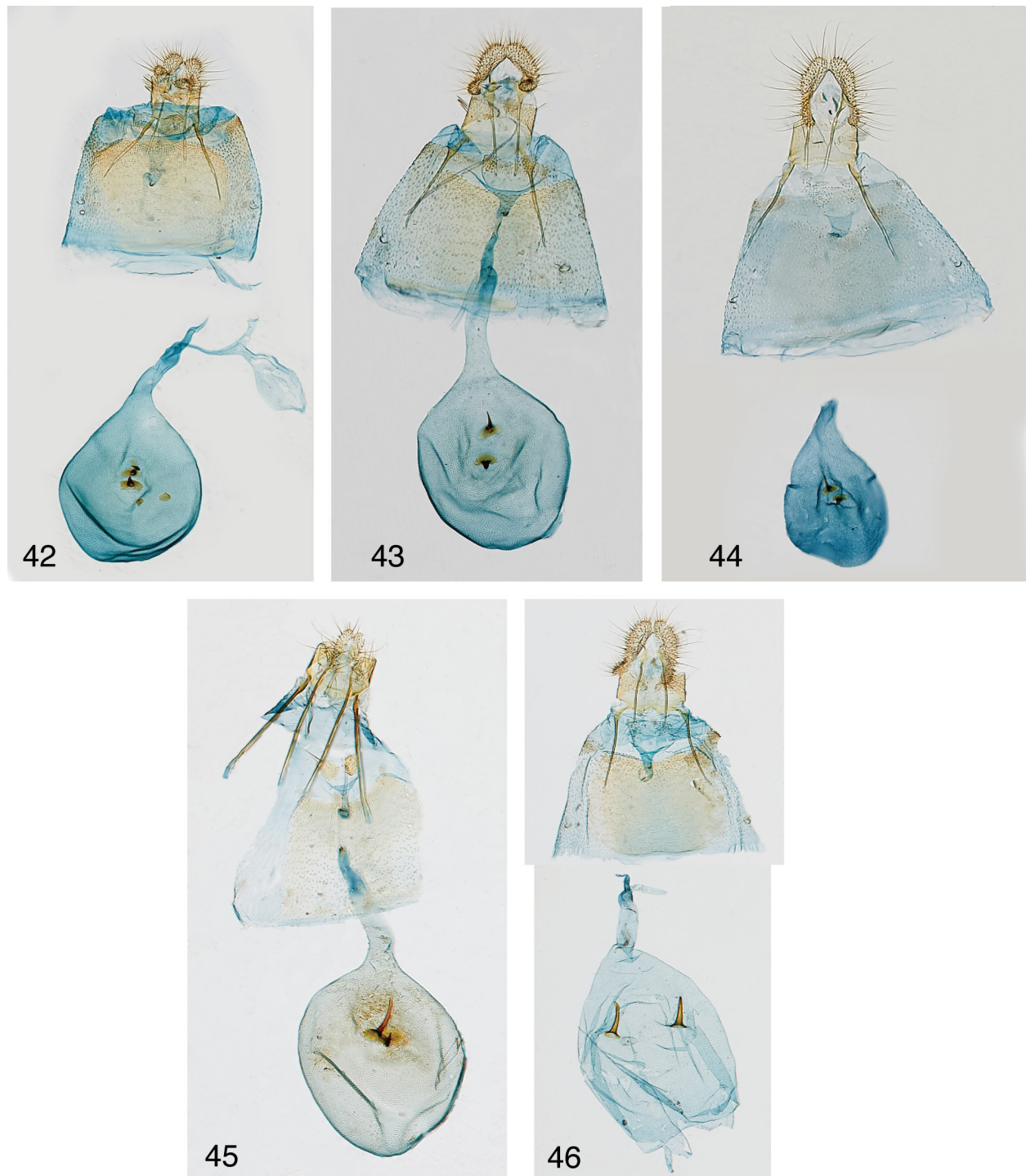


Figure 42–46. Female genitalia of *Eucosmocydia*. **42)** *E. lecaniodiscana*, USNM slide 142,063. **43)** *E. pancoviana*, USNM slide 153682. **44)** *E. kirimiriana*, USNM slide 143,280. **45)** *E. macabensis*, USNM slide 153,710. **46)** *E. hymenosa*, USNM slide 143,024.

DNA barcodes. There are six sequences of this species in BOLD (BIN: ABW2613), with an average distance of 0.14% among them and a 6.10% distance to its nearest neighbor, *E. chlorobathra*.

Types. Holotype ♂, Kenya, Eastern Province, Kirimiri Forest, 1710 m, 0°25.62'S, 37°32.83'E, 21 Jan 2003, r.f. *Allophylus ferrugineus*, A&M #2393, R. S. Copeland. Paratypes (11♂, 4♀). **Kenya:** Eastern Province, Kirimiri Forest, 1710 m, 0°25.62'S, 37°32.83'E, 8 Nov 2001 (1♀), A&M #1536, 17 Dec 2002 (1♂), A&M #2316, 21 Jan 2003 (10♂, 3♀), A&M #2393, r.f. *Allophylus ferrugineus*, R. S. Copeland.

Distribution and biology. *Eucosmocydia kirimiriana* is known only from the Kirimiri Forest of Kenya where it was reared from *Allophylus ferrugineus* (Sapindaceae).

Etymology. The specific epithet refers to the type locality of the Kirimiri Forest.

Eucosmocydia chlorobathra (Meyrick, 1911), new combination

Fig. 12, 13, 26, 34, 40, 41

Eucosma chlorobathra Meyrick 1911: 268; Clarke 1958: 352, pl. 175, fig. 4, 4a, 4b; Brown 2005: 317.

“Grapholitini sp. 8”: Brown et al. 2014: 350.

Diagnosis. The forewing of the female of *E. chlorobathra* is dark and somewhat mottled throughout as in *E. kirimiriana*, but it lacks the small ochreous patch at the base of the forewing characteristic of the latter. In the male genitalia of *E. chlorobathra* (Fig. 26), the valvae are considerably broader than in other species of the genus, and the distal 0.2 of the phallus is slightly upturned.

Redescription. *Male.* *Head.* Scales of vertex and frons pale reddish ochreous; labial palpus weakly upturned, length approximately 1.2 times diameter of compound eye, third segment exposed, scales of labial palpus and basal flagellomeres of antenna concolorous with vertex. *Thorax.* Notula mostly brown, tegula slightly paler. Forewing length 4.0 mm (n = 3); forewing with costa weakly curved throughout, termen weakly concave beneath apex, convex in remainder; forewing pattern mottled throughout without, but distinctly paler in distal 0.5; upperside ground color dark brown, with small patches and streaks of gray scattered throughout, more dense in basal 0.33; costal strigulae cream and gray, divisions black or brown, some in forming blackish dashes; speculum near mid-termen with slender pale orange, crescent-shaped mark with one black dot. Forewing underside tan with alternating rows of black and cream scales in basal 0.75, except three larger, patches of black scales, one irregular patch near base of wing at costal edge of discal cell, one elongate subrectangular patch arising near base of wing extending along CuP, and one irregular patch just beyond terminal of latter patch. Fringe pale brown. Hindwing dark brown, paler in costa and subcostal regions. Fringe pale cream with brown basal line. Hind tibia with pencil of whitish hair-scales. *Abdomen.* Sternite 7 with narrow crescent-shaped sclerite at mid-venter of anterior margin (Fig. 34). Genitalia (Fig. 26) with tegumen broad, rounded, with sparse fine setae in dorso-posterior 0.6 representing fused socii; valva with costa upcurved in distal 0.7, venter with shallow, weakly curved concavity in basal 0.3 creating ill-defined “neck,” cucullus representing distal 0.5 of valva, rather broad; caulis long, rodlike, attached to phallus subbasally; phallus downcurved at ca 0.6 distance from phallobase to apex, then weakly upcurved in distal 0.2.

Female. *Head and thorax.* Essentially as described for male, except lacking black scales on upperside of hindwing and underside of forewing (Fig. 13). *Abdomen.* Genitalia (Fig. 40, 41) lacking paired setose patches at posterior margin of sternite 7; area posterad of ostium with wide, V-shaped pocket, vertex of pocket with antrum undifferentiated, more or less confluent with ductus bursae; ductus bursae slender in posterior 0.6 abruptly broadening in anterior 0.4 at origin of ductus seminalis; posterior 0.2 of ductus bursae angled twice, then relatively straight; corpus bursae round, finely punctate throughout, with two thorn-shaped signa of similar size.

DNA barcodes. There are six sequences of this species, four from Kenya, and two from South Africa, in BOLD (BIN: ACI4940), with an average distance of 0.27% among them, and a 5.78% distance to their nearest neighbor, *E. kirimiriana*.

Types. Holotype ♀, Aldabra, Seychelles, 1908 J. C. F. Fryer (BMNH).

Additional specimens examined (8♂, 10♀). **Kenya:** Coast Province, Arabuko-Sokoke Forest, ca. 3°15.56'S, 39°58.50', 25 Aug 1999 (1♂, 1♀), r.f. *Allophylus rubifolius*, KIP #135, R. S. Copeland; same locality, 8 Jul 2001 (1♀), r.f. *Allophylus pervillei*, A&M #1348; Shimba Hills, 4°16.03'S, 39°23.66'E, 2 May 2001 (1♀), r.f. *Allophylus pervillei*,

A&M #1260, R. Copeland; same locality, 23 Jul 1999 (1♂), r.f. *Allophylus rubifolius*, A&M #192, R. S. Copeland. Arabuko-Sokoke Forest, 3°18.78'S, 39°58.88'E, 12 Jun 1999 (1♂, no abd.), r.f. *Allophylus rubifolius*, KIP-30, R. Copeland. Rift Valley Province: Masai Lodge, [UTM] 37M BU 5679 4682, 1670 m, 25 Nov–8 Dec 2010 (1♂), L. Aarvik & D. Agassiz (NHMO). **Malawi:** Southern Region, Mulanje District: Lujeri Tea Estate, Guest House, 700 m., 10 Feb 2004 (1♀), L. Aarvik (NHMO). **Seychelles:** Aldabra, Casuarina Grove near Middle Island Camp, 21 Mar 1968 (2♀), J. C. Shaffer (USNM). Rift Valley Province: Masai Lodge, [UTM] 37M BU 5679 4682, 1670 m, 25 Nov–8 Dec 2010 (1♂), L. Aarvik & D. Agassiz (NHMO). **South Africa:** Mpumalanga Region: Waterval-Boven, St.11, 28–29 Oct 2002 (1♂, 1♀), H.W. v.d. Wolf (NHMO). **Tanzania:** Morogoro District and Town, 550–600 m, Feb–23 Apr 1993 (5♂, 2♀), L. Aarvik, genital prep. L. Aarvik ♂ 2521, ♀ 2700 (NHMO); Morogoro District & Town: Kigurunyembe 700–900 m, 7 Mar 1993 (1♀), L. Aarvik, genital prep. L. Aarvik 2522 (NHMO); Arumeru District: Usa River, 1170 m, 19 Sep 1991 (1♀), L. Aarvik (NHMO).

Distribution and biology. *Eucosmocydia chlorobathra* is known from the Seychelles, Kenya, Malawi, Tanzania, and South Africa. In Kenya it was reared from *Allophylus pervillei* and *A. rubifolius* (Sapindaceae). In addition to the material listed above, sequence data from two specimens in BOLD (SAFRA3874-18 from Mpumalanga, Kruger National Park, Marula South, Skukuza, 24 Nov 2017 and KMPOU121-19 from Limpopo, Kruger National Park, Nxantseni North, Sangoni, 21 Feb 2019) place them in the same BIN (ACI4940) as those from Kenya. However, the latter two specimens were not examined; they were collected in Malaise traps, and there are no images of them in BOLD.

Eucosmocydia macabensis Brown and Razowski, new species

Fig. 16, 45

Diagnosis. *Eucosmocydia macabensis* is superficially similar to other congeners, but the basal half of the forewing is darker than that of most other species, with less orange overscaling, and the apical-most costal strigula is more slender and whiter than in other congeners. *Eucosmocydia macabensis* also can be distinguished by the presence of a slightly darker and broader (although ill defined), short median fascia extending obliquely from the basal 0.33 of the hind margin of the forewing. The female genitalia of *E. macabensis* are distinguished by the very small triangular pocket of the sterigma with a conspicuous pair of rugose patches in the lamella postvaginalis.

Description. *Male.* Unknown. *Female.* *Head.* Vertex and frons, labial palpus, and scales of antenna mostly pale grayish brown. *Thorax.* Notum brownish grey with a few small patches of darker brown. Forewing length 5.0 mm (n = 3); forewing (Fig. 16) slightly broadened apically; costa weakly convex throughout; termen only weakly concave beneath apex, weakly convex at middle. Upperside ground color pale ochraceous densely strigulated and reticulated with brown and a few orange scales; costal strigulae mostly concolorous with ground color, subapical one distinct, white, divisions dark brown; speculum paler than costal strigulae with similar lines and a series of inner spots; markings dark brown in form of dorso-submedian fascia and tornal blotch. Fringe pale brown, darker brown at tornus. Hindwing dark brown, paler basally. Fringe brownish grey. *Abdomen.* Genitalia (Fig. 45) with papillae anales and apophyses unmodified, as described for the genus; pocket of sterigma short, crescent-shaped, a pair of subrectangular, rugose patches subventrally in post-ostial area; ductus bursae slender, membranous, with slightly bulbous enlargement just beyond ostium, gradually broadened to junction with corpus bursae; corpus bursae rounded, finely punctate throughout, with a pair of thorn-shaped signa, one conspicuously longer than other.

DNA barcodes. No sequence data are available for this species.

Types. Holotype ♀, Mauritius Islands, Plaines Wilhems District, Macabe Forest, lot 21, 13 Feb 1963, E. D. Cashatt (USNM). Paratypes (2♀). **Mauritius:** Same locality as holotype, lot 18, 28 Jan 1963 (1♀), lot 21, 13 Feb 1963 (1♀), E. D. Cashatt (USNM).

Distribution and biology. *Eucosmocydia macabensis* is known only from the Mauritius Island. The early stages are unknown.

Etymology. The specific epithet refers to the type locality of the Macabe Forest, Mauritius.

***Eucosmocydia hymenosa* (Razowski, 2013), new combination**

Fig. 17, 46

Grapholita hymenosa Razowski 2013: 171.

Diagnosis. In facies, *E. hymenosa* is similar to *E. lecaniodiscana* with the forewing rather cream and pale brown in the basal half and darker brown in distal half (Fig. 17). Because *E. hymenosa* is known only from the female, male secondary features, which are usually diagnostic for members of this group, are unknown. Nonetheless, *E. hymenosa* can be distinguished by the presence of a pair of weak patches posterad of the sterigma, and a much narrower and shallower pocket of the sterigma.

Redescription. *Male.* Unknown. *Female.* *Head.* Vertex and frons pale orange-yellow, sprinkled with brownish gray [now lacking, details from Razowski 2013]. *Thorax.* Notae pale orange yellow, sprinkled with brownish grey. Forewing (Fig. 17) length 7.0 mm (n = 1); forewing broad, expanding to middle; costa convex; termen weakly concave beneath apex, broadly convex otherwise; upperside ground color orange yellow, sprinkled and strigulated greyish brown; some longitudinal strigulae at middle of wing; costal strigulae cream, slender, subapical strigula broad, paler, divisions brownish; dorsal patch slightly paler than remainder of wing, with brownish lines; tornal area brown; small blotch at mid-termen; speculum orange-yellow with three brown strigulae. Fringe brownish, orange-yellow at apex. Hindwing uniformly brown. Fringe white-cream with brown basal line. *Abdomen.* Genitalia (Fig. 46) with papillae anales and apophyses as described for genus; sterigma membranous with a pair of weakly spined patches in posterior part, comprised of thick membrane, antrum of similar composition; ductus bursae long, slender; corpus bursae ovoid with a pair of thorn-shaped signa.

DNA barcodes. There are no sequence data available for this species.

Type. Holotype ♀, Nigeria, [Oyo State], Ibadan, [International Institute of Tropical Agriculture], Golf Course Lake, 6–10 Feb 1978, D. & M. Davis, USNM slide 143,024 (USNM).

Distribution and biology. The life history is unknown, but based on related species, it is likely that the larvae of *E. hymenosa* feed in the fruit of Sapindaceae.

Eucosmocydia trigonoptila* (Meyrick, 1921), new combinationLaspeyresia trigonoptila* Meyrick, 1921: 63; Razowski and Krüger 2007: 136, fig. 149; Razowski 2013: 171.[Enarmoniini unplaced] *trigonoptila*: Brown 2005: 274.

Diagnosis. In facies, *E. trigonoptila* is similar to several congeners (see Razowski and Krüger 2007: 136, fig. 149), but perhaps most similar to *E. mixographa* and *E. hymenosa*, with the forewing rather paler and poorly marked in the basal half and darker with a complex pattern in the distal half. Although the type is missing the abdomen, the comparatively dark hindwing with blackish scales arranged in longitudinal rows separate this species from its closest relatives.

Redescription. *Male.* *Head.* Vertex and labial palpi pale orange-yellow. *Thorax.* Notae concolorous with head. Posterior tibia with large, triangular, expanded tuft of pale gray-ocherous scales extending nearly to end of segment. Forewing length approximately 7.0 mm (n = 1); forewing costa gently arched throughout, termen with weak concavity immediately below apex, remainder convex; upperside ground color orange-fuscous irrorated with pale ocherous scales, costal strigulae gray, brown, and cream; four oblique leaden-gray striae from costa between pairs of strigulae, one extending to termen beneath apex; median and pretornal fasciae ill-defined, comprised of dark indigo suffusion extending from near hind margin approximately 0.66 across wing, basal fascia edged anteriorly by a slightly curved dark fuscous line, with some fulvous-ocherous dots; a patch of fulvous-ocherous mottling connecting patches in discal cell, a narrow stripe extending to speculum, latter consisting of a leaden mark, a narrow cream crescent, and three black dots. Fringe violet-gray. Hindwing with blackish scales arranged in longitudinal rows, narrowly separated by grayish white. Fringe grayish white, with dark brown basal line. *Abdomen.* Black, with pale gray anal tuft [abdomen lost; details from Meyrick (1921)].

Female. Unknown.

DNA barcodes. There are no sequence data available for this species.

Type. Holotype ♂, Portuguese East Africa [Mozambique], Magude, Sep 1918, C. J. Swierstra, Meyr. type no. 2606 (DMP).

Distribution and biology. This species is known only from Mozambique. Nothing is known of its life history, but based on related species, it is likely that the larvae feed in the fruit of Sapindaceae.

Summary of Host Use

Larval hosts are known for seven of the 13 species of the *oedipus* species group of *Eucosmocydia*. Six were reared only from the fruits of Sapindaceae in Kenya, and on numerous occasions (Brown et al. 2014), suggesting that members of the genus are specialists on the fruit of this plant family. However, one species not recorded from Kenya (i.e., *E. mixographa*) was reported to feed on Fabaceae and Euphorbiaceae in the Democratic Republic of the Congo by Ghesquière (1940). Although it is possible that Ghesquière's (1940) records are erroneous, he was the collector of the lectotype and paralectotype of *G. mixographa*, so we assume that these records are indeed correct. Although only distantly related, Sapindaceae and Euphorbiaceae are noted for the production of latex (Agrawal and Konno 2009; Chase et al. 2016), a feature that typically discourages herbivory. Hence, although there appears to be a definite preference for Sapindaceae, the *oedipus* species group is not restricted to this plant family. Similar variation in host use is found in a species group of *Grapholita* that includes *G. chytranthusi* Razowski, *G. taocosma* (Meyrick), and two apparently undescribed species from Kenya (*Grapholitini* sp. 24 and *Grapholita* nr. *mesosocia* [in part], sensu Brown et al. 2014), which together feed on *Chytranthus obliquinervis* Radlk. (Sapindaceae) (Copeland and Razowski 2019), *Dichapetalum madagascariense* Poir. (Dichapetalaceae) (Brown et al. 2014), *Ochna ovata* F. Hoffm. (Ochnaceae) (Brown et al. 2014), and *Ochna natalitia* (Meisn.) Walp. (Hermann Staude foodplant database, personal communication).

One or more species in many genera of *Grapholitini* are recorded from the fruit of Sapindaceae, including *Andrioplecta* Obraztsov, *Cryptophlebia* Walsingham, *Grapholita* Treitschke, *Gymnandrosoma* Dyar, *Notocydia* Komai and Horak, *Parapammene* Obraztsov, and *Thaumatotibia* Zacher. However, none of these genera contains a preponderance of Sapindaceae-feeders. In many of the species, Sapindaceae is only one of many plant families used as larval hosts. For example, *Thaumatotibia leucotreta* has been recorded from 70 different plant species in 37 plant families, and *Cryptophlebia illepidia* (Butler, 1882) is primarily a Fabaceae feeding species that has been recorded several times on Sapindaceae.

Comments on the *terreirana* Species Group

Although we did not extensively review the species of the *terreirana* species group, we provide a few comments, including two new combinations.

Based on the ML analysis (Fig. 1a), the two sequenced species of the *terreirana* species group (i.e., *E. salticola* and *E. terreirana*) form a monophyletic lineage that is not sister to the *oedipus* species group. However, as previously mentioned, single-gene trees are not always compelling indicators of phylogenetic relationship. Hence, we continue to treat the *terreirana* species group as part of *Eucosmocydia*. Within this group, we discovered two species formerly assigned elsewhere that almost certainly belong in *Eucosmocydia* and these are briefly discussed below.

Eucosmocydia salticola (Meyrick, 1913), new combination

Eucosma salticola Meyrick 1913: 271; Razowski and Krüger 2007: 136.

Laspeyresia salticola: Razowski and Krüger 2007: 156.

Eucosmocydia prolixa Razowski and Wojtusiak 2012: 9, new synonym.

Eucosma salticola was described from 12 specimens, including both sexes, from Barberton, Three Sisters, and Waterval Onder, Transvaal, South Africa. According to Razowski and Krüger (2007), in addition to the male holotype, there are five paratypes in the DMP. The female holotype and its genitalia were figured by Razowski and Krüger (2007: fig. 147, 310, respectively).

Eucosmocydia prolixa was described from a holotype male from the Obudu Plateau, Nigeria; the description was accompanied by illustrations of the adult and genitalia (Razowski and Wojtusiak 2012: fig. 36, 131). Based

on forewing maculation and morphology of the male genitalia, *E. prolixa* is almost certainly conspecific with *E. salticola*.

One of us (LA) has dissected specimens from South Africa, Malawi, Kenya, and Uganda that superficially resemble the type specimen of *E. salticola* figured by Razowski and Krüger (2007: fig. 147), and the genitalia of those specimens are nearly indistinguishable from those illustrated by Razowski and Krüger (2007, female) and Razowski and Wojtusiak (2012, male). Although the adult of *E. prolixa* has a slightly different forewing color, the pattern is essentially the same as that of *E. salticola*, and the female genitalia of *E. salticola* strongly resemble those of *E. prolixa* (see Agassiz and Aarvik 2014: fig. 33).

***Eucosmocydia catamochla* (Meyrick, 1932), new combination**

Eucosma catamochla Meyrick 1932: 223; Clarke 1958: 352.

“Grapholitini Unplaced” *catamochla*: Brown 2005: 365.

Eucosma catamochla was described from five reared specimens from “Java, teak-forest,” Indonesia, without mention of the host. Clarke (1958: 352) designated a male lectotype (NHML) and illustrated the adult and its genitalia. He also mentioned that two of the five specimens were missing. Brown (2005) transferred the species to “Grapholitini Unplaced” based on the recommendation of Furumi Komai, who contributed the section on Grapholitini to the world catalogue of Tortricidae (Brown 2005).

In the male genitalia of *Eucosma catamochla*, the long, slender, parallel-sided valva and the tall, narrow, tegumen, to which the socii are fused, are very similar to those features in the male genitalia of *Eucosmocydia terreirana* (Razowski and Wojtusiak 2014: fig. 5). On the basis of these similarities, we provisionally transfer *Eucosma catamochla* to *Eucosmocydia*. This new combination broadens considerably the geographic distribution of *Eucosmocydia* from that of a strictly Afrotropical genus to now include southeast Asia.

***Eucosmocydia terreirana* Razowski and Wojtusiak 2014**

Eucosmocydia terreirana Razowski and Wojtusiak 2014: 216.

“Grapholitini sp. 23”: Brown et al. 2014: 372.

Eucosmocydia terreirana was described from a male holotype from Príncipe Island and a female paratype from São Tomé. Our DNA analysis shows that “Grapholitini sp. 23” from Kenya (Brown et al. 2014) is likely conspecific with a specimen of *E. terreirana* from Gabon; i.e., the barcodes are 98.3% similar. Brown et al. (2014) reported the host of “Grapholitini sp. 23” as *Carissa edulis* Vahl (Apocynaceae), which represents the first host record for *E. terreirana*.

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