Zootaxa 3594: 1–283 (2012)
www.mapress.com/zootaxa/

Monograph

ISSN 1175-5326 (print edition)
ZOOTAXA
ISSN 1175-5334 (online edition)

urn:lsid:zoobank.org:pub:B00799F3-F397-438C-B1E1-A8440E636921

ZOOTAXA

3594

Systematics, revisionary taxonomy, and biodiversity of Afrotropical Lithocolletinae (Lepidoptera: Gracillariidae)

JURATE DE PRINS[1] & AKITO Y. KAWAHARA[2]

[1] *Royal Museum for Central Africa, Tervuren, Belgium (e-mail: Jurate.de.prins@africamuseum.be)*

[2] *McGuire Center for Lepidoptera and Biodiversity, Florida Museum of Natural History, University of Florida, Gainesville, USA*

Magnolia Press
Auckland, New Zealand

Accepted by J. Brown: 23 Oct. 2012; published: 20 Dec. 2012

JURATE DE PRINS & AKITO Y. KAWAHARA
Systematics, revisionary taxonomy, and biodiversity of Afrotropical Lithocolletinae (Lepidoptera: Gracillariidae)
(*Zootaxa* 3594)

283 pp.; 30 cm.

20 Dec. 2012

ISBN 978-1-77557-074-5 (paperback)

ISBN 978-1-77557-075-2 (Online edition)

FIRST PUBLISHED IN 2012 BY

Magnolia Press

P.O. Box 41-383

Auckland 1346

New Zealand

e-mail: zootaxa@mapress.com

http://www.mapress.com/zootaxa/

ISSN 1175-5326 (Print edition)

ISSN 1175-5334 (Online edition)

Table of contents

Abstract

Afrotropical Lithocolletinae are known from 26 described species, mainly from southern Africa. In the present study we describe 41 new species, bring to 66 the number of species from this geographical region. The new species include: *Hyloconis luki* De Prins, **n. sp.**, *Neolithocolletis mayumbe* De Prins, **n. sp.,** *N. nsengai* De Prins, **n. sp.**, *Cameraria fara* De Prins**, n. sp.,** *C. landryi* De Prins**, n. sp.,** *C. perodeaui* De Prins, **n. sp.**, *C. sokoke* De Prins**, n. sp.**, *C. torridella* De Prins, **n. sp.**, *C. varii* De Prins, **n. sp.,** *C. zaira* De Prins**, n. sp.,** *Phyllonorycter aarviki* De Prins, **n. sp.,** *P. achilleus* De Prins, **n. sp**., *P. acutulus* De Prins, **n. sp.,** *P. adderis* De Prins, **n. sp.,** *P. agassizi* De Prins, **n. sp.,** *P. albertinus* De Prins**, n. sp.,** *P. dombeyae* De Prins **n. sp.,** *P. fletcheri* De Prins, **n. sp.,** *P. gato* De Prins, **n. sp.,** *P. grewiaephilos* De Prins**, n. sp.,** *P. hibiscola* De Prins, **n. sp.,** *P. ipomoellus* De Prins, **n. sp.,** *P. jabalshamsi* De Prins, **n. sp.,** *P. kazuri* De Prins, **n. sp**., *P. maererei* De Prins**, n. sp.,** *P. mida* De Prins, **n. sp.,** *P. mwatawalai* De Prins, **n. sp.,** *P. ocimellus* De Prins, **n. sp.,** *P. ololua* De Prins, **n. sp**., *P. rongai* De Prins, **n. sp.,** *P. ruizivorus* De Prins, **n. sp.,** *P. ruwenzori* De Prins, **n. sp.,** *P. silvicola* De Prins, **n. sp.,** *P. trochetellus* De Prins, **n. sp.,** *P. tsavensis* De Prins, **n. sp.,** *P. turensis* De Prins, **n. sp.,** *P. umukarus* De Prins, **n. sp.,** *Cremastobombycia morogorene* De Prins, **n. sp.,** *C. kipepeo* De Prins, **n. sp.,** *Porphyrosela desmodivora* De Prins, **n. sp.,** *P. gautengi* De Prins, **n. sp.** Furthermore, *Cameraria hexalobina* (Vári, 1961), **n. comb.** is transferred from *Phyllonorycter* to *Cameraria*, and a neotype for *Porphyrosela homotropha* Vári, 1963 is designated. *Lithocolletis aurifascia* Walker, 1875, previously placed in *Phyllonorycter*, is excluded from Lithocolletinae. We designate lectotypes where necessary and provide morphological descriptions of males and females, information on host plants, and detailed distribution data. We also include dichotomous keys to species groups and species, accompanied by DNA barcode sequences of 19 species. We also discuss generic relationships within Lithocolletinae based on both morphology and molecules with a special emphasis on Afrotropical taxa.

Key words: Afrotropics, *Cameraria*, *Cremastobombycia*, DNA barcode, *Hyloconis*, lectotype, *Neolithocolletis*, molecular character, new species, *Phyllonorycter*, *Porphyrosela*, taxonomy

"The man of wisdom has a dual duty to discern the essence of every significant thing and to name it properly."

Heraclitus of Ephesus
The father of the "Logos" tradition
Fifth century BC

Introduction

Lithocolletinae Stainton, 1854 is a subfamily of tiny, often shiny, leaf-mining moths in the diverse family Gracillariidae, the latter of which includes 1,880 described species (De Prins & De Prins 2012). The subfamily includes ten genera and 508 species globally, of which 26 species were previously known from the Afrotropics (De Prins & De Prins 2012). These tiny, distinctive, ornate moths with forewings of vivid metallic ground colour, and plant-mining life histories, make Lithocolletinae an attractive group to study in various research disciplines. This has led to a considerable amount of research on them, especially in the Holarctic region. Species diversity in the subfamily is skewed, with *Phyllonorycter* Hübner, 1822 including more than 400 species, whereas *Protolithocolletis* Braun, 1929 is monotypic. Some genera may be paraphyletic (e.g., *Hyloconis* Kumata, 1963), indicating the need for a modern taxonomic revision. Nearly all species are leaf miners, although some have switched to gall making, such as those in the *P. loxozona* group. Larvae of the subfamily have been recorded on 36 different plant families, but most mine in leaves of Fagaceae, Fabaceae, Betulaceae, Rosaceae, and Salicaceae. Lithocolletinae typically possess three sap-feeding and two tissue-feeding instars, the latter of which in certain cases can significantly fold and distort the host leaf. Due to their ability to feed within leaves, some lithocolletine species are well-known pests, such as *Cameraria ohridella* Deschka & Dimić, 1986 on *Aesculus hippocastanum* L., *Phyllonorycter blancardella* (Fabricius, 1781) on *Malus* spp., and *Cremastobombycia lantanella* Busck, 1910 on *Lantana camara* L.

Lithocolletinae are currently divided into 10 genera (Davis & Robinson 1998; De Prins & De Prins 2005, 2012): *Cameraria* Chapman, 1902 (72 species), *Chrysaster* Kumata, 1961 (2 species), *Cremastobombycia* Braun, 1908 (6 species), *Hyloconis* Kumata, 1963 (5 species), *Leucanthiza* Clemens, 1859 (3 species), *Macrosaccus* Davis & De Prins, 2011 (5 species), *Neolithocolletis* Kumata, 1963 (3 species), *Phyllonorycter* Hübner, 1822 (401 species), *Porphyrosela* Braun, 1908 (10 species), and *Protolithocolletis* Braun, 1929 (1 species). While this seemingly distinctive group of gracillariids is well studied and well known, the definition of Lithocolletinae itself remains unclear (see "Taxonomic History" section, below). Previous definitions largely utilized a mixture of morphological and life-history characteristics with many exceptions. New molecular data have provided much needed taxonomic stability at the family level (Regier *et al*. 2009; Mutanen *et al*. 2010; Kaila *et al*. 2011; van Nieukerken *et al*. 2011) and within (Kawahara *et al*. 2011). However, many molecular studies have been limited in the number of taxa sampled. Thus, we add molecular data to the study of Kawahara *et al*. (2011), which included 39 gracillariids (of which 13 were Lithocolletinae), to further elucidate relationships within the subfamily. We use the molecular trees as a framework for our classification. It is often necessary to utilize multiple sources of data, especially in cases where the taxon of interest is small in size, tropical in distribution, and/or represented by museum specimens only (De Prins & Sruoga 2012).

Monophyly of Lithocolletinae is supported by molecular data (Kawahara *et al*. 2011) and a few putative morphological synapomorphies. However, *Leucanthiza* Clemens, 1859, historically placed in Gracillariinae (De Prins & De Prins 2005), was nested in Lithocolletinae with strong support in Kawahara *et al*.'s (2011) molecular phylogeny. The new molecular tree prompts us to re-evaluate and propose a morphological character system defining the subfamily and its genera. Here we take the first step at this effort by recognizing adult characters that support these groupings. Although many potentially useful characters are found in the immature stages (Kumata 1961, 1963, 1993, 1995; Davis 1987; Kawahara *et al*. 2009; Davis & De Prins 2011; Davis & Wagner 2011), a standardization of characters from these stages is beyond the scope of the present study.

Taxonomic history

The classification of Lithocolletinae Stainton, 1854 has significantly changed over the last 150 years. The first valid lithocolletine species was *P*[*halaena*] *Tinea rajella* Linnaeus, 1758, described in *Systema Naturae* (Linnaeus 1758). This species became the type species of the genus *Phyllonorycter* Hübner, 1822 by subsequent designation by Walsingham (1908). However, the history of discovery of Lithocolletinae starts well before the publication of *Systema Naturae*. "With the exception of a brief observation in the *Biblia Naturae* of Swammerdam (1737) in respect to one of these insects, which he found in the pupal state in alder leaves (probably our *alnifoliella* [*Phyllonorycter rajella* (Linnaeus, 1758)], the earliest writer by whom we find any satisfactory notice of any species of this genus is Frisch, who in the third part of his *Beschreibung von allerley Insecten in Teutsch-Land* describes the natural history of "a small larva between the skins of the honeysuckle leaves and the moth it produces" (Frisch 1721: 27). This insect was undoubtedly *Phyllonorycter emberizaepenella* [described originally as *Ornix Emberizaepenella* Bouché, 1834], and one hundred and thirteen years elapsed before the natural history fully recorded by Frisch in 1721 was again elaborated…" (Stainton 1857: 24). Stainton's (1857) *The Natural History of Tineina*, second volume, devoted exclusively to *Lithocolletis* Hübner, [1825], is a well documented publication on Lithocolletinae, with meticulous attention to detail.

In the early 19th century the known lithocolletine species-group taxa were assigned either to the genus *Tinea* Linnaeus, 1758 (Schrank 1802) or *Elachista* Treitschke, 1833 (Treitschke 1833; Duponchel 1839). In one of the first attempts to classify Lepidoptera, Stephens (1834–1835: 403) included a special chapter, *An abstract of the indigenous Lepidoptera, contained in the Verzeichniss bekanter* [recte *bekannter*] *Schmetterlinge, by Hubner* [recte *Hübner*], in which he compared the classification presented in Hübner (1816–1826) with his own. Hübner ([1825]) divided *Phyllonorycter* into three informal groups: A. Nobiles: *Argyresthia*, *Glyphipterix*, and *Schiffermuelleria*; B. Eximiae: *Chrysoesthia*, *Eucestis* and *Lithocolletis*; and C. Frequentes, which contained only *Lyonetia*. Stephens (1834–1835: 403) unquestionably indicated that "Hübner has considered either sexes or varieties as distinct species," therefore, Stephens aimed to present a thoroughly inspected list of 4,198 species of Lepidoptera of European and exotic origin divided into 1258 genera—an admirable achievement even in present-day standards. At that time some lepidopterists (e.g., Stephens 1834–1835; Stainton 1848; Fitch 1859) assigned lithocolletine species to *Argyromyges* Curtis [recte *Argyromiges* Curtis, 1829] which belonged to Yponomeutidae. Zeller (1839) considered *Lithocolletis* Hübner, [1825] belonging to *Tineaceen*. He divided *Lithocolletis* into two informal groups: "A) Die Vorderfl[ügel] mit einem Schwänzchen" [forewing with a hook] and "B) Die Vorderfl[ügel] ungeschwänzt" [forewings without a hook]. Zetterstedt (1839), studying the lithocolletine insects of Lapponia [Lapland] (northern Finland, Sweden and Norway), assigned them to *Elachista* and placed this genus in the family *Tineariae*, whereas Lienig (1846), studying the Lithocolletinae of Lievland and Curland (present Latvia and coast of Lithuania), placed them in *Lithocolletis* following the generic concept presented by Zeller (1839, 1846). Wocke (1848) and Stainton (1848) followed the division suggested by Zeller (1839, 1846) in presenting the then known and some new lithocolletine taxa. Duponchel (1845) supported the suggestions of Hübner and Zeller and placed the then known lithocolletine species to Tinéides. Stainton (1850) also considered that *Lithocolletis* belongs to Tineidae and grouped it with *Elachista* Treitschke, 1833, *Lyonetia* Hübner, [1825], *Phyllocnistis* Zeller, 1848, *Cemiostoma* Zeller, 1848, *Opostega* Zeller, 1839, *Bucculatrix* Zeller, 1839, *Nepticula* Heyden, 1843 and *Trifurcula* Zeller, 1848, which was followed by de Graaf (1853). Herrich-Schäffer (1855) also placed *Lithocolletis* in Tineidae as one of the 118 genera which this family contained at that time. Catalogues and faunistic lists in the mid-19th century presented mainly genus and species-group names (Zeller 1846, 1847; Heydenreich 1851; Niceli 1851; Bruand 1851, 1852; Douglas 1853), emphasizing that *Lithocolletis* is "so natürlich [natural]", implying that the group is distinct, only slightly resembling *Lyonetia* and *Argyresthia* (Zeller, 1846: 166–168).

Lithocolletidae Stainton, 1854, as it was originally described, was defined by several morphological characters: "Head rough. Labial palpi filiform, drooping. Wings with long cilia, the anterior elongate, posteriorly acuminate, the posterior linear-lanceolate" (Stainton 1854: 264). In the re-definition of *Lithocolletis*[1] (= *Argyromiges*), Glaser (1863: 524) defined the genus as being small leaf-mining moths, having a tufted head,

1. λιθος (= stone) κολλητος (= glued together) (Glaser 1863; Emmet 1991)

smooth face, somewhat thick antennal base, filiform and drooping palps, a lanceolate forewing and very narrow hindwing. Wings were noted to have very long fringes with white or often metallic scales.

Many microlepidopterists followed the designation of *Lithocolletis* into its own family, Lithocolletidae, in their faunistic lists, studies on natural history (Frey 1856; Stainton 1859; Wocke 1961; Walker 1864; de Graaf & Snellen 1866), and catalogues (Heinemann & Wocke 1877; Frey 1880). However, others maintained the tradition of including *Lithocolletis* as part of Tineidae (= Tineina) (Glaser 1863; Snellen 1882). Walsingham (1894) also considered *Lithocolletis* as one of the genera belonging to the family Tineidae, but placed this genus into the subfamily Lithocolletinae. At the end of the 19th century, Lithocolletinae gained special attention because of their intimate relationship with their host plants or as representatives of the exotic, non-European fauna (Stainton 1863a-c, 1867). In the late 19th and early 20th century, species currently placed in Lithocolletinae were simply treated as part of Microlepidoptera, without a particular designation to a higher lepidopteran group (Chambers 1871; Zeller 1875; Meyrick 1891; Walsingham 1901). While revising the Australian Microlepidoptera, Meyrick (1882: 133) placed *Lithocolletis* into Gracillariidae "I am clear, however, that *Lithocolletis* and its allies cannot be kept apart from the Gracilaridae [recte Gracillariidae], with which they agree in the structure of the head, and especially in respect of the fourteen-legged larva, found in no other Tineina, and of the larval habits," but in *The Handbook of British Lepidoptera*, he treated *Lithocolletis* as part of the Tineidae (Meyrick 1895). Meyrick (1927) wrote the following in the preface of the revised edition of his well-known handbook: "this volume [edition of 1927] is intended to take its [edition of 1895] place; it is on the same lines, but with extensive modifications in detail…" (Meyrick 1927: v). One of these 'extensive modifications' comprised the fact that *Lithocolletis*, together with 21 other genera and nearly 1000 species, was again included within the family Gracillariidae. Just after the turn of the century, the famous speech of Chapman (1902) was read before the Entomological Society of the City of London emphasizing two important areas of gracillariid research: 1) classification based on the reflection of characters of its natural history; 2) the key-importance of preimaginal morphology for understanding the phylogeny of Gracillariidae and Lithocolletinae in particular, and for constructing a classification of this group. These two points greatly influenced the taxonomic changes in Lithocolletinae thereafter, and serve as the basis for the present revision.

TABLE 1. Notable historical publications of Lithocolletinae.

1758	C. Linnaeus officially described the first Lithocolletinae species: *Phyllonorycter rajella.*
1781	J. C. Fabricius studied seven European lithocolletine species.
1796–1838	J. Hübner's illustrations and descriptions of European Lithocolletinae is published.
1839–1877	P. C. Zeller publishes seven robust papers on European Lithocolletinae.
1848–1867	H. T.Stainton's works on natural history of Lithocolletinae are published.
1880–1939	E. Meyrick's described 55 exotic Lithocolletinae species of which 36 are still valid and his monumental systematic books on microlepidoptera are published
1908–1929	A. Braun differentiated genera within Lithocolletinae and revised North American Lithocolletinae.
1951	A. M. Hering's study on biology of Lithocolletinae is published.
1958–1998	T. Kumata's work on oriental Lithocolletinae and the character sets of generic and higher taxa.
1961–2002	L. Vári's studies of the Afrotropical Lithocolletinae, including "South African Lepidoptera. Vol. I. Lithocolletidae" his monumental work on African Lithocolletinae
1965–2001	G. Deschka published seventeen descriptions of new lithocolletine species.
1981–2004	V. I. Kuznetzov revised North East European and North Asian Lithocolletinae.
1978–2011	D. R. Davis published numerous papers on Nearctic Lithocolletinae and the systematics of the subfamily.
1979	J. Klimesch published his study on the lithocolletine moths from Canary islands.
1980–2000	A. M. Emmet and collaborators revised Lithocolletinae of Great Britain and Ireland.
2005	W. De Prins & J. De Prins catalogued all Lithocolletinae species of the world.
2011	B. Å. Bengtsson & R. Johansson revised Lithocolletinae of North Europe (Denmark, Iceland, Finland, Norway and Sweden).

The early 20th century was marked by the revisionary works of Annette Braun (e.g., Braun 1908, 1909, 1914, 1916, 1923, 1929). She worked on North American *Lithocolletis* and divided the group into several genera (for details refer to sections on generic descriptions). Numerous descriptions of Holarctic and exotic Lithocolletinae were added by Josef Klimesch, Edward Meyrick, and Lord Walsingham, followed by Donald Davis, Gerfried Deschka, A. Maitland Emmet, Tosio Kumata, Vladimir Kuznetzov, and Lajos Vári among others (for a complete reference list see De Prins & De Prins 2005, 2012).

Over the years, many researchers contributed to the classification of Lithocolletinae. Because of the difficulty in the identification of key characteristics, the classification of Lithocolletinae resulted in differences in how higher taxa should be grouped. The perception of what a genus should be was entirely different among lepidopterists at that time (Vane-Wright 2003, 2007). Generic divisions within the Lithocolletinae are undoubtedly set by the previous generations of lepidopterists. Decisions as to what defines an appropriate "genus" and "species" was and still is a fairly subjective exercise among taxonomists (Minelli 2000; Laurin 2005, 2010; Bertrand *et al.* 2006), leading to conflicting opinions between "splitters" and "lumpers". Debates range from arguments on the significance of natural history traits, morphological characters of the different stages of ontogenetic development to philosophical species concepts (Mayr 1942; Wilson 1999; Stamos 2003). We stay within the framework of the "traditional" genera of Lithocolletinae which were erected for their external and internal morphology of immatures and adults. Generic boundaries within Lithocolletinae were adapted continuously by adding new morphological evidence mostly obtained from tropical taxa (Kumata 1963, 1993, 1995). We follow a classification that reflects phylogeny (Hennig 1965, 1966; Meusemann *et al*. 2010; Zahiri *et al*. 2012). Genera of Lithocolletinae are defined by characters from: 1) wing veins, 2) larval morphology, 3) chaetotaxy of the last instar, 4) pupal morphology, 5) life history, and 6) molecules.

Lithocolletinae Stainton, 1854

Diagnosis. This is based on adult characters of separate lithocolletine genera following prior work (e.g., Stainton 1857; Chapman 1902; Ely 1918; Meyrick 1927; Le Marchand 1936; Kumata 1961, 1963, 1993; 1995; Vári 1961; Bradley *et al*. 1969; Kuznetzov 1981; Watkinson 1985; Davis & Robinson 1998; Parenti 2000; Bengtsson & Johansson 2011):

Hindwing with the vein Rs nearly parallel with vein M_1 or M_{1+2} at the basal half of wing (Kumata 1993; Davis & Robinson 1998).

In addition to this hindwing venation character (Table 2; Figs 11–20), the following adult characters may also serve to separate the subfamily Lithocolletinae from the other subfamilies of Gracillariidae: i) tiny moths (less than 10 mm in wingspan), adults rest with body parallel to surface or with head end lowered; ii) background colour of forewing brilliantly ochreous, copper-golden, reddish-brownish, with white or silvery white striate, wedge-like markings, roundish spots, or brownish/black thin, lineal fascial and striate markings; iii) head tufted with longer or shorter occipital piliform scales; iv) labial palpus moderate, porrect or drooping straight, filiform, with approximate ratio of palpomeres from base 1:1:1.5 (Figs 5–10); v) forewing with seven to nine veins, CuP indistinct over entire length; vi) hindwing with five to six veins, M_1 indistinct at basal half; vii) eighth abdominal sternite of male modified, produced caudally, forming a flap laying under valvae except in *Chrysaster*, *Leucanthiza*, *Macrosaccus*, and *Protolithocolletis.*

Key to adults of lithocolletine genera

1. Eighth abdominal sternite of male modified, extended caudally, forming a flap laying under valvae 5
– Eighth abdominal sternite of male unmodified, not extended 2
2. Hindwing with branched M_1 and M_2 (Table 2, line 1) . . . . . *Protolithocolletis*
– Hindwing with single M_1 3
3. Forewing with six or seven (R_2 rudimentary, indistinct, Cu_2 present) apical veins (Table 2, line 2) . . . . . *Leucanthiza*
– Forewing with five apical veins 4
4. R_5 arising either from the base of R_4 or stalked with R_4; only apex of valva in male genitalia covered with elongate, stout setae; ductus bursae in female genitalia longer than seventh abdominal segment, signum on corpus bursae consisting of numerous microscopic spicules scattered or in a linear series on subcaudal part of corpus bursae (Table 2, line 3) . . . . . *Macrosaccus*

– R_5 stalked with M_1; setation of valva in male genitalia concentrated along costal margin owing to presence of hairy clasper; ductus bursae in female genitalia very short (ca. 1/5 as long as seventh abdominal segment), corpus bursae without signum (Table 2, line 4) . . . . . *Chrysaster*

5. Hindwing with branched M_1 and M_2 6
– Hindwing with single M_1 8

6. Four veins running to costa of forewing, six apical veins (R_2 present, M_1 not branched); tegumen in male genitalia with two or more pairs of apical setae; female genitalia with two pairs of apophyses (Table 2, line 5) . . . . . *Hyloconis*
– Three or two veins running to costa of forewing (R_2 absent) 7

7. Forewing with six apical veins (R_2 absent, M_1 branched to M_1 and M_2); tegumen in male genitalia with one pair long and some short apical setae, valva not equal in width along its length, cucculus might be differently shaped; female genitalia with two pairs of apophyses (apophyses anteriores present) (Table 2, line 6) . . . . . *Cremastobombycia*
– Forewing with four or five apical veins (R_2 absent, R_3 rudimentary, indistinct, M_1 not branched), hindwing with three pairs of sensillae on the dorsal margin which are associated with the veins Cu_1, M_1 and M_2; tegumen in male genitalia with one pair of apical setae, valva bar shaped, cucullus simple; female genitalia with one pair of apophyses (anterior apophyses absent) (Table 2, line 7). . . . . *Porphyrosela**

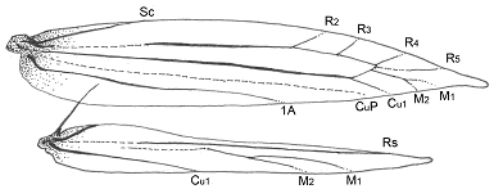
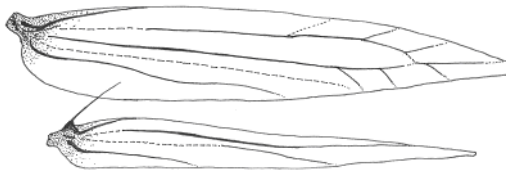
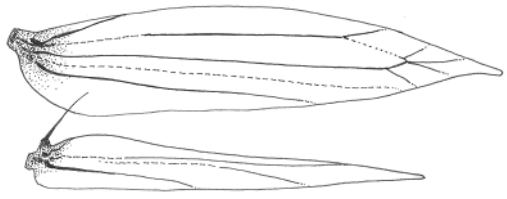
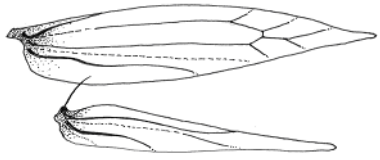
8. Forewing with six apical veins (R_2 present); tegumen in male genitalia with two pairs of apical setae (Table 2, line 8) . . . . . *Neolithocolletis*
– Forewing with five apical veins (R_2 absent); apex of tegumen with one pair of apical setae or naked, without setae 9

9. Apex of tegumen in male genitalia naked without setae (Table 2, line 9) . . . . . *Phyllonorycter*
– Apex of tegumen in male genitalia with a single pair of setae (Table 2, line 10). . . . . *Cameraria***

* Vári (1961) did not illustrate sensillae in hindwing venation of the type species *Porphyrosela desmodiella* (Clemens, 1859). Sensillae on the dorsal margin of the hindwing in *Porphyrosela* might be almost invisible due to the very small size of the wing.

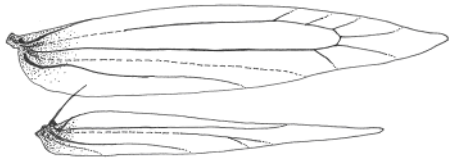
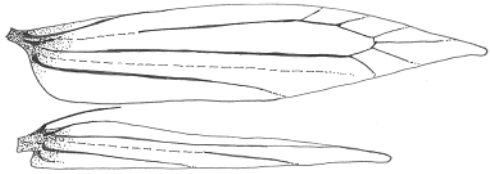
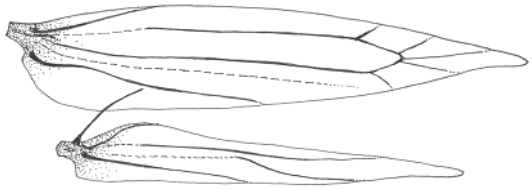
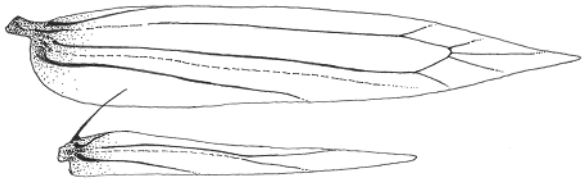
** Except the oriental species *Cameraria fasciata* Kumata, 1993 which has six apical veins in forewing (R_2 is present).

TABLE 2. Wing venation characters of Lithocolletinae genera.

Taxon	Character
	Eighth abdominal sternite of male unmodified, not extended
Protolithocolletis lathyri Braun, 1929	
Leucanthiza amphicarpeaefoliella Clemens, 1859	
Macrosaccus robiniella (Clemens, 1859)	
Chrysaster hagicola Kumata, 1961	

..... continued on the next page

TABLE 2. (Continued)

Taxon	Character
	Eighth abdominal sternite of male modified, extended caudally, forming a flap laying under valvae
	Hindwing with branched M_1 and M_2
Hyloconis puerariae Kumata, 1963	
Cremastobombycia solidaginis (Frey & Boll, 1876)	
Porphyrosela dorinda (Meyrick, 1912)	
	Hindwing with single M_1
Neolithocolletis hikomonticola Kumata, 1963	
Phyllonorycter rajella (Linnaeus, 1758)	
Cameraria ohridella Deschka & Dimić, 1986	

Biology

The immature stages of several lithocolletine species, including sap-feeding and tissue-feeding instars and their spectacular hypermetamorphosis are described in various publications (e.g., Watkinson 1985, Kumata 1961, 1963, 1993, 1995; Davis 1987; Bentancourt & Scatoni 2007; Davis & De Prins 2011). Most lithocolletine genera possess three sap-feeding and two tissue feeding instars. The first instar cuts through the epidermis of the mesophyllic cells

and then feeds on the sap which is released by the feeding damage. The larva excavates a long narrow serpentine mine along a tougher leaf vein, the second instar widens the mine, and the third instar usually feeds laterally, creating a blotch mine that enlarges the gallery. In the fourth and fifth instars larvae feed on mesophyllic cells within the mined area without further enlargement of the mine. These cells are eaten out in small islets while the larvae move along the epidermis of the leaf without tearing it, keeping the larval ventrum adaxially to the epidermis of the leaf. The mine increases in depth by the fourth instar, and the spinning instar lays threads across the inner surface of the mine. At this stage the mine obtains a clearly defined shape which in most cases is one of four forms, and it is characteristic to a genus or species-group: tube, elongate wrinkled/smooth tent or roundish chamber. Some species of Lithocolletinae can significantly fold and distort the leaf. The species belonging to the *Phyllonorycter loxozona* group construct galls. The deposition of frass is an additional character which might assist in defining the generic or species group of Lithocolletinae in one or another way: i) it can be scattered around the mine; ii) neatly arranged along the vein of the leaf; iii) gathered neatly at one side of the mine; iv) spun with silken threads into a pile; or v) incorporated into the cocoon. However, the feeding habits and the deposition of frass also might differ between generations and climatic conditions. Pupation takes place within the mine, except in *Chrysaster*, without any opening or tear, within the protection of some form of cocoon or pupation chamber or pupa held in a fine net of silken threads; in more rare cases without any obvious protection of the pupa. The colour, size, shape and position of the cocoon within the mine is specific constant. Pupae are highly diagnostic for their presence of a cremaster on the caudal abdominal segment (*Phyllonorycter*), absence of a cremaster (*Cameraria*), or presence of the accessory cremaster on the seventh sternum (*Macrosaccus*), dorsal / ventral / lateral surfaces and position of spines and setae, proportial length of the appendages, etc. The number of generations differs greatly by species and climatic conditions. Although some species are septimavoltine, the majority tend to be bi- or trivoltine.

Host plants

Currently, 870 different plant species are recorded as hosts for Lithocolletinae (De Prins & De Prins 2012). Of the 508 described lithocolletine species, at least one host plant is known for 461 (91%). Despite the predominance of oligophagy in Lithocolletinae confined within one host plant family, no less than 143 lithocolletine species are recorded from a single host plant only, indicating the often occurrence of the highly specialized monophagy within this subfamily. The 47 species that lack host plant data are predominantly tropical. Hosts of lithocolletine are represented across a broad spectrum of 36 plant families (Fig. 1). Most lithocolletine species utilize plants belonging to Fagaceae (106 species), Fabaceae (92 species), Betulaceae (51 species), Rosaceae (47 species) and Salicaceae (37 species). Each of the remaining 31 plant families serve as a host for a significantly lower number of lithocolletine moths (Fig. 1, Table 3). However, species of most genera feed on only one or two host families, and only *Cameraria* and *Phyllonorycter* species appear to be truly polyphagous, feeding on multiple plant families. All lithocolletine genera, with the exception of *Cremastobombycia*, are associated with Fabaceae (species assigned to the genus *Cremastobombycia* feed on Asteraceae and Verbenaceae). Moreover, all species belonging to *Chrysaster*, *Hyloconis*, *Macrosaccus*, *Neolithocolletis*, *Porphyrosela* and *Protolithocolletis* utilize exclusively Fabaceae plants. The correlation of lithocolletine moths with the plant family Fabaceae most probably is the ancestral condition of host plant preference within this subfamily. *Leucanthiza* feeds on Convolvulaceae, Fabaceae, and Theaceae. *Cameraria* and *Phyllonorycter* share very many hostplants, and the only host plant families that are not shared by *Cameraria* with *Phyllonorycter* are Annonaceae, Hippocastanaceae and Lauraceae. Host plants families utilized by *Phyllonorycter* belonging to Acanthaceae, Aquifoliaceae, Cistaceae, Dipsacaceae, Elaeagnaceae, Malpighiaceae, Malvaceae, Menispermaceae, Platanaceae, Polygonaceae, Primulaceae, Rhamnaceae, Rosaceae, Rutaceae, Saxifragaceae, Solanaceae, and Styracaceae are not shared with any other lithocolletine genus (Table 3). In most cases, closely related moths feed on closely related host plants, and these usually belong to either the same plant genus or to closely related plant genera belonging to the same family (Lopez-Vaamonde *et al*. 2003; De Prins & De Prins 2005, 2012). However, there are exceptions and some species show some plasticity in their host plant choice. In some rare cases, a species may feed on an unrelated host, if a female locates a host that is palatable for its larva. The best known example is *Cameraria ohridella* Deschka & Dimić, 1986 in Europe, where *Acer pseudoplatanus* L. (Aceraceae) may be chosen instead of the usual *Aesculus* spp. (Hippocastanaceae) (Péré *et al*. 2010).

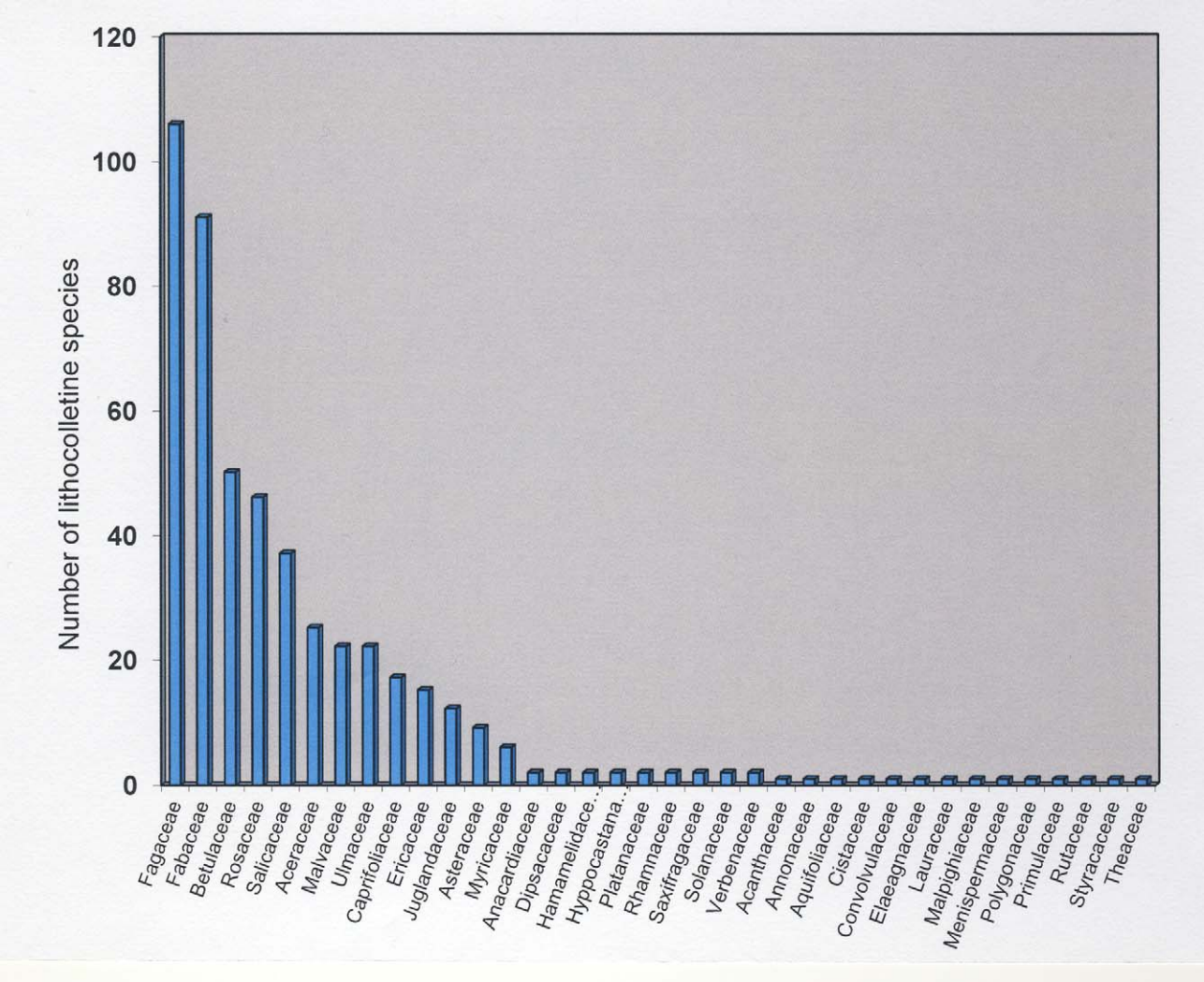


FIGURE 1. Host use in Lithocolletinae. Species in the subfamily feed on 36 different plant families, with the greatest number feeding on Fagaceae.

Distribution and diversity

Species diversity in Lithocolletinae is highly unequal, ranging from 401 species in *Phyllonorycter* Hübner, 1822, to one in *Protolithocolletis* Braun, 1929. Although lithocolletine species are known from all biogeographic regions, the vast majority is found in temperate regions, with 276 (54.3%) species in the Palaearctic, 145 (28.5%) in the Nearctic, 49 (9.6%) in the Oriental region, 26 (5.1%) in the Afrotropics, 18 (3.5%) in the Neotropics, and 8 (1.6%) species in the Australasian region (Fig. 2, Table 4). Eight of ten genera are known to be restricted to the Nearctic region, seven to the Palaearctic and in the remaining regions three to five genera are known (Table 4). Species are typically restricted to a single biogeographical region, rarely does their range span across more than one continent, however, some species are invasive where they were introduced either intentionally or unintentionally for different reasons (Lopez-Vaamonde *et al*. 2010). For example, *Cremastobombycia lantanella* Busck, 1910 has an original Neotropical distribution (Mexico), but it was intentionally introduced into the Australasian (Hawaii) region in order to control *Lantana* sp. (Busck 1910), *Neolithocolletis pentadesma* Meyrick, 1919 is an Oriental species but it was unintentionally introduced to Seychelles (Gerlach & Matyot 2006), *Macrosaccus robiniella* (Clemens, 1859) has an original Nearctic distribution but it was accidentally imported into the Palaearctic with its larval foodplant, *Robinia pseudoacacia* L. (Whitebread 1990).

TABLE 3. Host plant families utilized as hosts of Lithcolletinae genera.

Plant family	*Cameraria*	*Chrysaster*	*Cremastobombycia*	*Hyloconis*	*Leucanthiza*	*Macrosaccus*	*Neolithocolletis*	*Phyllonorycter*	*Porphyrosela*	*Protolithocolletis*	Total
Fagaceae	34	-	-	-	-	-	-	72	-	-	106
Fabaceae	11	2	-	5	1	5	3	54	10	1	92
Betulaceae	4	-	-	-	-	-	-	47	-	-	51
Rosaceae	-	-	-	-	-	-	-	47	-	-	47
Salicaceae	2	-	-	-	-	-	-	35	-	-	37
Aceraceae	6	-	-	-	-	-	-	19	-	-	25
Ulmaceae	1	-	-	-	-	-	-	21	-	-	22
Malvaceae	-	-	-	-	-	-	-	22	-	-	22
Caprifoliaceae	2	-	-	-	-	-	-	15	-	-	17
Ericaceae	3	-	-	-	-	-	-	12	-	-	15
Juglandaceae	2	-	-	-	-	-	-	10	-	-	12
Asteraceae	-	-	5	-	-	-	-	4	-	-	9
Myricaceae	2	-	-	-	-	-	-	4	-	-	6
Anacardiaceae	1	-	-	-	-	-	-	1	-	-	2
Dipsacaceae	-	-	-	-	-	-	-	2	-	-	2
Hamamelidaceae	1	-	-	-	-	-	-	1	-	-	2
Hippocastanaceae	2	-	-	-	-	-	-	-	-	-	2
Platanaceae	-	-	-	-	-	-	-	2	-	-	2
Rhamnaceae	-	-	-	-	-	-	-	2	-	-	2
Saxifragaceae	-	-	-	-	-	-	-	2	-	-	2
Solanaceae	-	-	-	-	-	-	-	2	-	-	2
Verbenaceae	-	-	1	-	-	-	-	1	-	-	2
Acanthaceae	-	-	-	-	-	-	-	1	-	-	1
Annonaceae	1	-	-	-	-	-	-	-	-	-	1
Aquifoliaceae	-	-	-	-	-	-	-	1	-	-	1
Cistaceae	-	-	-	-	-	-	-	1	-	-	1
Convolvulaceae	-	-	-	-	1	-	-	-	-	-	1
Elaeagnaceae	-	-	-	-	-	-	-	1	-	-	1
Lauraceae	1	-	-	-	-	-	-	-	-	-	1
Malpighiaceae	-	-	-	-	-	-	-	1	-	-	1
Menispermaceae	-	-	-	-	-	-	-	1	-	-	1
Polygonaceae	-	-	-	-	-	-	-	1	-	-	1
Primulaceae	-	-	-	-	-	-	-	1	-	-	1
Rutaceae	-	-	-	-	-	-	-	1	-	-	1
Styracaceae	-	-	-	-	-	-	-	1	-	-	1
Theaceae	-	-	-	-	1	-	-	-	-	-	1

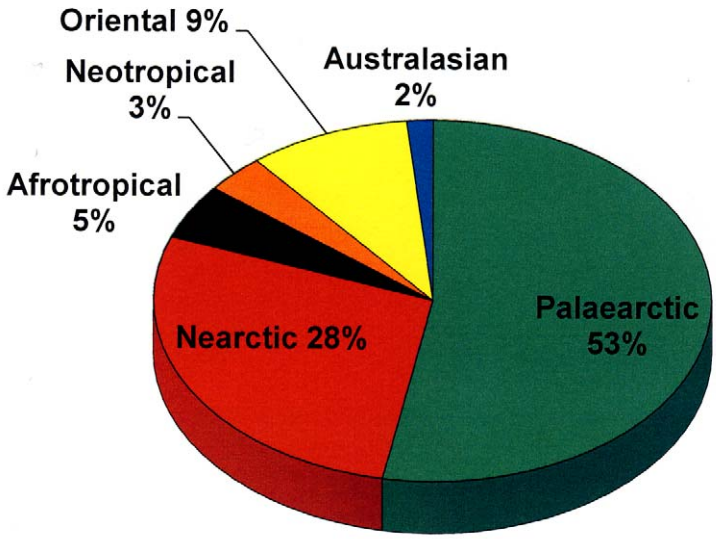


FIGURE 2. Diversity of lithocolletine species separated by geographic region. Highest number of species are found in the Palearctic, but this trend may be due to greater sampling in this region.

The global species diversity of Lithocolletinae is clearly much greater than what is known (Table 4). With the present treatment we aim to describe and illustrate a great number of species that were previously unreported.

TABLE 4. Global distribution and diversity of lithocolletine species according to geographic regions

Genera	Palaearctic	Nearctic	Afrotropical	Neotropical	Oriental	Australasian
Cameraria	7	53	1	-	12	-
Chrysaster	1	1	-	-	-	-
Cremastobombycia	-	5	-	1	-	1
Hyloconis	5	-	-	-	-	-
Leucanthiza	-	2	-	1	-	-
Macrosaccus	1	4	-	1	-	-
Neolithocolletis	1	-	1	-	2	-
Phyllonorycter	259	78	22	13	32	4
Porphyrosela	2	1	2	2	3	3
Protolithocolletis	-	1	-	-	-	-
Total	**276**	**145**	**26**	**18**	**49**	**8**

In this study, we revise the Afrotropical Lithocolletinae utilizing morphology, life history, and molecular data. While it is ideal to conduct revisionary work for taxa at a global scale, we have chosen first to tackle the problem of Lithocolletinae within the Afrotropics, as the global diversity of Lithocolletinae is far too large and well beyond the scope of this study.

A brief history of Afrotropical Lithocolletinae studies

Francis Walker described the first Afrotropical Lithocolletinae species (*Lithocolletis aurifascia*) from St. Helena (British overseas territory) in 1875. According to Robinson (2009), the specimen was collected by Edith Wollaston. Walker (1875: 192) described *Lithocolletis aurifascia* as “an extremely minute and very beautiful moth”. However,

this species is excluded from Lithocolletinae in the present study because of its head morphology, which resembles some Gracillariinae. Thus, it appears that the first Afrotropical lithocolletine was *Phyllonorycter encaeria*, described by Meyrick in 1911. This description was immediately followed by the description of *Phyllonorycter melanosparta* (Meyrick, 1912). Both species were discovered in South Africa, after which a few more species were described from other regions of the Afrotropics 25–30 years later (Meyrick 1936; Ghesquière 1940*). Lithocolletis urticicolella* Ghesquière, 1940, described from the Democratic Republic of the Congo, Kivu, valley of river Loso, was transferred to Tischeriidae (De Prins & De Prins 2005) and its present generic combination is *Tischeria urticicolella* (Ghesquière, 1940) (Puplesis & Diškus 2005). The middle of the 20th century was very fruitful to new species discoveries mainly due to the collecting trips by Pierre Viette in Madagascar (1949, 1951) and the detailed study by Lajos Vári (1961) in South Africa. In his monumental work, Vári (1961) treated most of the present genera of Gracillariidae, except *Phyllocnistis*, which was considered a different family (Phyllocnistidae) at that time. After describing 13 new lithocolletinae species, twenty years passed before one more *Phyllonorycter* species was described from Nigeria by Bland (1980), and again twenty five years before the descriptions of four more *Phyllonorycter* species discovered in Namibia, Kenya and Cameroon (Triberti 2004; De Prins & Mozūraitis 2006; De Prins & De Prins 2007). Up to the present study 25 species of Afrotropical Lithocolletinae were described (De Prins & De Prins 2012) and one species, *Neolithocolletis pentadesma* (Meyrick, 1919), was introduced to the Afrotropics from the Oriental region (Gerlach & Matyot 2006). In the present paper we augment the list with 41 new species, totaling 66 Lithocolletinae species occurring in the Afrotropical region.

Key to the genera of Afrotropical Lithocolletinae

1. Forewing venation with three veins (R_3, R_4 and R_5) terminating along costa, hindwing venation with non-branched M_1 or with stalked M_1 and M_2 3
– Forewing with four veins (R_2, R_3, R_4, R_5) terminating along costa, hindwing with non-branched M_1 2
2. Hindwing with single, non-branched M_1; apex of tegumen with two pairs of setae (Figs 12, 13). . . . . *Neolithocolletis**
– Hindwing with branched M_1 and M_2; apex of tegumen with more than 4 setae in male genitalia (Fig. 11). . . . . *Hyloconis*
3. Hindwing with a unbranched M_1, apex of tegumen in male genitalia without setae or no more than one pair of setae 4
– Hindwing with stalked M_1 and M_2, apex of tegumen in male genitalia with two or more setae 5
4. Apex of tegumen in male genitalia naked, without setae (Figs 16, 17) . . . . . *Phyllonorycter*
– Apex of tegumen in male genitalia with a single pair of setae (Figs 14, 15) . . . . . *Cameraria*
5. Apex of tegumen in male genitalia with a single pair of setae; anterior apophyses absent in female (Fig. 20) . . *Porphyrosela***
– Apex of tegumen in male genitalia with more than one pair of setae, which may be of different length; anterior apophyses present in female (Figs 18, 19)*Cremastobombycia*

* Except *Neolithocolletis mayumbe* which has three veins running to costa in forewing, but apex of tegumen with two pairs of setae in male genitalia.

** Anterior apophyses are absent in females of *Cameraria varii* also but all other morphological characters indicate the placement of this species into the genus *Cameraria*.

Checklist of the species of Afrotropical Lithocolletinae, with type localities

Hyloconis Kumata, 1963
luki De Prins, **n. sp.**—Luki-Mayumbe, Bas-Congo, Democratic Republic of the Congo

Neolithocolletis Kumata, 1963
mayumbe De Prins, **n. sp.**—Luki-Mayumbe, Bas-Congo, Democratic Republic of the Congo
nsengai De Prins, **n. sp.**—Luki-Mayumbe, Bas-Congo, Democratic Republic of the Congo
pentadesma (Meyrick, 1919)—Buitenzorg, Indonesia (Java)

Cameraria Chapman, 1902
fara De Prins, **n. sp.**—Faro riverside, North Province, Cameroon
hexalobina (Vári, 1961)**, n. comb.—**Punda Maria, Kruger National Park, South Africa
landryi De Prins**, n. sp.**—Luki-Mayumbe, Bas-Congo, Democratic Republic of the Congo
perodeaui De Prins, **n. sp.—**Luki-Mayumbe, Bas-Congo, Democratic Republic of the Congo
sokoke De Prins**, n. sp.—**Arabuko Sokoke Forest, Kenya

torridella De Prins, **n. sp.—**Turi, Rift Valley, Kenya
varii De Prins**, n. sp.—**Pretoria, South Africa
zaira De Prins**, n. sp.**—Panda, Haut Katanga, Democratic Republic of the Congo

Phyllonorycter Hübner, 1822
aarviki De Prins, **n. sp.**—Morogoro, Tanzania
achilleus De Prins, **n. sp**.—Kakamega Forest, Kenya
acutulus De Prins, **n. sp.**—Aberdares National Park, Kenya
adderis De Prins, **n. sp.**—Nyungwe National Park, Rwanda
agassizi De Prins, **n. sp.—**Ndoinet, Kenya
albertinus De Prins**, n. sp.—**Turi, Rift Valley, Kenya
anchistea (Vári, 1961)—Louis Trichardt, Soutpansberg, South Africa
brachylaenae (Vári, 1961)—Pretoria, South Africa
caudasimplex Bland, 1980—Ile-Ife, Nigeria
chionopa (Vári, 1961)—Abachaus, Otjiwarongo, Namibia
didymopa (Vári, 1961)—Tswaing, Pretoria District, South Africa
dombeyae De Prins **n. sp.**—Hluhluwe-Imfolozi Nature Park, KwaZulu-Natal, South Africa
encaeria (Meyrick, 1911)—Pretoria, South Africa
farensis De Prins, 2007—Faro riverside, North Province, Cameroon
fletcheri De Prins, **n. sp.**—Ibanda, Rwenzori Mountains, Uganda
gato De Prins, **n. sp.**—Nyungwe National Park, Rwanda
gozmanyi De Prins, 2007—Faro riverside, North Province, Cameroon
grewiaecola (Vári, 1961)– Waterpoort, Soutpansberg, South Africa
grewiaephilos De Prins**, n. sp.—**Tsavo National Park, Kenya
grewiella (Vári, 1961)—Malelane, Kruger National Park, South Africa
hibiscina (Vári, 1961)—Hennops River, Pretoria District, South Africa
hibiscola De Prins, **n. sp.**—Kakamega Forest, Kenya
ipomoellus De Prins, **n. sp.**—Nyungwe National Park, Rwanda
jabalshamsi De Prins, **n. sp.**—Jabal Shams, Oman
kazuri De Prins, **n. sp.**—Tsavo National Park, Kenya
lantanae (Vári, 1961)—Louis Trichardt, Soutpansberg, South Africa
lemarchandi (Viette, 1951)—Antananarivo, Madagascar
leucaspis Triberti, 2004—Brandberg, Namibia
loxozona (Meyrick, 1936)**—**Busanju, Uganda
madagascariensis (Viette, 1949)—Antananarivo, Madagascar
maererei De Prins**, n. sp.**—Morogoro, Tanzania
melanosparta (Meyrick, 1912)—Barberton, South Africa
melhaniae (Vári, 1961)—Hot Springs, Melsetter, Zimbabwe
mida De Prins, **n. sp.**—Arabuko Sokoke Forest, Kenya
mwatawalai De Prins, **n. sp.**—Morogoro, Tanzania
obandai De Prins & Mozūraitis, 2006—Gatamaiyu Forest, Kenya
ocimellus De Prins, **n. sp.**—Taita Hills, Kenya
ololua De Prins, **n. sp.—**Ololua Forest, Nairobi, Kenya
pavoniae (Vári, 1961)—Tshipise, Sibasa, South Africa
rhynchosiae (Vári, 1961)—Pretoria, South Africa
rongensis De Prins, **n. sp.**—Rongai, Rift Valley, Kenya
ruizivorus De Prins, **n. sp.**—Bois de Senteur, St. Pierre, Reunion
ruwenzori De Prins, **n. sp.**—Bundibugyo, Rwenzori Mountains, Uganda
silvicola De Prins, **n. sp.**—Kakamega Forest, Kenya
trochetellus De Prins, **n. sp.**—Mauritius
tsavensis De Prins, **n. sp.**—Tsavo National Park, Kenya
turensis De Prins, **n. sp.**—Turi, Rift Valley, Kenya
umukarus De Prins, **n. sp.**—Nyungwe National Park, Rwanda

Cremastobombycia Braun, 1908
kipepeo De Prins, **n. sp.**—Arabuko Sokoke Forest, Kenya
morogorene De Prins, **n. sp.**—Morogoro, Tanzania

Porphyrosela Braun, 1908
desmodivora De Prins, **n. sp.**—Ekona, Cameroon
gautengi De Prins, **n. sp.**—Jozini Dam, Lebombo Mountains, South Africa

homotropha Vári, 1963—Addis Ababa, Ethiopia
teramni Vári, 1961—Pretoria, South Africa

Hostplant checklist

Annonaceae
***Hexalobus* A. DC.**
crispiflorus A. Rich.—Lithocolletinae sp.
monopetalus (A. Rich.) Engl. & Diels—*Cameraria hexalobina* (Vári, 1961)
Asteraceae
***Brachylaena* R. Br.**
discolor DC.—*Phyllonorycter brachylaenae* (Vári, 1961)
rotundata S. Moore—*Phyllonorycter brachylaenae* (Vári, 1961)
sp.—*Phyllonorycter hibiscina* (Vári, 1961)
Convolvulaceae
***Ipomoea* L.**
bracteata Cav.—*Phyllonorycter ipomoellus* De Prins, **n. sp.**
Fabaceae
***Eriosema* (DC.) Desv.**
psoraloides (Lam.) Baill.—*Phyllonorycter rhynchosiae* (Vári, 1961)
***Dalbergia* L. f.**
hostilis Benth.—*Neolithocolletis nsengai* De Prins, **n. sp.**
***Desmodium* Desv.**
adscendens (Sw.) DC.—*Porphyrosela desmodivora* De Prins, **n. sp.**
***Flemingia* Roxb. ex W.T. Aiton**
grahamiana Wight & Arn.—*Phyllonorycter melanosparta* (Meyrick, 1912)
***Glycine* Willd.**
max (L.) Merr.—*Porphyrosela homotropha* Vári, 1963
***Hylodesmum* H. Ohashi & R.R. Mill**
repandum (Vahl) H. Ohashi & R.R. Mill—*Phyllonorycter melanosparta* (Meyrick, 1912)
***Rhynchosia* Lour.**
caribaea (Jacq.) DC.—*Phyllonorycter melanosparta* (Meyrick, 1912)
confusa Burtt Davy—*Phyllonorycter rhynchosiae* (Vári, 1961)
luteola var. *verdickii* (De Wild.) Verdc.—Lithocolletinae sp.
nitens Benth. ex Harv.—*Phyllonorycter rhynchosiae* (Vári, 1961)
***Pterocarpus* Jacq.**
indicus Willd.—*Neolithocolletis pentadesma* (Meyrick, 1919)
javanicus (Miq.) Kuntze—*Neolithocolletis pentadesma* (Meyrick, 1919)
***Teramnus* P. Browne**
labialis (L. f.) Spreng—*Porhyrosela teramni* Vári, 1961
sp.—*Porhyrosela teramni* Vári, 1961
***Vigna* Savi**
luteola (Jacq.) Benth—*Porphyrosela gautengi* De Prins, **n. sp.**
Porhyrosela teramni Vári, 1961
sp.—*Phyllonorycter melanosparta* (Meyrick, 1912)
Porphyrosela homotropha Vári, 1963
Porhyrosela teramni Vári, 1961
Lamiaceae
***Ocimum* L.**
gratissimum L.—*Phyllonorycter ocimellus* De Prins, **n. sp.**
Malvaceae
***Abutilon* Mill.**
mauritianum (Jacq.) Medik.—*Phyllonorycter hibiscina* (Vári, 1961)
***Dombeya* Cav.**
acutangula Cav.—*Phyllonorycter ruizivorus* De Prins, **n. sp.**
Phyllonorycter trochetellus De Prins, **n. sp.**
buettneri K. Schum—*Phyllonorycter loxozona* (Meyrick, 1936)
kefaensis Friis & Bidgood—Lithocolletinae sp.

occidentalis L.—*Phyllonorycter anchistea* (Vári, 1961)
rotundifolia (Hochst.) Planch.—*Phyllonorycter didymopa* (Vári, 1961)
Phyllonorycter dombeyae De Prins **n. sp.**
Phyllonorycter loxozona (Meyrick, 1936)
spectabilis Bojer—*Phyllonorycter madagascariensis* (Viette, 1949)
torrida (J.F. Gmel.) Bamps—*Cameraria torridella* De Prins, **n. sp.**
wittei De Wild. & Staner—Lithocolletinae sp.

***Grewia* L.**
caffra Meisn.—*Phyllonorycter grewiella* (Vári, 1961)
damine Gaertn.—*Phyllonorycter grewiella* (Vári, 1961)
ferruginea Hochst. ex A. Rich.—Lithocolletinae sp.
flava DC.—*Phyllonorycter grewiella* (Vári, 1961)
flavescens Juss.—*Phyllonorycter grewiella* (Vári, 1961)
hexamita Burret—*Phyllonorycter grewiella* (Vári, 1961)
messinica Burtt Davy & Greenway—*Phyllonorycter grewiella* (Vári, 1961)
monticola Sond.—*Phyllonorycter grewiella* (Vári, 1961)
picta Baill.—Lithocolletinae sp.
pinnatifida Mast.—Lithocolletinae sp.
praecox K. Schum.—Lithocolletinae sp.
similis K. Schum.—Lithocolletinae sp.
tenax (Forssk.) Fiori—Lithocolletinae sp.
tristis K. Schum.—*Phyllonorycter grewiaecola* (Vári, 1961)
villosa Willd.—*Phyllonorycter grewiaephilos* De Prins**, n. sp.**
Phyllonorycter grewiella (Vári, 1961)

***Hibiscus* L.**
calyphyllus Cav.—*Phyllonorycter hibiscina* (Vári, 1961)
Phyllonorycter hibiscola De Prins, **n. sp.**
lunarifolius Willd.—*Phyllonorycter hibiscina* (Vári, 1961)

***Melhania* Forssk.**
velutina Forsk—*Phyllonorycter melhaniae* (Vári, 1961)

***Pavonia* Cav.**
burchellii (DC) R. A. Dyer—*Phyllonorycter pavoniae* (Vári, 1961)
columella Cav.—Lithocolletinae sp.
praemorsa Cav.—*Phyllonorycter pavoniae* (Vári, 1961)
sp.—*Phyllonorycter hibiscina* (Vári, 1961)

***Ruizia* Cav.**
cordata Cav.—*Phyllonorycter ruizivorus* De Prins, **n. sp.**

***Sida* L**.
rhombifolia L.—*Phyllonorycter lemarchandi* (Viette, 1951)

***Triumfetta* L.**
cordifolia A. Rich.—*Phyllonorycter umukarus* De Prins, **n. sp.**

***Trochetia* DC.**
blackburniana Boj.—*Phyllonorycter trochetellus* De Prins, **n. sp.**

***Urena* L.**
lobata L.—*Phyllonorycter adderis* De Prins, **n. sp.**

Rosaceae

***Prunus* L.**
africana (Hook. f.) Kalkman—*Phyllonorycter achilleus* De Prins, **n. sp**.

Verbenaceae

***Lantana* L.**
sp.—*Phyllonorycter lantanae* (Vári, 1961)

Material and methods

Taxon sampling and rearing

Field work and rearing were conducted by the first author during 2001–2010 in the following countries: Cameroon, Democratic Republic of the Congo, Kenya, Rwanda, South Africa, and Tanzania. Adult specimens were collected

at a 20 W mercury vapor bulb placed at about 1.60 m above ground in front of a white vertical sheet. A 25 W black light lamp was also placed at the same level on the opposite side of the sheet. Pheromone traps were also placed in various biotopes, and adults were collected from them (for details see De Prins & Mozūraitis 2006, De Prins *et al*. 2009).

Leaf mines were collected and placed in plastic rearing containers with lids that were periodically moistened in order to protect the specimens from desiccation. Reared adult specimens were pinned, spread, and mounted for further morphological study. Three legs of each unique emerged adult were placed in a microcentrifuge tube containing 100% EtOH for molecular analysis when possible. Although the majority of life-history reports are from the first author's field rearing observations, rearing records from Lajos Vári's unpublished field diaries were also examined in detail.

Taxonomic material

All 432 primary types of the 66 Afrotropical lithocolletine species, and the types of *Lithocolletis aurifascia* Walker, 1875, were examined. Under the taxonomic section of each species in the present study, we list the primary types and indicate different labels by numbers in square brackets (e.g., [1], [2]). A forward slash "/" indicates the end of a line. Lectotypes are designated from the syntype series. In total, 1057 specimens were obtained and studied from the collections of the following museums and private collections:

ANSP	Academy of Natural Sciences, Philadelphia, USA
BMNH	Natural History Museum, London, UK
CCDB	Canadian Center for DNA Barcoding, Guelph, Canada
CCIG	Christian & Ingrid Guillermet Private Collection, Antibes, France
CIRAD	French agricultural research organization working for development in the South and the French overseas regions, Reunion
CDA	David Agassiz Private Collection, Weston-Mare, UK
CUMZ	Cambridge University, Zoological Museum, UK
FSMC	University of Florida, Florida Museum of Natural History, Gainesville, USA
HNHM	Hungarian Natural History Museum, Budapest, Hungary
INRA	Institut National de la Recherche Agronomique, Orléans, France
MHNG	Muséum d'Histoire Naturelle, Genève, Switzerland
MNHN	Muséum National d'Histoire Naturelle, Paris, France
NHMO	Natural History Museum, Oslo, Norway
NMK	National Museums of Kenya, Nairobi, Kenya
RMNH	Netherlands Center for Biodiversity Naturalis, Leiden, the Netherlands
RMCA	Royal Museum for Central Africa, Tervuren, Belgium
TMSA	Ditsong National Museum of Natural History (formerly Transvaal Museum), Pretoria, South Africa
UM-SI	University of Maryland–Smithsonian Institution (AToLep) frozen Lepidoptera sample collection, College Park, MD, and Washington D.C., USA.
ZMHB	Museum für Naturkunde der Humboldt Univeristät zu Berlin, Germany
ZMUC	Zoological Museum, University of Copenhagen, Denmark

Each specimen has been given a unique specimen identifier (specimen ID) which consists of a digital label under the specimen, readable by a scanner connected to the Faunistic Module of the Gracillariidae database (MS Access). This digital label refers to a record in the database which contains: species name, author, year of description, collection date, emergence date, geo-referenced location, host plant identification, deposition of the specimen, DNA voucher, genitalia slide number, imaging number, and remarks. The relational Gracillariidae database consists of four modules: Literature, Taxonomy, Faunistics and Loan Manager (De Prins & De Prins 2005), of which the former two have been included in the searchable website "Global taxonomic database of Gracillariidae (Lepidoptera)" (De Prins & De Prins 2012).

Species diagnoses and geographic boundaries

Species diagnoses are primarily based on characters of the wing, head, leg, and genitalia. We also used molecular data to aid in species identification whenever genetic data were available. We chose to include these data because morphological data are frequently prone to convergence and homoplasy (Bethoux 2007; Masters 2007; Manceau *et al*. 2010). In addition to standard "DNA barcodes," which we include primarily for identification purposes, we also utilized eight nuclear genes to assess phylogenetic placement of genera. Our COI results should only be used as "guide" to aid in determining species boundaries and not as an indication of phylogenetic relationship as mitochondrial data are prone to biases such as maternal inheritance, recombination, and inconsistent mutation rates which can blur true phylogenetic signal (e.g., Will & Rubinoff 2004; Rubinoff *et al*. 2006).

We treat species as non-overlapping units of variation in morphological and molecular characters from individuals from geographically circumscribed regions (Zapata & Jimenez 2012). The lithocolletine genera presented in this paper are arranged following Braun (1909), Meyrick (1912b) and Kumata (1993). Tentative morphological species groups and species are arranged alphabetically throughout the text. The Afrotropical region can be defined as the biogeographic area covering the African continent south of the Sahara (i.e. excl. Morocco, Algeria, Tunisia, Libya and Egypt), but including the islands in the Atlantic Ocean: Amsterdam Island, Ascension, Cape Verde Archipelago, Inaccessible Island, St. Helena, São Tomé and Principe, Tristan da Cunha, and the islands in the Indian Ocean: Comores (Anjouan, Grande Comore, Mayotte, Mohéli), Madagascar, Mascarene Islands (La Réunion, Mauritius, Rodrigues), Seychelles (Félicité, Mahé, Praslin, Silhouette, a.o.). Furthermore, those lithocolletine species occurring in the transition zone to the Palaearctic fauna have also been considered, namely most of the Arabia Peninsula (Kuwait, Oman, Saudi Arabia, United Arab Emirates, Yemen with Socotra) but not Iraq, Jordan and further north. Also, some Saharan species have been searched for (e. g. Hoggar Mts. in Algeria, Tibesti Mts. in South Libya).

Herbaria specimens

Herbaria in the following collections were examined for lithocolletine mines: the Herbarium of Hering (Humboldt University, Berlin, Germany), the Herbarium of Vári (Pretoria, South Africa), the East African Herbarium (Nairobi, Kenya), the Herbarium of Luki-Mayumbe Biosphere Reserve (Luki, Congo DR), and the Herbarium of the National Botanic Garden of Belgium (Meise, Belgium) (Table 7). Host plants were identified by botanists at the East African Herbarium (Nairobi, Kenya), the National Botanic Garden of Belgium (Meise, Belgium), the University of Koblenz (Germany), and at the Luki-Mayumbe Biosphere Reserve (Congo DR). Plant family and species group names follow the Missouri Botanical Garden's TROPICOS database (Missouri Botanical Garden 2011) and The Plant List (Royal Botanic Gardens, Kew 2012).

Morphological dissections, illustrations, and imaging

Adult external morphology was examined with a Leica MZ12.5 stereomicroscope (maximum magnification 75×). Genitalia were prepared following the methods of Robinson (1976) with some modifications. After maceration of the abdomen in 10% KOH for 24 hours and subsequent cleaning and deionization, the male genitalia were stained with 2% eosine B, a mixture of 2% azophloxine and 2% acid fuchsin; the female genitalia were stained with a 1% chlorazol black E solution and embedded in Euparal on slides. Genital morphology was examined using a Leica DMLB microscope under magnifications of 150×, 200×, and 400×. These slides were photographed with a Q imaging Micropublisher 5.0 RTV camera connected to a Leica DMLB light microscope. A composite genitalia image of each species was created using Auto-Montage Syncroscopy to produce composite results from several separate photographs in planes of different depths. Genitalia drawings were sketched from composite photographs. Genital terminology follows Vári (1961), Klots (1970), Kumata (1963; 1993, 1995), and Kristensen (2003). Although Kristensen (2003: 103) suggested to use the term 'phallus', we follow Vári (1961) and Kumata (1963; 1993; 1995) to ensure the continuous stability in terminology of

Lithocolletinae. These methods largely follow our prior publications on the morphology of Gracillariidae (e.g., De Prins & Mozūraitis 2006; De Prins & De Prins 2007; Kawahara *et al*. 2009, 2010). Wing venation slides were prepared following Vári (1961), applying modifications suggested by Hoare (2000). Scanning Electron Microscopy (SEM) imaging was used on some pupal specimens. The exuviae were sputtered with gold using a Bal-TEC/SCD 005 Sputter Coater. SEM images were taken with a Jeol MP 35060 camera attached to a Jeol JSM-5400 LV Electron Scanning Microscope and processed using the Orion 4 High Resolution Image Grabbing System software. Pupal terminology follows Davis (1987). Measurements for all taxa were undertaken using a digital micrometer attached to both Leica MZ 12.5 stereomicroscope and Leica DMLB light microscope with output written directly to an Excel spreadsheet. Measures are stated in millimeters for adults and in micrometers for genitalic structures.

Molecular phylogenetic analysis

We constructed two molecular sequence datasets: 1) the 658 bp "barcode" region of cytochrome oxidase 1 (COI) for 40 species (dataset 1); and 2) a concatenated dataset of eight nuclear gene sequences, totalling 7,626 bp for 85 species (dataset 2). We extracted DNA from adult hind and mid-legs, using the DNeasy Blood & Tissue Extraction Kit (Qiagen Corp., Valencia, CA, USA) for all samples that were available. For COI these included seven species (12 samples), including *Cameraria gautheriella, C. hamadryadella, C. ohridella, P. adderis, P. gato, P. ipomelus,* and *P. umukarus.* Successful amplifications were obtained for eight of nine samples (*P. gato* did not work).

This COI dataset was supplemented with 2 *Cameraria* and 21 *Phyllonorycter* COI sequences from GenBank and 17 sequences from the BOLD database for Afrotropical Lithocolletinae, coordinated by JDP and Carlos Lopez-Vaamonde (www.boldsystems.org). The final COI dataset included 52 sequences from 40 species (Supplementary Table 1). We also conducted a separate phylogenetic analysis in which we sequenced eight genes (CAD, DDC, enolase, ACC, 109fin, 265fin, 268fin, 3007fin) for 85 gracillariid taxa (of which 21 were Lithocolletinae). These sequences obtained following the primers and protocols outlined in Kawahara *et al.* (2011). We created two separate datasets because the majority of taxa sequenced for COI (dataset 1) lacked sequence data for the 8 nuclear genes (dataset 2), and the majority of taxa sequenced for 8 nuclear genes lacked sequence data for COI.

Sequences were assembled, edited, and aligned in Geneious 5.5 (Drummond *et al*. 2010). We used the "Geneious Alignment" option with default settings, and manually checked the alignment. As we have done previously in our studies (e.g., Kawahara *et al*. 2009, 2011; Regier *et al.* 2009; Cho *et al.* 2011; Kawahara & Rubinoff 2012), both datasets were subject to a maximum likelihood phylogenetic analysis in GARLI (Genetic Algorithm for Rapid Likelihood Inference (Zwickl 2006)) using grid computing (Cummings & Huskamp 2005) through The Lattice Project (Bazinet & Cummings 2009). For both datasets, we conducted 2000 best tree searches and 2000 bootstrap replicates, applying a GTR+I+G substitution model with a random starting tree.

For dataset 2, we also conducted Bayesian MCMC analysis with MrBayes 3.2 (Ronquist & Huelsenbeck 2003). Bayesian analyses included two parallel runs of four chains each, employing default priors and a random starting tree. Trees were sampled every 10^3 generations for 10^7 generations, and we changed the temperature setting to 0.15 to allow for thorough mixing. Convergence of the two runs was assessed by examining whether the standard deviation of split frequencies fell below the 0.01 threshold (Ronquist & Huelsenbeck 2003), and by checking the stability of clade splits with the "Cumulative" option in AWTY online (Wilgenbusch *et al*. 2004). Seventy percent of the post-burnin trees were discarded, and the remaining trees used to calculate the Bayesian consensus.

Species limits and phylogenetic relationships

Dataset 1, based on COI of *Cameraria* and *Phyllonorycter* alone demonstrated that the Afrotropical species, *C. hexalobina, C. landryi, P. adderis, P. didymopa, P. grewiaephilos, P. grewiella, P. hibiscina, P. ipomoellus, P.*

kazuri, P. lantanae, P. obandai, P. ocimellus, and *P. umukarus* are genetically distinct. Long internal branch lengths separate these species from each other, supporting the designation of these species as distinct from one another (Fig. 3). Although we attempted to sequence *P. gato*, we could not successfully amplify COI for this species, and thus it is not included in our trees.

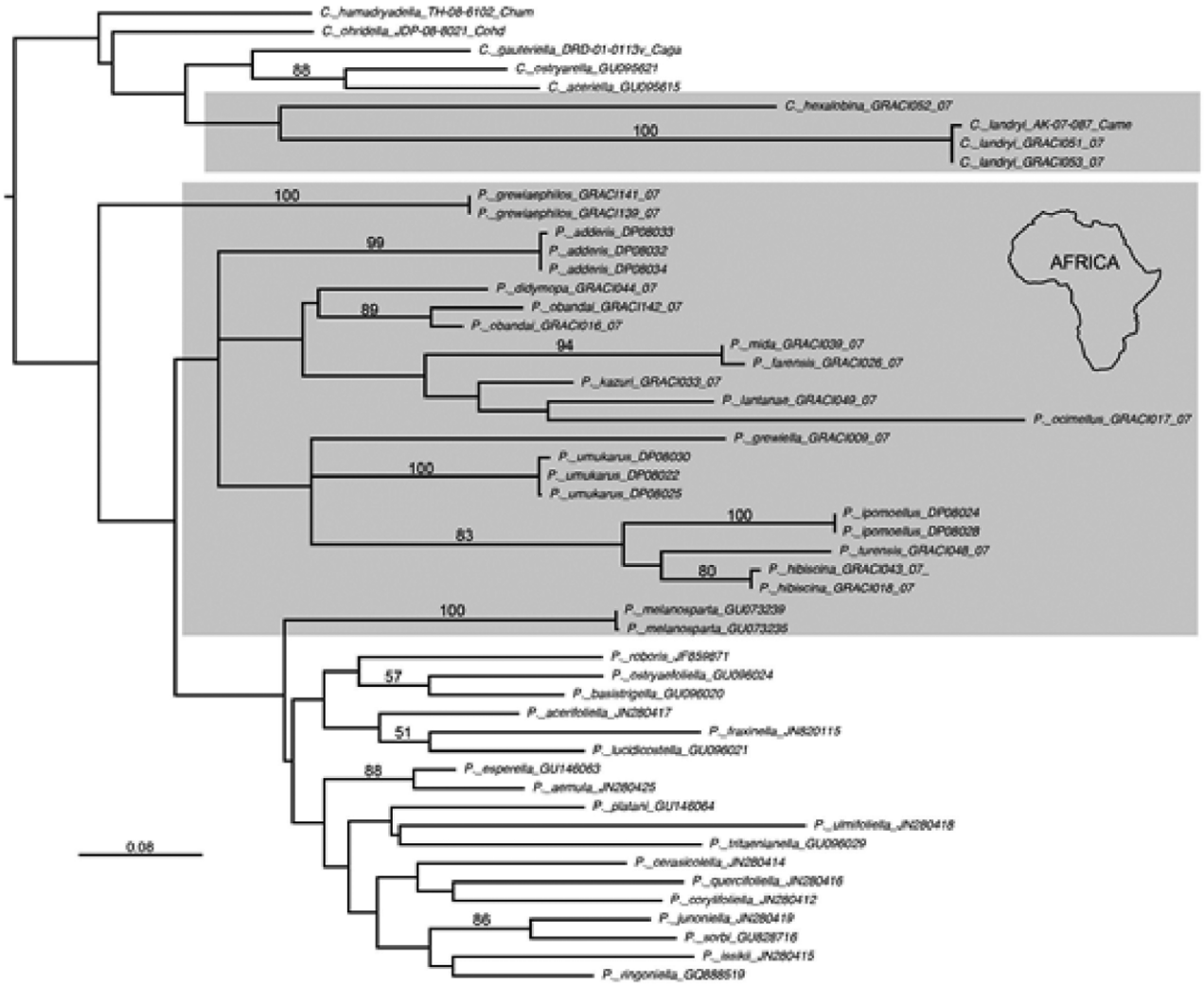


FIGURE 3. Maximum-likelihood tree of *Cameraria* + *Phyllonorycter* based on 40 taxa, for the COI data set alone. African species are genetically distinct, as shown by the long internal branch lengths among taxa boxed in grey. ML bootstrap values show above branches. Scale bar = 0.08 substitutions/site.

Results from our phylogenetic analyses of dataset 2 were largely congruent with those from Kawahara *et al.* (2011). Lithocolletinae (including *Leucanthiza*) is monophyletic with very strong branch support (bootstrap [BP] = 100%, Bayesian posterior probability [PP] = 1; Fig. 4). All *Phyllonorycter* species grouped together with strong support (BP = 100%, PP = 1) for the genus and within. *Cameraria* was also monophyletic, albeit with weaker support. The two Afrotropical species, *C. landryi* and *C. perodeaui* were ancestral to the remaining taxa sampled in the genus. While taxon sampling was limited, the two *Hyloconis* species constitute a group that is paraphyletic with respect to *Neolithocolletis*. Because our molecular data are limited, and because support for *H. wisteriae* + *Neolithocolletis* in our analyses was not strong (BP = 66%; PP = 0.93) we chose not to synonymize these genera in the present study.

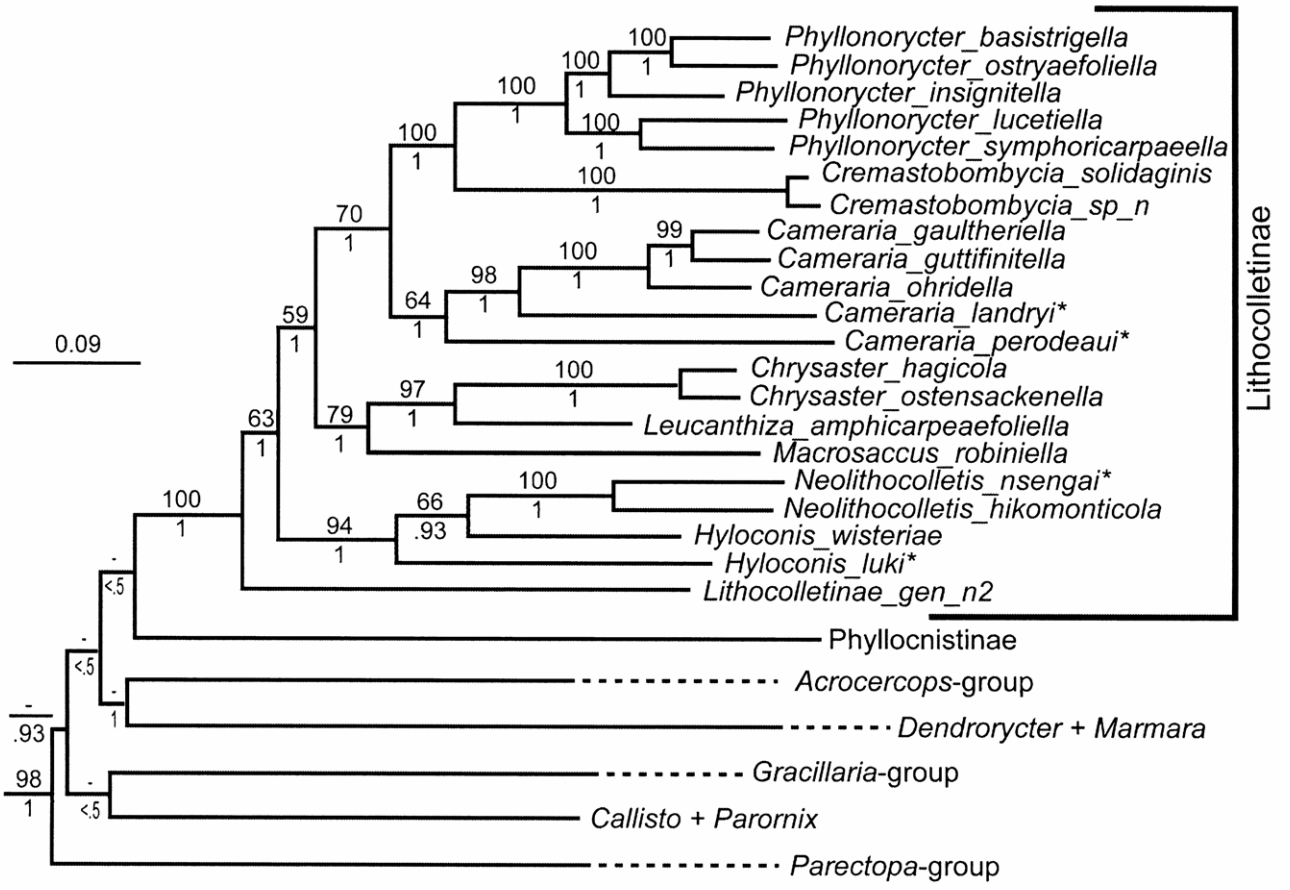


FIGURE 4. Molecular phylogeny of Gracillariidae, showing relationships among the Lithocolletinae species sampled for eight nuclear genes in this study. ML bootstrap values are shown above branches, Bayesian posterior probabilities shown below. African taxa are indicated with an asterisk. Scale bar = 0.09 substitutions/site.

Systematic account

Hyloconis Kumata, 1963

Hyloconis Kumata 1963: 28. Type species: *Hyloconis puerariae* Kumata, 1963, by original designation.

Historic account. *Hyloconis* includes four Japanese species: *H. pueraria* Kumata, 1963, *H. desmodii* Kumata 1963, *H. lespedezae* Kumata, 1963, and *H. wisteriae* Kumata, 1963, all off which feed on Fabaceae. Kumata (1963) proposed the genus because of differences in the biology and wing venation from those of *Cremastobombycia*, *Neolithocolletis*, and *Phyllonorycter*. The male genitalia of *Hyloconis* possess an appendage at the base of the valval costa and an incomplete transtilla (Kumata 1963; Kuznetzov & Baryshnikova 2001). Kumata (1993) drew attention to the diagnostic value of the apical setae on the tegumen. *Hyloconis* has more than four setae on the apex of tegumen, similar to *Cremastobombycia* and different from *Phyllonorycter* (apex of tegumen without setae) and *Neolithocolletis* (four setae) (Kumata 1993). The fifth species presently belonging to *Hyloconis*, *H. improvisella* (Ermolaev, 1986), was described from the Far East of Russia in the genus *Lithocolletis*. In the same paper, Ermolaev (1986) transferred the type species of *Hyloconis*, *H. puerariae*, to *Lithocolletis*, thus synonymizing *Hyloconis* under *Lithocolletis*. However, Park (1983) and Kamijo (1990) considered *Hyloconis* a valid genus. Later, Noreika (1994) placed *L. improvisella* to *Hyloconis*, and returned to *Hyloconis* two other species, *H. puerariae* and *H. lespedezae*, originally described by Kumata (1963) in *Hyloconis*. In keys and catalogues published later, *Hyloconis* was listed as one of the genera of Palaearctic Lithocolletinae (Noreika 1994, 1997; Kuznetzov & Baryshnikova 1998, 2001; Baryshnikova 2002; De Prins & De Prins 2005, 2012).

Until now, *Hyloconis* was known exclusively from the Palaearctic. Here we report *Hyloconis luki* De Prins, n. sp., from Central Africa.

Diagnosis. According to Kumata (1963), *Hyloconis* is morphologically most closely related to *Cremastobombycia* and *Phyllonorycter*, but it also shares many external and internal characters with other Lithocolletinae genera. The adult head has a tuft of long scales that projects forward above the vertex between the antennae as in *Cameraria*, *Neolithocolletis*, *Phyllonorycter*, and *Porphyrosela*; *Chrysaster*, *Leucanthiza*, and *Protolithocolletis* all possess a smooth vertex. The black margins of the white forewing markings in *Hyloconis* clearly differ from of comparable markings in *Cameraria* and *Cremastobombycia.* In the latter two genera the black margins of white forewings markings are situated apically whereas in *Hyloconis* they can be situated both basally and apically as in *Chrysaster*, *Phyllonorycter*, *Porphyrosela*, and *Protolithocolletis*. Forewing venation is similar to that of *Cremastobombycia*, *Leucanthiza*, *Neolithocolletis*, and *Protolithocolletis*, having veins R_2 and M_2 absent. Hindwing venation is similar to that of *Cremastobombycia*, *Porphyrosela* and *Protolithocolletis* in having M_2. The male genitalia are symmetrical or asymmetrical (Kumata 1963: 28). In the male genitalia of *Hyloconis*, the apex of the tegumen has 4 or more setae, as in *Neolithocolletis* and *Cremastobombycia*, but differers from *Phyllonorycter*, which lacks setae on the apex of the tegumen. Other Lithocolletinae genera, such as *Cameraria*, *Chrysaster*, *Macrosaccus* and *Porphyrosela*, have one pair of setae on the apex of the tegument. The transtilla in *Hyloconis* is incomplete as in most species of *Cameraria*; the valva has an ovate knob at the base of of the costa; the saccus is well developed, projected; and the anellus is sclerotized as in some *Cameraria* and *Cremastobombycia*. Sternum VIII in the male is enlarged into a wide flap. The female genitalia have a sclerotized plate on segment VIII, except in *H. wisteriae* Kumata, 1963; the ostium bursae opens in segment VIII, and the sterigma around the ostium bursae is sclerotized. The antrum and/or ductus bursae is usually sclerotized posteriorly. The corpus bursae is in the form of an enlarged, irregularly shaped sac, without signa or with a single very long signum (in *H. wisteriae*). Larvae of *Hyloconis* make entirely flattened mines, different from the tentiform mines of *Phyllonorycter* and other lithocolletine genera. The cocoon of *Hyloconis* is orbicular, with frass placed on one side of mine in a round patch (Kumata 1963). *Hyloconis* species feed on Fabaceae, a character shared with *Chrysaster*, *Neolithocolletis*, *Porphyrosela* and *Protolithocolletis*, and different from *Cremastobombycia* which feed on Asteraceae and Verbenaceae. The chaetotaxy of the last instar larva of *Hyloconis* is very similar to that of *Neolithocolletis*, but the thoracic legs of the last instar are not reduced in *Hyloconis* (Kumata 1993). Whereas *Hyloconis* may be paraphyletic with respect to *Neolithocolletis* (Fig. 4), support for *H. wisteriae* + *Neolithocolletis* in our analyses was weak (BP = 66%; PP = 0.93), and thus we consider the paraphyly of *Hyloconis* uncertain. Additional taxa will need to be sequenced to test the monophyly of *Hyloconis*.

Diagnosis of Afrotropical *Hyloconis*. *Hyloconis* is represented by only one species in the Afrotropical region, *H. luki* De Prins, n. sp., which is very small species with a wing length of ca. 1.5 mm. The external characters of Afrotropical *Hyloconis* are similar to those of Japanese *Hyloconis* species (2 paratypes of *H. wisteriae* and 2 paratypes of *H. puerariae* were compared, drawer Mi 10022 in BMNH, see also Kumata 1963: pl. 5, Figs 66–69). However, Afrotropical *Hyloconis* has strikingly different male genitalia from the Palaearctic species. Genitalia dissections are necessary for distinguishing nearly all Afrotropical lithocolletine genera.

Head: With tufted scales on posterior part of vertex and occiput; frons smooth, white, with silvery gloss. Maxillary palpus rudimentary; labial palpus short, drooping, filiform, pointed; haustellum of moderate length. Antenna nearly as long as forewing, flagellum thicker than in *Phyllonorycter*; pedicel slightly thicker, but shorter than flagellomere; scape short and thick, with pecten.

Thorax: Forewing background colour golden-ochreous; apex of forewing broadly rounded; forewing bearing sparsely distributed distinct, mostly fasciate and one strigulate (the basal) white markings; apical marking rounded. Margin of markings distincly black basally with light shading, brownish-greyish apically. Descaled forewing, short lanceolate, elongate, and pointed: maximum width/length ratio ca. 0.2. Forewing venation reduced to 9 veins, apical portion with 6 veins (R_2, R_3, R_4, R_5, M_1, Cu_1); R_2 originates at 4/5 of discal cell; M_1 not stalked, the cell between R_5 and M_1 open, R_5 originates from apex of cell to costa, M_1 arises from apical margin of the discal cell to termen, Cu_1 separate, R indistinct at basal half, CuP indistinct over entire length, 1A thick, separate. Hindwing lanceolate, about 3/4 as long as forewing, with 6 veins: Sc very short, Rs long, running to apical 1/3 of costa, M branched to M_1 and M_2, basal 2/3 of M_1 indistinct, parallel to Rs, Cu_1 absent, Cu_2 thick, simple; A_1 vestigial (Fig. 11). Retinaculum as a small fold on Sc. Frenulum in male as a single stout bristle; frenula in female as 2 tightly

appressed bristles. Legs slender, with darker rings; fore- and mid- tibia smooth, hind tibia with loosely appressed hairs on its lower surface, hind tarsus smooth, slender and ca. 2× as long as tibia.

Abdomen. Margins of abdominal opening narrowly sclerotized, slightly broadening towards S2, with sclerotized margination of abdominal opening weakly connected on T2 and unconnected on S2; S2 apodemes rather short, ending before opening, slender, with enlarged subbases, slender distally.

Male genitalia. Tegumen long, subconical, with narrow sclerotized arms, flexible; subapex of tegumen covered with short slender appressed setae, apex of tegumen with 5–6 long, stiff setae. Valvae symmetrical, very large and broad, long, bifurcated at apical part; ventral part of valva with 2 thick, sclerotized sutures from base of valva, anastomosing in apical 1/3, ventral surface of valva without setae. Vinculum rather small, caudal portion protruding into a narrow, slender saccus. Transtilla incomplete. Aedoeagus longer than valva, consisting of two distinct morphological parts: (1) narrow tubular, (2) very large bulbous coecum. Anellus strongly developed, sometimes covered with long tufted setae, juxta developed.

Female genitalia. Unknown.

Biology. Unknown.

Distribution. Moths of the Afrotropical *Hyloconis* occur in the primary rain forests with Fabaceae understore vegetation in Central Africa.

Relationships to other genera. The *Hyloconis* species sampled here suggest that the genus may be paraphyletic with respect to *Neolithocolletis* (Fig. 4). While *Hyloconis* and *Neolithocolletis* may be synonyms, at this stage we do not formally propose any taxonomic changes and retain both genera until the preimaginal stages of *Hyloconis* are discovered and additional species are sampled.

Species examined. ***Hyloconis puerariae* Kumata, 1963**

Paratype ♂, [1] (round label ringed with yellow colour) ‘Para / type’; [2] (handwritten in black Indian ink) ‘Teine / (printed) Hokkaido (handwritten in black Indian ink) 5.ii. / (printed) T. Kumata, 1959’; [3] (printed on a yellow label) ‘Host (handwritten in black Indian ink) 388 / *Pueraria* / *lobata*’; [4] (printed on a pink label) ‘Paratype / (handwritten in black Indian ink) *Hyloconis* / *puerariae* / KUMATA, 1963’; [5] (printed) ‘Brit. Mus. / (handwritten in black Indian ink) ‘1964-657’, in BMNH: drawer Mi 10022.

Paratype ♀, [1] (round label ringed with yellow colour) ‘Para / type’; [2] (handwritten in black Indian ink) ‘Teine / (printed) Hokkaido (handwritten in black Indian ink) 20.i. / (printed) T. Kumata, 1959’; [3] (printed on a yellow label) ‘Host (handwritten in black Indian ink) 388 / *Pueraria* / *lobata*’; [4] (printed on a pink label) ‘Paratype / (handwrittenin black Indian ink) *Hyloconis* / *puerariae* / KUMATA, 1963’; [5] (printed) ‘Brit. Mus. / (handwritten in black Indian ink) ‘1964-658’, in BMNH: drawer Mi 10022.

***Hyloconis wisteriae* Kumata, 1963**

Paratype ♂, [1] (round label ringed with yellow colour) ‘Para / type’; [2] (handwritten in black Indian ink) ‘Ino / Koti-ken / Sikoku, 16-vi. / (printed) T. Kumata, 1957’; [3] (printed on a yellow label) ‘Host (handwritten in black Indian ink) 257 / *Wisteria* / *floribunda*’; [4] (printed on a pink label) ‘Paratype / (handwritten in black Indian ink) *Hyloconis* / *wisteriae* / KUMATA, 1963’; [5] (printed) ‘Brit. Mus. / (handwritten in black Indian ink) ‘1964-657’, in BMNH: drawer Mi 10022.

Paratype ♂, [1] (round label ringed with yellow colour) ‘Para / type’; [2] (handwritten in black Indian ink) ‘Ino / Koti-ken / Sikoku, 17-vi. / (printed) T. Kumata, 1957’; [3] (printed on a yellow label) ‘Host (handwritten in black Indian ink) 257 / *Wisteria* / *floribunda*’; [4] (printed on a pink label) ‘Paratype / (handwritten in black Indian ink) *Hyloconis* / *wisteriae* / KUMATA, 1963’; [5] (printed) ‘Brit. Mus. / (handwritten in black Indian ink) ‘1964-657’, in BMNH: drawer Mi 10022.

1. *Hyloconis luki* De Prins, new species

(Figs 11, 21, 142, 143, 356, 443, 447)

Diagnosis. This species can be confused with *Cameraria perodeaui* De Prins, n. sp., owing to their similar wing patterns. However, the genitalia of *H. luki* are unique among Afrotropical Lithocolletinae in that they possess a tegumen with 4 long apical setae, and strikingly large, broad, bifurcated valva that lacks setae. The aedoeagus, consisting of two morphologically different parts, is unique among all Afrotropical Lithocolletinae.

Holotype: ♂, [1] ‘Congo Dem. Rep. [**Democratic Republic of the Congo**] / Bas-Congo 320 m / Nat.[ure] Res.[erve] Luki-Mayumbe / 05°37’S 13°05’E / 23.v.2007 / leg. J. & W. De Prins’; [2] ‘Gen. prep. 3744♂ / De

Prins'; [3] 'MRAC/KMMA / 00452'; wing venation preparations [4] 'MRAC/KMMA / 00454'; [5] 'MRAC/KMMA / 00455'; specimen ID: [6] 'RMCA ENT 000004800'; [7] 'DNA leg voucher / AK-07-121', stored in the molecular collection at UM-SI; [8] 'Holotype ♂ / *Hyloconis* / *luki* / De Prins, 2012', in RMCA.

Description. *Adult* (Fig. 21). Forewing length: 1.55 mm.

Head: Anterior portion of vertex covered with appressed scales with strong silver shine; posterior region of vertex and occiput with tufted stiff ochreous piliform scales of medium length projecting latero-dorsally with intrusion of shorter scales of paler ochreous shading projecting mostly posteriorly; frons smooth, white, with silvery gloss. Maxillary palpus rudimentary. Labial palpus short, white, with slight beige shading on third palpomere, drooping, terminal palpomere with pointed apex, directed downwards. Haustellum of moderate length, pale beige. Antenna nearly as long as forewing, flagellum thicker than in *Phyllonorycter*, consisting of 32-34 flagellomeres, apex of each flagellomere slightly broader than base, flagellomere fuscous with narrow shiny pale ochreous base and apex dorsally, light grey ventrally; pedicel slightly thicker but shorter than following flagellomere, of same colouration as remaining flagellomeres; scape white anteriorly and dark fuscous posteriorly with 5-6 ochreous short pecten of similar length.

Thorax: Ochreous; tegulae dark ochreous, slightly darker shading than thorax. Forewing ground colour ochreous with following white markings: one fascia, 3 costal strigulae and 2 dorsal strigulae; basal streak absent, fascia at 1/4 of costal margin of forewing, and subbasally on dorsal margin of forewing, irregularly curving, twice as broad at dorsal margin than at costal margin, edged on both sides with an irregular row black scales; first costal strigula situated just apically beyond 1/2 of forewing, comma shaped, short, reaching 1/3 of width of forewing, oblique towards apex, edged with black scales basally; second costal strigula at 3/4 of forewing, short stripe shaped, smaller than first costal strigula, oblique towards base, distinctively edged basally with a row of black scales and suffused, irregularly edged by dark fuscous scales apically; third costal strigula at apex, elongate spot, ca. as large as second strigula and significantly smaller than first strigula, edged by a row of black scales basally, and irroration of dark fuscous long rod-shaped scales bordering third strigula apically; first dorsal strigula situated opposite first costal strigula, oblique towards apex, extended slightly further than midline of forewing, edged by a row of black scales basally and by an irregular band of curving 2–3 rows of fuscous scales apically, tips of first costal strigula and first dorsal strigula touch each other; second dorsal strigula situated opposite second costal strigula, broad triangular shaped, just reaching midline of forewing, with black scales along basal margin and fuscous scales apically, a gap of ochreous scales as broad as 1/2 of length of second dorsal strigula separating tips of second costal and second basal strigulae; black fringeline separated from part of forewing by a layer of long reactangular shaped light fuscous scales extending along apex and termen; fringe greyish beige, short along termen and long at dorsum. Hindwing grey, fringe slightly darker than hindwing, long, only slightly shorter towards apex of hindwing. Prothoracic femur and tibia fuscous dorsally, greyish ochreous ventrally, tarsomere I fuscous, tarsomere II light fuscous with pale greyish apex, tarsomere III pale greyish with fuscous apex, terminal tarsomeres pale fuscous; midfemur pale beige, midtibia pale beige with three elongate black spots of similar size situated at base, in middle of midtibia, and at apex, apical spurs appressed, short, white with narrow ringed fuscous base, tarsomere I pale beige with a row of elongate black scales arranged in a row, tarsomere II white, tarsomere III white at basal half and fuscous at apical half, tarsomere IV entirely fuscous, and tarsomere V brightly white; hind femur dark beige, hind tibia dark greyish beige with loosely appressed hairs; medial spurs and apical spurs of medium length, ca. 1/2 of tibial length, pale greyish beige with white sharp tips, tarsus white with three dark fuscous rings, tarsomere I white with fuscous apex, tarsomere II–III white with fuscous base and apex, tarsomere IV fuscous at basal half and white at apical half, tarsomere V snowy white.

Abdomen: Dark fuscous dorsally and metallic white ventrally, sternum VIII not visible in preparation.

Male genitalia (Figs 142, 143). Tegumen ca. 283 µm, with large "hole" in median section, flexible, subconical, not sclerotized, except narrow sclerotized arms confluent in subapex; tegumen inrolled between valvae; subapex of tegumen covered with short slender appressed setae, apex of tegumen with 4 stiff, long (41 µm) setae. Valvae symmetrical, very large, broad, long, bifurcate in apical region, ca. 295 µm from base to tip of bifurcation, bifurcation ca. 83 µm deep, ventral region of valva with 2 thickly sclerotized sutures ca. 185 µm long, from base of valva, slightly bent at basal area, diverging from each other at 1/2 of valval length and anostomosing to ventral valval surface at apical 1/3, ventral surface of valva without setae. Vinculum rather small, ca. 30 µm, crescent shaped, medially sclerotized with triangular caudal part with protruding narrow, slender saccus (caudal part of saccus broken in preparation). Transtilla incomplete. Aedoaegus very long, longer than valva, consisting of two

distinct regions: (1) a narrow tubular, slightly sinuous apical part ca. 256 µm long, tapering at vesica; (2) very large bulbous coecum, slighly less sclerotized than tubular part of aedoeagus, ca. 150 µm long. Anellus well developed, tubular, thickly sclerotized, ca. 135 µm long, covered laterally with long tufted setae, terminating caudally with very heavily sclerotized ring encircling narrow canal in which tubular section of aedoeagus moves; juxta well developed, shaped as two narrow thickly sclerotized plates facing each other.

Female genitalia. Unknown.

DNA sequences. Molecular data are available (Molecular sample code: Porp121, Genbank numbers: CAD [JN125082], ACC [JN125042], 265fin [JN124917], 3007fin [JN124964]; Table S1).

Etymology. The specific name is a noun in apposition refering to the river Luki, which crosses the Mayumbe Forest, the area where this new species occrus.

Habitat. Primary rainforest with an undergrowth of Fabaceae (Figs 443, 447).

Host plant(s). Unknown.

Flight period. The holotype was collected in late May.

Distribution (Fig. 356). Known only from the type locality in the South-West of the Democratic Republic of the Congo.

Neolithocolletis Kumata, 1963

Neolithocolletis Kumata 1963: 21–22. Type species: *Neolithocolletis hikomonticola* Kumata, 1963, by original designation and monotypy.

Historic account. Kumata (1963) proposed *Neolithocolletis* to accommodate one Japanese species, *N. hikomonticola* Kumata, 1963. Although the latter closely resembles *Phyllonorycter*, the presence of vein R_2 in the forewing and hairy processes on the sclerotized anellus suggested a new genus was necessary. In the original description of the type species, Kumata (1963: 21) indicated the presence of a setose uncus in *Neolithocolletis:* "Uncus very elongate, with four apical setae and some microspines on outer surface." In the following publication Kumata (1993) pointed to an additional character of this genus differentiating it from *Cameraria* and *Hyloconis*: the presence of the very wide transtilla. *Neolithocolletis* remained monobasic until Kumata (1993) added two additional species: a new species, *N. kangarensis* Kumata, 1993, and *N. pentadesma* (Meyrick, 1919), the latter of which he transferred from *Phyllonorycter.* In the same publication, Kumata described three features that distinguish *Neolithocolletis* from other lithocolletine genera: i) fasciate whitish markings of the forewing margined basally, ii) tegumen of male genitalia with four setae (note: Kumata did not mention an uncus in the additional description of *Neolithocolletis*), iii) corpus bursae with many microscopic spine-like signa, and iv) larval characters. Based on the larval characters Kumata (1993: 6) concluded "*Neolithocolletis* is very closely related to *Hyloconis.*" Our molecular data confirm his hypothesis (Fig. 4). Kumata (1995) discovered a female belonging to *Neolithocolletis* in the Philippines. Based on *N. hikomonticola,* Kuznetzov & Baryshnikova (2001) grouped *Neolithocolletis* with *Chrysaster*, *Hyloconis*. and *Phyllonorycter. Neolithocolletis hikomonticola* was found to be the host of a new Eulophidae (Hymenoptera) species (Kamijo 1990; Ikeda 1995), whereas *N. pentadesma* modeled the bionomic study (Sajap *et al.* 1996).

To date, three species of *Neolitholletis* are known from three biogeographical regions: Palaearctic, Oriental, and Afrotropical (Kumata 1993; Gerlach & Matyot 2006; Bai *et al.* 2009).

Diagnosis. We define *Neolithocolletis* as a species-group taxon of the subclade *Neolithocolletis nsengai*, n. sp. + *Neolithocolletis hikomonticola* (Fig. 4). The forewing pattern of *Neolithocolletis* differs from that of *Cameraria* (except *C. fasciata*, *C. hexalobina*, *C. loxozona* and *C. perodeaui*) and *Cremastobombycia* in that whitish fasciate markings are found on the base of the forewing in *Neolithocolletis*, except in *N. mayumbe*. The vertex is tufted as in *Cameraria*, *Cremastobombycia*, *Hyloconis*, *Phyllonorycter*, and *Porphyrosela*; *Chrysaster* and *Protholithocolletis* have a smooth vertex. Forewing venation is similar to that of *Hyloconis* and *Protolithocolletis*, having an R_2, but differs from *Neolithocolletis* and *Protolithocolletis*, lacking a forewing M_2. Hindwing venation is similar to that of *Cameraria*, *Chrysaster*, *Leucanthiza*, and *Phyllonorycter*, in that it has an unbranched, single M_1, thus differing the genus from *Hyloconis*, which possesses two hindwing median veins: M_1 and M_2. Male genitalia of *Neolithocolletis* are symmetrical (Kumata 1963: 21). The presence of two pairs of apical setae on the tegumen in the male genitalia is unique to *Neolithocolletis*. The presence of a complete transtilla distinguishes *Neolithocolletis* from *Hyloconis*

and *Cameraria*. The corpus bursae of *Neolithocolletis* bears many microscopic spine-like signulae, whereas other Lithocolletinae genera possesses other types of signa or lack a signum entirely.

Kumata (1993) described diagnostic characters of the larva based on the last instar of *N. pentadesma* (Meyrick, 1919): i) abdomen with a series of subtriangular or elliptical shields both on the dorsal and ventral surface; ii) thoracic legs reduced into a small protuberance with six minute cones on the top; iii) ventral prolegs well developed on third and fourth abdominal segments; and iv) crochets absent on third to fifth abdominal segments and in anal proleg on tenth segment. Chaetotaxy: i) seta XD2 absent on prothorax, ii) seta D2 posterodorsal to D1 on abdomen except on sixth and seventh segments; on those latter segments D2 is posterolateral to D1, far remote from it and thick; iii) D2 on mesothorax and metathorax thickened and set close to D1; iv) lateral group of setae represented by two on all body segments except on eight and nine, L1 longer than L2 in abdominal segments; v) subventral group of setae represented by a single seta SV1 on all abdominal segments and on ventral prolegs; vi) seta V1 absent on sixth to ninth abdominal segments; vii) proprioseptor absent on eighth and ninth abdominal segments; viii) MV3 absent on all abdominal segments. Kumata (1993) indicated that the Lithocolletinae genera could be best diagnosed based on preimaginal stages, especially referring to the last instar. He recognized the following characters as separating *Neolithocolletis* from other lithocolletine genera: i) *Neolithocolletis* can be distinguished from *Hyloconis* by the reduced thoracic legs; ii) in *Neolithocolletis* seta D2 posterodorsal to D1 on abdomen except on sixth and seventh segments, in *Cameraria* and *Chrysaster* the seta D2 is always posterolateral to D1 on all abdominal segments; iii) the ventral prolegs in *Neolithocolletis* have a single subventral seta and in *Cameraria* and *Chrysaster* they have two or three subventral setae; and iv) *Neolithocolletis* differs from *Phyllonorycter* by the presence of two lateral setae L1 and L3 on mesothorax and metathorax and L1 and L2 on prothorax and abdominal segments; in *Phyllonorycter* the lateral group is represented by only one seta L1 on the mesothorax, metathorax and all the abdominal segments. All *Neolithocolletis* species for which the biology is known feed on Fabaceae (Kumata 1993). Mines are irregularly blotch shaped, usually on the disc between two lateral veins of a leaf, mostly on the underside of the leaf, but ocassionally on the upper side as well, whitish, flat, small (less than 2 cm in longest diameter) at maturity, and multiple on the leaflet (up to 40 mines on a single leaflet, occupying the whole lower surface) (Kumata 1993). Pupation takes place inside the mine within a circular white cocoon that is usually siutated in the center of the mine (Kumata 1993).

The two species of *Neolithocolletis* for which we have molecular data, *N. hikomonticola* and *N. nsengai*, are grouped together (Fig. 4). Their sequence composition is different from all other taxa we have sampled, and the two species appear to be nested within *Hyloconis* (Fig. 4)

Diagnosis of Afrotropical *Neolithocolletis*. We assign three Afrotropical species to this genus: the oriental *N. pentadesma*, discovered in Seychelles (Gerlach & Matyot 2006), and two native Afrotropical species from central Africa, *N. mayumbe* De Prins, n. sp., and *N. nsengai* De Prins, n. sp. *Neolithocolletis mayumbe* is placed in *Neolithocolletis* due to: 1) the general similarity of male genitalia to those of *N. hikomonticola*, *N. kangarensis*, and *N. pentadesma*, and 2) because the apex of the tegumen bears two pairs of setae, a diagnostic character of *Neolithocolletis* (Kumata 1993). *Neolithocolletis nsengai* is placed in *Neolithocolletis* because of its identical wing venation to that of *N. hikomonticola*, *N. kangarensis*, and *N. pentadesma* (i.e., all possess R_2 in the forewing and lack M_2 in the hindwing). Here we broaden the definition of *Neolithocolletis* by adding the following morphological characters attained from *N. mayumbe* and *N. nsengai*: 1) forewing may have five apical veins (R_2 may be absent), but the tegumen in male genitalia bears two pairs of setae. Four setae on the apex of the tegumen are present in type species, *N. hikomonticola*, and in *N. kangarensis*, *N. pentadesma*, *and N. mayumbe*; 2) apex of tegumen in male genitalia may possess one pair of setae, but the forewing has six apical veins (R_2 is present). Six apical veins are present in the type species, *N. hikomonticola*, and in *N. kangarensis*, *N. pentadesma*, and *N. nsengai*; 3) the signa area of small spinules on the inner wall of corpus bursae in the female genitalia as in many other *Neolithocolletis* species can be replaced by a signa line on the caudal part of the corpus bursae, as in *N. nsengai*. In general, the Afrotropical *Neolithocolletis* are small moths, having a wing length of ca. 1.6–2.0 mm. The external characters of *N. mayumbe* and *N. nsengai* only remotely resemble representatives of the genus from Japan and Malaysia. Wing venation alone cannot serve as a diagnostic character for this genus, and genitalia dissections are necessary. Wing venation of *N. nsengai* is entirely consistent with Oriental and Palaearctic *Neolithocolletis* species.

Head: Vertex tufted; frons smooth, white. Maxillary palpus small, rudimentary. Labial palpus short, drooping, filiform, pointed; haustellum moderate in length. Antenna nearly as long as forewing, flagellum thicker than in

Phyllonorycter; pedicel shorter than remaining flagellomeres; scape thicker than flagellomeres, short, with pecten ca. half as long as diameter of compound eye. Vertex plate joined with frontoclypeus, vertex tufted with erected long golden or silver shiny piliform scales, occiput covered with slightly tufted, thick, piliform scales; frons smooth shiny white, consisting of slender pressed piliform scales at central region of frontoclypeus and thicker at lateral sides of frontoclypeus along margin of eye; eyes big, ocular index ca. 0.7, interocular index ca. 1.2. Proboscis developed, naked, ca. 2.0 length of labial palpus. Labial palpus moderate, porrect, filiform, drooping or straight, with ratio of palpomeres from base 1: 1: 1.5 (Fig. 5). Maxillary palpus small, rudimental, bi-segmented, apical maxillary palpomere almost globular.

Thorax: Forewing background colour is golden-ochreous, or ferruginous ochreous, background colour shiny golden, or golden ochreous with indistinct fasciate whitish markings, intermixing with the ground colour of forewing and dark beige scales or with very distinct blackish spottish markings; apex of forewing is broadly rounded. Descaled forewing, lanceolate, elongate, and narrowly or shortly pointed: maximum width/length ratio ca. 0.18–0.21. Venation is confined either to 9 veins (in *N. nsengai*), apical part, with 6 veins (R_2, R_3, R_4, R_5, M_1, Cu_1); R_2 originates at 5/7 of cell or to 8 veins (in *N. mayumbe*) with 5 veins (R_3, R_4, R_5, M_1, Cu_1); M_1 not stalked, the cell between R_4 and M_1 open, R_5 originates from apex of cell to costa, M_1 arises from apex of the cell to termen, Cu_1 separate, R indistinct at basal 1/3, CuP indistinct over entire length, 1A strong, separate. Hindwing lanceolate, ca. 3/4 as long as forewing, with 5 veins: Sc very short, Rs long, running to 3/5 of costa, M_1 single, basal 2/3 of M_1 indistinct, parallel to Rs, Cu_1 strong, simple; A_1 vestigial (Figs 12, 13). Retinaculum as a small fold on Sc. Frenulum in male comprised of a single stout bristle; frenula in female comprised of 2 tightly appressed bristles. Legs slender, mid-legs dark ringed, forelegs and hindlegs not ringed; hind tibia with short loosely appressed hairs along apical half, hind tarsus with short appressed hairs on apex of tarsomeres I and II; tarsus ca.1.2× longer than tibia.

Abdomen. Margins of abdominal opening narrowly sclerotized slightly broader towards S_2, the sclerotized margination of abdomen opening well connected on T2 and unconnected on S2; S2 apodemes rather long, ending beyond the opening, very slender, also at base, slender distally. Flap-like sternum VIII small, a little longer than vinculum, subpentagonial (in *N. pentadesma*), or gently semi-rounded (*N. nsengai*) or elongated, almost as long as tegumen, spatulate with strongly sclerotized subbasal lateral margins (in *N. mayumbe*) either with an angulate apex (*N. pentadesma*) or with gently rouded apex (*N. mayumbe, N. nsengai*).

Male genitalia. Tegumen long, subconical, with very narrow sclerotized arms, weakly sclerotized; apex of tegumen with two long, stiff setae (*N. nsengai*) or four (*N. pentadesma, N. mayumbe*). Valvae symmetrical, narrow, rod shaped (*N. mayumbe*) or slightly enlarged apically (*N. nsengai*), with short sutures or without sutures on ventral surface, with rouded apex bearing thick and short setae (*N. pentadesma*), slender sparse, short setae (*N. nsengai*) or a couple of barbs (*N. mayumbe*). Vinculum crescent-shaped, narrow (in *N. mayumbe, N. nsengai*), or slightly broader (in *N. pentadesma*) with long slender saccus. Transtilla complete with a pair of small laterocephalic lobes (in *N. pentadesma,*), or trapezium-shaped (*N. nsengai*), or narrow bow shaped without laterocephalic lobes (*N. mayumbe*). Aedoeagus is slender tubular, sinuate (in *N. pentadesma* and *N. nsengai*) or straight (in *N. mayumbe*). Anellus developed, tubular (*N. nsengai*) or volcano-shaped (*N. pentadesma, N. mayumbe*), juxta either developed in a complex sclerotized structure (*N. pentadesma*) or undeveloped (*N. mayumbe, N. nsengai*).

Female genitalia. Papillae anales slightly compressed laterally, not fused ventrally. Two pairs of apophyses present. Segment VIII rather short in length. Apophyses anteriores initiate at subanterior part of segment VIII. Segment VII separated from segment VIII, with either strongly sclerotized cephalic margin of segment VII (*N. pentadesma*) or with strongly sclerotized arc-shaped scar situated on the entire sternum VII (*N. nsengai*). Ostium bursae opens on sternum between segments VII and VIII. Ductus bursae moderate in length with weakly sclerotized antrum (*N. pentadesma*) or with slight membranization of inner canal (*N. nsengai*). Corpus bursae large pyriform, with many microscopic spine-like signa scattered on inner margin (*N. pentadesma*) or caudal part of corpus bursae is ringed by narrow sclerotized curled line (*N. nsengai*).

Biology. Irregular blotch mine on the abaxial side of the leaf, rarely adaxial, whitish, flat, and small (less than 2 cm at mature stage). Pupation takes place within a circular, white cocoon which is placed inside a round mine-chamber (Figs 418, 419).

Host plant(s). Larvae feed on leaves of Fabaceae.

Distribution. *Neolithocolletis mayumbe* and *N. nsengai* occur in the rain forest of Central Africa. *Neolithocolletis pentadesma* was introduced to Seychelles in 2002 (Gerlach & Matyot 2006: 23).

Species examined. *Neolithocolletis pentadesma* (Meyrick, 1919):

Holotype ♂ [without abdomen], [1] (round label ringed with red colour) 'Type / H.T.'; [2] (handwritten in black Indian ink)'Buitenzorg / JAVA / *Pterocarpus indicus* / Roepke ix.1918 / 1919-10'; [3] (handwritten in Black Indian ink) *Lithocolletis* / *pentadesma* / Meyr. / (printed) TYPE', in BMNH: drawer Mi 10020.

Paratypes 2♂, 1♀, [right forewing lacking], 1 specimen [only head and left forewing present] [1] (round label ringed with yellow colour) 'Co-type'; [2] (handwritten in black Indian ink) 'Buitenzorg / JAVA / *Pterocarpus indicus* / Roepke ix.1918 / 1919-10'; [3] (handwritten in black Indian ink) *Lithocolletis* / *pentadesma* / Meyr. / (printed) CO-TYPE', in BMNH: drawer Mi 10020.

Note: In De Prins & De Prins (2005: 214) 9 syntypes are mentioned. However, Meyrick labelled one specimen as "H.T." [in BMNH, drawer Mi 10020].

Key to the species of the Afrotropical *Neolithocolletis* based on external characters

1. Forewing without white markings (Fig. 23) . . . . . 03. *nsengai*
– Forewing with white markings 2
2. Ground colour of forewing golden with indistinct white fasciae, without a distinct margin (Fig. 22). . . . . 02. *mayumbe*
– Ground colour of forewing reddish ochreous brown with distinct white fasciae, with rather wide blackish irregular edging basally (Fig. 24). . . . . 04. *pentadesma*

Key to the species of the Afrotropical *Neolithocolletis* based on male genitalia

1. Valva ca. 4× long than broad with more or less rounded apex; aedoeagus sinuate, nearly rectangularly bent at apical fifth; sternum VIII small, a little longer than vinculum. 2
– Valva elongate, slender, narrow, more than 6× long than broad, both margins running almost parallel to each other, slightly puffed caudally, with two large barbs at cucullus; aedoeagus straight; sternum VIII spatulate, long, significantly longer than vinculum (Figs 144–146) . . . . . 02. *mayumbe*
2. Costal margin of valva shallowly concave in apical third, apex round with a blunt angle at costal side; sternum VIII small subpentagonal (Fig. 149) . . . . . 04. *pentadesma*
– Valva elongate, rather broad, with dilating cucullus, costal and ventral margins of valva gently distancing from each other and united in rounded apex; sternum VIII very small, semi-rounded, slightly longer than broad (Fig. 147) . . . . . 03. *nsengai*

Key to the species of the Afrotropical *Neolithocolletis* based on female genitalia*

1. Segment VII strongly sclerotized on cephalic margin; sterigmatic sclerotizations on sternum VII absent; corpus bursae sparsely covered with acute spinules on inner surface except at caudal and cephalic ends (Figs 293, 294) . . . . . 04. *pentadesma*
– Segment VII not sclerotized on cephalic margin, arc-shaped strongly sclerotized seam extends along entire sternum VII, acute spinules on inner surface of corpus bursae absent, caudal part of corpus bursae ringed with narrow sclerotized curled line (Fig. 292) . . . . . 03. *nsengai*

* female genitalia of *N. mayumbe* unknown.

2. *Neolithocolletis mayumbe* De Prins, new species

(Figs 12, 22, 144–146, 357, 443, 447)

Diagnosis. *Neolithocolletis mayumbe* can be separated from all other Afrotrotropical Lithocolletinae by the shiny golden ground colour of the forewing and the presence of indistinct whitish fasciae. The male genitalia of *N. mayumbe* has a tegumen with two pairs of apical setae and narrow bar-shaped valva with two barbs at the cucullus.

Holotype: ♂, [1] 'Congo Dem. Rep. [**Democratic Republic of the Congo**] / Bas-Congo 320 m / Nat.[ure] Res.[erve] Luki-Mayumbe / 05°27'S 13°05'E / 22.iii.2006 / leg. J. & W. De Prins'; [2] 'Gen. Prep. 3704♂ / De Prins'; [3] 'MRAC/KMMA / 00407'; wing venation preparation [4] 'MRAC/KMMA 00535'; specimen ID: [5]

'RMCA ENT 000003293'; [6] 'DNA voucher / CLV16007', in INRA; [7] 'Holotype ♂ / *Neolithocolletis* / *mayumbe* / De Prins, 2012', in RMCA.

Description. *Adult* (Fig. 22). Forewing length: 2.1 mm (holotype).

Head: Vertex tufted with golden shiny piliform scales directed dorso-anteriorly, with faint intermixture of chestnut tipped piliform scales, occiput with short, almost white piliform scales directed dorso-posteriorly; frons smooth shiny white. Labial palpus slightly longer than eye, dirty white with a couple of dark ochreous scales on external lateral side of palpomere, drooping, directed ventrally, terminal palpomere with blunt apex, maxillary palpus small silver shiny, directed anteriorly; haustellum pale beige. Antenna nearly as long as forewing, not ringed, consisting of 39–40 flagellomeres, shiny golden to 2/3, flagellomeres with dark ochreous tipped scales apically at distal 1/3, followed by silvery shiny sector of flagellomeres, subterminal flagellomeres ringed by elongate, stout, dark brown scales (visible at 50×) followed by pale beige apex of antenna; scape only slightly thicker than flagellomere, short, white with a few dark brown scales dorsally, bearing 10–12 thick dirty white pecten half as long as diameter of compound eye, pedicel as rest of basal flagellomeres.

Thorax: Shiny white with slight golden shading on anterior and lateral margins, tegulae shiny golden. Forewing elongate, ground colour shiny golden, with indistinct fasciate whitish markings, intermixing with ground colour of forewing and dark beige scales; small dark brown round patch present on apex; fringe shiny golden, short from apex to tornus, and dirty white, long with some fuscous tipped scales at tornus. Hindwing silvery shiny greyish white; fringe very long, shiny, concolourous with ground colour of hindwing. Fore femur fuscous ochreous dorsally and dirty white ventrally with dark brown stout scales at apex; foretibia is fuscous ochreous irrorated with dark brown round appressed scales dorsally and elongate, stout, dark brown scales laterally; tarsomere I pale ochreous with dark ochreous apex, tarsomere II dirty white with fuscous apex, tarsomere III fuscous, tarsomere IV shiny white with fuscous at base, tarsomere V shiny white; midfemur white, midtibia dirty beige and tarsus uniformly pale ochreous beige with dark brown scales on apex of terminal tarsomere; hind femur and hind tibia dirty white, tibial spurs shiny white, tarsomeres I and II dirty white with pale ochreous apex, tarsomere III ochreous fuscous with white apex, terminal tarsomeres shiny white.

Abdomen: Ochreous dorsally, terga I–III light beige, shiny white ventrally with yellowish shade in genital segments. Sternum VIII rather long, 397 µm, spatulate, lateral margins strongly sclerotized, roughly edged, caudal part gently rounded.

Male genitalia (Figs 144–146). Tegumen moderately long (ca. 455 µm), slightly shorter than valva, tegumenal arms narrow, sclerotized, subapically abuting, apical part subconical, spinulosae with three slender apical setae 54–65 µm long (visible at enlargement 100×) [fourth seta not perceptible in preparation due to its slight latero-dorsal position on apex of tegumen]. Valvae symmetrical, valva elongate, slender, narrow, ca. 480 µm long, nearly parallel-sided, slightly inflated caudally, with two large barbs at cucullus: one at apex, other at ventral subapical margin of valva; apical half of valval ventral surface densely covered with long setae; valva sparsely setose medially, setae free at basal one third. Vinculum well developed, U-shaped, strongly sclerotized, with long, slender saccus, almost two-thirds length of valva (352 µm); saccus pointed caudally. Transtilla moderately developed, complete. Aedoeagus ca. 600 µm long, longer than valva, with enlarged coecum, slender cylindrical towards vesica, vesica with dense scobination (visible at enlargement 200×). Anellus developed, conical.

Female genitalia. Unknown.

Etymology. The name refers to the type locality, Mayumbe Forest. It is a noun in apposition.

Habitat. West African primary forest (Figs 443, 447).

Host plant(s). Unknown.

Flight period. The specimen was collected in late March.

Distribution. (Fig. 357). Known only from the type locality in the Democratic Republic of the Congo.

3. *Neolithocolletis nsengai* De Prins, new species

(Figs 5, 13, 23, 147, 148, 292, 358, 418–420, 443, 447)

Diagnosis. The **b**lack scale patches of the forewing pattern are unique among Afrotropical Lithocolletinae. The male genitalia somewhat resemble those of *N. pentadesma*, but the dilating cucullus area with a rounded apex in *N.*

nsengai easily separates this new species from *N. pentadesma* in which the costal margin of valva is shallowly concave in the apical third of the valva. The caudal portion of the corpus bursae of *N. nsengai* is ringed and edged by a narrow, sclerotized, curled line that is unique among Afrotropical Lithocolletinae. Although *N. nsengai* differs from all other species of *Neolithocolletis* by possessing only two setae on the apex of tegumen instead of four in the male genitalia and a curved signa line on the corpus bursae instead of a sparsely spinulose signa surface on the inner wall of corpus bursae in female genitalia, we assign this species to *Neolithocolletis* on the basis of the similarity of the general configuration of the genitalia with the Oriental *Neolithocolletis* species.

Holotype: ♂, [1] 'Congo Dem. Rep. [**Democratic Republic of the Congo**] / Bas-Congo 320 m / Nat.[ure] Res.[erve] Luki-Mayumbe / 05°37'S 13°05'E / mine 16.v.2007 / leg. J. & W. De Prins'; [2] 'e. l. *Dalbergia* / *hostilis* Benth. / [FABACEAE] / 30.v.2007; [3] 'Gen. Prep. 3735♂ / De Prins; [4] 'MRAC/KMMA / 00428'; specimen ID: [5] 'RMCA ENT 000004783'; [6] 'Holotype ♂ / *Neolithocolletis* / *nsengai* / De Prins, 2012', in RMCA.

Paratypes: 5♂, 6♀ (including 4♂and 2♀ genitalia preparations).

Democratic Republic of the Congo: 4♂, 6♀, Bas-Congo, 320 m, Nat[ure]. Res[erve]. Luki-Mayumbe, 05°37'S 13°05'E; mine 16.v.2007, leg. J. & W. De Prins; e.l. *Dalbergia hostilis* Benth. (Fabaceae), from 29.v.2007 to 31.v.2007; specimen ID: RMCA ENT 000004784–000004791, 000004793, gen. prep. De Prins 3733♂, 3734♀, 3736♀, 3737♂, 3738♂ (MRAC/KMMA 00425, 00426, 00428–00431), wing venation prep. MRAC/KMMA 00427, head preparation MRAC/KMMA 00537, in RMCA, 1♀ in BMNH, DNA vouchers AK-07-126, AK-07-134, AK-07-135, in UM-SI. 1♂, same locality data, 05.iv.2006, leg. J. De Prins, in BMNH.

Description. *Adult* (Fig. 23). Forewing length: 1.69–2.01 mm.

Head: Vertex smooth, covered with silver broader scales, occiput covered with slightly tufted blackish fuscous, thick, piliform scales of median length, projecting posteriorly, a row of broad spade-like scales projecting anteriorly, appressed to occiput; frons smooth, shiny white, consisting of slender appressed piliform scales at central part of frontoclypeus and thicker at lateral sides of frontoclypeus along margin of eye. Maxillary palpus white, small. Labial palpus dirty white with slight beige shading, drooping, terminal palpomere with pointed apex, directed downwards. Haustellum short, bent, pale beige. Antenna as long as forewing, consisting of 33–34 flagellomeres, each flagellomere dark fuscous with narrow golden stripe at base dorsally, light grey ventrally; pedicel slightly larger than following flagellomere, entirely dark fuscous dorsally and shiny white ventrally; scape covered with slightly tufted dark ochreous fuscous tipped scales dorsally and shiny whitecon colourous with frons ventrally, with 6–8 fuscous pecten of similar length, ca. as long as scape.

Thorax: Golden ochreous with black anterior 1/4; tegulae entirely black. Forewing ground colour golden ochreous with black markings without margins: irregular, zigzag, oblique costal stripe not reaching dorsum at 1/3 of forewing extended to base along costa, irregular black fascia at 1/2 of forewing, broad at costal area to beyond midline and narrow at dorsal sector, apical 1/3 and termen area densly irrorated with broad elongate dark grey with rounded black tipped scales; clearly distinct black fringeline along termen, but not at tornus and apex; fringe grey, short along termen and long at dorsum. Hindwing pale grey with long and dense dark grey fringe gradually shortening towards apex. Fore femur and fore tibia dark fuscous, tarsomeres I–II dark fuscous with white apices, tarsomere III white with dark fuscous apical half, IV dark fuscous, terminal tarsomere white; mid-femur dirty white, mid-tibia with appressed scales, dirty white with 3 black oblique dentate edged strypes at basal, median and subapical sector of tibia, tibial spurs dirty white with black patch medially, tarsus dirty white with two black patches, tarsomere I dirty white with subapical black patch and a few separate dispersed black scales at subbase, tarsomere II dirty white with black apex, tarsomere III black, terminal tarsomeres pale creamy; hind femur shiny dirty white with a few grey scales at subbase and medially, hind tibia with appressed scales at basal 1/3 and loose hairs at apical 2/3, dirty white with pale grey patch as subbase, black stripe medially and dark grey with tufted long grey scales at apical half, medial spurs long, nearly as long as tibia, greyish fuscous with dirty white base and apex, apical spurs short, about 3× shorter than medial spurs, dirty white with blackish fuscous subapex; tarsus white with three blackish fuscous irregular dentate narrow rings, tarsomere I–III white with blackish fuscous apices, tarsomere III with blackish fucous subbapex, terminal tarsomeres entirely white.

Abdomen: Fuscous grey dorsally, shiny silvery white ventrally with slightly cream shading on genital segments. Sternum VIII of male very small, visible at 100×, ca. 100–108 µm semi-rounded, slightly longer then broad, covered with tiny sparse setulae.

Male genitalia (Figs 147, 148). Tegumen subconical, only lightly sclerotized, except basal part, ca. 290 µm in length, shortly bifurcate apically, with ventral apex slightly longer than dorsal, ventral part of apex stronger

melanized than dorsal, bearing a pair of slender apical setae ca. 45 µm long, tuba analis not protruding. Valvae symmetrical, elongate, longer than tegument, 340 µm long, rather broad, with dilating cucculus area, costal and ventral margins of valva gently diverging from each other, then united in rounded apex, a narrow sclerotized suture from 1/2 of base, extending obliquely to apex, joining costa of valva just beyond 1/2; a line of short slender setae along subapcial and apical margins of valva, small area of slightly longer setae at subbasal part of ventral margin of valva; ventral surface of valva rather weakly sclerotized, often forming small wrinkles in median area. Vinculum narrow, semi-circular, strongly sclerotized, with triangular caudal plate connecting vinculum and saccus, saccus as long as valva, ca. 330 µm, narrow, slender, with slightly bulbous caudal part. Transtilla complete, narrow throughout, angled, trapezoidal, without laterocephalic lobes. Aedoaegus about twice as long as valva, ca. 780 µm, twice sinuating, broader at median part, coecum unscleritized, vesica nearly rectangularly bent, hook-like with pointed apex. Anellus short, tubular, weakly sclerotized, without distinct juxta.

Female genitalia (Fig. 292). Papillae anales long, broadly crescent-shaped in lateral view, with a broad gap between papillae anales ventrally, with rather short stiff setae distributed only on outward margin. Bases of posterior apophyses elongate, broadened, long rectangular shaped. Posterior apophyses short, ca. 130 µm in length, slender, gently approaching each other with their caudal parts, sharp pointed, reaching posterior ⅓ of segment VII. Segment VIII short, as long as width of extended bases of anterior apophyses, rather well sclerotized as broad band on tergum VIII and half ring open at sternum VIII, bearing elongate triangular basal extensions of bases of anterior apophyses with blunt triangular separate lateral ends facing each other ventrally, only weakly united with segment VII dorsally. Anterior apophyses slightly longer than posterior apophyses, ca. 140 µm in length, basal parts broad, elongate, more weakly sclerotized, gently confluent to lateral parts of half ring of segment VIII; caudal parts very slender, weakly sinuate, slightly dilating from each other, strongly sclerotized, with sharply pointed apices reaching just posteriad of middle of segment VII. Segment VII moderate in size, rectangular, cephalic margin not sclerotized. Ostium bursae ca. 60 µm in diameter, round, inconspicuous, situated at posterior margin of sternum VII medially, antrum ill defined, without sclerotizations, sterigma strongly sclerotized arc extending along entire sternum VII, with pointed terminations at anterior margin and broadly rounded caudal part ending immediately before posterior margin of sternum VII. Ductus bursae tubular, weakly sclerotized, slightly longer than length of segment VII, ca. 325 µm; girth of ductus bursae as broad as ostium bursae at posterior half, slightly narrowing towards intersection with corpus bursae, anterior half of ductus bursae with slight membranization of inner canal. Corpus bursae more or less triangular bell shaped, ca. 315 µm in length and ca. 235 µm broad at caudal (broadest) part, caudal part ringed and edged with narrow sclerotized curled line. No other trace of signum present. Ductus spermathecae strongly sclerotized, rather broad in diameter, long, ca. as long as corpus bursae, with large 6–7 convolutions of irregular diameter, convolutions slightly more compact at basal part of ductus spermathecae, and smaller spiralling at anterior part; vesica elongate oval, bilobed, situated near subcaudal part of corpus bursae.

DNA sequences. Sequence data are available for CAD (JN125049) and 3007fin (JN124937) (Table S1).

Etymology. This species is named in honour of Laurent Nsenga, the general managing director of the Luki-Mayumbe nature reserve and WWF, who provided generous support during the field work conducted in this reserve and has contributed greatly to the knowledge of Lepidoptera biodiversity in West Africa in general.

Habitat. A small shadowy opening covered with low vegetation in a primary rain forest of Central West Africa on a bank of the small river Luki (tributary of the Congo River) (Fig. 443).

Host plant(s). Fabaceae: *Dalbergia hostilis* Benth. (Figs. 418–420).

Mine. An oblong whitish or pale beige blotch-mine (Fig. 419) occurring on base of leaflet just above or below central vein on the underside of the leaf, and completely occupying the basal half of a leaflet; at maturity the mine is detached partly or completely from the upper side of the leaflet and discoloured into pale beige by the consumption of leaf tissue from the underside of the leaflet. Pupation takes place within a circular white cocoon, which is situated inside the mine cavity at the distal end. We have observed only one mine on a leaflet. Mining period: 15–20 days.

Flight period. We have recorded adults from early April to late May.

Distribution. (Fig. 358). Known only from the type locality in the Bas-Congo province of the Democratic Republic of the Congo.

4. *Neolithocolletis pentadesma* (Meyrick, 1919)
(Figs 24, 149, 150, 295)

Lithocolletis pentadesma—Meyrick (1919: 230).
Neolithocolletis pentadesma—Kumata (1993: 8–10, Figs 3A–C, 5A, B, 33A, 35B, 43D; 1995: 109), Sajap *et al*. (1996: 153–163), De Prins & De Prins (2005: 214), Gerlach & Matyot (2006: 23), Bai *et al*. (2009: 502).

Diagnosis. *Neolithocolletis pentadesma* can be easily distinguished from other species in the genus by the shallowly concave subcostal part of the cucullus. The species differs in larval characters from the type species *N. hikomonticola* in the presence of the ventral prolegs on the third to fifth abdominal segments instead of two pairs of ventral prolegs, one on the third and one on the fourth segment (Kumata 1993).

Material examined. *Holotype* (abdomen lacking): [**Indonesia]:** [1] 'Type'; [2] 'Buitenzorg / Java / [e.l.] *Pterocarpus indicus* / [leg.] Roepke / ix.1918, 1919-10'; [3] '*Lithocolletis* / *pentadesma* / Meyr.[ick] / TYPE', in BMNH.

Paratypes: 2♂, 2♀, 1 specimen (only head and left forewing present): **[Indonesia]**: Java, Buitenzorg, [e.l.] *Pterocarpus indicus*, [leg.] Roepke, ix.1918, 1919-10, gen. prep. De Prins 3794♀, in BMNH.

Additional material: 1♀ e.l. *Pterocarpus indicus* leaf mines, Seychelles, Fregate island, 4.x.2002, leg. J. Gerlach, gen. prep. De Prins 3796♀, in CUMZ.

Redescription. *Adult* (Figs 24, 149, 150, 295). Forewing length: 1.7–2.3 mm (see Kumata 1993: 8–10).

Host plant(s). Fabaceae: *Pterocarpus indicus* Willd. (Meyrick 1919: 230; Kumata 1993: 10, 1995: 109), *P. javanicus* (Miq.) Kuntze (Robinson *et al.* 2001: 274).

Distribution. Oriental region: Indonesia (Java) (Meyrick 1919: 230), Malaysia (Sarawak, Selangor), Philippines (Luzon) (Kumata 1993: 10); Afrotropical region: Seychelles (Fregate, Mahé) (Gerlach & Matyot 2006: 23).

Note: The record of *Neolithocolletis pentadesma* from Hong Kong (De Prins & De Prins 2005: 214; Robinson *et al*. 2011) is an unsubstantiated record (Bai *et al*. 2009: 502).

Cameraria Chapman, 1902

Cameraria Chapman 1902: 141. Type species: *Lithocolletis guttifinitella* Clemens, 1859 by original designation.

Historic account. The genus *Cameraria* was proposed by the British author T. A. Chapman (1902) during a presentation at the Entomological Society of the City of London. However, as pointed out in his talk, Chapman did not study the species himself, but relied on Chambers' observations and named the genus after him (chamber = *camera* in Latin). The designation of the new genus was based solely on larval morphology: Chambers divided mining Gracillariidae larvae into two groups: 'cylindrical-larva group' (group I), and 'flat-larva group' (group II). Annette F. Braun (1908) still called 'flat' mining larvae *Lithocolletis*, but she assigned them to Group II following Chambers' observations. She added another character which diagnoses this *Lithocolletis* group II—the apically edged white markings of the forewing. The year after Braun's publication, Busck (1909) praised Braun's (1908) work and corrected the generic arrangement she had proposed. He pointed out that "these two [*Phyllonorycter* and *Cameraria*] branches developed parallel… there can clearly not have been any crossings between [them] ... neither could one have been developed from the other." Therefore, Busck (1909) suggested the recognition of the two groups or branches of mining moths as separate genera - *Phyllonorycter* and *Cameraria*. In the same year, Braun (1909) presented a detailed account on the morphological structures of the larval heads of both cylindrical and flattened forms, and assigned the latter group as *Cameraria.* Furthermore, Braun (1909) presented her own diagram illustrating the probable relationship of *Cameraria* and *Phyllonorycter.* The flat nature of the larva and the persistence of a sap-feeding habit throughout the entire feeding period in *Cameraria* remained a unique characteristic that was recognized by some North American microlepidopterists at the beginning of the 20th century, and the usage of *Cameraria* was firmly established in their publications (Braun 1909, 1914; Busck 1909; DeGryse 1916). Mosher (1916) recognized another unique feature of *Cameraria*—the absence of a distinct cremaster at the caudal end of the pupa. C. R. Ely (1918) revised the North American Gracillariidae on the basis of wing venation, pointing out that *Phyllonorycter* and *Cameraria* both possess 7 veins [remark: Ely excluded the

rudimentary CuP in his counting] and rough head. Following the above-mentioned lepidopterists, he defined *Cameraria* on the basis of the flat larva and mines -"always on the upper side of the leaf of the food plant." Despite the frequent publications on *Cameraria* in North American entomological ;literature at the beginning of the last century, the genus was not recognized as distinct by other lepidopterists of that time. For instance, Fletcher (1929) treated *Cameraria* as a synonym of *Lithocolletis*, and the debate continued until the 1960s. In 1961, two important publications appeared concerning Lithocolletinae genera: one by Vári (1961) and the other by Kumata (1961). Vári (1961: 206) followed Fletcher and treated *Cameraria* as a synonym of *Lithocolletis*. However, much later, he (Vári *et al*. 2002: 26) excluded *Cameraria* from the synonymy of *Phyllonorycter*. We highly value the note of Vári (1961: 207): "I do not attempt at the present stage to erect new genera for these species [presented by him as *Lithocolletis*] as the male genitalia cannot be arranged in corresponding groups." Kumata (1961) described the genus *Chrysaster* and in his differential diagnosis compared it with two separate genera: *Cameraria* and *Lithocolletis*. A robust treatment of East Palaearctic *Cameraria* followed a couple of years later (Kumata 1963). Until recently *Cameraria* was considered as a North American genus found in Asia as well. Papers on *Cameraria* biodiversity, ecology, biology and evolutional relationships were published by North American microlepidopterists (Hinckley 1971, 1972; Opler 1971, 1974; Opler & Davis 1981; Faeth 1990a,b, 1991a,b; Bultman & Faeth 1985, 1986a,b,c, 1987, 1988; Maier & Davis 1989 etc.). *Cameraria* was also recorded from the Russian Far East and Central Asia (Ermolaev 1979; Noreika & Puplesis 1992; Noreika 1994, 1997). In Europe, little work was conducted on *Cameraria* until Deschka & Dimić (1986) described *Cameraria ohridella* feeding on Horse-Chestnut (*Aesculus hippocastanum*) from Macedonia. This species quickly became a highly invasive pest in West and Central Europe. In response to the invasion of this species into Europe, a plethora of publications on *Cameraria ohridella* (no less than 25 papers per year) appeared in the European entomological literature during the period of 1990–2008. The name *Cameraria* was even taken over as a common word by the mass media, and *C. ohridella* became the most studied lepidopteran species ever (Lees *et al*. 2011). Despite the attention that was drawn to this species, the diagnostic characters of tropical *Cameraria* and the phylogenetic position of the genus within Lithocolletinae remained unclear. There were significant attempts made to review the ecology, host-use evolution, and biogeography of *Cameraria* species groups (Opler & Davis 1981), the morphology of adults and larval instars (Kumata 1961, 1963, 1993, 1995), and some general observations on morphological characters for taxonomic and diagnostic purposes (Davis 1987; Skuhravý 1998; De Prins *et al*. 2003; Johne *et al*. 2005), as well as some cytogenetical peculiarities (Puplesiene & Noreika 1993; De Prins *et al*. 2002). Furthermore, since *C. ohridella* is a devastating pest on *A. hippocastanum*, a very popular ornamental plant in parks and avenues in Europe, many studies focused on understanding the chemical communication (pheromones) of this species in order to control it (Szöcs & Toth 1998; Svatoš *et al*. 1999, 2001, 2009; Szöcs *et al*. 2000, 2006; Francke *et al*. 2002; Kindl *et al*. 2002; Mircheva & Subchev 2002, 2003; Kalinová *et al*. 2003; Raspotnig *et al*. 2003; Augustin *et al*. 2004). However, these specialized studies were not focused on other species in the genus. The authors of the present study made several unsuccessful attempts to attract Afrotropical *Cameraria* using sex attractants synthesized for *C. ohridella* (product number 008524, Biobest N.V. Belgium) and *Phyllonorycter* (De Prins *et al*. 2009), and concluded that Afrotropical *Cameraria* species are not attracted to *C. ohridella* lures, which are highly effective in Europe. This presumably indicates that *C. ohridella* and its Afrotropical congeners are distantly related. Molecular studies on *Cameraria* mainly aimed to demonstrate the invasive aspect of *C. ohridella* (Perny 1997; Kovács *et al*. 2000; Lakatos *et al*. 2003; Hernandez-Lopez *et al*. 2009; Péré *et al*. 2010) and to clarify the origin of this species (Valade *et al*. 2009).

Cameraria is distributed worldwide, but has thus far been presumed to be localized to temperate regions: the greatest species richness of *Cameraria* is found in the Nearctic region (53 species), then followed by the Oriental (12 species) and Palaearctic (7 species) regions. *Cameraria* is not recorded from the Neotropical and Australian regions. It was not known from the Afrotropical region either until the assumption (van Nieukerken & De Prins 2007) that an Annonaceae-feeding species in southern Africa "in fact also belongs to *Cameraria*", thus constituting the first record of this genus for the Afrotropical region. Here we present eight Afrotropical species accommodated into the genus *Cameraria*, confirming the presence of this genus in the Afrotropics.

Diagnosis. *Cameraria* is morphologically very similar to *Phyllonorycter* in adult external features, particularly in wing venation (except *C. fasciata*) and general external structure (Kumata 1963). Vertex tufted like in most Lithocolletinae species but different from *Chrysaster*, *Protolithocolletis*, and *Leucanthiza* where vertex is smooth. The rough appearance of vertex is due to the neck plumes which are long and project forwards

above the vertex between antennae (Vári 1961). *Cameraria* differs from *Phyllonorycter* by the usually apically black margined white markings of forewing (except *C. fasciata*), a character shared with *Cremastobombycia*. Wing venation is identical to *Phyllonorycter* in having 5 apical veins in forewing. Hindwing venation is similar to *Phyllonorycter*, and *Chrysaster* in the absence of vein M_2. Sternum VIII in males forms a characteristic flap, often bifid caudally, laying under valvae like in many Lithocolletinae genera except *Chrysaster, Leucanthiza, Macrosaccus* and *Protolithocolletis*. The conspicuous adult characters separating *Cameraria* from many other closely related genera are found in the apical part of tegumen in male genitalia. It can be distinguished from *Phyllonorycter* by the presence of a pair of setae on the apex of tegumen, which are absent in *Phyllonorycter.* The apex of the tegumen in *Cameraria* may bear appendages. A pair of apical setae present in *Cameraria* is also present in *Chrysaster*, *Macrosaccus*, and *Porphyrosela* and may represent an apomorphy uniting these genera. However, many other morphological characters of adults including wing venation and male/female genital morphology inhibit making a confusion of *Cameraria* with these genera. *Cameraria* was described based on larval morphology (Chapman 1902), and the larval characters still remain the most significant diagnostic characters of this genus (Kumata 1993). *Cameraria* makes rather flat upperside mines in contrast with the tentiform mines of *Phyllonorycter.* Larvae of *Cameraria* are hypermethamorphic, where the body form remains flattened throughout most of larval life, only to become cylindrical in the final instar (Chapman 1902; Braun 1914; Opler & Davis 1981). On the contrary, larvae of *Phyllonorycter* are flat for only the first three sap feeding instars, and the following tissue feeding instars are cylindrical. Abdomen of the last instar of *Cameraria* have a series of sclerotized shields both on dorsal and ventral surfaces, prominently different from *Phyllonorycter.* In body chaetotaxy, the lateral group is bisetose on body segments (except on the segments IX and X) and the subventral group bisetose (SV1 and SV2) on ventral prolegs. Thoracic legs in *Cameraria* reduced to ventral protuberances (except in *C. hikosanensis*), but in tropical *Cameraria* they are well-developed (Kumata 1993). According to Kumata (1993) there are other slight morphological differences separating tropical *Cameraria* species from Holarctic congeners, such as the three subventral setae on the ventral prolegs (except in *C. bauhiniae*), and the complete transtilla in male genitalia (in *virgulata* species group). Pupa without cremaster in *Cameraria* but with cremaster in *Phyllonorycter.* Pupation occurs under a flat circular cocoon within the mine, the character also differentiating *Cameraria* from the other genera of Lithocolletinae. Exuvium protrudes from mine as in *Phyllonorycter.* The vast majority of *Cameraria* species are restricted to a single host (Opler & Davis 1981; De Prins & De Prins 2012). *Cameraria* and other Lithocolletinae mostly utilize the same host plant families, except Annonaceae, Hippocastanaceae and Lauraceae. No other lithocolletine genera except *Cameraria*, are recorded feeding on these latter plant families (De Prins & De Prins 2012). *Cameraria* also differs from *Phyllonorycter* in COI sequence data. These two groups are separated by at least 10% sequence divergence for the taxa that were sampled in this study (Fig. 3).

Diagnosis of Afrotropical *Cameraria*. Afrotropical *Cameraria* are generally small moths, having a wing length of 1.7–2.9 mm. In the Afrotropical region there are eight *Cameraria* species in five species groups: 1) *hexalobina* species group; 2) *landryi* species group; 3) *sokoke* group; 4) *perodeaui* group, and 5) *torridella* species group. The species within the *sokoke* and *landryi* groups are differ greatly in their genital morphology, but are nearly indistinguishable in their external habitus. We tentatively place these two species into two informal species groups for convenience in their taxonomic treatment until additional data can clarify their phylogenetic relationships. Some Afrotropical *Cameraria* species such as *C. hexalobina* (Vári, 1961) are highly distinctive externally due to the absence of white markings on forewings, or there might be just traces of them.

Head: Vertex plate jointed with frontoclypeus, head tufted with erect long piliform scales, whitish or light ochreous; frons covered with appressed smooth scales, shiny white or golden; eyes large, ocular index ca. 0.6–0.8, interocular index ca. 1.2–1.4 Antenna from ca. as long as forewing to ca. 20% shorter, smooth scaled, filiform; scape short thickened, bearing pecten of different length. Proboscis developed, naked, of medium length, ca. 2.0–2.5× length of labial palpus. Maxillary palpus small, rudimental, bi-segmented, apical maxillary palpomere almost globular. Labial palpus moderate, porrect, filiform, drooping, straight, with ratio of segments from base 0.5–1.0:1:1.25–2.2 (Fig. 6).

Thorax: Forewing ground colour orange-ochreous or beige-ochreous or dark brown-ochreous with white and black or only black markings; white markings are edged apically; fringe long, particularly near tornus and dorsum, reaching width of wing in forewing and ca. 3× width of wing in hindwing. Descaled forewing lanceolate, slender, and pointed. Venation with 8 veins, apical part with 5 veins R_3, R_4, R_5, M_1, Cu_1; M_1 and Cu_1 separate, CuP indistinct

(fold) over entire length, 1A strong, separate. Hindwing lanceolate, maximum width/hind wing length is 0.13, venation reduced 4 veined: Sc very short terminating near base of costa, Rs very long, extedning almost to apex of hindwing, M_1 single branched, basal 2/3 of M_1 indistinct, parallel to Rs, distal part of M_1 extending along dorsal margin, Cu_1 strong, ending slightly before 1/2 of dorsum; A_1 vestigial (Figs 14, 15). Frenulum in male a single stout bristle, frenula in female 2 tightly appressed bristles. Legs slender, with darker rings; epiphysis on foreleg absent, mid-tibia bearing a pair of tibial spurs; hind tibia thickened, with long fine loose hairs, long medial and short apical spurs, hind tarsus smooth, slender, ca. 1.1–1.3× as long as tibia.

Abdomen. Margins of abdomen opening narrowly sclerotized slightly broader towards S2, the sclerotized margination of abdomen opening well connected on T2 and unconnected on S2; S2 apodemes of median length, ending just beyond the opening, slender, with barbed bases, slender distally, a pair of tiny spicules present on each abdominal sternum sublatero-anteriorly. Sternum VIII in adult males well developed, flap-like, extended, in many species bifurcate caudally.

Male genitalia. Tegumen rather long, with a pair of setae on conical apex. Valvae symmetrical, slender, long, narrow, weakly curved, gently attenuated, or enlarged at cucullus area, haired and /or covered with tubercles. Transtilla incomplete in majority of species, however complete in *C. varii* and *C. torridella*. Vinculum well developed, V- or W-shaped (in *C. varii*) with prominent saccus or with long vincular ventral appendage (*C. zaira*). Anellus well developed, strongly sclerotized, tubular (*C. hexalobina* and *C. landryi*) or weakly developed (*C. varii*), can carry well developed fultura superior (*C. zaira*). Aedoeagus relatively simple, with enlarged coecum, gradually tapering towards slender apex; cornuti present or absent, some exogenous folds, invaginations might be present as well.

Female genitalia. Papillae anales flat caudally, fused. Segment VIII short, weakly connected to segment VII. Posterior apophyses without enlarged bases, slender; anterior apophyses originating at middle of segment VIII, slender or absent (*C. varii*). Segment VIII in most Afrotropical *Cameraria* species well connected to segment VII except *C. perodeaui*, where segment VIII retains only week lateral connections with segment VII. Ostium bursae opens at the posterior margin of segment VII near the connection with segment VIII either at depth of trapeziform sclerotized posterior extention of segment VII, or at emargination of posterior margin of segment VII, except *C. torridella* (where ostium bursae opens in median part of segment VII) and the *perodeaui* group (where ostium bursae opens in subposterior part of segment VII). Ductus bursae long, with triangular sclerotized plate crossing ductus bursae at subproximal part, near antrum (except *C. torridella*, *C. landryi*, and *C. perodeaui*); antrum slightly wider and melanized or very broad sac-shaped (*C. varii*). Corpus bursae oval, conspicuous distinct from ductus bursae, elongate sac-shaped, or with slight dilation of ductus bursae (*C. perodeaui*), with one or two signa areas or without signum (*C. perodeaui*). One signum usually crossed by fine median ridge.

Biology. In most cases a large, oblong, or tentiform mine on upperside of leaf, with one fold; no loose frass; pupation in a disc, in a very flat, oval white cocoon which is constructed on lower surface of mine; pupa protrudes through upper epidermis before adult emerges (Vari 1961: 211–212). However, it might construct a tentiform underside mine (*torridella* group).

Distribution. Afrotropical *Cameraria* occur in primary rain forests and/or mixed forest/savannah biotopes.

Relationships to other genera. *Cameraria* appears ancestral to a clade that constitutes *Cremastobombycia* + *Phyllonorycter* (BP = 70%, PP = 1.0; Fig. 4). Although our taxon sampling of *Cameraria* was limited to five species, those taxa formed a weakly supported monophyletic group (BP = 64%; Fig. 4). The two African species sampled in this study are ancestral to those from Europe (*C. ohridella*) and North America (*C. gaultheriella, C. guttifinitella*). These three genera share a modified male eighth abdominal sternite, extending caudally to form a flap under the valvae; and forewing veins R3, R4, and R5 extending to the costa. The valvae of *Cameraria* are symmetrical, slender, long, narrow, usually haired, but the morphology of the valva is highly variable in *Cremastobombycia* and *Phyllonorycter.*

Species examined. *Cameraria betulivora* (Walsingham, 1891):

Holotype ♀, [1] (round label ringed with red colour) ‘Type ’; [2] (handwritten in black Indian ink)‘United States / *Betula* / ex 25.iii.1883 / Riley 32546’; [3] (printed) ‘Walsingham / Collection / 1910-427’; [4] (printed)‘B.M. ♀ / Genitalia Slide / (handwritten) 28721’; [5] (handwritten in black Indian ink) ‘LITHOCOLLETIS / BETULIVORA Wlsm. / Ins. Life 326-7, 329 / No.75 (1891) / TYPE ♀ descr.’; [6] (printed on a blue label) ‘Figured in / MOTHS OF AMERICA / NORTH OF MEXICO’, in BMNH: drawer Mi 10019.

***Cameraria eppelsheimii* (Frey & Boll, 1878)**

Holotype ♀, [1] (round label ringed with red colour) 'Type '; [2] (handwritten in black Indian ink on a yellow label)'*L. Breviuscula* / Fr. & Boll / Dallas'; [3] (handwritten in black Indian ink) 'Frey Coll. / (printed) 'Walsingham / Collection / 1910-427'; [4] (handwritten in black Indian ink)'Type'; [5] (handwritten in black Indian ink) 'eppelsheimii / F & B'; [6] (printed) 'TYPE', in BMNH: drawer Mi 10019.

Note: In De Prins & De Prins (2005: 141) type specimens were indicated as "Not stated". However, 1 specimen labelled "Type" was found in the BMNH, drawer Mi 10019.

***Cameraria lebertella* (Frey & Boll, 1878)** [synonym of *C. bethunella* (Chambers, 1871)]

Holotype ♀, [1] (round label ringed with red colour) 'Type'; [2] (handwritten in black Indian ink on a purple label) '*L. Lebertella* / Fr. & B / Dallas'; [3] (handwritten in black Indian ink) 'Frey coll. / (printed) Walsingham / Collection / 1910-427'; [4] (handwritten in black Indian ink) 'Type'; [5] (printed) 'Type', in BMNH: drawer Mi 10019.

Note: In De Prins & De Prins (2005: 138) no type specimens were mentioned. However, in the BMNH, 1 specimen was found labelled "Type", in BMNH: drawer Mi 10019.

***Cameraria guttifinitella* (Clemens, 1859)**

♂, [right forewing and hindwing missing], [1] (handwritten in black Indian ink)'UNITED STATES / sup. *Rhus toxicodendron* /viii-ix Clemens Coll / Mus. Am. Ent. Soc. / Philadelphia 1872 / 36059', [2] (printed) 'Walsingham / Collection. / 1910-427'; [3] (handwritten in black Indian ink) '*Lithocolletis* / *guttifinitella* ♂ / Clms / HOMO-TYPE Clms'; [4] (handwritten in black Indian ink) 'W. 22'; [5] (handwritten in black Indian ink) 'B.M. 22'; [6] (printed) 'B.M. ♂/ Genitalia slide No (handwritten in red Indian ink) 4419', in BMNH: drawer Mi 10019.

Note: HOMO-TYPE means: A taxonomic type for a specimen which has been compared with the holotype by another than the author of the species and determined by him to be conspecific with it (McGraw-Hill Science and Technology Dictionary 2011).

***Cameraria toxicodendri* (Frey & Boll, 1878)** [synonym of *C. guttifinitella* (Clemens, 1859)]

Lectotype ♂, designated here, [1] (round label ringed with red colour) 'Type'; [2] (handwritten in black Indian ink on a yellow label) '*L. Toxicodendri* / Fr. & Boll / Dallas'; [3] (handwritten in black Indian ink 'Dallas / TEXAS / Boll.';[4] (handwritten in black Indian ink) 'Frey coll. / (printed) Walsingham / Collection / 1910-427'; [5] (printed) 'Type', in BMNH: drawer Mi 10019.

Note: In De Prins & De Prins (2005: 142) 6 syntypes are mentioned. A specimen labelled "Type" was found in the BMNH: drawer Mi 10019.

***Cameraria obstrictella* (Clemens, 1859)**

♀, [1] (handwritten in black Indian ink)'UNITED STATES / inf. *Quercus tinctoria* / ix ex v Clemens Coll / Mus. Am. Ent. Soc. / Philadelphia 1872 / 36041', [2] (printed) 'Walsingham / Collection. / 1910-427'; [3] (handwritten in black Indian ink) '*Lithocolletis* / *obstrictella* ♀ / Clms / HOMO-TYPE Clms', in BMNH: drawer Mi 10019.

***Cameraria ohridella* Deschka & Dimić, 1986**

Paratypes 5♂, 3♀, [all labels printed] [1] 'Kicevo 620 m / Macedonia, YU / e. l. 1.2.—11.3.1986 / G. Deschka leg.'; [2] 'Mine in *Aesculus / hippocastanum* L. / Zucht Nr 1890 / Mine: 1.8.1985'; [3] (red label) '*Cameraria ohridella* / DESCHKA & DIMIC / PARATYPUS'; [4] 'Br. Mus.: 1990-126', in BMNH: drawer Mi 10019.

Key to the species groups of the Afrotropical *Cameraria* based on external characters

1. Forewing with blackish-fuscous markings only (Figs 25–27) . . . . . *hexalobina* group
– Forewing with white and black markings 2
2. Forewing with median fascia straight, slightly oblique or angulated, or interrupted and shaped as two strigulae opposite each other 3
– Forewing with median fascia narrow and sinuate 5
3. First fascia at 1/4 very narrow, curving, edged apically (Fig. 37). . . . . *torridella* group
– First fascia at 1/4 broader than white markings at 1/2 of forewing, straight, edged on both sides (Figs 33, 34) . *perodeaui* group
5. Forewing with distinct edging of fasciae, with black scales arranged in rows (Figs 35, 36) . . . . . *sokoke* group
– Forewing with indistinct edging of fasciae with mottled black scales following apically white fasciae, black scales not arranged in rows (Figs 28–32) . . . . . *landryi* group

Key to the species groups of the Afrotropical *Cameraria* based on male genitalia*

1. Tegumen with very small (visible at 150× enlargement), asymmetrically protruded tuba analis, transtilla H-shaped with long proximal appendages (Fig. 167) . . . . . *torridella* group
– Tegumen symmetrical, with tuba analis not protruded, transtilla narrow ring shaped or incomplete 2
2. Sternum VIII very deeply emarginated (Fig. 152) . . . . . *hexalobina* group
– Sternum VIII with attenuating or rounded caudal part 4
3. Tegumen with a pair of apical extended socii (or horn-like appendages), cucullus of valva gradually or abruptly dilated (Figs 162, 165) . . . . . *sokoke* group
– Tegumen without extended apical appendages, valva equally narrow along its entire length or slightly tapering apically (Figs 154, 157, 160) . . . . . *landryi* group

* Male of *C. perodeaui* is unknown.

Key to the species groups of the Afrotropical *Cameraria* based on female genitalia*

1. Ostium bursae opening in the middle of segment VII; ductus bursae anteriad antrum not crossed by a sclerotized plate, with distinct anastomosis to corpus bursae, corpus bursae globular, with oval signum area crossed by slender sclerotized ridge (Figs 303, 304) . . . . . *torridella* group
– Ostium bursae opening at (sub)posterior margin of segment VII 3
3. Corpus bursae without signum (Fig. 302) . . . . . *perodeaui* group
– Corpus bursae with signum 4
4. Two signa areas on corpus bursae; ostium bursae opening at level of the sclerotized posterior extention of segment VII (Fig. 297) . . . . . *hexalobina* group
– One signum area on corpus bursae; ostium bursae opening at depth of the sclerotized posterior emargination of segment VII (Figs 298–300) . . . . . *landryi* group

* females of *C. sokoke* and *C. zaira* unknown.

The *hexalobina* group

The *hexalobina* group includes only one species, *Cameraria hexalobina* (Vári, 1961), **n. comb**., here transferred from *Phyllonorycter.* The forewing markings are brownish fuscous, and white scales are either absent or form a very narrow line. The larvae of *C. hexalobina* feed on Annonaceae and construct a large, oval, opaque, tentiform mine on the upper (adaxial) surface of the leaf.

Male genitalia have long, curved, very slender valvae; a narrow vinculum with a moderate saccus; and very large, deeply emargination caudally at sternum VIII.

Female genitalia of the *hexalobina* group have an ostium bursae that opens at the depth of the sclerotized posterior extention of segment VII, and a corpus bursae that possesses two signa areas: i) larger, oval, membranous, cranulated, and ii) smaller, oval, sclerotized signa area crossed by a fine median ridge.

5. *Cameraria hexalobina* (Vári, 1961), n. comb.
(Figs 25–27, 151–153, 296, 297, 359)

Lithocolletis hexalobina—Vári (1961: 211–212; pl. 22, fig. 6; pl. 65, fig. 3; pl. 104, fig. 4).
Phyllonorycter hexabolina [incorrect subsequent spelling]—Vári & Kroon (1986: 41, 136, 157).
Phyllonorycter hexalobina—Kroon (1999: 37, 105), Dall'Asta *et al*. (2001: 34), Vári *et al*. (2002: 26), De Prins & De Prins (2005: 301).

Diagnosis. Only blackish fuscous markings present on forewings—a diagnostic feature that easily separates *C. hexalobina* from the other Afrotropical *Cameraria* species. However in some specimens the whitish very narrow fasciae can follow the blackish markings. Nevertheless, the wing pattern of *C. hexalobina* can superficially be confused with that of the *melanosparta* group of *Phyllonorycter*, *Cremastobombycia morogorene* and *C. kipepeo*. In the *melanosparta* species group the forewing possesses a first costal strigula at 1/3 of forewing, whereas the

forewing pattern of *C. hexalobina* is defined by fasciae. The specific differences in genitalia are the main diagnostic characters. The combination of genitalia characters as described below easily separates C. *hexalobina* from *C. morogorene*, *C. kipepeo* and the *melanosparta* species group. Male genitalia of *C. hexalobina* are characterized by long, narrow, setose valva, tubular juxta, and by large and deeply bidendate sternum VIII. In female genitalia, the ostium bursae of *C. hexalobina* opens at the joint of segments VII and VIII at depth of posterior extention of segment VII and corpus bursae possesses two signa areas—prominent diagnostic characters for this species.

Material examined. *Holotype*: ♂, [1] [**South Africa**] 'Punda Maria / 12.iv.1952 / L. Vári / Ac[quisition]. no: 474'; [2] '9'; [3] 'HT'; [4] 'G[enitalia] / 6927♂'; [5] '*Lithocolletis* / *hexalobina* Vári / ♂ HOLOTYPE No 6364', in TMSA.

Paratypes: 3♂ and 2♀ (including 1♂ and 1♀ genitalia preparations). **South Africa**: 1♀, Punda Maria, 10.iv.1952, L. Vári, Ac[quisition]. no. 474', G[enitalia]. 7137♀'; *Lithocolletis hexalobina* Vári ♀ ALLOTYPE No 6365, in TMSA. 1♂, Punda Maria, 10.iv.1952, leg. L. Vári, Ac[quisition]. no. 474, G[enitalia] 6928♂'; '*Lithocolletis hexalobina* Vári PARATYPE No 6366', in TMSA. 2♂, 1♀, Punda Maria, 15.iv.1952, 21.iv.1952, 22.iv.1952, leg. L. Vári Ac[quisition]. no. 474; *Lithocolletis hexalobina* Vári PARATYPE No 6367–6369, in TMSA.

Additional material: 1♀ (including 1♀ genitalia preparations) and 1 specimen.

Democratic Republic of the Congo: 1♀, Bas-Congo, Nat.[ure] Res.[erve] Luki-Mayumbe, 05°27'S 13°05°E, 05.iv.2006, leg. J. De Prins; gen. prep. De Prins 3707♀ (RMCA 00418); ID: RMCA ENT 000003295, in RMCA, DNA voucher CLV16207 in CCDB. **South Africa**: 1 specimen, Zuurberg Pass, 27.iii.1954, leg. L. Vári, Ac[quisition]. no. 1160, in TMSA.

Redescription. *Adult* (Figs 25–27). Forewing length: 2.9–3.1 mm.

Head: Vertex tufted with reddish-ochreous scales and with a suffusion of a few white scales posteriorly; frons smooth, shiny white. Labial palpus whitish dorsally, dark fuscous ventrally. Antenna slightly shorter than forewing, flagellum slightly ringed with broad fuscous bands dorsally and whitish ventrally; scape reddish ochreous dorsally and whitish ventrally with a few dark brown scales anteriorly; flagellomeres pale beige at basal 1/3 and fuscous at apical 2/3.

Thorax: Reddish ochreous; tegulae uniformly reddish-ochreous. Forewing ground colour reddish ochreous; blackish fuscous markings consist of two transverse fasciae, one costal strigula and marked blackish-fuscous area along termen; basal streak short, narrow stripe slightly oblique towards apex, not touching base of forewing; first fascia at 1/3, narrow, slightly oblique towards apex, interrupted in paratypes 6366 and 6368 or present only as a short costal strigula (paratypes 6365, 6367, and 6369), a narrow white irregular elongate line bordering first fascia basally (holotype) or at midline when first fascia absent (paratypes); second transverse fascia just beyond middle of forewing, twice broader at dorsal margin than at costal margin of forewing, oblique towards apex, with fine edging of white scales basally; first costal strigula at 3/4 patch as small whitish spot bordered apically by narrow curving path connected with second fascia, apical area along termen broadly covered with blackish fuscous scales forming an irregularly shaped band with hardly visible white edges basally; fringeline with blackish-tipped scales, more distinct from middle of termen to dorsum; fringe along dorsal margin pale beige. Hindwings pale ochreous greyish with long pale fringe slightly darker shaded than hindwing. Fore femur and fore tibia dark fuscous, foretibia dark fuscous with two white lateral patches one subbasally and other medially, tarsomere I white at basal half and apically, tarsomere II with white basal half and fuscous apical half, apical tarsomeres completely white; mid-femur white with dark fuscous irroration basally and at apical half, mid-tibia white with blackish fuscous base and two oblique blackish fuscous stripes at 1/3 and 2/3, tarsomere I white with two blackish fuscous patches subbasally and subapically, tarsomere II white with blackish fuscous apex, tarsomere III blackish fuscous at basal 2/3, apical 1/3 white, tarsomeres IV–V fuscous; hind femur white with two fuscous patches basally and subapically, hind tibia white to middle with a basal fuscous patch, apical half dark fuscous, tarsomere I white with a small blackish fuscous patches subbasally and subapically, tarsomere II fuscous with white apex, tarsomere III fuscous at basal 2/3, white apically, tarsomeres IV–V white.

Abdomen: Dark fuscous dorsally, white ventrally with a median fuscous line. Genital segment pale ochreous white. Sternum VIII of male very large, deeply bidentate caudally.

Male genitalia (Figs 151–153). Tegumen rather large, forming inverted elongate V with blunt apex, ca. 2/3 length of valva, sclerotized, especially laterally and basally, tuba analis not protruded. Valvae symmetrical, long, 1/3 longer than sternum VIII, banana-curved, slender, suddenly tapering apically towards gently blunted apex,

conspicuously dilated at base, densely setose with long, slender, hair-like setae. Vinculum strongly sclerotized, narrow; saccus slender, moderate ca. 1/3 length of valva, tapering apically; anellus sclerotized, tubular. Aedoeagus slightly shorter than valva, slender, vesica very weakly sclerotized, coecum enlarged, bulbous.

Female genitalia (Figs 296, 297). Papillae anales compressed posteriorly, covered with long slender setae, ca. 180 µm long, basal bar narrow, but strongly sclerotized. Posterior apophyses strongly sclerotized, short, ca. 220 µm long, slender, slightly broader at bases, apices sharply pointed, reaching bases of anterior apophyses. Segment VIII weakly sclerotized, connected dorsally and ventrally. Anterior apophyses almost as long as posterior apophyses, ca. 210 µm, a little bit broader at bases, slender, slightly bent with sharp apices. Ostium bursae located at posterior margin of segment VII, opens at depth of trapezoidal sclerotized posterior extention of segment VII, antrum moderate, tubular, with a strongly sclerotized plate at ca.160 µm from ostium bursae. Ductus bursae moderate, almost twice as long as segment VII, ca. 1.08 mm long, with smooth transition to corpus bursae, narrow, slender, slightly stronger sclerotized anteriorly. Corpus bursae moderate, oval, slightly enlarged anteriorly, with an oval, crenulated, membranous area and a smaller, oval, smooth-edged, strongly sclerotized signum, a fine narrow needle-like ridge, ca. 175 µm long, crossing entire signa area. Ductus seminalis short with associated large bulla seminalis. Bulla spermathecae small, oval, located at anterior sector of segment VI. Ductus spemathecae of moderate length consisting of 13 elongate convolutions, with convolutions slightly larger anteriorly.

DNA sequences. COI barcode data are available for *C. hexalobina* ([Molecular sample code Chex, Genbank number JX888170]; Table S1).

Variation. There is a small variation in width and coloration of the first fascia of forewing (hardly visible in paratype 6369). The width of first costal strigula can vary significantly: from comma-shape forming a bridge with second fascia to small dark patch along costa with separate few dark fuscous scales connecting first costal strigula to second fascia.

Remarks. The female specimen collected in the Democratic Republic of the Congo does show very slight differences in wing pattern and in female genitalia compared with the specimens of *C. hexalobina*, collected in South Africa. The specimen collected in DRC has narrow whitish fasciae following blackish markings on forewing and possess a slightly enlarged triangular funnel-shaped sterigma in female genitalia. The available series of specimens from two distant localities (in South Africa and DRC) does not allow us to evaluate whether the slight morphological deviation of the signum falls within the intraspecific variation of *C. hexalobina*. Since sequence data from the primary types of *C. hexalobina* are still to be studied we assign the female specimen collected in DRC to the species *C. hexalobina* until more data become available.

Habitat. Savannah vegetation with high standing dry grass.

Host plant(s). Annonaceae: *Hexalobus monopetalus* (A. Rich.) Engl. & Diels (=*H. glabrescens* Hutch & Dalziel.)—Vári 1961: 212, Kroon 1999: 37, Dall'Asta *et al*. 2001: 34, De Prins & De Prins 2005: 301, Robinson *et al*. 2011, manuscript notes of Vári: note No 0474 of 30/03/1952, note No 1160 of 22/03/1954.

Mine. A large, oval or oblong, opaque, tentiform, semi-transparent tentiform mine on the upperside of the leaf with one fold; no loose frass, but speared out in centre on lower surface of mine; pupation in very flat white cocoon which is made on lower surface of mine (Vári 1961: 211–212, De Prins & De Prins 2005: 301). The mining period is ca. 5–11 days (Vári's notes: note No 0474 of 30/03/1952, note No 1160 of 22/03/1954).

Flight period. We have recorded adults on wing from late March to late April.

Distribution. (Fig. 359). Democratic Republic of the Congo (**new record**) and two localities in South Africa (Vári 1961: 212).

The *landryi* group

The *landryi* consists of three species: *C. landryi* De Prins, n. sp., *C. varii* De Prins, n. sp., and *C. fara* De Prins, n. sp. Forewing ground colour of this group ochreous with white/black markings consisting of three transverse sinuoid fasciae, directed towards apex. The fasciae possess indistinct, intermingling margins with dense suffusion of blackish fuscous scales. Hostplants of the *landryi* group are unknown.

Male genitalia have very diverse characters that are characteristic to each species: very narrow straight valva in *C. varii* and broader, curved valva with an acuminate apex in *C. landryi*; complete transtilla in *C. varii* and incomplete in *C. landryi;* well developed, tubular anellus in *C. landryi*, whereas the anellus is not developed in *C.*

varii; clefted vinculum with short saccus in *C. landryi* and U-shaped vinculum with long (ca. as long as sternum VIII) saccus in *C. varii*.

The female genitalia similar to those in the *hexalobina* group, characterized by ostium bursae opening located at the posterior margin of segment VII. Anterior apophyses absent in *C. varii*, but present in *C. landryi* and *C. fara*. Corpus bursae bears one round or oval signum crossed by straight median ridge (*C. landryi, C. varii*) or signum is dentate (*C. fara*).

Key to the species of the *landryi* group based on external characters

1. Neck tuft white posteriorly with ochreous intermixture anteriorly, basal half of tarsomere III of hindleg white (Fig. 31). . . 08. *varii*
– Neck tuft pale yellowish ochreous with golden shine, basal half of tarsomere III of hindleg black 2
2. Frons golden yellowish, dirty white fascia distinct, 2nd fascia at 1/2 of forewing separated from costal patch situated at 3/4 of forewing (Figs 29, 30). . . . . 07. *landryi*
– Frons snowy white, dirty white fascia obsolete, 2nd fascia at 1/2 of forewing Y-shaped, connected with the costal patch situated at 3/4 of forewing (Fig. 28). . . . . .06. *fara*

Key to the species of the *landryi* group based on male genitalia*

1. Transtilla complete, valva narrow, straight, slightly enlarged at cucullus, covered with tubercules, aedoeagus with a semircular hook-like projection on vesica, tubular juxta not developed (Figs 157, 159–161). . . . . 08. *varii*
– Transtilla incomplete, valva narrow or attenuating or with enlarged cucullus, setose, saccus short, ca.1/3 of valval length or . . shorter, aedoeagus without projections on vesica, tubular juxta developed (Figs 154, 156) . . . . . 07. *landryi*

* male of *C. fara* is unknown.

Key to the species of the *landryi* group based on female genitalia

1. Antrum simple, without scobination, anterior margin of segment VII without ringed sclerotization (Fig. 299) . . . . . 07. *landryi*
– Antrum broad and long, tubular, or triangular funnel-shaped, anterior margin of segment VII ringed with sclerotized narrow ring 2
2. Anterior apophyses absent, antrum broad and long, tubular, longer than 1/2 of length of segment VII, anterior part of antrum covered with numerous sclerotized scobination, corpus bursae with is fine, narrow, straight signum (Figs 300, 301). . 08. *varii*
– Anterior apophyses present, antrum triangular funnel shaped, shorter than 1/2 of length of segment VII, equally covered with sclerotized scobination, sclerotized signum on corpus bursae with dentate signum (Fig. 298) . . . . . .06. *fara*

6. *Cameraria fara* De Prins, new species

(Figs 28, 123, 298, 360, 442)

Diagnosis. The forewing markings provide no features that separate this species from *Cameraria landryi* and *C. varii*. The hindlegs are more differentiated (Figs 123–125). Genital characters resemble those of *C. hexalobina*. However, *C. fara* can be separated from the latter by the broad funnel-shaped sterigma and the dentate signum on the corpus bursae.

Holotype: ♀, [1] '**Cameroon** / North Province / Faro riverside 289 m / 08°23'N 012°49'E / 27.xi.2003 / leg. J. De Prins'; [2] 'Gen. Prep. 3638♀ / De Prins'; [3] 'MRAC/KMMA / 00395'; specimen ID: [4] 'RMCA ENT 000003284'. [5] 'DNA voucher / CLV15107', in CCDB; [6] 'Holotype ♀ / *Cameraria* / *fara* / De Prins, 2012', in RMCA.

Description. *Adult* (Figs 28, 123). Forewing length: 2.4 mm (holotype).

Head: Tufted, neck plumes pale-ochreous, projecting forward; frons smooth, shining white. Maxillary palpus white, very small. Labial palpus white, drooping, palpomeres 2 and 3 with a few small ochreous scales laterally, terminal palpomere sharp caudally, directed downwards. Haustellum of median length, curved. Antenna light ochreous with blackish longitudinal scales situated on each flagellomere dorsally; flagellum pale ochreous

ventrally with basally annulated darker brownish obsolete rings; scape pale ochreous, mottled with darker brown with pale ochreous pecten of different length; pedicel pale beige.

Thorax: Shining ochreous; tegulae shining ochreous with slightly darker anterior sector. Forewing ground colour ochreous with dirty white/black markings consisting of three transverse fasciae, one costal patch and one dorsal strigula and marked blackish-fuscous at tornus; blackish dorsal strigula runs slightly oblique beyond midline of forewing, 1st narrow oblique dirty white/ blackish fascia at 1/4 of forewing, 2nd fascia at 1/2 of dorsum running towards apex, Y-shaped, angled subcostally, richly irrorated with blackish fuscous scales; 3rd fascia very narrow white, extending along termen, edged apically by blackish fuscous scales, reaching termen; termen area richly covered by dark fuscous scales, tornus irrorated with blackish scales; fringeline indistinct, dark fuscous, formed by fuscous tipped scales along tornus. Hindwings dirty white with golden shine along costal margin; fringe concolorous with hindwing. Fore-femur and fore-tibia brownish fuscous, epiphysis brownish, tarsomeres I–III white, annulated with dark brown apically, tarsomere IV brownish grey, tip of tarsus white; mid-femur pale ochreous, mid-tibia dirty white with elongate dark brown patches dorsally, tibial spurs white with dark fuscous spots subapically, tarsus with three blackish rings: subbasal narrow, median and broadly ringed subapical, tarsomere I white with fuscous median patch and fuscous apex, tarsomere II white with fuscous base, tarsomere III white with fuscous apex, tarsomere IV entirely fuscous, tarsomere V white with fuscous base; hind tibia brown ochreous, mottled with dark brown scales, medial and apical spurs white with brown subapices; tarsus white with a brownish spot subbasally and two blackish rings: narrow medially and broad subapically, tarsomere I white with blackish median spot and apex, tarsomere II white with blackish base and apex, tarsomere III blackish, tarsomeres IV white with blackish base, tarsomere V white.

Abdomen: Brownish dorsally, paler ventrally.

Male genitalia. Unknown.

Female genitalia (Fig. 298). Papillae anales compressed posteriorly, covered with long slender setae up to 80 µm, basal bar narrow, but well sclerotized. Posterior apophyses strongly sclerotized, short, ca. 200 µm long, slender, apices sharply pointed, reaching ca.1/3 beyond bases of anterior apophyses. Segment VIII well sclerotized, connected dorsally and ventrally. Anterior apophyses slightly shorter than posterior apophyses ca. 160 µm, slender, with sharp apices. Ostium bursae located at posterior margin of segment VII, opens at posterior margin of triangular-shaped sterigmatic sclerotization of segment VII, antrum moderate, tulip-like basally, tubular distally, with a sclerotized plate ca. 190 µm from ostium bursae. Ductus bursae moderate, almost 3× as long as segment VII, ca. 900 µm, gradually broadening anteriorly towards corpus bursae, with abrupt infusion to corpus bursae. Corpus bursae moderate, nearly round, ca. 280×315 µm, bears an oval sclerotized signum area crossed by a dentate signum.

Etymology. The specific name refers to the Faro River, the floodplain of which is the type locality. The specific name is composed from the river name + latinized ending –a in the agreement in gender with the generic name. It is to be treated as a compound noun in apposition. This combination of species-group name agrees with Art 31.2.1 of the ICZN.

Habitat. Riparian woodland with high standing grass (Fig. 442).

Host plant(s). Unknown.

Flight period. We have recorded adults on wing at the end of November.

Distribution. (Fig. 360). The species is known only from the type locality in Cameroon.

7. *Cameraria landryi* De Prins, new species

(Figs 6, 29, 30, 124, 154–156, 299, 361, 443, 447)

Diagnosis. The forewing markings do not exhibit distinctive characters separating this species from *Cameraria varii*, but *C. landryi* is clearly defined by a unique combination of genitalia characters. The male genitalia are easily diagnosed by a well developed tubular juxta, broad, tapering densely setose valva, clifted vinculum, and sternum VIII with two lateral shallow emarginations. Based on the female genitalia, *C. landryi* can be distinguished from the remaining Afrotropical *Cameraria* species by the location of ostium bursae in depth of shallow emargination of segment VII. Short and narrow antrum easily separates this species from *C. varii* and *C. fara*.

Holotype: ♂, [1] 'Congo Dem. Rep. [**Democratic Republic of the Congo**] / Bas Congo 320 m / Nat[ure]. Res[erve]. Luki-Mayumbe / 05°37'S 013°05'E / 23.v.2007 / leg. J. & W. De Prins'; [2] 'Gen. Prep. 3706♂ / De Prins'; [3] 'MRAC/KMMA / 00417'; specimen ID: [4] 'RMCA ENT 000004448'; [5] 'DNA leg voucher / AK-07-087', in UM-SI; [6] 'Holotype ♂ / *Cameraria* / *landryi* / De Prins, 2012', in RMCA.

Paratypes: 4♂ and 2♀ (including 2♂ and 1♀ genitalia preparations).

Democratic Republic of the Congo: 1♂, Bas Congo, 320 m, Nat[ure] Res[erve] Luki-Mayumbe, 05°37'S 013°05'E, 16.v.2007, leg. J. & W. De Prins, specimen IDs: RMCA ENT 000004450, in RMCA, 1♂, same locality data, 22.v.2007, in BMNH. 2♂, Bas-Congo, 250 m, Luki-Mayumbe Nat.[ure] Res.[erve], 5°27'S 13°5'E, 29.xi.2008, leg. J. & W. De Prins, gen. prep. De Prins 3755♂, 3756♂ (MRAC/KMMA 00488, 00489), descaled head prep. MRAC/KMMA 00529, specimen IDs: RMCA ENT 000005201–000005202, in RMCA. 2♀, Bas Congo, 320 m, Nat.[ure] Res.[erve] Luki-Mayumbe, 05°27'S 013°05'E, 22.iii.2007, leg. J. & W. De Prins, gen. prep. De Prins 3705♀ (MRAC/KMMA 00416), specimen ID: RMCA ENT 000003294, 000003296, in RMCA, DNA voucher CLV16107, CLV16307, in CCDB.

Description. *Adult* (Figs 29, 30, 124). Forewing length: 2.2–2.4 mm.

Head: Vertex slightly tufted projecting ventro-anteriorly with pale-ochreous shiny scales intermixed with darker ochreous; occiput with tufted pale ochreous scales without shine, with a suffusion of a few white scales; frons smooth, shiny white, lateral part consisting of very long white piliform scales reaching from base of antenna to palpus, with some rough scales on clypeus near palpus. Maxillary palpus white, very small. Labial palpus white, drooping, first palpomere with a few small shiny ochreous scales laterally, terminal palpore sharp caudally, directed downwards. Haustellum median, curved. Antenna as long as forewing, consisting of 39–40 flagellomeres, dorsally first basal flagellomere with dark brown elongate scales at apex forming a broad ring, each median flagellomere with dark fuscous apical 3/4 and light ochreous base, apical flagellomeres with 1–5 basal stout fuscous scales, last two terminal flagellomeres dirty white; ventrally flagellum pale ochreous; scape pale ochreous with 6–8 dirty white pecten of different length; pedicel pale beige.

Thorax: Shiny ochreous with overlapping shading of pale ochreous at median and posterior sectors; tegulae shiny ochreous with slightly darker anterior sector. Forewing ground colour ochreous with dirty white/black markings consisting of three transverse fasciae, one costal patch and one dorsal strigula and marked blackish-fuscous at tornus; short irregular dorsal strigula close to base edged apically by 1–2 rows of black scales running slightly oblique to midline of forewing, first narrow oblique dirty white fascia at 1/4 of forewing, broadly apically edged by black irregularly distributed scales, second fascia at 1/2 of dorsum running towards apex, angled subcostally, width of second fascia is twice broader at costa than at dorsum, irroration of blackish fuscous scales round tip of subcostal angle of second fascia, forming dark ochreous fuscous patch at midline of forewing, brightly white triangular costal patch at 3/4 of forewing, apically edged by narrow row of black scales followed by fuscous patch situated between first costal patch and third fascia; third fascia runs along termen with brightly white and broad costal part, dirty white narrow median part and almost indistinct dorsal part (hardly visible in three specimens), apically edged by irregularly distributed black scales which overlap by transition to fuscous scales numerously present at apical part of forewing, termen area richly covered by dark fuscous scales, tornus ochreous with golden shine; indistinct dark fuscous fringeline runs along termen, but not at tornus, no fuscous-tipped scales present at tornus. Hindwings dirty white with golden shine along costal margin; fringe darker than hindwing long grey from base to middle of hindwing and 1/3 shorter pale grey at apical half, apex of hindwing surrounded by short dirty white fringe with silver shine. Fore femur dark fuscous at basal 1/2 with transition to ochreous at subapex, pure ochreous apical part, fore tibia ochreous, irrorated with numerous tiny dark fuscous scales at basal ⅔ and dark fuscous at apical ⅓, tarsomeres I–IV dark fuscous, terminal tarsomere dirty white with dark fuscous base; mid-femur pale ochreous, mid-tibia dirty white ventrally dirty white dorsally with three blackish patches, small at base, median medially and large one subapically, tibial spurs dirty white with dark fuscous tips and a small dark fuscous median spots, tarsus with three blackish rings: subbasal narrow, median and subapical broadly ringed, tarsomere I white with fuscous median patch and fusous apex, tarsomere II dark fuscous with white apex, tarsomere III white with fuscous apex, tarsomeres IV entirely fuscous, tarsomere V white with blackish base and apex; hind femur shiny pale ochreous, hind tibia shiny pale ochreous at basal ⅓ and blackish fuscous at apical ⅔ with tufted fuscous tipped long piliform scales, medial spurs long pale ochreous with fuscous clouds medially, apical spurs shiny pale ochreous white with blackish subapex; tarsus white with two blackish small spots basally and two blackish rings: narrow medially and broad subapically, tarsomere I white with blackish median spot and

apex, tarsomere II white with blackish base and apex, tarsomere III blackish, tarsomeres IV white with blackish base, tarsomere V white with dark fuscous tip.

Abdomen: Dark fuscous dorsally, pale ochreous ventrally, genital segments whitish ochreous. Sternum VIII of male middle size broad, trapeziform, squamose, shallow emarginated lateral subbasally and with gently rounded apex bearing a few long setae.

Male genitalia (Figs. 154–156). Tegumen moderately sclerotized, elongate subconical, ca. 330 µm in lnegth, slightly shorter than valva, tegumenal arms narrow, strongly sclerotized to ⅔, and extending parallel at subapex, apex blunt, squamose with spinulose subpapical area, crossed by narrow suture at apex, with a pair of apical setae of ca. 90 µm long. Valvae symmetrical, slightly longer than tegumen, ca. 375 µm long, rather broad, sinuating, basal $^{1}/_{5}$ slightly enlarged, setae free, costal margin sinuates as broad parabol, ventral margin almost straight, cucullus bluntly narrowed, lateral surface except basal densely covered with tubercles bearing long (as long as width of valva) setae. Vinculum small narrow, cleft by juxta, composed of two short triangular parts facing each other medially, saccus short, as 90 µm long, cleft by juxta. Transtilla incomplete with bases of valval costae narrowly produced, but not connected with each other, anellus developed, tubular, strongly sclerotized with slender cylindrical basal part and broad terminal part. Aedoeagus rather long, slightly longer than valve, ca. 400 µm in length, with well dilated coecum part, sharply tapering apically with acute vesica; vesica with thick broad ridge invaginated into aedoeagus.

Female genitalia (Fig. 299). Papillae anales flat, very short, not protruding caudally, ringed by basal bar, with abundant long setation as long ca. 160 µm along thickly sclerotized caudal surface and tuberculosae basal bar. Posterior apophyses rather short, ca. 190 µm long, slightly widened at subcaudal part, parallel to each other, reaching beyond ostium bursae, slightly into segment VII. Segment VIII short, weakly united with segment VII, without sclerotized connection ventrally bearing rectangular basal extensions of bases of anterior apophyses. Anterior apophyses slightly longer than posterior, ca. 240 µm long, slender, sharply narrowing towards pointed apex, parallel to each other and slightly broadend at bases, weaker sclerotized than posterior apohyses, reaching subanterior part of segment VII. Segment VII relatively short, more or less rectangular, posterior margin of segment VII squamose, shallow emarginated. Ostium bursae opening at depth of shallow emargination located at posterior margin of segment VII, sterigma small, simple shaped, lamella antevaginalis narrow small wrinkled fold; antrum short, melanized tube-shaped crossed by a small cuticle fold (plate) at anterior part of antrum. Ductus bursae of medium length and girth, almost as long as segment VII, unsclerotized, enlarged distally smoothly transiting to corpus bursae. Corpus bursae elongate-oval, ductus bursae + corpus bursae ca. 1.0 mm in lnegth, with gently rounded caudal part, bearing one strongly sclertotized oval signum area crossed by strongly sclerotized needle-like signum ca. 60 µm long, second signum area round, light squamose ot caudal sector of corpus bursae without conspicuous sclerotized signum. Ductus spermathecae almost as long as ductus bursae, membranous with more or less compact 27-28 convolutions, vesica small, rounded.

DNA sequences. Sequence data are available for COI (Molecular sample codes and GenBank numbers: Came: CAD [JN125055], enolase [JN125137], ACC [JN125022]; COI: [JX888171], Cland1 [JX888172], Cland2 [JX888173] Table S1).

Etymology. This species is named in honour of Bernard Landry, Lepidoptera specialist at the Muséum d'histoire naturelle, Genève, for his kind supervision and valuable advice extended to the first author over many years.

Habitat. Central African primary rain forest (Figs 443, 447).

Host plant(s). Unknown.

Flight period. Adults have been collected from late March to late May.

Distribution. (Fig. 361). Known only from the type locality in the Democratic Republic of the Congo.

8. *Cameraria varii* De Prins, new species

(Figs 31, 32, 125, 157–161, 300, 301, 362)

Diagnosis. The forewing pattern of *C. varii* with interchanging three white/black oblique fasciae is a fairly common occurrence within *Cameraria*, it resembles that of *C. landryi*, *C. fara* and the oriental species *C. pongamiae* Kumata, 1993, *C. virgulata* Kumata, 1993, *C. magnisignata* Kumata, 1993, *C. borneensis* Kumata, 1993, and *C. milletiae* Kumata, 1993. Male genitalia also fall into the general pattern of Afrotropical and oriental

Cameraria, but the diagnostic characters such as narrow spiculose valva, vinculum with short round latero-proximal appendages, and aedoeagus bearing a hook on vesica easily separates *C. varii* from the other *Cameraria* species. Female genitalia retain only a pair of apophyses, and bear a highly specific and unique antrum as described below. The combination of those characters facilitates to easily distinguish this species from the other Afrotropical *Cameraria*.

Holotype: ♂, [**South Africa]:** [1] 'Pretoria / 30.x.1968 / L. Vári'; [2] 'Gen. Prep. 3698♂ / De Prins'; [3] 'MRAC/KMMA / 00400', specimen ID: [4] 'RMCA ENT 000004276'; [5] 'Holotype ♂ / *Cameraria* / *varii* / De Prins, 2012', in RMCA.

Paratypes: 1♂, 3♀, [**South Africa]:** Pretoria, 7.xi.1968, leg. L. Vári, gen. prep. De Prins 3699♀ (MRAC/KMMA 00401), 1♀ specimen ID: RMCA ENT 000004277, in RMCA; 1♂, 2♀ gen. prep. De Prins 3453♀, 3454♂, 3510♀, in TMSA.

Description. *Adult* (Figs 31, 32, 125). Forewing length: 2.5 mm (♂ holotype), 2.3 mm (♀ paratype).

Head: Vertex tufted with whitish scales with a light suffusion of a few dark brown and light ochreous scales (dark brown laterally and ochreous medially); several dirty white with dark brown-tipped piliform scales present antero-laterally between antennae, projecting anteriorly, and much shorter pure white piliform scales on occiput projecting posteriorly; a bunch of short light ochreous with golden shine and small dark brown tips piliform scales on occiput, behind eyes; frons smooth, shiny white with a slight yellow shading between antennas. Maxillary palpus small, porrect, white. Labial palpus white, ca. as long as diameter of compound eye, drooping, directed downwards, with a row of dark brown scales along all palpomeres on lateral exterior margin. Haustellum pale beige. Antenna slightly shorter than forewing (ca. 2.4 mm in holotype), flagellomeres mainly pale fuscous at apical 3/4 and light ochreous at basal 1/4, attaining a slightly ringed general view; ventrally flagellomeres pale ochreous; scape ground colour ochreous with 4–5 dark brown tipped scales infused randomly and white patches at apical anterior and apical posterior margins, scape white ventrally with 8–10 white pecten ca. half as long diameter of compound eye; pedicel white with blackish basal band dorsally.

Thorax: White anteriorly, light ochreous medially and posteriorly and white at posterior lateral sector; with three forked dark brown lines, consisting of one row of dark brown round scales, running radially from anterior margin; tegulae ochreous with dark brown tipped scales infused randomly and whitish pale ochreous lateral apical margins. Forewing ground colour ochreous; white and blackish brown markings gently interchanging as shorter/longer black/white fasciae/strigulae; first costal strigula close to base of forewing, small consisting of 15–20 blackish scales, having a shape of irregular patch; first dorsal strigula close to base of forewing, long, exceeding middle of forewing, narrow, curved irregularly as a slender line consisting of mixture of blackish and white round scales; first fascia interrupted at subcosta, shaped at costal margin as a white short rod edged on both sides by black scales, shaped as a broad white patch separated by a row of black scales in middle, and sharply curved, narrowed toward apex at midline of forewing, densely edged by conglomeration of black scales apically; second fascia white, narrow, gently curved at midline of forewing, at dorsal part to subcosta edged apically by broad and irregular long band irrorated with blackish brown scales, at subcosta edging band forks into two: one branch crossing white fascia and edging costal part of fascia basally, other branch extending towards apex and fusing with costal patch edging second costal strigula apically; second costal strigula at 3/4, a small semi-round white patch edged by one row of blackish scales basally and by elongate large blackish brown patch apically; third fascia is oblique, narrow white band, running across forewing from 3/4 at dorsal margin to subapex at costal margin, densely edged with several rows of blackish scales apically; dark brown tiped scales marking edge of termen and tornus; fringeline at tornus with blackish-tipped scales; fringe short whitish along tornus, long whitish with slight golen shine along dorsal margin. Hindwings whitish with silver shine, with long whitish pale grey fringe slightly darker shaded than hindwing. Fore femur light fuscous beige dorsally with dirty white subbasal and subapical patches ventrally, fore tibia beige fuscous with an irroration of dark brown scales and with dark brown subapex and white apex, tarsomere I dirty white at basal half and blackish brown at apical half; tarsomere II blackish brown at basal half and dirty white at apical half, tarsomere III dirty white with blackish brown apex, tarsomere IV dark fuscous, tarsomere V light fuscous; mid-femur dirty white with a few small dark brown fuscous patches, mid-tibia dirty white with three transverse dark brown bands encircling mid-tibia, basal band narrow, median and apical bands broad, tibial spurs white with dark brown subapices, tarsomere I white with dark brown median patch and apex, tarsomere II white with dark brown base and brown apex, tarsomere III dark brown, tarsomeres IV–V dirty white with light ochreous shade; hind femur dirty white

irrorated with a few dark brown scales, hind tibia white with brown basal patch irrorated with dark brown scales and large dark ochreous patch irrorated with dark brown tipped scales extending from middle of tibia to apex, tibial spurs white with dark brown median patches, hind tarsus white with a blackish small spot basally and three blackish rings of median width, tarsomere I white with small median and large apical dark brown patches, tarsomeres II–III white with dark brown apices, tarsomeres IV–V white.

Abdomen: Dark grey dorsally, except genital terga which are lighter and have silvery shine. Ground colour of sterna exept terminal ones are lighter of terga but sterna are densely irrorated with dark brow scales forming large median and subanterior patches. Posterior margin of sterna is without dark brown irroration. Sternum VIII of male middle size broad, trapezoid shaped.

Male genitalia (Figs 157–161). Tegumen very long, ca. 770 µm, as long as valva, narrow, with broad sclerotized arms having strongly sclerotized lateral margins which join transversally at basal 1/3 of tegumen forming a large cavity; from midden to apex tegumen is shaped as conus with slightly thicker lateral folds; second transversal junction at apical 1/3 of tegumen without forming a cavity but with two lateral small folds; apical 1/3 of tegumen is flexible, soft, forming several lateral folds, apex of tegumen setose bearing a sector of short stiff microtrichiae inserted in round deep tubercules (visible at 400× enlargement) and a pair of larger stiff short (could be broken in holotype) setae at latero-apical sector of tegumen (clearly visible at 100–200× enlargement). Valvae symmetrical, long, ca. 750 µm; narrow, almost straight, slightly narrowed medially with cucullus area gently enlarged and terminating with rounded apex; sharp, pointed, short, thick microspinules seldom distributed on apical and median surface to subbase mostly along ventral margin; narrow suture extending longitudinally along median surface of valva. Vinculum strongly sclerotized, rather broad, H-shaped, with two lateroapical broad and short appendages rounded distally, projecting cephalad; saccus strongly sclerotized long, ca. 400 µm, narrow to distal sector, caudally bulbous. Transtilla sclerotized, rather narrow, flexible, somewhat trapezoidal-rounded. Aedoeagus long, slightly shorter than valva, ca. 615 µm, broad at coecum, tapering towards vesica; vesica with two soft overlapping folds, longer 90 µm at basal part of vesica and shorter 55 µm towards apex; sharp, strongly sclerotized, semicircal hook on apex of vesica.

Female genitalia (Figs 300, 301). Papillae anales, compressed with a setose caudal end; basal part densely setose by disorderly distributed setae. Posterior apophyses long (ca. 330 µm), slender, straight, slightly tapering at apices, reaching anterior margin of segment VII, apices blunt. Anterior apophyses not perceptable. Segment VII more or less rectangular-shaped with strongly sclerotized ring encircling anterior margin. Ostium bursae located at posterior margin of segment VII, antrum broad and long, shaped as elongate sac, slightly shorter than length of segment VII, well sclerotized, especially anterior part of antrum which is densely covered with numerous tiny pectinate microspicules. Ductus bursae long, weakly sclerotized (abrupted in paratype preparation) narrow along most of length but enlarging anteriorly at junction with corpus bursae; crossed by sclerotized triangular plate near anterior margin of antrum. Corpus bursae nearly round, medium sized, ca. 220 × 175 µm, with a smooth rounded signum ca. 77 µm in diameter with more heavily sclerotized posterior margin. Bulla spermathecae oval, rather large, ca. 100 µm, located in segment VI, ductus spermathecae ca. 390 µm long formed of 43 coils of almost equal diameter, terminating in subanterior sector of segment VII; anterior part of ductus spermathecae broad uncoiled, as broad as half of diameter of bulla spermathecae.

Etymology. The specific name honours the late Dr. Lajos Vári, an outstanding lepidopterist and a prominent figure of African Gracillariidae at the Transvaal Museum, Pretoria who collected and kindly donated the type series to the first author indicating the novelty of this species.

Variation. A slight variation in intensity of blackish scales on the markings of forewing was observed in type series. Forewing along termen of female is slightly more irrorated with blackish scales than forwing along termen of male.

Habitat. Urban area of Pretoria city (South Africa).

Host plant(s). Unknown.

Flight period. Adults have been collected from late October to early November.

Distribution (Fig. 362). Currently known only from the type locality in South Africa.

The *perodeaui* group

The *perodeaui* group can superficially be confused with the species of the *lemarchandi* group and *Porphyrosela.* The wing pattern of the *perodeaui* group slightly resembles that of *C. fasciata* Kumata, 1993, known from West Malaysia. The first fasciate white marking at 1/4 of forewing is straight, edged on both sides, the second strigulate white marking at 1/2 of forewing edged on both sides. Wing venation corresponds to that of typical *Cameraria* with 5 apical veins in forewing, long Rs and single branched M_1 in hindwing. The distance between the vein R5 and the neghbouring costal vein R_4 is slightly larger in *C. perodeaui,* than in many other *Cameraria* species. The scarce available material does not allow us to determine whether it could be a slight variation in the position of vein R4 in this species group. The biology and male genitalia of this species group is unknown. In females, papillae anales are separated by a broad ventral gap, the ventral edges of basal bar are turned centrad. Apophyses posteriores short, situated close to each other, weakly sclerotized; anterior apophyses with broad bases in subposterior sector of segment VIII, long, ca. 2× longer than posterior apohyses, strongly sclerotized, dilating from each other. Ostium bursae in subposterior sector of segment VII, sterigma small, lamella antevaginalis crescent-shaped. Ductus bursae anterior to antrum without small sclerotized plate; corpus bursae without signum.

9. *Cameraria perodeaui* De Prins, new species

(Figs 14, 33, 34, 302, 363, 443, 447)

Diagnosis. The wing pattern of *C. perodeaui* superficially resembles that of *Pyllonorycter lemarchandi.* However, the female genitalia of the two species are very different: 1) narrow, sclerotized slender papillae anales with spirally turned sharp ventral ends separated by broad gap in *C. perodeaui* and broad well developed papillae anales in *P. lemarchandi*; 2) ductus bursae and corpus bursae not separated in *C. perodeaui* and clearly separated in *P. lemarchandi*; and 3) heavy sclerotized antrum well developed extending all along segment VII in *P. lemarchandi*, the sterigma represented by a small, narrow, crescent-shaped lamella antevaginalis in *C. perodeaui. Cameraria perodeaui* also differs in COI sequence ("DNA barcode").

Holotype: ♀, [1] 'Congo Dem. Rep. [**Democratic Republic of the Congo**]' [2] **'**Bas-Congo 320 m / Nat.[ure] Res.[erve] Luki-Mayumbe / 05°37'S 13°05'E / 16.v.2007 / leg. J. & W. De Prins; [3] 'Gen. Prep. 3743♀ / De Prins'; [4] 'MRAC/KMMA / 00451'; specimen ID: [5] 'RMCA ENT 000004799'; [6] 'DNA leg voucher / AK-07-063, in UM-SI'; [7] 'Holotype ♀ / *Cameraria* / *perodeaui* / De Prins, 2012', in RMCA.

Paratype: 1♀ (including 1♀ genitalia preparation). **Democratic Republic of the Congo**: 1♀, Bas-Congo, 320 m, Nat.[ure]. Res.[erve] Luki-Mayumbe, 05°37'S 13°05'E, 23.v.2007, leg. J. & W. De Prins, gen. prep. De Prins 3742♀ (MRAC/KMMA 00450), wing venation prep. MRAC/KMMA 00453, specimen ID: RMCA ENT 000004798, in RMCA, DNA voucher AK-07-136, in UM-SI.

Description. *Adult* (Figs 33, 34). Forewing length: 2.1–2.3 mm.

Head: Anterior part of vertex with suppressed white piliform scales with metallic shine, a bunch of erected pale-ochreous piliform scales on posterior part of vertex and occiput; basic colour of erected scales pale ochreous intermixed with slight suffusion of dark brown piliform scales, a few of them, mostly those situated at outer margin with shiny golden tips; longer tufted scales on posterior part of vertex project latero-dorsally, shorter tufted scales on occiput project posteriorly; frons smooth, white, with silver gloss. Maxillary palpus rudimentary. Labial palpus white without gloss with slight beige shading, drooping, terminal palpomere with sharply pointed apex, directed downwards. Haustellum of medium length, 2× curved, whitish pale beige. Antenna slightly shorter than forewing, consisting of 32–33 flagellomeres, each flagellomere dark fuscous with narrow shiny pale ochreous base and apex dorsally, light grey ventrally; pedicel slightly thicker and shorter than following flagellomere, concolourous with remaining flagellomeres; scape dark fuscous anteriorly and pale beige posteriorly with 6–8 white thick, long as diameter of compound eye, pecten of similar length.

Thorax: Fuscous; tegulae fuscous, concolourous with shading of thorax. Forewing ground colour brownish ochreous with white markings: one fascia, 3 costal strigulae and 2 dorsal strigulae; basal streak absent, fascia at 1/4 of forewing, almost straight, rather wide, edged on both sides with an irregular row black scales; first costal strigula just situated slightly beyond half of forewing, comma shaped, oblique towards apex, rather short, just

reaching a fourth of width of forewing, edged with black scales on both sides, in right forewing of paratype black edging of first strigula extends along costa; second costal strigula at 3/4, short stripe shaped, oblique towards base, edged on both sides by a row of black scales; a suffusion of fuscous scales between second and third costal strigulae on right forewing of paratype, absent on left forewing; third costal strigula at apex, rod-shpaed or rounded spot ca. twice as large as first two costal strigulae, edged by blackish scales on both sides; first dorsal strigula opposite first costal strigula, oblique towards apex, extending slightly longer than midline of forewing, edged on both sides, tips of first costal strigula and first dorsal strigula touching each other; in paratype, first costal strigula and first dorsal strigula joined with each other to form slightly angulated fascia; second dorsal strigula opposite second costal strigula, rod-shaped, not reaching midline of forewing, edged on both sides; black fringe line running along termen, also at tornus and apex; fringe greyish beige, short along termen, long at dorsum. Hindwings pale greyish; fringe slightly darker than hindwing, very long at middle and gradually shorter towards apex of hindwing. Fore femur and fore tibia fuscous dorsally, pale gray ventrally, tarsomeres pale fuscous with slight beige shading, terminal tarsomere beige ochreous; mid-femur and mid-tibia fuscous dorsally, pale grey ventrally, tibial spurs fuscous, tarsomeres I–II fuscous, tarsomeres III–IV fuscous with dirty white in basal half, terminal tarsomere dirty white; hind femur shiny dirty white with a few fuscous scales subbasally and medially, hind tibia shiny greyish ochreous with pale grey subbasally, intermixted with ochreous grey shiny scales; appressed scales at basal 1/3, appressed loose hairs at apical 2/3; medial spurs long, ca. 2/3 of tibial length, pale grey with metallic shine and dark fuscous median part, apical spurs short, hald as long as medial spurs, pale shiny grey with fuscous subapex, tarsus white with three blackish fuscous rings, tarsomere I white with blackish apical half, tarsomere II grey basally, white medially and fuscous apically, tarsomere III white with blackish fuscous base and grey apex, tarsomere III blackish fuscous subbapically, tarsomere IV entirely greyish fuscous, tarsomere V white with very narrow grey basal ring.

Variation of wing pattern: The suffusion of fuscous scales at the termen area can significantly vary in its intensity. Apex of left and right forewing of same specimen may be different, e.g., in one paratype; apex of right forewing has a large fuscous patch and terminal area of the left forewing lacks fuscous irroration.

Abdomen: Fuscous grey dorsally, pale grey with metallic shine ventrally.

Male genitalia. Unknown.

Female genitalia (Fig. 302). Papillae anales joined by strongly sclerotized basal bar, with narrow, getntly roundled, turned ends, contiguous dorsally, somewhat triangular with rounded tips, ventrally separated by rather wide gap; radially setose with long (140 µm) stiff setae intermixed with shorter, more slender (ca. 75 µm) setae; inner surface of papillae anales+basal bar covered with numerous rounded tubercles. Bases of posterior apophyses fused with basal bar, posterior apophyses short, ca. 180 µm in length, slender, slightly bent inwards, reaching posterior edge of segment VII with their sharply pointed apices. Segment VIII short, unsclerotized, weakly connected to segment VII only dorsally by narrow band, ventrally segment VIII with a broad irregularly shaped “hole”. Anterior apophyses with very broad, hooked, shoulder-like bases, anastomosed with posterior margin of segment VIII; anterior apophyses+broadly dilated bases of anterior apophyses ca. 260 µm long, caudal part of anterior apophyses ca. 170 µm; anterior apophyses slender, bent inwardly with sharp apices pointing outward, extending well into segment VII, ending just before middle. Segment VII medium sized, ca. 330 µm long, slightly enlarged towards anterior margin, middle area of ventral posterior margin with rounded emargination bordering sterigma anteriorly, tubular, more numerous laterally. Ostium bursae opening at middle of emargination of posterior margin of segment VII; lamella antevaginalis a thickly sclerotized crescent, encircling ostium bursae. Antrum short tubular melanized, articulated from two parts. Ductus bursae gradually widening to corpus bursae, without distinct separation. Ductus bursae plus corpus bursae ca. 820 µm long, weakly sclerotized; corpus bursae without signum. Ductus spermathecae narrow, sclerotized, ca. 145 µm long, gently and broadly coiled, of medium size, irregularly rounded, situated close to posterior margin of segment VI.

DNA sequences. Sequence data are available for CAD (JN125085) and 3007fin (JN124967; Table S1).

Etymology. The specific name honours Bruno Perodeau, the principal technical advisor and the director of the projects at the World Wildlife Foundation in the Democratic Republic of the Congo for his generous and heartwelcome support during the field work in the DRC, his intensive efforts to conserve nature in Africa and his sincere interest in insect biodiversity issues of this country.

Habitat. Primary rain forest (Figs 443, 447).

Host plant(s). Unknown.

Flight period. Adults have been collected in late May.

Distribution (Fig. 363). Known only from Luki-Mayumbe, the type locality in the West of the Democratic Republic of the Congo.

The *sokoke* group

The *sokoke* group consists of two species: *C. sokoke* De Prins, n. sp. and *C. zaira* De Prins, n. sp. The forewing ground colour of this group is ochreous with white/black markings consisting of three transverse, sinuoid, clearly defined fasciae, directed towards apex. The fasciae possess prominent margins. The specimens of *C. sokoke* and *C. zaira* do not show significant external morphological differences, the holotype of *C. zaira* is too worn to detect differences in the colour scaling of the legs or other minor external differences. The hostplants of the *sokoke* group of species are unknown.

The male genitalia show quite a few very diverse characters: two apical appendages on tegumen which can be long horn-like (*C. zaira*) or median-sized setose (*C. sokoke*); transtilla incomplete; long vincular process and developed fultura superior in *C. zaira;* and simple v-shaped vinculum in *C. sokoke*.
The female genitalia are unknown.

Key to the species of the *sokoke* group based on male genitalia

1. Tegumenal processes with rounded setose apices, valva bar-shaped, with slightly enlarged cuculli, anellus weakly developed, without fultura superior; saccus short, just a slight extension of caudal part of vinculum, blunt, aedoeagus cylindrical with rounded vesical part (Figs 162, 164). . . . . 10. *sokoke*
– Apex of tegumen with two long, naked, horn-like processes, valva straight with very broadly enlarged diamond-shaped cuculli, fultura superior on anellus with two sinuate thick sclerotized appendices terminating with slender, sharp-ended, flexible, downwards bent apices; saccus long, about half length of valva, slender, aedoeagus slightly shorter than valva, slender and narrow, coecum enlarged, balloon-shaped, vesica gently bent, with a small cluster of tiny subapical cornuti (Figs 165, 166) . . . . . 11. *zaira*

10. *Cameraria sokoke* De Prins, new species
(Figs 35, 162–164, 364, 437)

Diagnosis. The forewing pattern of *C. sokoke* can easily be confused with that of *C. zaira*, but the male genitalia are specific and highly diagnostic. *Cameraria sokoke* can be easily recognized from all other species of Afrotropical *Cameraria* by small setose processes on apex of tegumen. For further details differentiating *C. sokoke* from *C. zaira* see identification key and the description below. Apical appendices of tegumen are found, beside in Afrotropical *Cameraria* species, only in two oriental species: *C. trizosterata* (Kumata, 1993) and an undescribed *Cameraria* species found in Vietnam (van Nieukerken & De Prins 2007).

Holotype: ♂, [1] '**Kenya /** Arabuko Sokoke Forest / 12 km W Gede 70 m / 03°17'S 39°59'E / 30.iii.2004 / leg. J. De Prins'; [2] 'Gen. Prep. 3645♂ / De Prins'; [3] 'MRAC/KMMA / 00385'; specimen ID: [4] 'RMCA ENT 000003275'; [5] 'DNA voucher / CLV14207', in CCDB; [6] Holotype ♂ / *Cameraria* / *sokoke* / De Prins, 2012', in RMCA

Description. *Adult* (Fig. 35). Forewing length: 1.9 mm.

Head: Vertex tufted with ochreous piliform scales intermixed with white; frons smooth, shiny white covered with long narrow appressed white scales. Labial palpus slightly longer than eye, light beige with darker shading from outer lateral side, apically pointed, directed downwards. Maxillary palpus small, porrect, ochreous. Antenna as long as forewing, not ringed, each flagellomere clearly distinctive, narrower basally and wider apically, first two flagellomeres white, rest light ochreous beige, gradually darkened towards tip of antenna; ventral side of antenna lighter than dorsal; pedicel white; scape white ventro-anteriorly, ochreous brown dorso-posteriorly, pecten white, thick, as long as scape.

Thorax. Light ochreous with white shading at posterior part; tegulae brownish ochreous, unicolous. Forewing elongate, ground colour light ochreous with white markings consisting of basal streak and three parallel fasciae; basal streak initiates at basal corner of dorsal margin of forewing, oblique towards apex, edged apically with a

irregular row of black scales; first fascia at 1/4, slender, oblique, directed towards apex, running transverse, but not reaching costa, tapering to sharp point at costa, finely edged apically with one row of black scales extending to costa and beyond white marking of first fascia; second fascia at 1/2 parallel to first fascia basally, with a sharp curve directed towards apex at costal sector, reaching costa, edged apically with 2–3 rows of black scales; third fascia parallel to second fascia at 3/4, slightly curved at apical area and reaching costal margin of forewing, costal part of third fascia edged by irroration of numerous black scales, however, dark spot of black irroration of scales bordering costal sector of third fascia not reaching apex of forewing; no apical streak, but a very distinctive black fringe line along termen to tornus; fringe very short golden shiny along termen and long, dirty white with golden shine along dorsal margin of forewing. Hindwing pale greyish with silvery shine with long fringe of slightly darker shading without shine. Fore femur light fuscous,without shine, fore tibia dirty white covered with irroration of light fuscious, relatively large, irregularly dispersed scales, tarsomeres I–II dirty white with dark fuscous apices, tarsomere III ochreous, terminal tarsomere shiny golden. Mid-femur and tibia fuscous dorsally and dirty white ventrally, tarsomere I dirty white with dark fuscous longitudinal patch dorsally, tarsomere II light beige dorsally and dirty white ventrally, tarsomeres III–IV fuscous, terminal tarsomere light beige. Hind femur white with silvery shine, hind tibia white with fuscous small partch subbasally and fuscous small patch at apex, apical spurs dirty white with ochreous apical half on longer spine and fuscous apces on shorter spines; tarsomere I with fuscous subbasal spot and dark fuscous subapical spot, tarsomere II dirty white with fuscous apical ring, tarsomeres III ochreous fuscous, tarsomere IV–V pale beige.

Abdomen. Fuscous dorsally, paler ventrally. Sternum VIII in males tapering caudally with sharp caudal apex, lateral edges covered with long numerous setae.

Male genitalia (Figs 162–164). Tegumen rather long, tapering distally, uncus possesses two short thick processes with rounded apices (socii), covered with short and numerous setae; socii separated by broad U-shaped indentation of uncus; a pair of long apical setae arising subbasally from apical processes; tegumenal arms (gnathos) long, reaching 2/3 of tegumen, moderate in width, strongly sclerotized, V-shaped, connected basally, one long seta arising at tip of each tegumenal arm. Valvae symmetrical, very slender and long, ca. 380 µm, longer than sternum VIII, straight, dorsal and ventral margins gradually widening towards cucullus, with long, triangular, dorsobasal process at connection with tegumen, and short, broad triangular, ventrobasal process at connection with vinculum; apex gently rounded; median inner surface of valva starting from subbasal 1/4 covered with median long, spine-like, thick, pointed setae, setose sector originating at subbasal 1/4 of valva as narrow band, significantly enlarging apically and terminating in fully setose apex. Vinculum narrow with long slender lateral processes and thickened median margin with very short, broad, blunt saccus. Aedoeagus ca. 4/5 as long as valva, slightly broadened at coecum, gradually tapering towards vesica, with slightly wrinkled sclerotization at vesica.

Female genitalia. Unknown.

Etymology. The specific name is a noun in apposition refering to the type locality.

Habitat. East African Coastal Forest (Fig. 437).

Host plant(s). Unknown.

Flight period. Adults were recorded in late March.

Distribution. (Fig. 364). Known only from the type locality in East Kenya.

11. *Cameraria zaira* De Prins, new species

(Figs 36, 165, 166, 365)

Diagnosis. Wing pattern of *C. zaira* is very similar to *C. sokoke*, except for the apical part of forewing: subcostal apical margin of third fascia is broadly edged with black scales in *C. sokoke* and narrowly edged with a row of black scales in *C. zaira*. The horn like tegumenal appendices in male genitalia as described below is a unique character for this species and therefore, it is highly distinctive. Beside the distinctive (sub)apical tegumenal processes *C. zaira* clearly differs from *C. sokoke* by a full set of morphological characters in male genitalia: form of valvae, vinculum, and sclerotized anellus (see description below).

Holotype: ♂, **Democratic Republic of the Congo:** [1] 'Ht. Katanga / Panda / 04.ii.1930 / [leg.] J. Romieux; [2] 'Gen. Prep. 3517♂ / De Prins'; [3] 'Holotype ♂ / *Cameraria* / *zaira* / De Prins, 2012', in MHNG.

Description. *Adult* (Fig. 36). Forewing length: 2.8 mm.

Head: Vertex tufted with pale ochreous piliform scales intermixed with white; frons smooth, with long shiny white with slight golden lustre scales appressed tightly all over frons to labial palpi. Labial palpus slightly longer than eye, light goldish beige, unicoloured from all sides dorsally and ventrally, apically pointed, downwards. Maxillary palpus small, porrect; light golden beige. Antenna ca. as long as forewing, pale beige, not ringed; first two flagellomeres white, following flagellomeres light ochreous beige, gradually darkened towards tip of antenna; each flagellomere with longitudinal piliform scales, dark dark ochreous apices, making every fagellomere clearly distinctive; ventral side of antenna pale beige; pedicel white; scape white with a few ochreous scales, pecten not perceptible.

Thorax. Light ochreous with white shading; tegulae light ochreous. Forewing elongate, ground colour light ochreous with white markings consisting of basal streak and three parallel fasciae; basal streak slightly oblique towards apex, edged dorsally by a few black scales; first fascia at 1/4, slender, oblique, directed towards apex, running transverse, but not reaching costa, tapering to sharp point at costa, finely edged apically with one row of black scales; second fascia at 1/2 parallel to first fascia basally, with a sharp curve directed towards apex at costal sector, reaching costa, edged apically with 2–3 rows of black scales; third fascia parallel to second fascia at 3/4, slightly curved at apical area and reaching costal margin of forewing, narrowly edged apically with a row of black scales; some white scales at at termen black tipped; fringe short dirty white along dorsal margin of forewing. Hindwing pale greyish beige; fringe very long, same shading as hindwing. Fore coxa pale ochreous dorsally and whitish ventrally, fore femur light ochreous, without shine, fore tibia light ochreous with a few darker ochreous scales dispersed ventrally, tarsomeres pale ochreous, terminal tarsomere dark ochreous. Mid-femur light ochreous spotted ventrally, with dark ochreous tiny scales mid-tibia pale ochreous with brown subapical patch, tarsomere I pale beige with tiny dark brown scales medially and subapically, tarsomeres II–III light beige with darker apical halves, terminal tarsomeres pale beige. Hind femur pale beige, slightly darker dorsally, hind tibia whitish with silverish beige shine, medial spurs almost half long as tibia, unicoloured, same shading as tibia, apical spurs same shading as median spurs, unicoloured, tarsomeres pale whitish ochreous, without markings.

Abdomen: Fuscous dorsally, paler ventrally. Sternum VIII damaged.

Male genitalia (Figs 165, 166). Tegumen moderate in length, numerously covered with tiny round tubercules of microchetae; dorsally ends with gently rounded apical bulb, covered with numerous short stiff microsetae; apex of tegumen with two long setae; subapical lateral sides well sclerotized, subapex of tegumen with two long, slender, strongly sclerotized, tapering, horn-shaped processes (socii), smooth and without setae; apical processes (socii) are separated by a sharp triangular conus like tegumenal sclerotization covered with tiny microtrichiae, subbasal part of sclerotization is connected to smooth lateral sides of tegumenal subapex by rough wrinkled broad scarf. Valvae symmetrical long, 704 µm, tightly confluent with vinculum, with more or less rectangular bases and terminating with broad setose diamant-shaped apices. Vinculum U-shaped rather widened anteriorly; with long vincular process which arise between appendices of fultura superior and almost as long, as fultura superior but with broad base and bifurcate apex, saccus very long, ca. 470 µm, about half length of valva, narrow, slender, cylindrical, gently rounded caudally; anellus with well developed sclerotized fultura superior bearing two sinuate thick sclerotized appendices terminating with slender, pointed, flexible, downward bent apices; apices of fultura superior squamose. Aedoeagus ca. 650 µm long (without unsclerotized coecum), shorter than valva, slender, narrow, cylindrical, cordal part covered with microscobination, coecum part unsclerotized, broadened, balloon shaped, 410 µm in length, vesica gently bent, with tiny cluster of ca. 6–8 subapically blunt cornuti (visible at 400×).

Female genitalia. Unknown.

Etymology. The name '*zaira*' is derived from the Portuguese '*Zaire*', itself as a mispronunciation of the Kikongo word '*nzere'* meaning "the river that swallows all rivers" denoting the river Congo. The name Zaire was until 1997 used to refer to the country, where the species *C. zaira* was found.

Habitat. Unknown.

Host plant(s). Unknown.

Flight period. The species was recorded in early February.

Distribution. (Fig. 365). Known only from the type locality in the south-eastern region of the Democratic Republic of the Congo.

The *torridella* group

The *torridella* group, comprising one species, shares the characters in adult external features and male genitalia with *Cameraria niphonica* Kumata, 1963 and *C. aceriella* (Clemens, 1859). The first two basal white markings of the forewing are apical-edged like in great majority of *Cameraria*, (although the mid-fascia can have a few basal-edging scales). However, the apical white markings are basally edged like in *Phyllonorycter.* Forewing venation slightly differs in the *torridella* group from the great majority of *Cameraria* species in the distance between veins R_4 and R_3. In many *Cameraria* species, it comprises ca. 9.5% of the cell length, whereas in the *torridella* group it comprises ca. 15–16% of the cell length. In hindwing venation Rs makes a light turn towards the costal margin and reaches it slightly more basally than Rs in many *Cameraria*. Larvae of the *torridella* group feed on *Dombeya torrida* Bamps [Malvaceae]. The mine of the *torridella* group is underside tentiform like those in *Phyllonorycter* (D. Agassiz pers. comm.). It differs from mines of *Cameraria* which usually are shaped as upperside blotch mines (Braun 1908, Opler & Davis 1981, Kumata 1993).

The tegumen of the male genitalia with 1–3 stout setae on apex, tuba analis shortly protruded, valvae symmetrical, gradually enlarging towards cucullus, densely setose with slender hair-like setae. Transtilla complete, H-shaped, with straight horizontal bar and long lateral projections on cephalic margin. Vinculum U-shaped, thickly sclerotized. Saccus moderately long, ca. as long as sternum VIII. Aedoeagus straight, slightly shorter than valva, cylindrical, of median girth with long slender rod-like cornuti on apical part and vesica.

In female genitalia papillae anales strongly compressed caudally, attached to each other laterally, a needle-like projection stretches from basal part of papillae anales to posterior ca. 1/3 of segment VIII. Apophyses slender without enlarged bases. Ostium bursae opens in middle of segment VII. Ductus bursae slender and long. Corpus bursae small globular, with two signa areas, one with an elongate rod like signum, other with an assemblage of rough sclerotizations.

The *torridella* group also differs in ribosomal protein S28 gene (GenBank accession number AF477550 (Lopez-Vaamonde *et al*. 2003: 1818 as *P. loxozana* [sic], which is a misidentification of *C. torridella*).

12. *Cameraria torridella* De Prins, new species

(Figs 15, 37, 167–169, 303, 304, 366)

Diagnosis. *Cameraria torridella* resembles *Phyllonorycter loxozona* which also feeds on *Dombeya* spp. White vertex, curved second fascia, horizontal stripe of black scales between second fascia and apex differentiate this species externally from other lithocolletine species feeding on *Dombeya* spp. Compared to *P. loxozona*, the male genitalia of *C. torridella* are diagnostic in having much shorter, broader valva with rounded cuculli, H-shaped transtilla, sclerotized anellus, tegumen with a small protruding tuba analis and rather long saccus. Female genitalia of *C. torridella* with conus shaped sterigma located at median sector of segment VII. This character conspicuously differentiates C. *torridella* from *P. loxozona*, The anterior apophyses of C. *torridella* are ca. 2× longer than those in *P. loxozona.*

Holotype: ♂, [1] '**Kenya** Rift Valley Prov.[ince] / Turi, 8000 ft / 2.xii.1998 / [leg.] D. J. L. Agassiz'; [2] 'Gen. Prep. 3489♂ / De Prins'; [3] 'MRAC/KMMA / 00287', specimen ID: [4] 'RMCA ENT 000003121', [5] 'Holotype ♂ / *Cameraria* / *torridella* / De Prins, 2012', in RMCA.

Paratypes: 5♂, 3♀ (including 5♂ and 2♀ genitalia preparations), 4 specimens (from which 2 specimens miss their abdomens). **Kenya:** 4♂, Rift Valley Prov.[ince], Turi, 8000 ft, l.[arva] *Dombeya torrida*, em.[erge] from 29.x.1998 to 07.xi.1998, leg. D. J. L. Agassiz, specimens IDs: RMCA ENT 000003122–000003124, gen. prep. De Prins 3488♂ (MRAC/KMMA 00288), 3491♂ (MRAC/KMMA 00289), 3495♂ (MRAC/KMMA 00290), 3767♂ (MRAC/KMMA 00491), wing venation prep. 3766♂ (MRAC/KMMA 00490), head prep. 3785♂ (MRAC/KMMA 00526), in RMCA, from which 1♂ in BMNH. 1♂, Rift Valley Prov.[ince], Turi, 8000 ft, 2.iii.2000, leg. D. J. L. Agassiz, gen. prep. De Prins 3496♂ (MRAC/KMMA 00379), specimen ID: RMCA ENT 000003270, in RMCA, DNA voucher in INRA. 2♀, Rift Valley Prov.[ince], Turi, 8000 ft, l.[arva] *Dombeya torrida*, em.[erge] 29.x.1998 and 03.xi.1998, leg. D. J. L. Agassiz. Specimen IDs: RMCA ENT 000003126—000003127, gen. prep. De Prins 3492♀ (MRAC/KMMA 00291), 3768♀ (MRAC/KMMA 00492), in RMCA. 1♀, Rift Valley Prov.[ince], Turi, 8000 ft, l.[arva] *Dombeya torrida*, em.[erge] 26.x.1998, leg. D. J. L. Agassiz, in BMNH. 2 specimens, same data,

in NMK. 2 specimens, missing abdomens, Rift Valley Prov.[ince], Turi, 8000 ft, l.[arva] *Dombeya torrida*, em.[erge] 01.xi.1998 and 03.xi.1998, leg. D. J. L. Agassiz, specimen IDs: RMCA ENT 000003128–000003129, in RMCA.

Description. *Adult* (Fig. 37). Forewing length: 3.0–3.6 mm.

Head: Vertex tufted with white piliform scales intermixed with ochreous brown, more abundant on anterior margin of occiput; frons smooth, shiny white covered with long narrow appressed scales. Labial palpus1.5 longer than eye, light shiny ochreous dorsally and fuscous laterally from outside, directed downwards and apically pointed. Maxillary palpus very small almost imperceptible, light ochreous, proboscis rather long, curved, light beige with golden shine. Antenna slightly shorter than forewing, consisting of 43–44 flegellomeres, lightly ringed, smooth, first three flagellomeres dirty white, remaining flagellomeres gradually darkened attaining dirty white basal halves and shading ochreous-fuscous apical halves covered with ciliate tiny scales; last three flagellomeres grey; pedicel dirty white anteriorly and light fuscous-ochreous posteriorly; scape white anteriorly with white black-tipped scales, and shiny bright ochreous posteriorly, pecten white with ochreous bases, slightly shorter than half of eye.

Thorax. White anteriorly, ochreous posteriorly with white patch at caudal sector; tegulae ochreous anteriorly and white at 1/3 posterior sector. Forewing elongate, ground colour shiny ochreous with white markings consisting of basal streak, two fascia, two costal and one dorsal strigulae; basal streak short, 1/9 of forewing, slender, running parallel to costa and reaching first fascia, not edged; a narrow line of dark brown scales runs along costa starting from base of forewing and ending at first fascia; first fascia at 1/5, irregular shaped and curved distally at subcostal sector, edged with two rows of black scales apically; second fascia at 1/3 parallel to first facia, running parallel to first fascia, edged with two rows of black scales apically, and a few single scales near dorsum and costa basally, first costal strigula at 3/5 blunt triangular, not reaching midline of forewing, edged on both sides with one row of black scales, first dorsal strigula opposite first costal strigula, but larger, extending slightly beyond middle of forewing (in one paratype smaller than first costal strigula), irregular triangular shaped, in holotype constricted, in two paratypes joint with costal strigula, edged on both sides with one row of black scales; second costal strigula almost at apex, comma or irregular patch shape, not strictly edged, but many black scales are scattered around second costal strigula; broad irregular horizontal line of dispersed black scales subcostally make bridge from second fascia towards intersector between first dorsal and first costal strigulae; an irroration of black scales extends to termen of forewing; apical streak of black scales runs from tips of costal and dorsal strigulae and extends running along outer margin of forewing; fringe dirty white with golden shine, very short at apex, longer at termen and as long as width of forewing at tornus and dorsum. Hindwing light fuscous with long light ochreous shiny fringe. Fore femur dark fuscous dorsally and dirty white ventrally, fore tibia dark fuscous with dirty white apical patch in male and fuscous in females, fore tarsomere I light grey basally with dark fuscus apical sector in in both sexes, tarsomere II light shiny silver grey with dark fuscous basal ring in males and light ochreous in females, with dark ochreous apical sector in both sexes, tarsomere III dark ochreous, tarsomere IV light grey with light ochreous apical half in both sexes, tarsomere V white in both sexes; mid-femur dirty white, mid-tibia white with three elongate patches of light fuscous scales, first at 1/3, second at ½, and third at apical region, tarsomere I dirty white with dark fuscous apical half, tarsomere II white with dark fuscous apical ring, tarsomere III dark fuscous, terminal tarsomeres white, apical spurs white with ochreous patch at base; hind femur white with light fuscous irregular patch at 1/2, hind tibia light fuscous, with oppressed shiny light golden fuscous hairs, hind tarsomere I with fuscous subapical ring in males and light ochreous subbasal and subapical patches in females, tarsomeres II–V white with light golden shine, medial spurs dark fuscous with whites bases and apices, apical spurs white with a few light ochreous scales at 1/2.

Abdomen. Segments I–III light fuscous dorsally and golden ochreous ventrally in males, fuscous dorsally and golden ochreous ventrally in females, segments IV–VII dark fuscous dorsally and dirty white ventrally in males, fuscous ventrally and golden ochreous in females, caudal segments grey dorsally and golden ochreous ventrally in both sexes. Segment VIII in males twice long as broad, gently tapering and rounded caudally, covered with long setae more dense at lateral margins, caudal surface rough edged.

Male genitalia (Figs 167–169). Tegumen rather long, almost as long as valva, truncate posteriorly with tiny truncate tuba analis; light setose subapically (visible at 400×) covered with sparse longer setae and numerous short microtrichiae. Valvae symmetrical, slightly longer than sternum VIII, ca. 350 µm, narrow at base to 1/2, broaden from median surface to almost round distally; ventral valval margin with a transparent unsclerotized transitional

lobe at 1/2; basal half of ventral surface of valva without setae, but distal half of ventral surface dense setose. Setae becoming shorter and thicker towards apex and along ventral distal margin of valva. Vinculum narrow laterally, significantly broader rounded at base of saccus, strongly sclerotized especially ventrad saccus; saccus slender, ca. 1/2 length of valva, blunt caudally; transtilla H-shaped, of moderate width, about 1/3 of aedoeagus, with two lateral posterior processes ca. half as long as central part of transtilla, annellus sclerotized with developed fultura. Aedoeagus slightly longer than valva, rather thick, gently tapering from coecum towards vesica; vesica with elongate strongly sclerotized rod like cornuti at about 1/3 of total length of aedoaegus (visible at 100×).

Female genitalia (Figs 303, 304). Papillae anales connected dorsally, flattened, lightly sclerotized, rounded posteriorly, covered with sparse long setae, ca. 60 µm in length, basal bar inperceptible; a slender, needle-like, weakly sclerotized projection ca. 140 µm extending from bases of anterior apophyses, reaching posterior 1/3 section of segment VIII. Posterior apophyses slightly longer than segment VIII, ca. 0.50 mm long, reaching posterior sector of segment VII, slender and narrow with gently pointed apices. Segment VIII weakly sclerotized and well connected to segment VII. Anterior apophyses ca 0.45 mm in length, reaching subanterior portion of segment VII, slender, gently pointed. Posterior margin of segment VII weakly sclerotized, without bar, tuberculate. Ostium bursae located at 1/2 of segment VII, with markedly expressed conus-shaped sterigma, ductus bursae ca. 1.5× length of segment VII, ca. 0.70 mm long, narrow, antrum narrow, melanized, followed by narrow, gradually broadening section with smoothly sclerotized wall. Corpus bursae subcircular, small, ca. 0.20 mm in diameter, ca. 0.28 mm long, bearing two sclerotized sections: one with rough sclerotizations, other a smooth ellipsoidal plate with a long (ca. 90 µm), distinctly sclerotized, rod-like signum crossing centre of elipsoidal plate.

Variation. Slight variation was observed in the costal and dorsal strigulae: the first costal and first dorsal strigulae may be joined or separate. Irroration of black scales at the termen and dorsum of the forewing varies in intensity. The background of the vertex is white, but the amount of infused ochreous piliform scales varies slightly, resulting in slightly different colours of the tufted vertex.

Etymology. The name of this species is derived from the specific name of the host plant *torrida* coupled with the diminutive Latin suffix *–ella* in feminine gender.

Habitat. The moths have been found at 2200–2500 m, where green vegetation is present for 10 months of the year (D. Agassiz pers. comm.).

Host plant(s). Malvaceae: *Dombeya torrida* (J.F. Gmel.) Bamps.

Mine. Underside, tentiform mine (D. Agassiz pers. comm.).

Flight period. Adults fly in early March and from late October to early December.

Gene Bank accession number. AF477550 (Lopez-Vaamonde *et al*. 2003: 1818 as *P. loxozana* [sic], which is a misidentification of *C. torridella)*.

Distribution. (Fig. 366). Recorded only from one locality in the Rift Valley in Kenya.

Phyllonorycter Hübner, 1822

Phyllonorycter Hübner, 1822: 66–74, 76–80. Type species: *Phalaena rajella* Linnaeus, 1758 by subsequent designation by Walsingham 1908: 976. The type species was cited by Walsingham as *rayella*, an incorrect subsequent spelling (Nye & Fletcher 1991: 240–241) (see also Bradley 1966: 218).

Phyllonorycter Hübner, 1806: [2]. A work rejected for nomenclatural purposes by the International Commission on Zoological Nomenclature, 1926 (Opinion 97): 19–30. A nomenclaturally unavailable name.

Lithocolletis Hübner, 1825: 423. Type species: *Phalaena rajella* Linnaeus, 1758 by subsequent designation by Walsingham 1908: 976. A junior objective synonym of *Phyllonorycter* Hübner, 1822.

Eucestis Hübner, 1825: 423. Type species: *Tinea ulmifoliella* Hübner, 1817 by subsequent designation by Hampson 1918: 387. A junior subjective synonym of *Phyllonorycter* Hübner, 1822.

Eucesta Hübner, 1826: 67. An incorrect subsequent spelling of *Eucestis* Hübner, 1825. A nomenclaturally unavailable name.

Hirsuta Bruand, 1851: 50. A nomenclaturally unavailable name as the genus was not described and the only included species was denoted by the undescribed manuscript name *fritilella* Tischer.

Lithocolletes Hübner, Dyar 1903: 549. An incorrect subsequent spelling of *Lithocolletis* Hübner, 1825. A nomenclaturally unavailable name.

Phyllorycter Walsingham (de Grey), 1914: 336. An unjustified emendation of *Phyllonorycter* Hübner, 1822.

Hirsuta Fletcher 1929: 110. Type species: *Elachista populifoliella* Treitschke, 1833, by original designation. By citing "*Hirsuta*, Bruand 1847 (non-descr.)" together with a type species, Fletcher unintentionally established Bruand's nomenclaturally unavailable name. A junior subjective synonym of *Phyllonorycter* Hübner, 1822 (Nye & Fletcher 1991: 150).

Подрод [Subgenus] *Asymmetrivalva* Kuznetzov et Baryshnikova, 2004: 630–633. Type species: *Lithocolletis acerifoliella* Zeller, 1839, by original designation. A junior subjective synonym of *Phyllonorycter* Hübner, 1822, synonimized by De Prins & De Prins 2005: 264. *Asymmetrivalva* was established to denote a subgenus of *Phyllonorycter* Hübner, 1822.

The genus *Phyllonorycter*, known as *Lithocolletis* for many years, is one of the most successful lineages within Gracillariidae and accommodates 401 species world wide (De Prins & De Prins 2012). The concept of the genus based on adult and larval morphology, as well as biology is well established and defined by many authors (Braun 1908; Meyrick 1912b, 1927; Ely 1918; Kumata 1959, 1963, 1967, 1973, 1982, 1993; Patočka 1980; Kuznetzov 1978, 1979a–c, 1981; Emmet *et al.* 1985; Davis & Robinson 1998; Davis & Deschka 2001; Laštůvka & Laštůvka 2006; Liblikas et al. 2009; Bengtsson & Johansson, 2011).

Diagnosis. We define the genus *Phyllonorycter* as the assemblage of species-group taxa which fall into the clade *Phyllonorycter* (Fig. 4). Morphologically *Phyllonorycter* is very similar to *Cameraria* in adult external features (except for the basal-edged white markings of the forewing), and wing venation (it is identical with *Cameraria* with the exception of *C. fasciata*). Sternum VIII in males forms a characteristic large flap laying under valva like in *Cameraria*, *Cremastobombycia*, *Hyloconis*, *Neolithocolletis*, and *Porphyrosela*, but differently from *Chrysaster*, *Leucanthiza*, *Macrosaccus*, and *Protolithocolletis* where sternum VIII in males is not protruded. *Phyllonorycter* can be distinguished from other genera of Lithocolletinae including *Cameraria* and *Macrosaccus* by the simple conical tegumen without apical setae, which is an apomorphy for this genus. However, the preimaginal stages might propose more generic differential diagnostic characters in Lithocolletinae (Kumata 1993; Davis & Deschka 2001). *Phyllonorycter* differs from other genera of Lithocolletinae by the single lateral seta (L1) on the mesothorax, metathorac and all abdominal segments in the last instar larva (Kumata 1993; Davis & Deschka 2001). The loss of setae L2 and L3 on the body segments of the last instar larva is possibly an apomorphy that would suggest that the genus is an advanced group in the subfamily (Kumata 1993; Davis & Deschka 2001). However, the larvae of the Afrotropical *Phyllonorycter* have not been examined yet.

Phyllonorycter also differs from *Cameraria* in COI sequence data. These two groups are separated by at least 10% sequence divergence for the taxa that were sampled in this study (Fig. 3).

Diagnosis of Afrotropical *Phyllonorycter*. Afrotropical *Phyllonorycter* are generally small moths, having a forewing length of 2.7±0.5 mm with a few species falling outside this range. Forewing markings are very attractive, often showing white fasciate or strigulate patterns with silvery shine contrasting sharply with golden yellowish, ochreous or metallic brown ground colour coloration. The *melanosparta* group is the only one among Afrotropical *Phyllonororycter* without white markings on the forewing. The following distinctive features characterize Afrotropical *Phyllonorycter*:

Head: Vertex tufted with erected long piliform scales, being bicoloured at their tips and frequently varying in shading and length from frons to occiput [the rough appearance of vertex is due to the neck plumes which are long and project forwards above the vertex between antennae (Vári 1961)]; frons covered with appressed smooth scales, frequently white, sometimes with golden sheen or strong metallic gloss, or mottled with brownish scales (Figs 132, 133); labial palpus moderate, porrect, filiform, drooping, straight, terminal palpomere about 1.5× longer than second palpomere, sharply pointed; maxillary palpus minute, porrect, proboscis well developed, about twice as long as labial palpus; antenna simple, about as long as forewing, not clearly ringed; scape short, thickened (Figs 7, 8), bearing pecten of different length.

Thorax: Forewing with black or blackish brown scales arranged in a row(s) edge fasciate or strigulate whitish markings basally or mixed (except *melanosparta* group, where white markings absent); fringe long, particularly near tornus and dorsum, reaching width of wing in forewing and ca. 3× width of wing in hindwing. Descaled forewing lanceolate, slender, and pointed. Venation with 8 veins (Figs 16, 17), discal cell closed, ca. 0.75 of wing length, apical part with 5 separate veins: R3, R4, R5, M1 and Cu1; CuP indistinct for entire length, A1 strong, to margin. Hindwing greyish, dirty white, lustrous, silvery, lanceolate, maximum width 0.11 that of length, venation reduced, Sc very short, Rs very long running almost to apex, basal 2/3 of M1 indistinct, parallel to Rs, distal 1/3 of M1 ends at 3/4 of dorsum, Cu1 strong, ends about 2/5 of dorsum (Ely, 1918; Vári, 1961; Kumata, 1993). Legs with darker rings, spots or markings aiding identification (Figs 126–131); fore- and mid-legs slender, midtibia bears scales which project alongside a pair of short tibial spurs; hindtibia thickened, with long fine loose hairs and medial and apical spurs, hindtarsus smooth, slender and ca.1.5× as long as tibia.

Male genitalia. Sternum VIII developed, flap-like, extended. Tegumen simple, without apical setae, in *grewiaecola* group with lateral appendages, valvae symmetrical, whereas valvae of many *Phyllonorycter* species of

northern hemisphere asymmetrical, much elongated, mostly bar shaped with filament-like setae, in *P. loxozona* valvae sinuate, sometimes with shorter or longer spines (*P. achilleus*, *P. jabalshamsi*), in the *rhynchosiae* group ventral surfaces of valva bears flap-like projection(s). Transtilla in most of the species complete, quadrate, or with thicked lateral lobes or protruded projections on cephalic margin. In one species of the Afrotropical *Phyllonorycter*—*P. achilleus*—transtilla incomplete with long dorsal basal valval projections present which abute each other but not joining. In *P. grewiaecola* incomplete transtilla connected with sclerotized fultura superior. Vinculum mostly crescent or U-shaped, thickly sclerotized. Saccus varies from tiny pointed tip on vinculum in *P. chionopa* (Fig. 182) to extremely long slender projection, almost as long as abdomen in *P. obandai* and *P. farensis* (Figs 254, 257). In most Afrotropical *Phyllonorycter*, saccus slender, straight, of medium length, projecting anteriad. In *leucaspis* group, saccus characteristically sinuoid, turned at basal part (Figs 224, 227, 230, 231, 234). Anellus weakly sclerotized, except *P. grewiaecola* where anellus with sclerotized fultura superior bearing two sinuate horns posteriorly. Aedoeagus usually straight or slightly curved, but mostly slender, cylindrical, slightly enlarged at coecum. In *chionopa* species group, girth of coecum and vesica strikingly differing (Fig. 182). Length of aedoeagus varying from short in *P. brachylaenae* and *P. melhaniae* (Figs 207, 210, 253) to extremely long, almost as long as abdomen in *P. farensis* (Fig. 258). Apical part of aedoeagus usually with slender rod-like cornuti, sometimes tiny barbs on vesica.

Female genitalia. Papillae anales slightly compressed laterally, attached to each other laterally, usually as long as wide, covered with long sparsely set setae. Stronger or weaker sclerotized basal bar may be present or absent or partly present. In most of the species groups, a needle-like projection streches from basal part of papillae anales to posterior ca. 1/3 of segment VIII in the *encaeria*, *gato*, *hibiscina*, *hibiscola*, *lemarchandi*, *melhaniae*, *mida*, *rhynchosiae*, *silvicola* and *umukarus* groups. Segment VIII is well connected with segment VII. Posterior apophyses usually slender in most of the informal species groups, and with slightly enlarged basal halves in the *leucaspis* and *jabalshamsi* groups. In most cases anterior apophyses initiate at basal plate in segment VIII, except in the *melanosparta* and *achilleus* groups. In the *melanosparta* group anterior apophyses are replaced by caudal sterigmatic appendages and in the *achilleus* group the anterior apophyses are short, straight and initiate at the joint of segment VIII and VII. In the Afrotropical *Phyllonorycter* ostium bursae opens either at the joint of segments VII and VIII like in the *chionopa*, *encaeria*, *grewiella*, *jabalshamsi*, *lemarchandi*, *leucaspis*, *melhaniae*, *ruwenzori* and *silvicola* groups or in segment VII like in the remaining informal species groups. Sterigmatic sclerotizations on segment VII in Afrotropical *Phyllonorycter* are either not developed like in the *achilleus*, *chionopa*, *grewiella*, *jabalshamsi*, *leucaspis*, and *ruwenzori* informal species groups or are well developed as volcano, bumerang, or triangular cuticle fold or arc-shaped suture like in the *encaeria*, *gato*, *hibiscina*, *hibiscola*, *mida*, *rhynchosiae*, *silvicola* and *umukarus* species groups. In the *mida* group lamella post-vaginalis possesses very complicated-shaped sclerotizations covered with sharp large spines (Fig. 338); in the *melanosparta* group sterigma formed as a plate-shaped appendage with the extended caudal processes serving as anterior apophyses (Figs 334, 335); the similar sterigmatic appendages present in the *grewiaecola* group, in the *obandai* group sterigma is shaped as moderate M-shaped suture with opening of ostium bursae at its depression (Fig. 340); in the *melhaniae* group sterigma is partly attached tube-shaped sclerotization (Fig. 336). The anterior margin of segment VII can be encircled by a heavily sclerotized ring-like structure in *P. hibiscola*. Ductus bursae varies from very short in the *leucaspis* group to very long in the *obandai* group. Corpus bursae is variable in size and shape, in most species with the corpus bursae and ductus bursae clearly differentiated, although in some Afrotropical *Phyllonorycter* species (the *encaeria*, *obandai*, *didymopa*, *melanosparta* groups) the junction of the ductus and the corpus bursae is gradual and indistinct. The corpus bursae often bears signa areas and a sclerotized signa, but often lacks a distinct signum. There can be one or two signa areas on corpus bursae; sclerotized signum can have the shape of a star with extended rays (in the *mida* and *rhynchosiae* groups), a band consisting of sharp barbs arranged in 3–4 rows (in the *hibiscina* group), a long sharp needle (in the *umukarus*, *grewiaecola* groups) or other shapes.

Biology. The life history of *Phyllonorycter* is described by Braun 1908; Needham *et al*. 1928; Vári 1961; Kumata 1963, 1993; Davis 1987; Landry & Wagner 1995; Davis & Robinson 1998; Davis & Deschka 2001). *Phyllonorycter* species are believed to possess three early sap-feeding and two subsequent tissue feeding instars (Davis & Deschka 2001), while Kumata (1993) proposes that the last instar might be also the sixth. The range of host plant choice in *Phyllonorycter* is very broad; no less than 32 families of plants serve as foodplants (for a full account of *Phyllonorycter* host plants, see De Prins & De Prins 2012). As with most of the Afrotropical microlepidoptera, the pattern on biology, host plant preferences and host plant specialization obtained from limited

rearing records of *Phyllonorycter* is still rather obscure. Four families of plants: Asteraceae, Fabaceae, Malvaceae, and Verbenaceae were reported as hosts of Afrotropical *Phyllonorycter* (Viette 1951; Vári 1961; Kroon 1999; Dall'Asta *et al*. 2001; De Prins & De Prins 2005, 2012). The rearing record of *P. lemarchandi* on Solanaceae (Paulian & Viette 1955) needs confirmation. In this study we add Convolvulaceae, Lamiaceae, and Rosaceae to the list of host-plant families for Afrotropical *Phyllonorycter.* All informal species groups belonging to Afrotropical *Phyllonorycter* exhibit high host plant specialization at least at the generic level. In the *hibiscina*, *lemarchandi*, *leucaspis*, *melanosparta*, *rhynchosiae* groups restricted oligophagy is documented. Species-related host-plant specifity needs a special study for the *grewiella* and *hibiscina* species groups, since an unusually high number of hosts for one species has been recorded, 7 for *P. grewiella*, and 5 for *P. hibiscina*. Furthermore, even the entire informal *hibiscina* species group is characterized by a great span of host plants,—eight, belonging to three plant families: Asteraceae, Convolvulaceae, and Malvaceae, an unusual biological character for other *Phyllonorycter* species groups. Twenty seven Afrotropical *Phyllonorycter* species (41.5%) have rearing records reporting 38 plant species as hosts. Twenty-three species of *Phyllonorycter* in the Afrotropical region feed on Malvaceae.

The great majority of reared Afrotropical *Phyllonorycter* make underside mines, however one species—*P. grewiella*—mines the upper side of *Grewia* spp. leaves. The prognathous sap-feeding instar initiates a slender, serpentine subepidermal gallery which is enlarged by the third instar to form a flat blotch. The hypognathous tissue feeding larva (fourth and fifth instars) do not enlarge the area of the mine but contracts the edges of the mine closer together by silk, thus finally constructing a tentiform blotch mine (Hering 1951; Kumata 1963, Emmet *et al*. 1985; Davis & Deschka 2001). The parenchymal tissues within the mine are consumed almost wholly, or in spots, larval frass of tissue feeding instars becomes granullar and is typically collected at one end of the mine. Pupation occurs within the mine cavity either without a cocoon or it is enclosed by a slender, ellipsoid cocoon of which colour, size, shape and position within the mine is usually constant and species-linked (Emmet 1985 *et al*.).

Distribution. Afrotropical *Phyllonorycter* species are largely distributed in southern Africa (Botswana, Namibia, South Africa, Zimbabwe) and in eastern Africa (Kenya, Tanzania, Uganda) and the Arabian Peninsula (southern Oman, southern Yemen. Several species are recorded from Madagascar and the Mascarene Islands, and four species from the regions bordering Central Africa (northern Cameroon, Nigeria and Rwanda). Until the present study, no *Phyllonorycter* species has been recorded from coastal western Africa and the high inlands of Central Africa. The greatest concentration of *Phyllonorycter* diversity is documented from eastern Africa (23 species). The distributional pattern we report might be biased by extensive collecting efforts in eastern Africa by many microlepidopterists (e.g., Vári 1961; Triberti 2004), but we believe that the distributional pattern concentrated in the eastcoast of Africa is the general pattern. Only *hibiscina* and *leucaspis* groups showed pan-(trans-) Afrotropical distribution. The remaining groups of Afrotropical *Phyllonorycter* were recorded from restricted woodland and savannah biomes. Fabaceae and especially Malvaceae, the most common host plant families for *Phyllonorycter*, play a critical role in woodland communities. Savannah communities are dominated by grasses (Poaceae) as they are everywhere, but the woody component is strongly influenced by the presence of Fabaceae and Malvaceae species (J. De Prins, pers. observation).

Afrotropical *Phyllonorycter* species are not restricted to particular elevations; they vary from almost sea level (*P. mida*) up to almost 3000 m (*P. acutulus*) in Kenya. However, the greatest species richness can be found between 0–500 m and 1500–2000 m elevations. Nevertheless, the *mida* and *grewiella* species groups showed a large range in elevation preference: *P. mida* was recorded from sea level in Kenya to 1300 m in Yemen, *P. grewiella* ranges from 80 and 500 m in eastern Kenya up to 1300 m in Namibia and 1800 m in Yemen. Most species are represented by too few individuals to draw any meaningful conclusions.

In general, *Phyllonorycter* is particularly species-rich in the northern hemisphere, and poorly represented in the southern hemisphere. Thirteen species assigned to *Phyllonorycter* are known from the Neotropics and only four are known from the Australian region. Here we present 48 species of *Phyllonorycter* from the Afrotropical region grouped into 22 informal species groups. Some of these groups can be distinguished superficially by forewing pattern and forewing length: i) the *melanosparta* group shows only black markings on forewing without white markings; ii) first and second fasciae on forewing in the *grewiaecola* group sinuate and are linearly bordered by black scales apically and basally; iii) the ground colour in *chionopa* group is bright yellow with big, broad, semi-round or rectangular shiny white patches; iv) wings in the *lemarchandi* group have metallic lustre and small white dots similar to those in *Porphyrosela*, however, the specimens of the *lemarchandi* group are slightly bigger than those of *Porphyrosela*; v) the *grewiella* species group possesses large strigulae on dorsal margin of forewing

whereas distinctive strigulae on the costal margin are absent; vi) the *obandai*, *agassizi* and *achilleus* groups show a unique and recognizable pattern combined from strigulae of different length and orientation to apex with the length of basal streak (see appropriate descriptions). However, wing pattern is not a reliable character for species group differentiation in Afrotropical *Phyllonorycter*, since the wing pattern of the informal species groups can be confused with that of other Lithocolletinae genera. For instance, the wing pattern of *P. lemanchandi* is almost indistinguishable from many *Porphyrosela* species, the *melanosparta* group can be confused with *Cameraria hexalobina* and *Cremastobombycia kipepeo* due to the absence of white markings on forewings, the *grewiaecola* group can be confused with the *landryi* and *sokoke* groups of *Cameraria* since these groups possess sinuate fasciae etc. Only male and female genitalia provide the most reliable features for discriminating the species groups and the species. Valva provides some of the best characters to discriminate the informal groups of Afrotropical *Phyllonorycter*, like proportial valval length and width in comparison with other male genital structures, valval size, shape of cucullus, location of ventral appendices, presence of distal spines and setation. In female genitalia, the shape of sterigma, location and position of ostium bursae, form of corpus bursae, the configuration and shape of signa are diagnostic for species or species groups. Based on genitalia, nine distinct multi-species groups plus 15 single-species groups are recognized. Morphologically different genitalia demand that each of the 15 single-species groups is assigned to its own group.

Relationships to other genera. Phylogenetically, *Phyllonorycter* is most closely related to *Cremastobombycia* (Fig. 4). These two genera together form a well-supported clade (BP = 100%, PP = 1.0) with the nuclear genes sampled for this study. *Phyllonorycter* and *Cremastobombycia* share a similar preimaginal morphology, host plant, and male genital morphology. Specifically, larvae of both genera: i) are cylindrical, whereas larvae of *Cameraria* are flat; ii) construct strongly contracted mainly abaxial tentiform mines, whereas the larva of *Cameraria* builds mainly an adaxial blotch-shaped mine; iii) feed on Asteraceae and Verbenaceae, whereas Asteraceae and Verbenaceae plants are not utilized by *Cameraria* (Table 3). The transtilla in male genitalia is complete in both genera *Phyllonorycter* and *Cremastobombycia* whereas it is incomplete in *Cameraria*.

Species examined. *Phyllonorycter alniella* (Zeller, 1846) [synonym of *P. rajella* (Linnaeus, 1758)].
Lectotype ♂, designated here, [1] (round label ringed with red colour) 'Type'; [2] (handwritten in black Indian ink on a beige label) '*Alniella'*; [3] (handwritten in black Indian ink) 'Zeller Coll. / (printed) Walsingham / Collection / 1910-427'; [4] (handwritten in black Indian ink) 'Type'; [5] (printed) 'Type'; [6] (printed) 'B.M. ♂ / Genitalia Slide / No (handwritten in black Indian ink) 19072', in BMNH: drawer Mi 10011.

Note: In De Prins & De Prins (2005: 340) type material was mentioned as "not stated". A specimen labelled "Type" was found in the BMNH: drawer Mi 10011.

The male specimen in BMNH: drawer Mi 10011, '*alnifoliella* Dp = *rajella* Zell. = *alniella* Zell. = *neapolitana* Rbl.' bearing the following labels: [1] (round label ringed with red colour) 'Type'; [2] (handwritten in black Indian ink on a beige label) '*Rajella* / Tosc R661'; [3] (handwritten in black Indian ink) 'Zeller Coll. / (printed) Walsingham / Collection / 1910-427'; [4] (handwritten in black Indian ink) 'Type'; [5] (printed) 'Type'; [6] (printed) 'B.M. ♂ / Genitalia Slide / No (handwritten in black Indian ink) 19073' is not a type specimen. It is a misidentification of *Phyllonorycter vulturella* (Deschka, 1968). This was notified by G. Deschka on genitalia slide no. 19073 which bears the following labels: [1] (handwritten in black Indian ink) '*Phyllonorycter* ♂ / *rajella* (Zeller) / *vulturella* Deschka / *Rajell*a, Tosc R 661 / Zeller Coll. / Walsingham Coll. / 1910-427 Type'; [2] '19073 ♂ / 1974 GD / (printed) EUPARAL'.

Key to the species groups of Afrotropical *Phyllonorycter* based on male genitalia*

1. Tegumen trilobed (with two lateral appendages) (Figs 191, 198). . . . . *grewiaecola* group
– Tegumen simple, without lateral appendages 2
2. Tegumen reduced, truncate, short, shorter than sternum VIII; tuba analis not protruded. 3
– Tegumen ca. as long as sternum VIII or longer or tuba analis protruded 4
3. Saccus slender, strongly folded on the junction with vinculum, transtilla reactangular, aedoeagus shorter than valva (Figs 224, 227, 230, 231, 234) . . . . . *leucaspis* group
– Saccus straight, transtilla with broader and thicker lateral sides, aedoeagus long, ca.1.5× longer than valva (Figs 275, 277) . . . . . .*ruwenzori* group
4. Valva narrow, slender and long, more than 25× longer than broad. 5
– Valva broad, or has different shapes with appendages, of mid-length or short, less than 25× long than broad 9

5. Valva narrow, sinuated, cucullus narrow, apical 1/3 of valva densely setose, transtilla broad U-shaped; tegumen of medium length, tuba analis protruded almost as long as length of tegumen, vinculum broad, crescent, saccus short, sternum VIII with small notch caudally (Fig. 237, 239). . . . . *loxozona* group
– Valva straight or slightly bent, but not sinuated 6
6. Valva narrow, slender but with an enlarged cucullus; transtilla narrow, U-shaped; tegumen very long, almost as long as valva; saccus short, extended (Figs 176, 179) . . . . . *agassizi* group
– Valva narrow slender along all its length or with acuting apex 7
7. Valva about as broad basally as apically, straight; transtilla butterfly-shaped with thick lateral sides; tegumen truncate at apex; vinculum triangular shaped, saccus not extended; aedoeagus broad at coecum and very slender at vesica (Figs 182–184). . . . . *chionopa* group
– Apex of valva acute, sharp or bearing a sharp spine at narrow apex 8
8. Valva bent ventrad, with sharp acuting apex, no spines; transtilla complete, arc-shaped, narrow, tegumen of mid-length, basally ca. as long as broad (Fig. 221) . . . . . *lemarchandi* group
– Valva gently acuting towards slightly rounded apex, apex bears a sharp spine; transtilla incomplete; tegumen long, ca. 3× longer than broad basally (Figs 170, 171) . . . . . *achilleus* group
9. Valva with flap or weakly sclerotized digitate projections or appendices 10
– Valva without ventral projections, may bear a spine subapically 11
10. Valva with digitate projection on cucullus, bifurcated; saccus short, shorter than width of vinculum (Fig. 173) . . *adderis* group
– Valva with ventral or basal projections and appendices; saccus of mid-length, longer than sternum VIII, or very long (Figs 185–190, 257–274) . . . . . *encaeria* group, *rhynchosiae* group
11. Valva with sclerotized suture on its ventral surface (Figs 206, 208, 211, 214). . . . . *hibiscina* group
– Valva without suture on its ventral surface 12
12. Valva with enlarged, gently rounded apical part, no special projections at apex, lacking spines and/or bristles 13
– Valva broad basally, attenuate apically, with or without triangular small projection at apex, with bristles and/or spine. 14
13. Saccus very long ca. 2× longer than valva (Figs 254–256) . . . . . *obandai* group
– Saccus ca. 2× shorter than valva (Fig. 252) . . . . . *melhaniae* group
14. Sternum VIII very big, broad also apically, deeply bifurcated caudally (Figs 202, 205). . . . . *grewiella* group
– Sternum VIII sharply acuminating caudally or gently acuminating, with more or less rounded apex attaining very shallow, tiny cleft 15
15. Saccus slender, extended, cylindrical shaped (Figs 240–251) . . . . . *melanosparta* group
– Vinculum broad, saccus is not differented from vinculum (Fig. 217) . . . . . *jabalshamsi* group

* Males of the *gato*, *hibiscola*, *mida*, *silvicola* and *umukarus* groups are unknown.

Key to the species groups of Afrotropical *Phyllonorycter* based on female genitalia*

1. Anterior apophyses replaced by sterigmatic appendices (Figs 333–335). . . . . *melanosparta* group
– Anterior apophyses present 2
2. Posterior, anterior apophyses and sterigmatic appendices present (Figs 312, 313) . . . . . *grewiaecola* group
– Posterior and anterior apophyses present, sterigmatic appendices absent 3
3. Ductus bursae sharply sinuoid at initial part, corpus bursae, big, long, broad, cylindrical, without signum (Figs 328–330) . . . . *leucaspis* group
– Ductus bursae without sharply sinoid curve at initial part, but straight, corpus bursae of different shapes, with or without signum 4
4. Sterigmatic cuticle sclerotization on segment VII fold-shaped or arch-shaped 5
– Sterigmatic cuticle sclerotization on segment VII absent or tube-shaped (antrum appressed to segment VII) 12
5. Corpus bursae without signum 6
– Corpus bursae with signum. 8
6. Anterior margin of segment VII ringed with strong sclerotization (Fig. 323) . . . . . *hibiscola* group
– Anterior margin of segment VII without sclerotized ring. 7
7. Cuticle heavily wrinkled at subposterior sector of segment VII (Fig. 311) . . . . . *gato* group
– Cuticle smooth at subposterior sector of segment VII (Figs 307–310). . . . . *encaeria* group
8. Anterior margin of sterigmatic fold convex, signum spine-like, located on corpus bursae close to anterior margin of segment VII (Fig. 350) . . . . . *silvicola* group
– Anterior margin of sterigmatic fold not separated from cuticle of segment VII, signum band, or stellate located in the median part of corpurs bursae or caudally 9
9. Lamella post-vaginalis attain a complex, highly sclerotized structure, covered with aggregation of spines (Figs 338, 339) . . . . *mida* group
– Lamella post-vaginalis small, contains other structure than aggregation of spines or imperceptible. 10
10. Ostium bursae with highly sclerotized margin; corpus bursae with signum area covered with fine short spines and a stellate signum (Figs 342–348) . . . . . *rhynchosiae* group
– Ostium bursae without sclerotized margin, corpus bursae with long (bar-, rod-, needle-shaped) signum or no signum 11

11. Sterigma enlarged and thick posteriorly, smooth signum area diamond shaped, with a needle-like sclerotized signum crossing the signum area (Fig. 351). . . . . *umukarus* group
– Sterigma narrow but strongly sclerotized arc-shaped suture, corpus bursae with band-like signum covered with short spines (*P. dombeyae* without signum) (Figs 316–318, 320–322) . . . . . *hibiscina* group
12. Ostium bursae opens at or close to posterior margin of segment VII 14
– Ostium bursae opens close to anterior margin of segment VII 13
13. Sterigma small, M-shaped situated at subanterior sector of segment VII, ductus bursae very long running along entire abdomen of moth, corpus bursae mall, slender without signum (Figs 340, 341) . . . . . *obandai* group
– Anterior apophyses very short, initiate at anterior margin of segment VIII, ostium bursae opens at anterior margin of segment VII, sterigmatic cuticle sclerotization on segment VII absent (Fig. 305) . . . . . *achilleus* group
14. Signum located at posterior sector of corpus bursae close to incerption of ductus bursae to corpus bursae 15
– Signum located at median/caudal sector of corpus bursae or no signum on corpus bursae 17
15. Posterior part of sterigmatic appendage loose, appresed but not fused with cuticle of segment VII (Figs 336, 337) . . . . . *melhaniae* group
– Sterigmatic plate or cuticle aberrations absent 16
16. Signum plate round, crossed by slender, dentate signum (Fig. 324). . . . . *jabalshamsi* group
– Signum heavily sclerotised area with sharp and thick small spines (Fig. 349). . . . . *ruwenzori* group
17. Ductus bursae short, corpus bursae located in segment VI (Figs 325, 326) . . . . . *lemarchandi* group
– Ductus bursae long, corpus bursae located anterad segment VI 18
18. Antrum well developed, melanized, tube shaped, broader than girth of ductus bursae (Figs 331, 332) . . . . . *loxozona* group
– Antrum not differentiated from ductus bursae 19
20. Posterior apophyses ca. 2× longer than anterior apophyses (Fig. 314). . . . . *grewiella* group
– Posterior apophyses ca. as long as anterior apophyses (Fig. 306) . . . . . *chionopa* group

* Females of the *adderis* and *agassizi* groups are unknown.

The *achilleus* group

The *achilleus* group includes a single species, *P. achilleus*. This species is placed in its own species group because its wing pattern and male genitalia characters are like no other *Phyllonorycter.* Adults belonging to the *achilleus* species group can be distinguished by a forewing pattern unique among African *Phyllonorycter*: very long basal streak, slightly shorter than 1/2 of the forewing length, semiround basal dorsal patch, narrow oblique costal and dorsal strigulae and three small narrow straight costal strigulae in apical sector of forewing. Male genitalia are distinguished by a narrow valva bearing a large sharp spine at cucullus, an incomplete transtilla, a broad vinculum without an extended saccus, a very long tegumen, and a long and narrow sternum VIII. Female genitalia lack a developed sclerotized sterigma, the posterior apophyses are broad basally and slender distally, the anterior apophyses are short, originating at the anterior margin of segment VIII, the ostium bursae opens in the anterior portion of segment VII, and the corpus bursae has an oblonge, weakly sclerotized signum area bearing a signum. Larvae of the *achilleus* species group feed on Rosaceae.

13. *Phyllonorycter achilleus* De Prins, new species

(Figs 38, 170–172, 305, 367, 441)

Diagnosis. Cannot be confused with any other of the Afrotropical *Phyllonorycter* species, superficially resembles some of the Palaearctic species feeding on *Prunus*, but external morphology and genitalia are very unique.

Holotype: ♂, [1] '**Kenya,** Rift Valley / m. *Prunus africana* / Turi, 8000 ft., / e. m. 16.x.1999 / [leg.] D. J. L. Agassiz; [2] Gen. Prep. 3500♂ / De Prins; [3] MRAC/KMMA / 00381, specimen ID: [4] 'RMCA ENT 000003125', [5] 'Holotype ♂ / *Phyllonorycter* / *achilleus* / De Prins, 2012', in RMCA.

Paratype: ♀. **Kenya:** Kakamega Forest, 1575 m, 00°20'N 34°52'E, 01.iv.2003, leg. J. & W. De Prins, gen. prep. De Prins 3632♀ (MRAC/KMMA 00380), specimen ID: RMCA ENT 000003265, in RMCA, DNA voucher CLV12907, in CCDB.

Description. *Adult* (Fig. 38). Forewing length: 4.3 mm of male (holotype) and 3.2 mm of female (paratype).

Head: Vertex tufted orange-ochreous, some lighter yellowish hairs in posterior part, frons shiny white. Labial palpus light fuscous, almost whitish, drooping, 1.5× longer than eye. Maxilary palpus golden ochreous; proboscis yellowish beige. Antennae a little shorter than forewing, ochreous above, greyish ochreous towards terminal part,

white beneath; flagellomeres a little darker in their posterior half, but not clearly ringed, pedicel short with whitish anterior and ochreous posterior halves; scape brownish dorsally, white ventrally, pecten short, cilia-like, whitish-ochreous, as long as scape and shorter.

Thorax: Golden-ochreous; lateral sides white, narrow white median line, tegulae orange-ochreous, some white scales towards thorax. Fore wings elongate, ground colour orange-ochreous with shiny white and dark brown pattern, consisting of white basal streak, basal patch, 4 costal and 4 dorsal shiny white strigulae, finely edged with dark brown scales basally. Basal streak slightly longer than 1/3, finely edged with dark brown at costal margin and around proximal part of basal streak; first costal strigula a little closer to apex than first dorsal strigula, narrow, oblique, turned towards apex; second, third, and fourth costal strigulae small, narrow, straight, parallel and of equal size; dorsal patch shiny white, semi-circular on dorsum between base and first dorsal strigula, edged with dark brown scales, first dorsal strigula narrow, oblique, proximal end with dark brown edging elongate in median area of dark brown scales extending to dark brown-blackish apical spot, a small whitish golden stripe consisting of only few scales borders apical spot; second dorsal strigula triangular, shiny white; third and fourth dorsal strigulae very small, inconspicuous, consisting of only a few white scales; termen a little darker than wing ground colour; fringe light fuscous. Hind wings narrow, elongate, pointed, ground colour fuscous, fringe fuscous. Fore femur and tibia dark brownish grey on upperside, light grey on underside, tarsomere I brownish grey with lighter tip above, tarsomeres II–V brownish grey; mid-and hind legs dark unicolours, ochreous-grey on upperside, lighter than fore legs, light grey on underside; mid-tibia with one pair of ochreous-greyish spurs, outer spur half as long as inner one; hind tibiae with two pairs of ochreous-greyish spurs, outer spurs half as long as innes ones; tarsomeres ochreous-greyish, a little darker on uppersides, hind tarsomeres in female slightly lighter than hind tibia.

Abdomen: Dark greyish fuscous above, a little lighter towards proximal end, underside lighter greyish. Descaled sternum VIII in males long, narrow with rough margins, gently rounded at apex.

Male genitalia (Figs 170–172). Tegumen moderate, lightly membranous, without setation, apex slightly bifurcate. Valvae symmetrical, valva slender, ca. 750 µm long, broadest just before middle, narrower towards base, gently tapering beyond middle, apical third with parallel sides, slightly curved ventrally; central area finely haired, hairs pointed towards base; two long, slender bristles on ventral side before apex, assemblage of strongly sclerotized, short, sharp ended dental macrochaetae in preapical area, a strong, well-chitinized hooked spine at apex, almost as long as greatest valva width, slightly curved dorsally. Transtilla incomplete. Vinculum small, triangular. Saccus as very short semi round appendix visible only at 250× magnification. Aedoeagus shorter than valva, 4/5 of valval length, slender, straight, vesica slightly curved, ending in narrow, projection. One very long cornutus, about 1/2 of aedoeagus length, and rather broad located close to coecum, at ca. 1/2 of aedoeagus diameter.

Female genitalia (Fig. 305). Papillae anales wide, semi rounded compressed postero-anteriorly, overlapping each other laterally; covered with round tubercules and long slender setae-like hairs around basal margin; a narrow, but strongly sclerotized line borders base of each papilla anales. Posterior apophyses, moderate runing up to anterior margin of segment VIII, abuting to each other with their tips, basal half about twice thicker than distal half, with sudden transition from thick basal half to very slender and narrow distal half at middle of apophyses posteriores. Segment VIII, moderate, anterior half lightly more sclerotized than posterior half, very weakly connected with bases of papillae anales. Anterior apohyses half shorter than posterior apophyses, starting at anterior margin of segment VIII, without broadened bases or any sclerotized connection with sternum VIII, straight, narrow, parallel to each other with sharp apices, reaching posterior 1/3 of segment VIII only. Segment VII very long, almost parallel sided, sclerotized. Ostium bursae located at anterior margin of segment VII, sterigmatic cuticle sclerotizations not developed. Antrum very short, tubular, straight, ductus bursae very short, broad, weakly sclerotized. Ductus seminalis arising from anterior end of ductus bursae, very short, bulla seminalis small elongate sack, conspicuously smaller than corpus bursae; spermatheca located in segment VII, ductus spermathecae forming 11–13 coils having larger diameter before vesicle. Corpus bursae moderate, slightly rounded, but more or less sac-shaped, with a oblonged weakly sclerotized, smoothly edged, signum area with a diamond-like signum of 4 rays, of which one lateral marginal ray elongate, anterior ray asymmetrically bifurcate, other lateral and posterior marginal rays of signum of similar size: broad and very short.

Etymology. The species name is derived from the Greek mythological hero of the Trojan War Achilleus (Ἀχιλλεύς). This name also honours the late Achiel and Maria De Keyser for their kindness and favours to the author of this species.

Variation. Females of *P. achilleus* differently from males are smaller in wing span, background coloration of forewing is slightly lighter, hind tarsomeres pale brownish fuscous, whereas hind tarsomeres of males are darker.

Habitat. Tropical rainforest where Guineo-Congolian flora intermixes with savannah plants at altitudes above 1500 m (Fig. 441).

Host plant(s). Rosaceae: *Prunus africana* (Hook. f.) Kalkman.

Flight period. Adult specimens are recorded from two periods of the year: early April and mid-October.

Distribution (Fig. 367). Known only from two localities situated close to each other: the type locality at Albertine Rift, and from Kakamega Forest in western Kenya.

The *adderis* group

The *adderis* group includes one species, *P. adderis* De Prins, n. sp. The very different male genitalia prevents its confident placement in any of the other proposed species groups. The male genitalia have a deeply bifurcate valva, with highly asymmetrical cucullus and sacculus. The bifurcation probably is autapomorphy for this informal species group. The discovery of the female might help resolve its taxonomic placement. Larvae of *P. adderis* feed on Malvaceae.

14. *Phyllonorycter adderis* De Prins, new species

(Figs 39, 173–175, 368, 435, 444)

Diagnosis. *Phyllonorycter adderis* superficially resembles *P. acutulus* and *P. hibiscola.* However, the three species can be diagnosed by at least six external morphological characters (Table 2). Male genitalia of *P. adderis* possess deeply bifurcate valva with morphologically asymmetrical cucullus and sacculus, unique among Afrotropical *Phyllonorycter.*

TABLE 2. Diagnostic differences between *P. adderis*, *P. acutulus*, and *P. hibiscola*.

Species	FW length (mm)	Vertex	Apical spot on FW	FW ground color	FW fasciae	Spot on termen of FW
P. adderis	2.8–2.9	bright ochreus	present, small and round	bright intensive ochreus	narrow, aligned, distinctly margined	present
P. acutulus	3.5	pale beige ochreous	large, elongate, extending beyond midline of FW	pale beige ochreus	broad without distinct margins	absent
P. hibiscola	2.1–2.4	black	absent	bright intensive ochreus	medium broad, distinctly margined	absent

Holotype: ♂, [1] '**Rwanda /** Nyungwe N[ational] P[ark] 1800 m / 11 km N Uwinka / 02°25'S 29°09'E / mine 03.viii.2008 / leg. J. & W. De Prins'; [2] 'e. l. *Urena lobata* L. / [Malvaceae] / 17.viii.2008'; [3] 'Gen. Prep. 3750♂ / De Prins'; [4] 'MRAC/KMMA / 00462'; specimen ID: [5] 'RMCA ENT 000005052'; [6] 'DNA voucher / DP08032', in UM-SI; [7] 'Holotype ♂ / *Phyllonorycter* / *adderis* / De Prins, 2012', in RMCA.

Paratypes: 3♂ (including 1♂ genitalia preparation). **Rwanda:** 3♂, Nyungwe N[ational] P[ark], 1800 m, 11 km N Uwinka, 02°25'S 29°09'E, mine 03.viii.2008, leg. J. & W. De Prins, e. l. *Urena lobata* L. [Malvaceae] 18.viii.2008, 19.viii.2008, 21.viii.2008, specimen IDs: RMCA ENT 000005051, 000005053–000005054, gen. prep. De Prins 3749♂ (MRAC/KMMA 00461), in RMCA, DNA vouchers DP08033 and DP08034, in UM-SI.

Description. *Adult* (Fig. 39). Forewing length: 2.85–2.96 mm (n = 4).

Head: Vertex tufted, consisting of two sublateral bunches of piliform scales of different length, shorter ochreous with slight intermixtion of shiny golden piliform scales situated centrad, longer darker ochreous with brownish fuscous apical tips piliform scales situated at outer margins of vertex, occiput covered with short stiff piliform scales, projecting posteriorly; frons smooth, bearing broad, spade like appressed scales, white, with

metallic shine. Labial palpus slightly longer than eye, white with slight metallic gloss, drooping, terminal palpomere with pointed apex, directed downwards. Maxillary palpus small, dirty white with rounded apex; proboscis quite short but longer than labial palpus, bent, pale beige. Antenna almost as long as forewing, consisting of 36–37 flagellomeres, each flagellomere (except scape and pedicel) fuscous dorsally, and grey ventrally; pedicel slightly thicker but shorter than following flagellomere, fuscous ochreous; scape dark ochreous dorsally and golden ochreous ventrally with thick 7–8 pale beige pecten of different length, longest slightly longer than scape.

Thorax: Anteriormost 2 rows of scales ochreous, 2–3 subanterior rows greyish white, mid-sector and posterior sector ochreous; tegula light ochreous anteriorly with smooth transition to dirty white in posterior part. Forewing ground colour ochreous with white markings: two transverse fasciae, one costal and one dorsal strigulae and 2 strigulae at termen; basal streak very short, narrow, running parallel costa, not edged, first fascia at 1/4 of forewing, moderately broad, of equal width at costal and dorsal margins, with one slight curve directed towards apex subcostally, edged with two rows of black scales apically, second fascia at 1/2 almost a straight line crossing forewing with slight constricted central part, edged with 1–2 rows of black scales basally, first costal strigula at 3/4 of forewing, more or less rectangular shaped, bright white, almost reaching middle of forewing, edged with irregular row of black scales from both sides, first dorsal strigula at 3/4 of forewing, situated opposite first costal strigula, triangular-shaped with broad base, bright white, ending just before midline of forewing, distinctively edged with a row of black scales basally, and bordering area of black tip scales apically; Y-shaped area of black tipped scales irrorate termen, of first costal strigula from apical margin and extends to apical patch situated costa and broadly edged by 3–4 rows of black scales; apical patch brightly white, elongate, followed by an area of dark fuscous scales on apex of forewing; a second small terminal round brightly white patch present dorsad midline of forewing; termen area covered with ochreous-golden black tipped scales, tornus black transiting to black based fringe, fringe line long, running from apex, all around termen margin to tornus, fringe short pale beige at apex, short with ochreous shading along termen and long fuscous at tornus and along dorsum. Hindwing dark grey with long fringe of same shading as hindwing, increasing in length towards base of hindwing. Fore femur and fore tibia fuscous mottled with whitish, tarsomere I fuscous with greyish midden part and apex, tarsomere II pale grey at basal half and light fuscous at apical half, tarsomeres III–IV light fuscous, terminal tarsomere pale grey; mid-femur fuscous slightly mottled with white, mid-tibia fuscous with two elongate white patches of similar size, one at base and other at middle of tibia, apical spurs appressed, short, fuscous, with mottled white, apices shiny white**,** tarsomere I fuscous with two white patches basally and medially, and with smooth transition between colours, tarsomere II white, with dark grey apex, tarsomeres III–IV grey, terminal tarsomere dirty white; hind femur fuscous dorsally and whitish with silver shine ventrally, hind tibia fuscous with light ochreous shading at lateral sides with loosely appressed hairs; medial spurs of medium length, slightly less than 1/2 of tibial length, pale grey, apical spurs slightly longer than median spurs, grey mottled with white, tarsus dirty white with three dark fuscous irregular patches, tarsomere I fuscous with white median part, tarsomere II dark grey with whitish base, tarsomeres III–IV dark grey, tarsomere IV with white apex, terminal tarsomere white.

Abdomen: Dark fuscous dorsally, first two terga with metallic shine, genital terga with slight ochreous shading, ventrally sterna whitish with strong metallic shine; descaled sternum VIII well developed, spade shaped, ca. 220 µm in length, with broadly rounded caudal part.

Male genitalia (Figs 173–175). Tegumen long 340 µm (holotype), subconical, with truncate apex, sclerotized, apical part densely covered with numerous tiny, short, stiff cilia on dorsal and lateral surfaces, tegumenal arms narrow, long, bent as bow, confluent, forming a broad ark at middle of tegumen, tuba analis well perceptible, naked, not covered with cilia. Valvae symmetrical, long, bifurcate, with slender weakly sclerotized cucullus part and thick, heavily sclerotized sacculus part, sacculus 475 µm long, cucullus 365 µm long, non bifurcate median part 187 µm long, cucullus covered with tubercules bearing short bristly setae, apex of cucullus gently tapering, obtuse; sacculus area originating from a deep median longitudinal fold, extending from base of valva to beyond middle of valva to bifurcation; sacculus gently bent, apex of sacculus trapezoidal, tip of apex gently rounded at outer angle, and nearly perpendicular inner angle, basal ventral surface and apical ventral surface of sacculus covered with well spaced tiny tubercules bearing short bristly setae. Vinculum thick, crescent shaped, both caudo-lateral parts of vinculum form thick sclerotized folds articulating into a short saccus, saccus 75 µm long, truncate caudally. Transtilla complete, well developed, bent, arc-shaped, without lateral distal lobes. Aedoeagus ca. 380 µm long, about as long as cucullus of valva, S-shaped, with broad coecum, and with slightly enlarged caudal part of vesica, apex truncate, 2 small linear cornuti present on subcaudal part of vesica. Anellus well developed, hour-glass

shaped, lightly sclerotized, covering slightly more than 1/3 of aedoeagus; juxta developed, shaped as two narrow sclerotized triangular plates facing each other.

Female genitalia. Unknown.

DNA sequences. Three COI barcodes are available for *P. adderis* (Molecular sample code: Cadd1 [JX888175], Cadd2 [JX888176], Cadd3 [JX88177]; Table S1).

Etymology. The specific epithet is derived from the Latin word 'addere', meaning 'to append'. It refers to the long appendical cucullus on the valva.

Habitat. Montaine wet, closed canopy forest at an altitude of approximately 1800 m.

Host plant(s). Malvaceae: *Urena lobata* L. (Fig. 435).

Mine. Semi-transparent, tentiform underside mine, between veins of the leaf, usually on basal part of the leaf. Several mines can be present on one leaf.

Flight period. Adults have been recorded in August.

Distribution (Fig. 368). Known only from the type locality in southwestern Rwanda.

The *agassizi* group

The wing pattern of *P. agassizi* resembles that of *P. obandai*, however, the unusual male genitalia of *P. agassizi* argue against its placement in the *obandai* species group. We therefore tentatively place *P. agassizi* in its own species group. The valvae are very narrow with a long, unusually enlarged cucullus; the tegumen is very long; and the transtilla is strongly sclerotized and very narrow. Discovery of the female could clarify the taxonomic placement of the species. The larval host is unknown.

15. *Phyllonorycter agassizi* De Prins, new species

(Figs 40, 176–181, 369)

Diagnosis. The wing pattern of *P. agassizi* De Prins, n. sp., consists of a short, truncate oblique, strigulae and is unique among Afrotropical *Phyllonorycter*. Only five other species, *P. achilleus*, *P. chionopa*, *P. grewiella*, *P. lemarchandi*, and *P. obandai* lack a transverse fascia on the forewing. This is the only similarity between these species. The shape of the valva in is similar to that of *Cremastobombycia kipepeo*. But the strongly developed anellus in *C. kipepeo*, and generic differences between *Phyllonorycter* and *Cremastobombycia* do not suggest the grouping of those two species.

Holotype: ♂, [1] '**Kenya /** Ndoinet, 9000 ft / 20.xii.1998 / [leg.] D. J. L. Agassiz'; [2] 'Gen. Prep. 3490♂ / De Prins'; [3] 'MRAC/KMMA / 00655'; specimen ID: [4] 'RMCA ENT 000006146'; [5] 'Holotype ♂ / *Phyllonorycter* / *agassizi* / De Prins, 2012'; in RMCA.

Description. *Adult* (Fig. 40). Forewing length: 3.3 mm.

Head: Vertex tufted with dark brown piliform scales of different length, occiput with bunches of longer scales directed dorsolaterally, tufted white piliform scales of equal length with light ochreous bases distributed all over posterior sector of vertex and occiput, directed dorsolatery on lateral sector of vertex and dorsoposteriorly on median sector of occiput; frons smooth white with slight ochreous lustre ventrally, a bunch of ca. 3, long, flat, rectangular-shaped, shiny white scales directed ventroanteriorly on frontoclypeus, just lateroventrad of each antenna. Labial palpus slightly longer diameter of compound eye, white dorsally and fuscous along all palpomeres on outer margin laterally, drooping, directed lateroventrally, terminal palpomere with sharp apex, maxillary palpus white, proboscis with pale beige shading. Antenna slightly shorter than forewing, not ringed; flagellomeres dirty white fuscous-ochreous basally (slender dirty white and fuscous piliform longitudinal scales intermixing) with gradual darker fuscous shading towards apex dorsally; lighter, piliform scales more ochreous than fuscous with dark brown tips ventrally; scape long, almost as long as diameter of compound eye, dorsally dirty white at anterior 1/3, ochreous at midden 1/3, and pale beige at posterior 1/3, ventrally shiny white, with 8–9 long, slender, shiny, light ochreous pecten, slightly shorter than diameter of compound eye, pedicel as remaining flagellomeres.

Thorax: Dirty white on lateral margins, light ochreous on posterior margin, tegulae dark ochreous. Forewing elongate, ground colour fuscous brown, darker shading towards apical part due to more dense intermixtion of

darker brown scales; with white markings consisting of 5 costal strigulae, and 3 pale beige almost indisting dorsal strigulae; all strigulae are broadly edged basally with triangular shaped strigulae-like streaks of dark brown scales, which are clearly distinctive on dorsal margin of forewing; first costal strigula at 1/3 of forewing, straight, oblique towards apex, truncate rod shaped, just not reaching middle of forewing, edged basally with triangular patch of dark brown scales; second costal strigula at 1/2 at middle of forewing, parallell to first costal strigula but slightly longer, truncate, edged basally by narrow triangular patch of dark brown scales; third costal strigula shorter than first and second costal strigulae, less oblique toward apex, tapering caudally, thickly edged basally by 2–3 rows of dark brown scales; fourth costal strigula at subapex, comma shaped, clearly white, basally edged by narrow row of dark brown scales; fifth costal strigula white elongate patch at apex, surrounded by an irroration of dark brown scales; first dorsal strigula indistinct pale beige at 2/5, not directly opposite first costal strigula, but slightly moved towards apex, triangular shaped, not reaching middle of forewing, slightly oblique, basally edged with 2–3 rows of dark brown scales; second dorsal strigula opposite third costal strigula, indistinct, without regular shape, pale beige patch, basally edged with triangular shaped patch of dark brown scales, third dorsal strigula only few whitish scales at tornus, but tip of it forms a round small white patch, distinct in subapical sector of forewing; apical sector of forewing filled with a thick irroration of dark brown tipped scales, extended as a short apical fringe line; fringe short, dirty white from apex to tornus, and long, dirty white with some golden shine along dorsal margin. Hindwing silvery shiny pale beige; fringe very long, shiny, concolourous with hindwing, with slight intermixture of darker scales. Fore femur and fore tibia fuscous dorsally and dirty white ventrally, shiny, tarsomeres I and II dark fuscous with pale beige apices, tarsomere III pale beige with fuscous apex, terminal tarsomeres fuscous; mid-femur pale beige, mid-tibia dirty white with longitudinal dirty beige stripes, tibial spurs dirty white at basal half, and beige at apical half, tarsomeres light fuscous, with long irregular white patches at median part, gradual shading to lighter colouration towards caudal part of midleg, hind legs broken.

Abdomen: Dark fuscous ochreous dorsally with ochreus genital segments. Sternum VIII rather long, slightly tapering towards gently rounded caudal end; rough edged.

Male genitalia (Fig. 176–181). Tegumen as long as valva (760 µm), tegumenal arms narrow, sclerotized, abutting at 2/3, apical part conical, less sclerotized, with small, sharply pointed apex covered by tiny microchetae (visible at 250×) and no long setae. Valvae symmetrical, slightly concave basally, ca. 760 µm in length; narrow, gently tapering subcaudally, curved at subapex with significantly enlarged cucullus area, and terminating in extended short projection; ventral surface of valva from basal 1/4 to 3/4 bearing a slender suture and medial part covered with numerous long, slender, hair-like setae, subapical sector of valva nearly lacking setae (only 3–4 separate slender setae present); long, dense setae along margins of cucullus. Vinculum well developed, thick, sclerotized, broad V-shaped with short, slender, terminal process, 60 µm in length, elongate, with gently rounded caudal end, saccus projecting cephalad. Transtilla narrow, complete, sclerotized, arc-shaped. Aedoeagus long, 858 µm, slightly longer than valva, with enlarged basal part, tapering towards vesica; subcaudal sclerotized lateral part of aedoeagus bearing two short barbs, arranged longitudinally; vesica flexible, weakly sclerotized tip with three tiny barbs alligned in a horizontal row (visible at 250×).

Female genitalia. Unknown.

Etymology. The species is named after the collector of the holotype, David J. L. Agassiz, a microlepidopterist and active collaborator at the Natural History Museum, London. With their warm personalities, friendliness, and hospitality, David and Dorothea Agassiz have spent many years collecting and studying Microlepidoptera in East Africa and have helped to train many beginners in African insect biodiversity.

Habitat. East African savannah areas.

Host plant(s). Unknown.

Flight period. The specimen was collected in late December.

Distribution. (Fig. 369). Known only from the type locality in Kenya.

The *chionopa* group

The forewing pattern of *P. chionopa* is very distinctive: large white patches on bright yellowish ochreous background. Male genitalia are characterized by slender parallel sided valva, a butterfly-shaped transtilla, and the lack of an extended saccus. Female genitalia of this group have a reduced sclerotized sterigma, short anterior

apophyses which extend from the boundary between segment VII and VIII, ostium bursae opens at the boundary of segment VII and VIII. External and internal characters are very unique and thus, this species is placed in its own species group.

16. *Phyllonorycter chionopa* (Vári, 1961)

(Figs 41, 182–184, 306, 370)

Lithocolletis chionopa—Vári (1961: 223–224; pl. 20, fig. 6; pl. 106, fig. 4).
Phyllonorycter chionopa—Vári & Kroon (1986: 21, 136, 157), Dall'Asta *et al*. (2001: 33), Vári *et al*. (2002: 26), Triberti (2004: 81; fig. 6: A–C), De Prins & De Prins (2005: 280).

Diagnosis. The wing pattern with large white patches on a bright yellowish ochreous background is unique to this species. The male genitalia have a slender, parallel-sided, setose valva that bears a short spine dorso-apically; a well developed, laterally thickened transtilla; and a very short saccus that is not extended. This combination of characters does not occur in other *Phyllonorycter* species that have slender and parallel-sided valva.

Material examined. *Holotype*: ♀, [1] [**Namibia**] 'Abachaus, S[outh]. W[est]. A[frica]. / Oct[ober]. '44 / [leg.] G. Hobohm /'; [2] '*Lithocolletis* / *chionopa* / Vari/'; [3] 'G[enitalia] / 7727♀'; [4] '3238'; [5] '*Lithocolletis* / *chionopa* Vári / ♀ HOLOTYPE No 6496', in TMSA.

Additional material: 2♂ (including 1♂ genitalia preparation). **Namibia**: 1♂, Brandberg, Ugab, 30.xi.2000, LF leg. W. Mey'; *Phyllonorycter chionopa* Vari, det. P. Triberti (I/03); genit. prep. trb 2792, in ZMHB. 1♂, 'Brandberg, Nuwuarib Valley, 1100 m, 1-2.xii.2000, LF leg. W. Mey; *Phyllonorycter chionopa* Vari, det. P. Triberti (I/03), in ZMHB.

Redescription. *Adult* (Fig. 41). Forewing length: 3.0 mm.

Head: Vertex tufted with white piliform scales with a slight suffusion of yellow scales with golden shine; frons smooth, covered with long appressed piliform white scales. Labial palpus drooping, downturned, palpomeres pure white; maxillary palpus white; proboscis developed, light beige. Antenna slightly shorter than forewing, flagellomeres 1–4 whitish, remaining flagellomeres pale greyish.

Thorax: White, tegulae white with a few golden ochreous scales. Forewing elongate, ground colour golden yellow with white markings consisting of broad, irregularly shaped basal streak, two broad, costal, patch-like strigulae, and two dorsal patch-like strigulae; basal streak broadly ovoid, irregular margined, extending to 1/4 of forewing but not reaching costa or dorsal margin; first costal strigula at 1/2 of forewing, shaped as large triangular, extending slightly beyond midline of forewing; second dorsal strigula in apical area obliquely directed towards base, rod shaped, extending slightly beynd half of termen, with some white scales up to edge of termen; first dorsal strigula at 1/3 of forewing, crescent-shaped, ovally extended beyond half of dorsal margin, second dorsal strigula at 3/4 of forewing, smaller than first dorsal strigula, shaped as subtriangular, reaching almost midline of forewing; a small irregular white dot is present at tornus; all white markings on forewing are not edged; fringe pure white, longer at termen and shorter at dorsal margin. Hindwing uniformly white, fringe white with slight creamy shadow. Hindlegs white.

Abdomen: White. Sternum VIII of male elongate moderate, gradually tapering to rounded caudal apex.

Male genitalia (Figs 182–184). Tegumen very weakly sclerotized, conus shaped, tuba analis truncate, apically covered with tiny short, numerous setae. Valvae symmetrical, slender, parallel sided, directed straight laterally, cucullus area somewhat rounded with rounded apical angle at costal margin; short thick spine directed ventrally present on dorsal apical angle of valva; medial surface with long slender setation, which significantly increases towards apex, cucullus with rough bulb-like edging. Vinculum, broad, tapers towards saccus, saccus not projecting. Transtilla strongly sclerotized, narrowed at mid-bar thickened at lateral sides; anellus developed, slightly sclerotized. Aedoeagus slightly longer than valva, broad and straight at coecum, then abruptly becomes slender and sinuous at vesica.

Female genitalia (Fig. 306). Papillae anales laterally compressed, triangular, twice as broad dorsally than ventrally, covered with short fine setae; basal bar strongly sclerotized, narrow, circling posterior margin of segment VIII. Posterior apophyses sclerotized, slender, slightly broader at bases, reaching posterior margin of segment VII, apices sharply long pointed. Segment VIII weakly sclerotized, connected dorsally and ventrally. Posterior margin of segment VII is stronger sclerotized than anterior parts of segment VII. Anterior apophyses short, about half

shorter than posterior apophyses, very slender with sharp apices, straight, initiating without basal plate. Ostium bursae situated at posterior margin of segment VII. Sterigmatic sclerotizations of cuticle not developed, antrum not sclerotized. Ductus bursae and corpus bursae are missing in preparation.

Habitat. Sandy floodplain, rocky slopes along dry river bed with dominant trees as *Acacia montis-usti* and *Commiphora* sp. (Mey 2004: 10).

Host plant(s). Unknown.

Flight period. Vári (1961: 224) mentions the collecting date of the holotype as "December 1944". However, the label under the holotype specimen indicates the collecting date as "Oct[ober] [19]44". Adults are probably on the wing from October (the collection date of the holotype) to late November–early December (Triberti 2004).

Distribution. (Fig. 370). Recorded only from a few localities in Namibia (Vári 1961; Triberti 2004).

The *encaeria* species group

The *encaeria* species group consists of three species: *P. encaeria* (Meyrick, 1911), *P. lantanae* (Vári, 1961) and *P. kazuri* De Prins, n. sp. The *encaeria* species group shares some similarities to the *rhynchosiae* species group. Species of both groups possess a few synapomorphies: more or less flap-like projection(s) on ventral margin of valva in male genitalia, a large cuticle fold of sterigma occupying a significant area of segment VII, and a needle-like projection in female genitalia. But the species of the *encaeria* species group differ from the *rhynchosiae* species group in that their corpus bursae does not carry signa. Wing pattern in the *encaeria* species group is not readily distinguishable, however these species possess a sharply angulated fascia in the middle of forewing which can be interrupted, two oblique strigulae are located opposite to each other, and a white apical patch / strigula. Wing pattern does not provide characteristic features that can readily distinguish species within the group. Dissections of genitalia also do not provide sufficient diagnostic differences among species within the *encaeria* species group. Thus, only males can be used to diagnose species within the group and female genitalia can only provide an easy noticeable diagnostic character separating the *encaeria* species group from the *rhynchosiae* species group. The male of *P. lantanae* is unknown. Larvae of the *encaeria* species group (*P. lantanae*) feed in infra tentiform mines on leaves of Verbenaceae plants.

The male genitalia in the *encaeria* group are characterized by a parallel sided valva with rounded cucullus with a broad flap-like, weakly sclerotized projection on ventral margin. Transtilla strongly sclerotized with long proximal arms, saccus of medium length, slightly longer than sternum VIII, aedoeagus of medium length, slightly longer than saccus.

The female genitalia are characterized by fold-shaped sterigmatic sclerotization, sharp needle-like projection initiating at the bases of posterior apophyses, ductus bursae slender in girth, moderate or small corpus bursae without signum.

Key to species of *encaeria* group based on external characters

1. Forewing with two fasciae 2
– Forewing with one angulated fascia or has only oblique strigulae (Figs 45, 46) . . . . . 19. *lantanae*
2. Thorax entirely ochreous (Figs 42, 43) . . . . . 17. *encaeria*
– Thorax golden ochreous with white lateral margins (Fig. 44) . . . . . 18. *kazuri*

Key to males of *encaeria* group based on genitalia*

1. Ventral margin of valva with harp-like projection subcaudally (Fig. 185) . . . . . 17. *encaeria*
– ventral margin of valva with long broad flap-like projection extending along entire ventral margin of valva (Fig. 188) . . . . . 18. *kazuri*

* male genitalia of *P. lantanae* unknown.

Key to females of *encaeria* group based on genitalia

1. Posterior apophyses as long as anterior apophyses, more or less straight, antrum weakly sclerotized (Fig. 307) . . . 17. *encaeria*
– Posterior apophyses ca. 1.5× as long as anterior apophyses, posterior apohyses slightly bent in the middle, antrum well sclerotized (Figs 308–310) . . . . . 19. *lantanae*; 18. *kazuri**

* *P. lantanae* and *P. kazuri* can be separated by external characters (see diagnosis), male of *P. lantanae* unknown.

17. *Phyllonorycter encaeria* (Meyrick, 1911)

(Figs 42, 126, 185–187, 307, 371)

Lithocolletis encaeria, n. sp.—Meyrick (1911: 234).
Lithocolletis encaeria—Vári (1961: 215–216; pl. 23, fig. 2; pl. 65, fig. 6; pl. 104, fig. 7).
Phyllonorycter encaeria—Vári & Kroon (1986: 32, 136, 157), Dall'Asta *et al*. (2001: 33), Vári *et al*. (2002: 26), De Prins & De Prins (2005: 291).

Diagnosis. *Phyllonorycter encaeria* can superficially be separated from *P. lantanae* by forewing pattern and markings on hindlegs: basal white marking in *P. encaeria* appears as an oblique fascia, whereas in *P. lantanae* the basal white marking appears as an oblique dorsal strigula, which can vary in length. Hind tarsomeres I–III in *P. encaeria* with faint fuscous subapical patches, in *P. lantanae* hind tarsomeres I–III with dark fuscous halves. *Phyllonorcyter lantanae* and *P. kazuri* differ in female genitalia by the ratio of posterior / anterior apophyses. In *P. encaeria* this ratio is ca. 1 and in *P. lantanae* and *P. kazuri* this ratio is ca. 1.5.

Material examined. *Holotype*: ♂, [1] [**South Africa**] ‘Pretoria / 8.x.1906 / A. J. T. Janse’; [2] ‘19’; [3] ‘6/47’; [4] ‘G[enitalia] / 4156’; [5] ‘*Lithocolletis / encaeria* / 641’; [6] ‘*Lithocolletis / encaeria* M. / Type No. 361’, in TMSA.

Additional material: 5♀ (including 5♀ genitalia preparations) and 4 specimens. **South Africa**: 1♀, Pretoria district, Grove Fount, 04.i.1911, leg. C. J. Swierstra, gen. prep. LV 7505♀, in TMSA. 3♀, Pretoria, 27.ii.1916, 13.xi.1918 and 04.x.1926, leg. A. J. T. Janse, gen. prep. Vári 3393♀, 4131♀, 7504♀, wing venation slide Vári 1595, in TMSA. 1♀, Pretoria, 20.ix.1951, leg. L. Vári, G[enitalia] 7502♀, *Lithocolletis encaeria* Meyrick; ♀ METALLOTYPE No 6378, in TMSA. 2 specimens, Pretoria, 05.ii.1913 and 28.ii.1916, leg. A. J. T. Janse, in TMSA. 1 specimen, Pretoria, Willow Glen, 02.v.1985, leg. L. Vári, in TMSA. 1 specimen, Pretoria, Zoutpan, 4–10.ii.1929, leg. G. van Son, in TMSA.

Note: Vári (1961) frequently used the term "metallotype" to indicate the first specimen of the opposite sex to the holotype, but which was not included in the original type series, in order to distinguish it from the allotype. That term was introduced by Munro (1957), but it is not recognized by the International Code of Zoological Nomenclature. We retain it anyway in quoting the labels as it gives extra information.

Redescription. *Adult* (Figs 42, 43, 126). Forewing length: 2.3–2.5 mm.

Head: Vertex tufted ochreous, with some white piliform scales posteriorly; frons white. Labial palpus whitish. Antenna slightly shorter than forewing; flagellomeres with apical third dark fuscous dorsally, whitish ventrally; scape light ochreous.

Thorax: Shiny ochreous. Forewing elongate, ground colour ochreous with white markings consisting of very short basal streak, two fascia, two costal strigulae and one dorsal strigula;basal streak very short without edging, first fascia at 1/4, oblique directed toward apex, slightly angulated near costa, not edged; second fascia at 1/2, angulated at midline of forewing, edged basally with a few black scales; first costal strigula at 3/4, triangular shaped, reaching midline of forewing, first dorsal opposite first costal, elongate triangular, reaching middle of forewing; first costal and first dorsal strigulae irregularly and sparsely edged with black scales; black scales concentrated in disc between first costal and first dorsal strigulae; second dorsal strigula triangular, located at apex; black scales dispersed along termen; fringe pale ochreous, beyond blackish median line ochreous whitish. Hindwing pale grey with fringe of same colour. Fore femur and tibia dark fuscous, tibia with tiny subapical lateral spot, tarsomere I fuscous with white base and apex, tarsomere II fuscous with basal white half, tarsomere III fuscous, tarsomere IV white; mid-leg mainly white, mid-tibia with two patches submedially and subapically, tarsomere I with fuscous patch subapically, tarsomere II with fuscous apex, tarsomere II with fuscous basal half, tarsomere IV white, tarsomere V dark fuscous; hind tibia with ochreous fuscous patch

laterally from mid-tibia to subapex, tarsomeres I–III with faint fuscous subapical patches, tarsomere V entirely fuscous.

Abdomen: Pale fuscous dorsally and pale grey ventrally. Segment VIII in males moderately long, truncate caudally.

Male genitalia (Figs 185–187). Tegumen rather short, sclerotized, bluntly rounded caudally, tuba analis not protruding. Valvae symmetrical, moderate, with almost parallel margins, slightly tapering apically with gently rounded cuculus, apical sector finely setose, ventral valval margin with wide, weakly sclerotised, extended harp-shaped projection; transtilla strongly sclerotized, narrow and slender; vinculum narrow, saccus very slender, slightly shorter than valva. Aedoeagus slender, 1.5× longer than saccus, slightly curved, tapering with vesica sharply pointed.

Female genitalia (Fig. 307). Papillae anales connected dorsally, flattened, weakly sclerotized, with sparse long setae; basal bar narrow but strongly sclerotized; a slender needle-like strongly sclerotized projection going from basal bar and reaching middle of segment VIII. Posterior apophyses slender, slightly bent in middle, a little bit broader at basal half, gently tapering reaching posterior sector of segment VII. Anterior apophyses almost as long as posterior ones, very gently curved, ending just before middle of segment VII. Ostium bursae located almost at posterior sector of segment VII, sterigma simple, membranous, anteriad ostium bursae forming sclerotized fold, which occupies anterior 1/3 of segment VII. Ductus bursae moderate, very slender, narrow. Corpus bursae moderate, membranous, no signum.

Variation. Fuscous patches on legs of *P. encaeria* can be very reduced (Vári 1961: 216).

Habitat. This species has been found in the urban area of Pretoria and Cape Town, South Africa.

Host plant(s). Unknown.

Flight period. Adult specimens were collected mainly during two periods: 1) early January–late February, and late September–mid-November.

Distribution. (Fig. 371). Recorded from Pretoria and suburbs of Cape Town, South Africa (Meyrick 1911: 234; Vári 1961: 216).

18. *Phyllonorycter kazuri* De Prins, new species

(Figs 44, 188–190, 308, 372, 438)

Diagnosis. According to wing pattern, *P. kazuri* is indistinguishable from *P. encaeria*, and hardly distinguishable from *P. lantanae*. However the thorax in *P. encaeria* is entirely golden ochreous whereas in *P. kazuri* it is golden ochreous with white lateral sides. *Phyllonorycter kazuri* differs in genitalia from *P. encaeria* by having a long wide, flap-like ventral projection of the valva that originates at the base and ends at the subcaudal part of the valva. The female genitalia of *P. kazuri* are not distinguishable from those of *P. lantanae*, but differ from *P. encaeria* by proportial length of posterior/anterior apophyses. In *P. encaeria* posterior apophyses are of ca. equal length with anterior apophyses, whereas in *P. lantanae* and *P. kazuri* posterior apohyses are 1/3× longer than anterior apophyses.

Holotype: ♂, [1] '**Kenya /** Tsavo National Park 530 m / Taita Discovery Centre / 03°40'S 38°45'E / 12.iv.2002 / leg. J. De Prins'; [2] 'Gen. Prep. 3661♂ / De Prins'; [3] 'MRAC/KMMA / 00348'; specimen ID: [4] 'RMCA ENT 000003276'; [5] 'DNA voucher / CLV14307', in CCDB; [6] 'Holotype ♂ / *Phyllonorycter* / *kazuri* / De Prins, 2012', in RMCA.

Paratype: ♀, **Kenya**: Tsavo National Park, 530 m, Taita Discovery Centre, 03°40'S 38°45'E, 12.iv.2002, leg. J. De Prins, gen. prep. De Prins 3521♀ (MRAC/KMMA 00393), specimen ID: RMCA ENT 000003283, in RMCA; DNA voucher CLV15007, in CCDB.

Description: *Adult* (Fig. 44). Forewing length: 2.1–2.2 mm.

Head: Vertex covered with tufted, dirty whitish, piliform mixed with ochreous scales; frons smooth, covered with long appressed white with slight golden shine, piliform scales, short yellowish pilifirm scales behind eyes. Labial palpus ca. as long as diameter of compound eye, straight, directed downwards, narrow, acuminating, pointed caudally; maxillary palpus porrect, small, white; haustellum moderate whitish beige. Antenna pale greyish slightly darker shading at apical 1/3, flagellomeres pale greyish with ochreous shading with dark grey apical part; pedicel pale greyish with darker apical part, same as following flagellomeres; scape ochreous with light apex and with 13–15 short whitish beige pecten.

Thorax: Golden ochreous with white lateral margins; tegula ochreous at anterior half and white at posterior half. Forewing golden ochreous with white markings consisting of short basal streak, two transverse, sharply angulated fasciae, two costal and one dorsal strigulae; basal streak short, just a small white patch at base of forewing, not edged; first fascia at basal 1/4, narrow, sharply angulated at subcostal area, finely black edged basally; second fascia at middle of forewing, narrow, sharply angulated at midline of forewing, finally edged with black scales basally; first costal strigula at 3/4, second costal strigula at apex, white irregular patch shaped, without clear edging, first dorsal strigula opposite first costal strigula. Hindwing pale beige with whitish golden fringe. Fore femur and fore tibia pale beige, tarsus with three white and three ochreous patches, tarsomere I ochreous basal half and white apical half, tarsomere II ochreous, tarsomere III white, tarsomere IV dark ochreous, last tarsomere white; mid-tibia white with three small ochreous patches: basically, in middle and apically, tibial spurs short, white, with ochreous bases. Hind femur and hind tibia white, medial and apical spurs white, tarsus white with a few light ochreous scales on apical parts of tarsomeres, tip of tarsus shiny golden.

Abdomen: Light ochreous dorsally, whitish ventrally. Sternum VIII of males short, ca. 100 µm long, with broad, truncate apex.

Male genitalia (Figs 188–190). Tegumen rather short, moderately sclerotized, sclerotized arms joining anterior apex, posterior area covered with numerous minute micro setae, apex gently rouded, tuba analis not protruding. Valvae symmetrical, valva rather broad, moderate, about 2× longer than eighth sternum, somewhat sparse ellipsoid shape with rounded apex, very slightly enlarged at base, slightly more than 3× as long as basal width, with very large ventral flat, slightly sclerotized, elongate projection, starting at valval base and ending at ventrosubapical margin at about 3/4 of total valval length; median surface of valva from basal 1/3 is covered with microspinules and tiny spines; both ventral and dorsal valval margins running as range of short pointed small spines and longer, slender hair like sparse setae more numerous but smaller size in apical area, projection without spines but covered with numerously with microspinules and short ventromarginal setae. Vinculum narrow, U-shaped, thickly sclerotized, especially laterally, slightly broadening caudally; saccus slender, 3/4 length of valve, ca. 150 µm, slightly broadening and gently rounded caudally. Transtilla well developed, strongly sclerotized, more or less H shaped, with proximal arms longer than distal, horizontal bar broad well sclerotized, slightly bended, shorter than vinculum. Aedoeagus about 1/3 longer than valva, ca. 260 µm, slender, cylindrical, slightly broader at coecum and gently tapering towards vesica; vesica with one elongate, very narrow, rod like with dental margin, weakly sclerotized cornutus (visible at 200× enlargement) about 1/3 total length of aedoeagus.

Female genitalia (Fig. 308). Papillae anales connected dorsally, rounded caudally, with long sparse setae; basal bar not developed; a slender needle-like strongly sclerotized projection expends from base of posterior apophyses. Posterior apophyses with triangular strongly sclerotized bases, slender, ca. 340 µm long, slightly bent in middle, a little bit broader at basal half, gently tapering reaching anterior sector of segment VII. Anterior apophyses slightly shorter than posterior ones, very gently curved, reaching anterior sector of segment VII. Ostium bursae located almost at posterior sector of segment VII, Sterigma simple, membranous, anteriad ostium bursae forming sclerotized fold, which occupies anterior 1/3 of segment VII. Ductus bursae moderate, very slender, narrow. Corpus bursae moderate, membranous, without signum.

DNA sequences. A COI barcode is available (Molecular sample code: Pkaz [JX888187]; Table S1).

Etymology. The specific epithet means ‘small and beautiful’ in Swahili.

Habitat. Savannah, at an altitude of approximately 500 m (Fig. 438).

Host plant(s). Unknown.

Flight period. The specimens were collected in mid-April.

Distribution. (Fig. 372). Known only from the type locality in eastern Kenya

19. *Phyllonorycter lantanae* (Vári, 1961)

(Figs 45, 46, 127, 309, 310, 373)

Lithocolletis lantanae—Vári (1961: 214–215; pl. 23, fig. 1; pl. 104, fig. 5).

Phyllonorycter lantanae—Vári & Kroon (1986: 48, 136, 157), Kroon (1999: 42, 107), Dall’Asta *et al*. (2001: 34), Vári *et al*. (2002: 26), De Prins & De Prins (2005: 311).

Diagnosis. *Phyllonorycter lantanae* is closely related to *P. encaeria* and *P. kazuri*, but can often be diagnosed by the white costal dot at 1/4 of forewing, broad costal part of first fascia and dark brownish patch between first costal and second dorsal strigulae. Thorax in *P. lantanae* is entirely ochreous, whereas in *P. kazuri* it is white laterally. Very long and slender posterior apophyses, longer than anterior apophyses in *P. lantanae* and smaller cuticle fold of sterigma can separate this species from *P. encaeria*, but not from *P. kazuri*.

Material examined. *Holotype*: ♀, [1] [**South Africa**] 'Louis Trichardt / 20.iv.1955 / L.[ajos] Vári / Ac.[quisition] no: 1575'; [2] '15'; [3] 'G.[enitalia] / 7548'; [4] '*Lithocolletis / lantanae* Vári / ♀ HOLOTYPE No 6377', in TMSA.

Additional material: 1♀ (including 1♀ genitalia preparation).

Kenya: 1♀, Rift Valley, Gilgil, 2100 m, 00°32'S 36°22'E, 26.xi.2005, leg. D. J. L. Agassiz, gen. prep. De Prins 3703♀, in BMNH; DNA voucher CLV15907, in CCDB.

Redescription. *Adult* (Fig. 45, 46, 127). Forewing length: 1.9 mm.

Head: Vertex tufted with ochreous, piliform scales; frons pale fuscous golden. Labial palpus pale greyish. Antenna slightly shorter than forewing, flagellomeres with apical dark fuscous halves dorsally, and greyish ventrally; scape whitish anteriorly and fuscous posteriorly, pecten whitish.

Thorax: Thorax and tegula ochreous golden. Forewings ochreous golden with following white mrkings: costal dot, one fascia, 2 costal strigulae, 2 dorsal strigulae and some black scales in apical area; first dorsal strigula at 1/4, oblique toward apex, reaching midline of forewing, indistinct; costal dot at 1/3, edged with blackish scales; angulated fascia at 1/2, sharp angle anterior to middle of forewing, twice as broad at costal sector than at dorsal sector, finely edged along both margins; first costal strigula at 3/4 triangular shape, not reaching midline of forewing, finally edged basally; second dorsal strigula opposite first costal strigula, slightly curved toward apex, not reaching midline of forewing, edged basally, second costal strigula at apex; white dot at tornus; a small patch of blackish scales present between first costal and second dorsal strigulae; a few black-tipped scales dispersed in apical area; fringe pale ochreous around apex, termen to tornus, pale fuscous along dorsal margin. Hindwing and fringe pale fuscous. Fore leg dark fuscous, tibia with a tiny, white postmedian and apical dot on outer side, tarsomeres I–II fuscous with white bases, tarsomere III dark fuscous, tarsomere IV dirty white, tarsomere V fuscous; mid-tibia whitish with basal halves dark fuscous and a subapical dark fuscous patch, tarsomeres I–II with dark fuscous apices, tarsomere III with dark fuscous base, tarsomeres IV–V entirely dark fuscous; hind femur with faint median fuscous patch, hind tibia with a fine fuscous line subbasally and a dark fuscous patch from middle to near apex on outer side, hind tarsomere I with subbasal and subapical dark fuscous patches, tarsomere II with dark fuscous apical half, tarsomere III with dark fuscous basal half, tarsomere IV dirty white, tarsomere V entirely dark fuscous.

Abdomen: Greyish fuscous dorsally and whitish ventrally.

Male genitalia. Unknown.

Female genitalia (Figs 309, 310). Papillae anales triangular, almost twice as long as wide, ca. 75 µm, connected laterally with their bases and free at apical part, finely setose externally, with long lateral and apical setae (ca.115 µm long) and shorter setae (ca. 80 µm long) randomly scattered in middle portion of papillae anales; basal bar not sclerotized, a slender, needle-like, weakly, sclerotized projection ca. 145 µm long extending from posterior margin of segment VIII to middle of segment VIII. Posterior apophyses with small and strongly sclerotized triangular bases, very long (440 µm), slender, slightly broadenened at middle, shaply narrowing towards apices, almost parallel, gently approaching to each other at apical part, strongly sclerotized, sharply pointed, running well into anterior sector of segment VII. Anterior apophyses 1.2× (in holotype) and 1.4× (in additional specimen) shorter than posterior apophyses (298 µm in length), almost reaching anterior margin of segment VII. Ostium bursae circular, located at posterior margin of segment VII. Antrum thickly sclerotized posteriorly as thick wall tube; sterigma occupies median part of segment VII, as sclerotized triangular shaped fold. Ductus bursae weakly melanized. Corpus bursae small, mebraneous, without signum (Vári 1961: 215), but not perceptible in holotype slide 7548♀ of holotype preparation. In additional specimen ductus bursae slender elongate, with smoothly transition from ductus bursae to narrow sack shaped corpus, rounded caudally. Bulla seminalis nearly as large as corpus bursae, slender similar shaped as corpus bursae, ductus seminalis long, narrow, broadened at junction with ductus bursae. Ductus spermathecae as broad, one curve situating tube for about half its length, terminating in 11–13 small convolutions; vesicle round ball-shaped, relatively large.

Variation. We have noticed a difference in ratio of length of posterior apophyses / anterior apophyses, proportional size of sterigmatic fold, less sclerotized antrum, presence of small sclerotized ring on outer margin of ostium bursae and some other slight differences in female genitalia comparing to the females from South Africa and the female RMCA ENT 000003292 collected in Kenya. It might be a new species from the *encaeria* group, but until males of *P. lantanae* from the type locality and from Kenya are unknown, and the DNA barcode of the *P. lantanae* holotype is not studied, we consider that the observed slight morphological differences fall into the intraspecific variation range of the *P. lantanae* species due to the significant geographical distantance between the populations.

DNA sequences. A COI barcode is available (Molecular sample code: Plan [JX888188]; Table S1).

Habitat. The mine of *P. lantanae* was collected in the bushland area in South Africa. The second specimen was attracted to light at 2100 m.

Host plant(s). Verbenaceae: *Lantana*, presumably *L. rugosa* Thunb.—Vári 1961: 215; Dall'Asta *et al*. 2001: 34.

Lantana sp.—Kroon 1999: 42, De Prins & De Prins 2005: 311.

Mine. A moderate, irregular, oblong semi-transparent, tentiform underside mine with three folds; fine black frass are loose throughout the mine, part of it are used to cover the pale ochreous whitish cocoon; exuvium protrudes epidermis of a leaf before adult emerges (Vári 1961: 218, De Prins & De Prins 2005: 331). The mining period is ca. 16 days (Vári's note No 1575 in the manuscript notebook of 04/04/1955).

Flight period. Two specimens are known hitherto. The holotype was reared from a mine collected on 04 April 1955 and the second specimen was attracted to light 50 years later, on 26 November 2005. Adults fly presumably in mid-April in southern Africa and in late November in the areas round the equator.

Distribution. (Fig. 373). Recorded from one locality in South Africa (Vári 1961: 215) and one locality in Kenya (**new record**).

The *gato* group

The *gato* group includes one species, *P. gato* De Prins n. sp. *Phyllonorycter gato* cannot be placed in any of the other species groups because it has very unique female genitalia. The anterior apophyses are situated at the posterior margin of segment VIII, antrum broad, sclerotized, sterigma are well developed, arc-shaped, wrinkled, and corpus bursae lacks any signa.

20. *Phylonorycter gato* De Prins, new species
(Figs 47, 311, 374, 444)

Diagnosis. This new species can superficially be confused with *P. adderis* and *P. ipomoellus*, however the distinct margin of the second fascia (only present on the proximal side), separates *P. gato* from *P. ipomoellus*. In *P. ipomoellus*, the second fascia is bordered from both sides by a slender row of black scales. *Phyllonorycter gato* can be separated from *P. adderis* by the straight and unbordered first fascia whereas in *P. adderis* it is oblique and boldly margined. Female genitalia are distinctive from all other Afrotropical *Phyllonorycter* species by the combination of the following features: posterior region of anterior apophyses are positioned at the posterior margin of segment VIII, ostium bursae ringed with tubular sclerotized margin, antrum broad and sclerotized, sterigma well developed, arc-shaped, strongly wrinkled sclerotized suture (small fold) occupying almost all surface of sternum VII, and lack of signum on corpus bursae.

Holotype: ♀, [1] '**Rwanda /** Nyungwe N[ational] P[ark] 1800 m / 11 km N Uwinka / 02°25'S 29°09'E / mine 03.viii.2008 / leg. J. & W. De Prins'; [2] 'e. l. unidentified plant [Unknown] / 10.viii.2008'; [3] Gen. Prep. 3752♀ / De Prins; [4] MRAC/KMMA / 00486'; specimen ID: [5] 'RMCA ENT 000005151'; [6] 'DNA voucher / DP08021', in UM-SI; [6] 'Holotype ♀ / *Phyllonorycter* / *gato* / De Prins, 2012', in RMCA.

Description. *Adult* (Fig. 47). Forewing length: 2.9 mm (holotype).

Head: Vertex tufted, with ochreous, piliform scales of different length, arranged in more or less two bunches, projecting radially; frons smooth, covered with narrow piliform dirty white with slight ochreous shading and

metallic gloss appressed scales.. Labial palpus slightly longer than eye, drooping, straight, dorsally and laterally pale ochreous with slight metallic shine, terminal palpomere with pointed apex, directed downwards. Maxillary palpus small, ochreous; proboscis curved beige ochreous. Antenna slightly shorter than forewing, consisting of 36–37 flagellomeres, dorsally each flagellomere (except scape and pedicel) dark fuscous with ochreous base; ventrally flagellomeres yellowish ochreous with narrow fuscous blackish apex; pedicel slightly longer than following flagellomere ochreous, with narrow fuscous blackish band anteriorly; scape dark ochreous with narrow brownish fuscous band anteriorly, with 7–8 ochreous pecten of similar length approximately twice longer than scape.

Thorax: Ochreous; tegula ochreous, also at its posterior part. Forewing ground colour ochreous with white markings: two transverse, almost straight fasciae, one costal, one dorsal strigulae and a tiny white spot at middle of termen; basal streak very short, just oblonged white spot, slightly oblique towards apex, not edged; first fascia at 1/4 of forewing, narrow, almost straight, edged basally to dorsal 1/4, row of black edging scales crossing first fascia and 3/4 of first fascia edged apically; second fascia at 1/2, narrow, only slightly broader than first fascia, almost straight, no constrictions, broadly edged with 2 rows of blackish scales basally, only a couple of black scales present at middle of apical edge of second fascia; first costal strigula at 3/4 of forewing, short not reaching midline of forewing, narrow, rod shaped, edged with irregular one row of blackish scales from both sides; first dorsal strigula at 3/4 of forewing, situated opposite first costal strigula, short, slightly longer than first costal strigula, not reaching midline of forewing, rod-shaped, with obtuse caudal part, edged with distinct regular row of blackish scales basally and with irregular, more slender row of blackish scales apically; a round patch consisting of sparsely set greyish brown scales bordering apical edges of first costal and first dorsal strigulae and terminal ochreous area, of same colour as background of forewing; a tiny white spot consisting 1–2 brightly white scales present at middle of termen; apical, termen and tornus carry long, brownish grey black tipped scales, broadly edging forewing, without composing a distinct fringe line; fringe short, ochreous at termen, getting longer and becoming brownish grey along dorsum. Hindwing greyish beige; fringe long and of slightly darker shading than hindwing. Fore femur ochreous bronze, fore tibia fuscous with dirty white median irregular stripe, tarsus greyish fuscous with two white broad rings, tarsomere I dirty white with fuscous apex, tarsomere II fuscous with white apex, tarsomere III white at basal half, grey at apical half, terminal tarsomeres grey; mid-femur whitish beige, mid-tibia dirty white with golden shine and with three bronze ochreous patches: small at base, medium sized medially and large subapically, tibial spurs of mid-length, dirty white with golden shine and with large bronze ochreous patch medially, tarsomere I dirty white at basal half and fuscous at apical half, tarsomere II dirty white with fuscous apex, terminal tarsomeres fuscous; hind femur and tibia ochreous with bronze gloss, medial spurs of moderate length, fuscous brownish with ochreous bases, apical spurs lighter, light grey with bronze ochreous bases and apices; tarsomere I grey with beige apex, tarsomere II beige grey, tarsomere III beige with fuscous basal half, terminal tarsomeres beige with bronze shine, tip of hind leg blackish fuscous.

Abdomen: Dorsally dark fuscous with strong metallic shine, ventrally dark grey with median ochreous patch on each sternum.

Male genitalia. Unknown.

Female genitalia (Fig. 311). Papillae anales more or less trapezoid shaped, 132 µm long, 70 µm wide, appressed to each other laterally, weakly sclerotized, setation weak with median part setae free, shorter setae (ca. 103 µm in length) present on caudal part of papillae anales and much longer setae (ca. 182 µm in length) present on basal part of papillae anales; transition between papillae anales and segment VIII very smooth, without any sclerotization separating structures. A slender, straight, needle-like, sclerotized projection 164 µm long extending from bases of papillae anales tol anterior 1/4 of segment VIII. Posterior apophyses with very narrow bases, sclerotized, very slender, but with slight enlargement at basal 1/3 (at ca. 160 µm from bases), long, (486 µm in length), sharp ended, extending into anterior 1/3 of segment VII. Segment VIII weakly sclerotized, connected dorsally and ventrally, ca. 2× as long as papillae anales, cylindrical. Anterior apophyses initiate at posterior margin of segment VIII, close to bases of posterior apophyses, long (394 µm), slightly shorter than posterior apophyses, slender, without any enlarged parts, with sharp apices extending into anterior 1/3 of segment VII. Segment VII trapezoidal, melanized, anterior margin slightly less than twice longer than posterior margin, posterior margin squamose. Ostium bursae short tube shaped with strongly sclerotized margins, located at posterior 1/3 of segment VII, antrum broad, strongly sclerotized, 243 µm in length, extending to anterior margin of segment VII to sharp, sinuate curve; sterigma well developed, with strongly sclerotized, ark shaped broad fold (suture), crossing sternum

VII; top of arc-shaped sterigmatic sclerotized fold with wrinkled additional sclerotizations run almost to posterior margin of segment VII. Ductus bursae follows antrum in width and following sharp sinuoid turn roughtly widens into strongly melanized broad sector ca. 156 µm long, then abruptly becoming slender and weakly melanized; length of ductus bursae ca. 710 µm; corpus bursae moderate, weakly melanized, irregularly sac-shaped, 510 µm long, 290 µm wide, distinct from ductus bursae, lacking sclerotized signum, but with caudal anterior part of corpus bursae bearing irregularly shaped area of weak wrinkles. Ductus spermathecae slender, weakly melanized posteriorly, but getting thicker and stronger melanized at anterior part, posterior part with very weak curved convolutions, anterior part with tight strongly melanized convolutions, totally 530 µm in length, consisting of approximately 20–22 revolutions; bulla spermathecae large, ca. 150 µm long, 73 µm wide, with stronger melanized posterior part, situated on segment V.

Etymology. The specific epithet is derived from the vernacular adjective “gato” or “gatoya” in Kirwanda meaning “small”.

Habitat. Open clearings in montaine wet forest at an altitude of approximately 1800 m (Fig. 444).

Host plant(s). An unidentified low shrub.

Flight period. Adults were collected in early August.

Distribution (Fig. 374). Known only from the type locality in southwestern Rwanda.

The *grewiaecola* group

The *grewiaecola* group includes two species: *Phyllonorycter grewiaecola* (Vári, 1961) and *P. grewiaephilos* De Prins, n. sp. Adults belonging to the *grewiaecola* group can be distinguished by a characteristic forewing pattern: two very oblique slender white fasciae, blackish margined from both sides, second fascia sinuating from costa, elongate towards apex, the third group of white markings at subapical sector consisting of a triangular dorsal strigula and a elongate apical stripe (Vári 1961: pl. 22, fig. 7). White markings edged on both sides. Forewing more or less lanceolate, the costal margin is not convex but straight with slight declination at apical part. The joining vein between R_4 and R_3 in *the grewiaecola* group is rudimentary, very slender and indistinct. There are no differences in external features between those two species assigned to the *grewiaecola* group. Therefore, only dissections of genitalia provide the means for an accurate identification. Larvae construct underside tentiform mines on *Grewia* spp. (Malvaceae). Pupa possesses a rudimentary cremaster (Figs 136–141), pupation without cocoon (Vári 1961).

The male genitalia of the *grewiaecola* group are characterized by a trilobed tegumen, which is a unique character among all Lithocolletinae and is a putative apomorphy for this group. Valvae symmetrical, long, narrow, curved, haired and/or covered with tubercles, rounded at apex. Transtilla not complete. Vinculum narrow U-shaped; saccus median or long. Anellus developed, it might carry fultura superior. Aedoeagus short, thick, slightly sinuating, coecum enlarged, vesica with long, narrow cornuti. Sternum VIII in males flap-like, extended, densely covered with tiny nodules, deeply or shallow bifurcate caudally.

Female genitalia segment VIII short, well connected with segment VII. Posterior apophyses with enlarged basal 1/3 and with enlarged bases; anterior apophyses initiate at middle of segment VIII from rather broad sclerotized plate. Ostium bursae opens in subposterior sector of segment VII. Sterigmatic sclerotizations located at subposterior sector of segment VII, well developed with long narrow lateral appendages of lamella antevaginalis, act as a third pair of apophyses. Anterior margin of segment VII ca. 2× broader than posterior margin. Ductus bursae wide, corpus bursae elongate sac-shaped, with one moderate signum with fine median ridge.

Note: this group of species shares a lot of morphological characters with *Cameraria:* i) presence of sinuate fasciae ; ii) presence of lateral appendages on tegumen; iii) narrow rod-like valva covered with tubercules, iv) bifurcate sternumVIII in males, v) signum area on copus bursae crossed by median ridge in females. However, the pupal morphology corresponds to *Phyllonorycter:* i) pupal abdominal segments are covered with dense minute spines, whereas in *C. ohridella* the pupal abdominal segments carry an inwardly curved thorn and/or a spine (De Prins *et al*. 2003); ii) cremaster present, though it is rudimentary. The *grewiaecola* group probably occupies an intermediate position between *Cameraria* and *Phyllonorycter* and therefore it is difficult to place it. Probably this species group is an ancestor and might be somewhere at the base position of splitting of the highly divergent *Cameraria* and *Phyllonorycter.* The generic affinities in morphologically resembling oriental species like *C. bauhiniae*, *C. quadrifascia*, *C. barlowi*, *C. trizosterata*, *C. fasciata* are rather vague as well (Kumata 1993).

Therefore, it seems preferable at the moment to follow a more conservative approach leaving this group in *Phyllonorycter*, as initially proposed by Vári (1961: 212) and mainly considering the pupal and genital morphology until additional morphological and molecular data are obtained.

Key to the species of the *grewiaecola* group based on male genitalia

1. Anellus with well sclerotized fultura superior bearing two sinuate, slender horns; saccus ca. 1/3 length of valva, gradually accuminate caudally; sternum VIII deeply emarginated caudally (Figs 191, 192, 194, 196, 197). . . . . 21. *grewiaecola*
– Fultura superior on anellus not developed; saccus slightly longer than 1/2 of valva length, equally slender along entire length; sternum VIII, with shallow semi-round emargination (Figs 198, 199). . . . . .22. *grewiaephilos*

Key to the species of the g*rewiaecola* group based on female genitalia

1. Sterigma well developed and heavily sclerotized cup-shaped with broad lamella antevaginalis; anterior apophyses ca. 1/2 as long as posterior apophyses; signum on corpus bursae oval-shaped with sclerotized median ridge (Fig. 312). . 21. *grewiaecola*
– Sterigma mountain-shaped with narrow lamella antevaginalis; anterior apophyses ca. 3/4 as long as posterior apophyses; signum on corpus bursae diamond-shaped, with sclerotized median ridge (Fig. 313) . . . . . .22. *grewiaephilos*

21. *Phyllonorycter grewiaecola* (Vári, 1961)

(Figs 7, 16, 48, 49, 191–197, 312, 375, 427, 438)

Lithocolletis grewiaecola—Vári (1961: 212–213; pl. 22, fig. 7; pl. 65, fig. 4; pl. 104, fig. 6).
Phyllonorycter grewiaecola—Vári & Kroon (1986: 39, 136, 157), Dall'Asta *et al*. (2001: 33), Vári *et al*. (2002: 26), De Prins & De Prins (2005: 298).

Diagnosis. The pattern of the forewing is indistinguishable from *Phyllonorycter grewiaephilos*. However, *P. grewiaecola* can be well diagnosed in male and female genitalia. The conspicuous fultura superior with two slender cruved horns of the anellus in the male genitalia is unique character to Afrotropical Lithocolletinae and is a highly distinctive feature for this species. The large caudally bidentate sternum VIII in males is diagnostic. Females are less easily separated, however, the cup-like sterigma, the broad lamella antevaginalis with long sterigmatic lateral appendages, and the elongate narrow signum on the corpus bursae in the female genitalia of *P. grewiaecola* distinguish this species from the similar *P. grewiaephilos.*

Material examined. *Holotype*: ♂. [1] [**South Africa**] 'Waterpoort / 4.v.1956 / [leg.] L. Vári / Ac[quisition] no: 1945'; [2] '81'. [3] '3122'; [4] 'G[enitalia] / 7507'; [5] 'Lithocolletis/ grewiaecola Vári / ♂ HOLOTYPE No 6370', in TMSA.

Paratypes: 2♀ (including 2♀ genitalia preparations). 1♀, [**Namibia**]: Abachaus [Abaehaus], S.W.A. [South West Africa], v.'45, [leg.] G. Hobohm; G[enitalia] 7499; *Lithocolletis / grewiaecola* Vári ♀ PARATYPE No 6372, in TMSA. 1♀, **Zimbabwe**: Beitbridge, 22.iv.1956, [leg.] v[an] Son & Vári'; 7677; *Lithocolletis grewiaecola* Vári ♀ ALLOTYPE No 6371, in TMSA.

Additional material: 27♂, 24♀ (including 6♂, 4♀ genitalia preparations) and 4 specimens). **Kenya**: 25♂, Tsavo National Park, Taita Discovery Centre, 03°40'S 38°45'E, 530 m, mine 12.iv.2002, leg. J. De Prins; e.l. *Grewia tristis* K. Schum. (Tiliaceae), from 14.iv.2002 to 24.iv.2002, specimen IDs: RMCA ENT 000003003–000003027, gen. prep. De Prins 3520♂ (MRAC/KMMA 00257), 3515♂ (MRAC/KMMA 00273), 3666♂ (MRAC/KMMA 00274), 3667♂ (MRAC/KMMA 00275), descaled head prep. (MRAC/KMMA 00532), in RMCA, 1♂ (RMCA ENT 000003025), DNA voucher CLV11407, in CCDB. 22♀, same data, specimen IDs: RMCA ENT 000003029—000003049 and 000003051, gen. prep. De Prins 3673♀ (MRAC/KMMA 00277), 3675♀ (MRAC/KMMA 00286) in RMCA, 1♀ (RMCA ENT 000003046), descaled head prep. De Prins 3789♀ ((MRAC/KMMA 00530), in RMCA, DNA voucher CLV11507, in CCDB. 1♀, Taita Discovery Centre, Mwakaramba Tank 03°40'S 38°46'E, 500 m, 02.iv.2001, leg. J. & W. De Prins, ex *Grewia* sp., specimen ID: RMCA ENT 000003050, gen. prep. De Prins 3399♀ (MRAC/KMMA 00259), in RMCA. 1♂, Tsavo National Park, Taita Discovery Centre, 03°40'S 38°45'E, 530 m, 13.iv.2002, leg. J. De Prins, specimen ID: RMCA ENT

000003028, gen. prep. De Prins 3672♂ (MRAC/KMMA 00284), wing venation preparation De Prins 3787♂ (MRAC/KMMA 00528), specimen ID: RMCA ENT 000003028, in RMCA. 1♀, same locality data, except the date 12.iv.2002, specimen ID: RMCA ENT 000003052, gen. prep. De Prins 3674♀ (MRAC/KMMA 00285), in RMCA. **Namibia**: 1 specimen, Abachaus [Abaehaus], S.W. A. [South West Africa], Feb'[ruary] [19]43, G. Hobohm. 1 specimen, same data, except the date Aug[ust]' [19]43, in TMSA. 2 specimens, same locality data, except the date Mar[ch] [19]43. 1♂, Erongo Mt., Farm Ameib, 23.ii.1975, S. Endrödy–Younga, gen. prep. De Prins 3452♂ (TMSA 14603), in TMSA. **South Africa**: 1 specimen, Skukuza, 22.vi.1980, L. Vári, Ac[quisition]. no. 3807, in TMSA.

Redescription. *Adult* (Figs 49, 50). Forewing length: 2.4–2.6 mm.

Head: Vertex tufted with ochreous, piliform scales intermixed with white, more abundant posteriorly; frons mostly white but in some specimens can be intermixed with slightly golden scales. Labial palpus as long as diameter of compound eye, white with a few dark fuscous scales on outer side, slender, directed downwards. Maxillary palpus tiny, minute, white, proboscis light beige. Antenna slightly shorter than forewing, not ringed, smoothly scaled, with first five flagellomeres lighter than remaining ones, gradually darkening from white to greyish fuscous on upper side and slightly lighter on underside; pedicel shiny white with a few light ochreous scales posteriorly; scape white shiny anteriorly and ochreous brown posteriorly, pecten thick, white, reaching 1/3 of eye.

Thorax: Ochreous brown, with white semicircular transverse band and white apical spot; tegulae ochreous brown anteriorly and white posteriorly. Forewing elongate, ground colour ochreous brown with white markings consisting of basal streak, two fascia and one dorsal strigula; basal streak short slender reaching 1/6 of forewing, directed towards costa but not reaching it, finally edged with one row of blacked scales posteriorly; first fascia at 1/5, slender, very oblique directed towards apex, running transverse, but not reaching costa, tapering and sharply ending at 1/3 of costa, finely edged on both sides with one row of blackish fuscous scales; second fascia at 1/3 parallel to first fascia, oblique, irregular, directed towards apex but not reaching costa, curving at 3/5, and extending as an elongate wide parabola to apex; initial half of second fascia shaped as a transverse band, edged on both sides with one row of blackish fuscous scales; a row of dark brown scales at dorsal edge connect both fascia, parabola-shaped band of second fascia edged posteriorly with suffusion of blackish fuscous scales dispersed towards tornal sector; a small costal indistinct white patch consisting of white scales sometimes with suffusion of a few blackish scales is present at 1/2 of costa; white apical marking intermixed with a few blackish scales elongate towards costa at apex; triangular dorsal strigula at 3/5 directed towards apex, edged basally; fringe is ochreous from apex to near tornus and whitish with golden shine along dorsal margin of forewing. Hindwing pale ochreous with golden shine with long, pale golden, shiny fringe. Legs whitish pale with a few dark markings dorsally; fore femur suffused with fuscous, tibia with dark fuscous scales, tarsomeres I and II white with dark fuscous apical halves, tarsomere III fuscous, tarsomeres IV and V fuscous in male, whitish in female; mid-tibia with two oblique narrow parallel ochreous-fuscous stripes first stripe to 1/2 of mid-tibia, second stripe from 1/2 of mid-tibia to apex, first tarsomere with a small basal fuscous patch and apical ringed with dark fuscous scales, tarsomere II with subapical dark fuscous ring, tarsomere III white; terminal segment darker, spurs white with fuscous small spot at 1/2; hind femur shiny white with indistinct light ochreous small patch at 1/2, hind tibia with an ochreous-fuscous patch streching from 2/3 to near apex, tibial spurs with subapical fuscous patch, tarsomere I with a basal and subapical dark fuscous patch, tarsomere II with a very small subapical dark fuscous patch, terminal tarsomeres white except apex of last tarsomere which is darker.

Abdomen: Grey dorsally, golden light fuscous ventrally, terga VII and VIII shiny light fuscous. Sternum VIII, in males long with mostly parallel margins to 1/3 of sternum, then tapering towards apex to 2/3 and abruptly narrowing with deeply bidentate caudal apex.

Male genitalia (Figs 191–197). Tegumen rather long, with three lobes: middle lobe long, tapering, with gently rounded apex, without setae, laterally two symmetrical lobes tapering apically, reaching 2/3 of length of tegumenal mid-lobe. A pair of setae located on small triangular appendices at base of long lobe-like tegumenal appendages. Valvae symmetrical; valva very long and narrow, almost as long as sternum VIII, straight, weekly curved at middle; bluntly rounded at apex; a row of long solitary hairs as long as width of valve, extending from 1/3 along ventral margin, more dense in subapical region; thick setae over apical section of valva. Vinculum narrow, sclerotized, U-shaped; fused with saccus, saccus 1/3 as long as valva, slightly bulged basically, tapered and rounded caudally; transtilla narrow sclerotized, incomplete, consisting of two hook-shaped lateral arms; anellus with well developed,

sclerotized fultura superior carring two sinuate slender horns posteriorly, 1/2 as long as valva. Aedoeagus slightly longer than valva, significantly enlarged and bulged at coecum, parallel sided at middle, straight with two sclerotized rod-shaped cornuti ca. half as long as aedoeagus, extending parallel from middle to vesica; vesica unsclerotized, weakly wrinkled and pinaculate distally, covered with numerous tiny tubercules of setulae (clearly visible at 200×).

Female genitalia (Fig. 312). Papillae anales connected dorsally, flattened caudally, 2× wider than long, sclerotized posteriorly, covered with round tubercules of long setae, 2–3× as long as papillae anales with even longer setae basally; basal bar very narrow, weakly sclerotized, slightly wider ventrad from posterior apophyses. Posterior apophyses well sclerotized, ca. 0.4 mm long, reaching anterior 1/3 of segment VII, wider at bases, broader and slightly curved on basal 1/3, running tapering to apex, apically pointed. Segment VIII weakly sclerotized, connected to segment VII ventrally and dorsally. Anterior apophyses shorter, more than half compared to posterior apophyses, reaching anterior 1/3 of segment VII, ca. 0.18 mm long, bases of anterior apophyses situated at posterior margin of segment VIII, almost at connection with segment VII. Ostium bursae heavily sclerotized, located at posterior margin of segment VII, cuticle forms a sclerotized cup-like sterigma with long lateral appendices acting as additional pair of anterior apophyses; antrum spirally membranous, funnel-formed. Ductus bursae rather wide, as long as segment VII, initial section bulbed and more sclerotized, suddenly doubling in width at anterior 1/3 of segment VII, then gradually widening towards anterior sector of segment VI to half of bursa diameter. Corpus bursae large, oval in mid-sector of corpus, with heavily sclerotized, spine-like signum; signum ca 0.1 mm long, broader at anterior portion of bursa and tapering towards posterior portion, sharply ridged, surrounded by sclerotized ellipsoid area.

Variation. The tuft of scales on the vertex can slightly vary in coloration: dark piliform scales show intermediate colours from dark brown to light ochreous and the intermixed white, piliform scales on the posterior section of tuft can vary in their abundance. Frons mostly white but can be intermixed with a few ochreous golden scales. There is significant variation in depth of caudal margination of the sternum VIII of male abdomen and level of sclerotization in fultura superior of anellus.

Habitat. Moths of *C. grewiaecola* have been found in savannah areas at altitudes of 470 m to 920 m (Fig. 438).

Host plant(s). Malvaceae: *Grewia kwebekensis* N. E. Br.: needs confirmation—Vári (1961: 213). In note 1945 written by Vári on 23 April 1956 (field notebook of Vári) it is stated that he collected at ”Waterpoort North side a few mines on *Grewia* [species not mentioned]. The first moth emerged on 04.v.1956. [*grewiaecola* [types]”, Dall’Asta *et al*. (2001: 33), De Prins & De Prins (2005: 298).

G. tristis K. Schum. (**new record**) (Fig. 427).

Mine. The underside tentiform mine is mostly round or oval, 25–35 mm diameter. The mine is opaque, pale cream, whitish or light yellow. No folds are perceptible, frass loosely scattered; pupation without cocoon. Exuvium protrudes from epidermis of the leaf before the adult emerges. We observed the larvae of *P. grewiaecola* feeding on *G. tristis* bushes growing close to each other. Mines of the moths examined were collected in Kenya in the period between 23 March and 12 April. Mines were found locally but in abundance and in similar stadium of larval development. The plants are mostly exploited in the first half of the rainy season, when new leaves are well developed.

Flight period. Adults fly from February to August.

Distribution. (Fig. 375**).** Recorded from Namibia, South Africa, Zimbabwe (Vári 1961: 213), and Kenya (**new record**).

22. *Phyllonorycter grewiaephilos* De Prins, new species

(Figs 51, 52, 136–141, 198–200, 313, 376, 428, 429, 438)

Diagnosis. Pattern of forewing indistinguishable from that of *Phyllonorycter grewiaecola* but genitalia diagnostic. Absence of fultura superior of anellus, long, slender saccus, thick aedoeagus with digitate vesica and more or less rounded apex of sternum VIII in males prominently differentiate this species from *P. grewiaecola*. Longer apophyses anteriores, mountain-like sclerotized sterigma with long lateral appendages and diamond-like signum on corpus bursa in female genitalia differentiate this species from the similar *P. grewiaecola*. *Phyllonorycter*

grewiaephilos was reared only from *Grewia villosa* leaves. *Phyllonorycter grewiaecola* also differs in COI sequence ("DNA barcode").

Holotype: ♂. [1] '**Kenya** / Tsavo National Park / Taita Discovery Centre / 03°40'S 38°45'E, 530 m / mine 12.iv.2002 / leg. J. De Prins'; [2] 'e.l. *Grewia villosa* Willd. / [Tiliaceae] / 24.iv.2002'; [3] 'Gen. Prep. 3665♂ / De Prins'; [4] 'MRAC/KMMA / 00272'; specimen ID: [5] 'RMCA ENT 00000307'; [6] 'Holotype ♂ / *Phyllonorycter* / *grewiaephilos* / De Prins, 2012', in RMCA.

Paratypes: 30♂, 30♀ (including 10♂and 5♀ genitalia preparations). **Kenya:** 12♂, Tsavo National Park, Taita Discovery Centre, 03°40'S 38°45'E, 530 m, mine 12.iv.2002, leg. J. De Prins, e.l. *Grewia villosa* Willd. (Tiliaceae), from 14.iv.2002. to 25.iv.2002, specimen IDs: RMCA ENT 000003053–000003059, 000003076, 000003349, 000004274–000004275, gen. prep. De Prins 3519♂ (MRAC/KMMA 00346), 3670♂ (MRAC/KMMA 00276), 3481♂ (MRAC/KMMA 00398), 3518♂ (MRAC/KMMA 00399), in RMCA, 1♂ in BMNH. 11♀, same locality data, specimen IDs: RMCA ENT 000003078–000003087, 000003104, gen. prep. De Prins 3483♀ (MRAC/KMMA 00258) in RMCA. 1♂, Tsavo National Park, Taita Discovery Centre, 03°40'S 38°45'E, 530 m, 12.iv. 2002, leg. J. De Prins, specimen ID: RMCA ENT 000003077, gen. prep. De Prins 3671♂ (MRAC/KMMA 00283), in RMCA. 15♂, Tsavo, ca. 30 km S Voi, Taita Discovery Centre, Env.[ironment] TDC [Taita Discovery Centre], 475 m, 03°43'S 038°46'E, mine 23.iii.2004, leg. J. & W. De Prins, e.l. *Grewia villosa* Willd. (Tiliaceae), from 28.iii.2004 to 08.iv.2004, specimen IDs: RMCA ENT 000003061–000003069, 000003071–000003076, gen. prep. De Prins 3605♂ (MRAC/KMMA 00264), 3607♂ (MRAC/KMMA 00269), 3612♂ (MRAC/KMMA 00270), 3611♂ (MRAC/KMMA 00271), in RMCA, 2♂ in BMNH, DNA voucher CLV11607, CLV25307, CLV25107, in CCDB. 19♀, same locality data, specimen IDs: RMCA ENT 000003088–000003099, 000003102, 000003103, 000003267, gen. prep. De Prins 3606♀ (MRAC/KMMA 00265), 3610♀ (MRAC/KMMA 00266), 3609♀ (MRAC/KMMA 00267), 3608♀ (MRAC/KMMA 00268), in RMCA, 2♀ in BMNH, DNA voucher CLV11707, CLV13107, in CCDB. 2♂, Rift Valley, L.[ake] Bogoria, 06.ii.1999, D. J. L. Agassiz, gen. prep. De Prins 3668–3669♂, 1♂ in BMNH and 1♂ in NMK.

Description. Adult (Figs 51, 52). Forewing length: 2.7–2.9 mm.

Head: Vertex tufted with ochreous piliform scales intermixed with white, white blunt, piliform scales are dominant on posterior margin of occiput, projected dorsally; frons smooth, shiny white (in some specimens with slight goldish shine) covered with long narrow appressed white scales. Labial palpus as long as diameter of compound eye, dark fuscous from outer lateral side and white from inside, apically pointed, directed downwards. Maxillary palpus white, proboscis light yellow. Antenna slightly shorter that forewing, not ringed, first three flagellomeres white, rest gradually shading from white to golden fuscous intermixed with elongate, light beige stripes, at apical sector flagellomeres covered with ciliate tiny golden fuscous scales, last flagellomere dark fuscous; pedicel shiny white; scape white anteriorly and ochreous brown posteriorly, pecten white, thick, as long as length of two flagellomeres.

Thorax. Ochreous brown with two oblique white stripes joining posteriorly and white round mark at posterior sector; tegulae dark ochreous anteriorly, white posteriorly, metathorax golden ochreous. Forewing elongate, ground colour ochreous brown with white markings consisting of basal streak, two fascia, one costal and one dorsal strigulae; basal streak short, slender, reaching 1/6 of forewing, directed towards costa, edged with a fine row of black scales posteriorly and a few dispersed scales anteriorly; first fascia at 1/5, slender, oblique, directed towards apex, running transverse, but not reaching costa, tapering, blunt at costa, finely edged on both sides by one row of black scales; first costal strigula small, rounded, at 1/2 of forewing with a few black scales posteriorly; second fascia at 1/3 parallel to first fascia in oblique at origin, directed towards apex, but not reaching costa, at 3/5 making sharp turn to midline of forewing, sinuous to apex, and short, narrow, indistinct strip of white scales extending along costa from apex; first half of second fascia edged basally and apically with one row of black scales to turn at 3/5, after turn apical edging continues as posterior edging with thicker irregular border with black scales sparsely distributed at tornal sector, anterior part of band not edged, elongate costal area finely edged posteriorly with a few dispersed black scales; half rounded dorsal strigula at 2/3 edged basally with row of black scales, a few black scales edge dorsum between second fascia and first dorsal strigula; fringe very short golden shiny at tornal sector and long, dirty white with golden shine along dorsal margin of forewing. Hindwing dirty white with a slight golden shine, fringe long, of same colour. Legs white with some darker markings dorsally; fore femur shiny light ochreous basally suffused with fuscous apically in males and white with suffusion of light ochreous in females, tibia dark fuscous, tarsomeres I–IV white with dark fuscous apical halves in males, fuscous in females, tarsomere V dirty

white in males, pale ochreous in females; mid-tibia with three oblique ochreous, parallel stripes, basal one small and indistinct, second one from 1/3 to mid-tibia, third one from mid-tibia to apex; tarsomere I with small basal fuscous patch and ringed apically with dark fuscous scales, tarsomere II ringed subapically with dark fuscous scales, terminal tarsomeres white; spurs dark fuscous basally and white at apical half; hind femur dirty white with indistinct light ochreous small patch at 1/2, hind tibia with ochreous shiny oblique stripe from 1/2 to apex, medial tibial spurs half as long as tibia with two fuscous patches one subbasally and other subapically, apical tibial spurs twice shorter than medial with s few fuscous scales subbasally, hind tibia fuscous hairy, tarsomere I white with dark fuscous patch subapically, tarsomere II white with small light fuscous patch apically in males and white in females, tarsomeres III–IV dirty white with light ochreous shading, terminal tarsomere ochreous.

Abdomen: Fuscous dorsally, golden shiny ventrally, segments VII and VIII beige with light ochreus shading in males dorsally, and pale ochreous ventrally in female. Sternum VIII in males gently tapering caudally with blunt very lightly bidentate caudal apex.

Male genitalia (Figs 198–200). Tegumen rather long, in three parts: central long broad lobe gently rounded at apex, without setae, two lateral symmetrical processes, margins of which run parallel, gently rounded apically, reaching 2/3 length of central lobe, covered with sparse setae. A pair of setae is located on small triangular appendices at base of long lobe-like tegumenal appendages. Valvae symmetrical, valva 1.5× as long as sternum VIII, narrow, costal and dorsal margins running almost parallel, weekly curved at mid, bluntly cut at apex; weekly setose at basal sector of dorsal margin and pinaculated with tubercules from middle of costal margin to apex. Setae thick, ca. as long as distance between costal and dorsal margins of valva. Vinculum narrow, sclerotized, U-shaped; transtilla narrow, consisting of two symmetrical hook-shape bent parts; fultura absent, saccus slightly shorter as sternum VIII, slender, gently rounded apically. Aedoeagus twice as long as sternum VIII, length 2/3 width of valva, coecum slightly bulged, central part running straight with 2 long close to each other long needle-like cornuti (clearly visible at enlargement 200×), vesica narrow, 3× narrower in diameter as a central part of aedoaegus, 1/6 as long as entire aedoeagus, sclerotozed, finger like, without special appendices.

Female genitalia (Fig. 313). Papillae anales connected dorsally, flattened, 2× wider than long, sclerotized posteriorly, covered with dense round penaculate tubercules of long setae; setae 2–3× as long as papillae anales, basal bar rather broad, sclerotized, slightly wider ventrad from posterior apophyses. Posterior apophyses well sclerotized, ca.0.34 mm long, reaching anterior 1/3 segment VII, wider at basal 1/3, tapering to apex, pointed. Segment VIII weakly sclerotized, well connected to segment VII. Anterior apophyses ca. 2/3 in length of posterior apophyses, ca. 0.23 mm long, extending to anterior 1/3 of segment VII. Sterigma well developed, crescent-shaped, with depression around ostium bursae, and with long lateral appendages; ostium bursae located at posterior 1/3 of segment VII, antrum sclerotized, broad tubular; ductus bursae short, ca. as long as segment VII, ½ with of antrum at its origin, then gradually broadening towards corpus bursae. Corpus bursae oval, ca. 0.32 × 0.21 mm, large, with sclerotized diamond-like signum ca. 0.1 mm. Central sector of signum area crossed by an arrow-like signum.

Variation. There is little variation in shine from golden ochreous till ochreous in forewing and size of first costal strigula which varies from hardly visible few white scales to clearly defined half rounded patch.

DNA sequences. Two COI barcodes are available for *P. grewiaephilos* (Molecular sample codes: Pgre1 [JX888180], Pgre2 [JX888181]; Table S1).

Etymology. The specific name is composed of the name *Grewia* and the Greek name Philos **(**Φίλος), meaning ‘friend’ (masculine). The name means ‘A friend of *Grewia*’.

Habitat. *Phyllonorycter grewiaephilos* have been found in savannah areas at altitudes between 470 m and 920 m (Fig. 438).

Host plant(s). Malvaceae: *Grewia villosa* Willd. (Figs 428, 429).

Mine. An underside tentiform mine elongate or oval, 11–16 mm long. The mine is opaque creamy, or light brown. No folds are perceptible, frass loosely scattered; pupation without cocoon. Exuvium protrudes epidermis of a leaf before adult emerges. Mines were found locally but abundant in a small area of savannah within Tsavo National Park in Kenya in a period between 23 March and 12 April. The preimaginal stages within mines were in similar stadium of development. The difference of period between the first and the last moth emergence is 11 days. The plants are mostly exploited in the first half of the rainy season, when new leaves are well grown up.

Pupa (Figs 136–141)**.** The general form is elongated oval, sub-cylindrical, gradually narrowing towards last five segments, slightly fattened, light brown with a lighter shading on abdomen and darker on vertex; the pupa becomes slightly darker brown close to the adult emergence, like in most Lithocolletinae species. Length ca.

2.4–2.5 mm. Head more or less triangular, with two pairs of long setae and with loose antennal appendages. Vertex furnished with a frontal process (cocoon cutter), relatively short, broadly triangular, acute, with wrinkled median surface. The apices of the antennae and the apices of the wings approximately coincide at the same length. The appendages of antennae are shorter than the appendages of metathoracic future legs which extend slightly beyond the abdominal tip. The distance between the apices of the mesothorax and metathoracic legs is approximately 1.25× the distance between the apices of the prothoracic and mesothoracic legs. Abdominal segments mostly covered dorsally and ventrally with dense minute spines; two pairs of setae (one dorsal and one lateral) present on each segment of A2–7. Caudal sternum of A10 with short, blunt plates arranged in a rosette and caudal tergum equipped with rudimentary cremaster, consisting of one short spine situated proximally and two blunt processes situated sub-distally.

Flight period. Adults fly from early February to mid-April.

Distribution. (Fig. 376). Recorded from the Rift Valley and Tsavo National Park in Kenya.

The *grewiella* group

This group is comprised of only one species *Phyllonorycter grewiella*. The forewing pattern of *P. grewiella* is very distinct. A basal streak runs along the costal margin and there is a striking white strigula on the dorsal margin whereas any white distict strigula is absent on the costal margin. Male genitalia are very distinctive because of their very large and broad valva, and their large, bidentate sternum VIII. Female genitalia of this group lack a developed sterigma. Larvae of the *grewiella* species group feed on Malvaceae and create upperside narrow tentiform mines.

23. *Phyllonorycter grewiella* (Vári, 1961)

(Figs 53–57, 201–205, 314, 315, 377, 430, 437, 438)

Lithocolletis grewiella—Vári, (1961: 213–214; pl. 22, fig. 8; pl. 65, fig. 5; pl. 104, fig. 3).

Phyllonorycter grewiella—Vári & Kroon (1986: 39, 136, 157), Kroon (1999: 35, 104, 152), Dall'Asta *et al*. (2001: 33–34), Vári *et al*. (2002: 26), Lopez-Vaamonde *et al.* (2003: 1818), De Prins & De Prins (2005: 298), Lopez-Vaamonde *et al*. (2006: 7).

Diagnosis. The forewing pattern is quite unique from other Afrotropical *Phyllonorycter* in that it has two striking broad dorsal strigulae and an obscure apical patch. Valva broad, with a large bidentate sternum VIII. Female genitalia of *P. grewiella* lack sterigmatic sclerotization on sternum VII, antrum covered with tiny spines, ductus bursae long, corpus bursae small and round. Larvae of *P. grewiella* mine the upperside of its host leaf, whereas larvae of the other two *Grewia* feeding Afrotropical *Phyllonorycter* species *P. grewiaecola* and *P. grewiaephilos* are underside miners.

Material examined. *Holotype*: ♂, [1] [**South Africa**] 'Malelane / 24.iii.1952 / [leg.] Janse & Vari'; [2] 'HT'; [3] 'G.[enitalia] / 7523'; [4] '*Lithocolletis* / *grewiella* Vári / ♂ PARATYPE [sic] No 6373', in TMSA.

Paratypes: 2♂ and 1♀. (including 2♂ and 1♀ genitalia slides). **South Africa**: 1♀, Skukuza, 6.iv.1952, [leg.] L. Vári, Ac.[quisition] no: 496; G.[enitalia] 7135; AT; *Lithocolletis grewiella* Vári ♀ ALLOTYPE No 6374, in TMSA. 1♂, Skukuza, 2.iv.1952, [leg.] L. Vári, Ac.[quisition] no: 447;8; G.[enitalia] 7134; *Lithocolletis grewiella* Vári ♂ PARATYPE No 6375, in TMSA. 1♂, Skukuza, 19.iv.1952, [leg.] L. Vári, Ac.[quisition] no: 492; 10; G.[enitalia] 7130; *Lithocolletis grewiella* Vári ♂ HOLOTYPE [sic] No 6376, in TMSA.

Remarks. The labels "Holotype" and "Paratype" have obviously been reversed in two type specimens while rearranging the collection, since Vári (1961: 214) indicated Malelane as the type locality of this species.

Additional material: 7♂, 11♀ (including 4♂ and 1♀ genitalia preparations) and 15 specimens. **Botswana:** 2 specimens, Kang, 32 km S, 22–24.i.1978, [leg.] M. J. Scoble. Ac[quisition]. no 3703, in TMSA. 1 specimen, Nata, 14.i.1978, [leg.] L. Vári, in TMSA. **Kenya**: 2♂, Taita Discovery Centre, Mwakaramba Tank, 03°40'S 38°46'E, 500 m, 02.iv.2001, leg. J. & W. De Prins, e. l. *Grewia* sp., 18.iv.2001, gen. prep. De Prins 3398♂ (MRAC/KMMA 00261), specimen ID: RMCA ENT 000003110, ID: RMCA ENT 000003108, in INRA, DNA voucher CLV11807 in CCDB, genitalia slide in RMCA. 1♀, same locality data, specimen ID: RMCA ENT 000003120, in RMCA. 2♂, Tsavo National Park, Taita Discovery Centre, 03°40'S 38°45'E, 530 m, mine 12.iv. 2002, leg. J. De Prins; e.l.

Grewia villosa Willd. (Tiliaceae), 24.iv.2002 and 25.iv.2002, specimen IDs: RMCA ENT 000003107, 000003111, gen. prep. De Prins 3482♂ (MRAC/KMMA 00260), in RMCA. 1♂, same locality data, e. l. 25.iv.2002, in NMK. 4♀, same locality data e.l. from 22.iv.2002 to 24.iv.2002, RMCA ENT 000003112–000003115, gen. prep. De Prins 3484♀ (MRAC/KMMA 00262), in RMCA. 1♀, same locality data, e. l. 22.iv.2002, in NMK. 1♂, Arabuko Sokoke Forest, 10.5 km W Gede, 80 m, 03°16'S 039°58'E, 26.iii.2004, leg. J. & W. De Prins, specimen ID: RMCA ENT 000003109, gen. prep. De Prins 3644♂ (MRAC/KMMA 00263), in RMCA. 4♀, Tsavo–ca. 30 km S Voi, Taita Discovery Centre, Env.[ironment] TDC [Taita Discovery Centre], 475 m, 03°43'S 038°46'E mine 23.iii.2004, leg. J. & W. De Prins, e.l. *Grewia villosa* Willd. (Tiliaceae), from 30.iii.2004. to 05.iv.2004, specimen IDs: RMCA ENT 000003116–000003119, in RMCA, 1♀, ID: RMCA ENT 000003117, DNA voucher CLV11907, in CCDB. **Namibia**: 1 specimen, Abachaus [Abaehaus], S[outh].W[est]. A[frica]., Feb[ruary]' [19]43, G. Hobohm, in TMSA. 1 specimen, same locality data except the date ix' [19]45, in TMSA. 1♀, Erongo, Eileen Farm, campsite, 1310 m, 15–16.iii.2005, leg. W. Mey, in ZMHB. **South Africa**: 1 specimen, Malelane, 24.iii.1952, Janse & Vari, in TMSA. 1 specimen, Naboospruit, Mosdene Fm. [farm], 17.ii.1976, *Grewia*? *caffra*, e. l. 23.ii.1976, L. Vári, in TMSA. 1♀, Rustenburg, 03.iii.1958. D. W. Rorke, Ac[quisition]. no. 2047, in TMSA. 1 specimen, same locality data except the date 04.iii.1958, in TMSA. 1 specimen, Krüger National Park Survey, Olifants Camp, 23.xi.1961. Ac[quisition]. no. 2341, in TMSA. 1 specimen, Kruger National Park Survey, Punda Milia, 6–15.v.1975, Potgieter & Scoble, in TMSA. 2 specimens, Nylstroom, Deelkraal Farm, 23.ii.1976, M. J. Scoble. Ac[quisition]. no. 3542, in TMSA. 1 specimen, Pretoriuskop [Pretorius Kop], 02.vi.1980, *on Grewia*, e.l. 27.vi.1980, L. Vári, in TMSA. 1 specimen, Skukuza, 27.vi.1980, L. Vári, Ac[quisition]. no. 3820, in TMSA. 1 specimen, same locality data except the date 04.vii.1980, in TMSA. **Yemen:** 1♂, prov[ince]. Ibb, 5 km NE Al Qa'jdah [Al Qa'idah], 1850 m, 28.iv.1998, leg. M. Fibiger *et al*., gen. prep. De Prins 3717♂, in ZMUC.

Redescription. *Adult* (Figs 53–57). Forewing length: 2.4–2.8 mm.

Head: Vertex tufted with white piliform scales with a faint suffusion of ochreous brown scales; frons smooth, shiny white. Labial palpus as long as diameter of compound eye, white (in a few specimens last segments golden fuscous), apically pointed, directed downwards. Maxillary palpus white, small, proboscis pale beige with light golden shine. Antenna as long as forewing, not ringed, smooth scaled, first four flagellomeres dirty white, remaining flagellomeres light ochreous with golden shine; pedicel shiny white, scape dirty white, pecten white, thick, as long as scape.

Thorax: Ochreous brown with a broad transverse white band anteriorly; tegulae white. Forewing ochreous dark golden with metallic shine with white marking consisting of three tiny costal markings and two large dorsal strigulae; costa with white streak stretching from base to middle of forewing, broader basally and gently tapering apically, edged dorsally; second costal strigula is beyond middle of forewing, narrow spine shaped, oblique, edged basally, third costal strigula at 3/5 oblique, very narrow, consisting of dirty white and golden fuscous scales, obscure, edged basally with black scales; first dorsal strigula at 1/4, broad white, oblique, curved, pointed at middle of forewing, edged with black scales from both sides, second dorsal strigula (patch) at 3/4, white, broad, triangular-shaped, edged with black scales basally; apical area of forewing with irroration of fine blackish scales, more dense at tornal sector; a black apical dot present, outer margin of forewing edged with fringe line; fringe pale, very short from apex to tornus, and twice longer along dorsum. Hindwing greyish fuscous with long pale golden shiny fringe. Legs pale, with dark brown markings; fore femur ochreous fuscous, fore tibia fuscous with dirty white basal 1/4, tarsomeres I–III fuscous, apical trasomeres ochreous; mid-tibia with two oblique fuscous ochreous parallel patches, first patch from 1/4 of tibia to middle, second patch from middle to apex; tarsomeres I–II with fuscous basal halves, terminal tarsomeres dirty white; tibial spurs dirty white; hind femur light ochreous, hind tibia ringed with two fuscous stripes, first stripe runs from base to 1/4 of hind tibia, second stripe at apical 1/4 of hind tibia; apical and medial tibial spurs almost of same length, light ochreous; tarsomere I with apical fuscous patch, tarsomere II with basal fuscous patch, terminal tarsomeres III–V light ochreous.

Abdomen: Fuscous dorsally, golden shiny ventrally, terga VII and VIII light fuscous. Sternum VIII in males well developed, big, tapering caudally with bidentate apex.

Male genitalia (Figs 201–205). Tegumen very long (860 µm), cylindrical, somewhat elongate-quadrangular, with small pointed peak at apex; tegumenal arms sclerotized, broad at bases and narrow at apical half, slightly sinuating at basal 1/3, approaching each other at apical 1/3 forming inverted elongate V, narrowly connected at apex; also with weakly sclerotized ark shaped, narrow rounded bridge running from dorsomedian part and reaching 2/3 length of tegumenal arm. Valvae symmetrical, broad at base, as long as tegumen, ca. 860 µm, gently tapering

from beyond half and abruptly narrow at apical 1/5; apex and subapical area set with 5–6 long bristles (ca. 115 µm) and multiple shorter bristles, stiff setae (50 µm in length); a spine, 66 µm long, at 2/3 length of valval ventral margin. Vinculum broad, sclerotized, crescent-shaped, with slender saccus of moderate length, ca. 175 µm long, caudal part of slightly enlarged, with rounded apex. Aedoeagus as long as sternum VIII, ca. 810 µm, gently tapering from coecum to middle, then nearly straight and bending caudally with truncate vesica; apical third of aedoaegus with a single cornutus in form of an elongate scar.

Female genitalia (Figs 314, 315). Papillae anales connected dorsally, flattened, ca. 3× wider than long, sclerotized posteriorly, covered with very small penaculate tubercules of setae posteriorly and bigger penaculate tubercules anteriorly, setae as long as papillae anales, basal bar narrow, slightly wider ventrad at base of posterior apophyses. Posterior apophyses sclerotized, ca. 0.38 mm long, reaching posterior 1/3 segment VII, slender and apically pointed. Segment VIII not sclerotized, weakly connected ventrally and dorsally. Anterior apophyses half of length of posterior, ca. 0.20 mm, located at posterior 1/3 of segment VII. Segment VII strongly scletotized. Sterigma simple, ostium located at posterior margin of segment VII. Ductus bursae very long, ca. 3.5× as long as segment VII, equally narrow along length. Corpus bursae rounded, ca. 0.23 × 0.21 mm, diameter ca. ½ of posterior margin of segment VII, with rounded sclerotized area in anterior poriton of corpus bursae bearing delta-shaped signum and covered with tiny short spines, occupying almost 1/3 of anterior membranous portion of bursa copulatrix.

Remarks. The illustration of the female genitalia in Vári (1961: pl.104: 3) may be misleading. Vári (1961: 214), while observing the genitalia preparation LV 7135, made from the female paratype specimen No 6374 states, that “ductus and corpus bursae are not perceptible in preparation”.

Variation. The tuft of scales on the head can slightly vary in density of suffusion of ochreous piliform brown scales. The background colour of mesothoracic and metathoracic legs can vary from dirty white to pale yellow. The ground colour of forewings can have slightly different dark ochreous gold shading.

DNA sequences. A COI barcode is available for *P. grewiella* (Molecular sample code: Pgrew [JX888182]; Table S1).

Habitat. *Phyllonorycter grewiella* is found in coastal savannahs of southern and East Africa, also forests belonging to the Zanzibar-Inhambane floristic region and in coastal Yemen (Figs 437, 438).

Host plant(s). Seven species of *Grewia* (Malvaceae):

G. caffra Meisn. **(new record)**.

G. damine Gaertn. (= *G. bicolor* Juss).—In note 0496 written by Vári on 02 April 1952 (manuscript notebook of Vári) it is stated that he collected at “Skukuza 1+ some empty mines of *Lithocolletis* (=0447) on *Grewia bicolor* Juss. s. l. (= 0458) [0458 = *Nepticula*]. [*P. grewiella* [types]]” **(new record**).

G. flava DC.—In note 3542 written by Vári on 19 February 1976 (manuscript notebook of Vári) it is stated that he collected in “Dellkraal 2 mines of *Acrocercops* [recte *Phyllonorycter*] on *Grewia flava*. First moth emerged 23.ii.1976. [*P. grewiella*]” (**new record**).

G. flavescens Juss.—Vári (1961: 214), Kroon (1999: 104), Dall’Asta (2001: 34), De Prins & De Prins (2005: 298).

G. hexamita Burret (= *G. messinica* Burtt Davy & Greenway)—Vári (1961: 214), Kroon (1999: 35, 104), Dall’Asta *et al*. (2001: 34), De Prins & De Prins (2005: 298). In note 0447 written by Vári on 24 March 1952 (manuscript notebook of Vári) it is stated that he collected at “ Skukuza some mines of *Lithocolletis* on *Grewia messinica* (= 0446) [0446 = *Nepticula*]. Moth emerged 02.iv.1952. [*P. grewiella* [types]”.

G. monticola Sond.—In note 2047 written by Vári on 23 February 1958 (manuscript notebook of Vári) it is stated that D. W. Rorke collected at “Rustenburg some mines of *Lithocolletis* on *Grewia monticola* Sond. First moth emerged 03.iii.1958. [*P. grewiella*]” **(new record)**.

G. villosa Willd. **(new record)** (Fig. 430).

Mine. An upperside tentiform mine, shaped as an oval blotch which can reach 30 mm in diameter with one or two folds. Frass black and loose in mine, pupation without cocoon. Exuvium protrudes epidermis before adult emerges. Mines were found on large young leaves.

Flight period. Most specimens were reared and collected during every month of the year except August, October and December. The earliest record of *P. grewiella* is 14 January, the latest 23 November. The majority of specimens were bred and collected in late March and early April.

Distribution. (Fig. 377**).** This species is recorded from Botswana, Kenya, Namibia, Yemen **(all new records)**

and a few localities in South Africa (Vári 1961: 214). The single record from Bontebok (Cape Province) (Lopez-Vaamonde *et al*. 2003: 1818) is not included in our distribution map because it is a questionable record. The species was identified from a single larva only, taken from a mine on *Grewia* sp. (Lopez-Vaamonde, pers. comm.).

The *hibiscina* group

The *hibiscina* group consists of 6 species: *P. acutulus* De Prins, n. sp., *P. brachylaenae* (Vári, 1961), *P. dombeyae* De Prins, n. sp., *P. hibiscina* (Vári, 1961), *P. ipomoellus* De Prins, n. sp., and *P. turensis* De Prins, n. sp. Adults belonging to this group cannot be distinguished by forewing pattern, since it resembles the *rhynchosiae* species group. Moths belonging to both groups possess the following white markings on their forewings: an oblique first fascia, long dorsal strigula, second fascia angulated, straight, diabolo shaped, two strigulae (costal and dorsal) opposite each other in subapical sector of forewing, and apical patch / strigula. Therefore, the accurate identification can be done only based on genital characters. Larvae of the *hibiscina* group feed in infra tentiform mine on leaves of Asteraceae, Convolvulaceae, and Malvaceae.

The male genitalia in the *hibiscina* group are characterized by slightly curved valva with slightly enlarged rounded cucullus and oblique sclerotized suture crossing valva in subcucullus area or along midline of the valval surface. The suture crossing the ventral surface of valva is also found in *Neolithocolletis nsengai* De Prins, n. sp. Sternum VIII moderate, rounded caudally.

The female genitalia possess arc-shaped, heavily sclerotized, sterigmatic lamella post-vaginalis (unique to this species group) on segment VII. This character can be superficially confused with similar arc-shaped sterigma lamella antevaginalis of *Neolithocolletis nsengai*. The female genitalia of the *hibiscina* species group also possess a narrow ductus bursae, oval sac-shaped corpus bursae and band-like signum covered with fine short spines stretching longitudinally along corpus bursae (except in *P. acutulus* and *P. dombeyae*). In *P. dombeyae*, the signum on corpus bursae is absent, however, the male genitalia in general pattern and in presence of suture stretching along ventral surface of valva entirely correspond with the male genitalia of the *hibiscina* group. Therefore, we place *P. dombeyae* in the *hibiscina* group provisionally until more data become available. In *P. acutulus*, the signum on corpus bursae is short and narrow, band-like, located on the initial part of corpus bursae.

Key to males of the *hibiscina* group based on genitalia*

1. Valval suture streches along entire ventral surface of valva, saccus 1/2 of valval length, aedoaegus long and slender (Figs 211, 213) . . . . . 26. *dombeyae*
– Valval suture streches only in subcucullus sector, saccus ca. as long as valva, aedoeagus compact 2
2. Aedoeagus ca 2× longer than sternum VIII, spine on vesica of aedoeagus present (Figs 215, 216) . . . . . 27. *hibiscina*
– Aedoeagus ca. 3× longer than sternum VIII, spine on vesica of aedoeagus absent (Figs 207, 209, 210) . . . . . 25. *brachylaenae*

* male genitalia of *P. acutulus*, *P. ipomoellus* and *P. turensis* unknown.

Key to females of the *hibiscina* group based on genitalia

1. Posterior apophyses longer than length of segment VII 2
– Posterior apophyses shorter than length of segment VII, band-like signum on corpus bursae ca. 2× longer than length of posterior apophyses (Fig. 318) . . . . . 25. *brachylaenae*
2. Corpus bursae without signum (Fig. 319) . . . . . 26. *dombeyae*
– Corpus bursae with signum 3
3. Signum on corpus bursae ca. as long as posterior apophyses 4
– Signum on corpus bursae ½ or less than posterior apophyses 5
4. Anterior apophyses with broad sclerotized bases, 1/3 shorter than posterior apophyses, corpus bursae oblong (more than twice longer than broad), signum on corpus bursae equally broad along its entire length (Fig. 320) . . . . . 27. *hibiscina*
– Anterior apophyses without broad sclerotized bases, ca. as long as posterior apophyses, corpus bursae more or less roundish (1.5× longer than broad), signum on corpus bursae narrow initially and broad caudally (Fig. 321) . . . . . 28. *ipomoellus*
5. Signum on corpus bursae narrow, situated posteriorly, close to anastomosis with ductus bursae, slender, short ca. 3× shorter than length of posterior apophyses (Figs 316, 317) . . . . . 24. *acutulus*

– Signum on corpus bursae band-like, moderate in length and width, no more than ca. 2× shorter than length of posterior apophyses (Fig. 322) . . . . . .29. *turensis*

24. *Phyllonorycter acutulus* De Prins, new species
(Figs 58, 316, 317, 378)

Diagnosis. The forewing ground colour of *P. acutulus* is dark with grey fuscous shading, which differs from *P. brachylaenae*, *P. hibiscina*, and *P. ipomoellus* which have a brightly ochreous forewing ground colour; first fascia in *P. hibiscina, brachylaenae* and *P. ipomoellus* is narrow, and it is twice as broad in *P. acutulus* and *P. turensis;* second fascia is with clear margins in *P. brachylaenae*, *P. hibiscina*, and *P. ipomoellus* and the apical margin of second fascia is without any distinctive border smoothly transiting to ground colour in *P. acutulus* and *P. turensis.* Female genitalia of *acutulus* differ from other species of *hibiscina* group by a short narrow signum on corpus bursae running only on posterior sector of corpus bursae.

Holotype: ♀, [1] '**Kenya** / Aberdares Nat.[ional] Park / Karuru Falls, 2980 m / 00°22'S 036°54'E, (N6) [number of locality] / 12.iv.2000 / leg. Ugo Dall'Asta; [2] 'Gen. Prep. 3708♀ / De Prins'; [3] 'MRAC/KMMA / 00419'; specimen ID: [4] 'RMCA ENT 000004451', [5] 'Holotype ♀ / *Phyllonorycter* / *acutulus* / De Prins, 2012', in RMCA.

Description. *Adult* (Fig. 58). Forewing length: 3.56 mm.

Head: Vertex tufted (but worn in specimen examined); frons composed from long piliform smooth, shiny beige fuscous, with shorter dirty white scales on frontal part and darker shading beige fuscous scales towards clypeus. Maxillary palpus dirty white, very small. Labial palpus dirty beige intermixed with light fuscous, drooping, directed fronto-ventrally, terminal palpomere slightly darker shading than basal, tapering caudally. Haustellum short 2× curved. Antenna as long as forewing, consisting of 43–44 flagellomeres, first three basal flagellomeres dirty white with intermixed, shiny, ochreous, piliform scales most abundant at posterior part of flagellomere, from 4th to 17th flagellomeres dark fuscous, remaining caudal flagellomeres smoothly transit from dark fuscous to dirty white, intermixed with separate, dark fuscous, slender, piliform scales towards tip of antenna, producing in general brighter shading; flagellum pale fuscous ventrally; scape shiny dirty white at anterior half and ochreous at posterior half with 6–8 dirty white pecten of different length; pedicel dirty white with intermixed light ochreous piliform scales.

Thorax: Ochreous fuscous; tegulae pale fuscous. Forewing ground colour ochreous with pale fuscous shading with white markings consisting of two transverse fasciae, two costal strigulae, and one dorsal strigula, first fascia white almost straight at 1/4 of forewing, second fascia at 1/2 of forewing, slightly contracted at midline, broadly edged with three rows of dark fuscous scales basally, first costal and first dorsal strigulae opposite each other broad triangular shaped touching with tips each other at midline of forewing, broadly edged basally with dark fuscous scales, second costal strigula at apex, long, running to middle of termen, bright white surrounded by dark fuscous-tipped scales over apical portion of forewing from apical edge of first costal and first dorsal strigulae to margin of termen; tornus with fuscous-tipped long and slender scales; fringe short shiny pale ochreous along apex and termen, long pale fuscous along tornus and dorsum. Hindwings pale fuscous; fringe darker fuscous than hindwing, at basal part long, almost half as long as hindwing at broadest point, gradually shortened towards apex of hindwing. Fore femur and fore tibia dark ochreous fuscous, tarsomere I dark ochreous fuscous, tarsomeres II–V lighter ochreous with brownish shading; mid-femur and mid-tibia dark fuscous dorsally and ochreous ventrally, tibial spurs pale ochreous with dark fuscous scales laterally, tarsus ochreous with slight mixture of tiny piliform fuscous small scales on tarsomeres; hind femur and hind tibia pale beige, medial and apical spurs unicoloured pale beige, tarsomere I pale fuscous, apical tarsomeres gradually obtaining lighter shading, to terminal shiny pale beige tarsomere, tip of tarsomere with dark fuscous V-shape marking.

Abdomen: Dark fuscous dorsally, dirty white ventrally, genital segments silver.

Male genitalia. Unknown.

Female genitalia (Figs 316–317). Papillae anales connected laterally with gently rounded apices, covered with median, stiff, sparsely distributed setae; basal bar not developed. Posterior apophyses long, with slightly broadened rectangle bases, ca. 501 µm in length, reaching posterior 1/3 of segment VII, slightly dilating at basal half and converging in caudal 1/3, making a small and very gentle curve, narrow, equally broad along all their length, with narrowly rounded apex. A medium sized, needle-like projection, ca. 162 µm long, extending into posterior sector

of segment VIII near bases of anterior apophyses, projection slightly bent, with sharp posterior apex, anterior half of projection twice wider than posterior part, anterior caudal edge narrowly rounded. Segment VIII long, weakly united with segment VII, without any sclerotized connection, bases of anterior apophyses united into broad, slightly sclerotized ring encirclying posterior half of segment VIII. Anterior apophyses slightly shorter than posterior, 402 µm long, slender, extedning parallel to each other and parallel to posterior apophyses, slightly curved with narrowly rounded at apices, almost reaching ostium bursae. Segment VII 548 µm long, trapezoidal, posterior 1/3 weakly melanized, without sclerotized margins. Ostium bursae opening rounded, comparatively big, located at anterior 2/3 of segment VII, sterigma small, lamella post-vaginalis narrow one wrinkle fold shaped as parabol, 506 µm long, located in central part of segment VII, caudal ends ending just before anterior margin of segment VII; antrum long, more strongly melanized than ductus bursae, two wrinkled parallel strongly melanized elongate sutures run dilating in anterior half of antrum. Ductus bursae of medium length and girth, slightly longer than segment VII, broader than antrum, smoothly dilating towards corpus bursae; transition between ductus and corpus bursae is smooth, without visible boundary. Corpus bursae elongated-oval, with gently rounded caudal part, bearing one strongly sclerotized sharp ridge like signum located at posterior part of corpus bursae, 160 µm long. Ductus spermathecae rather short, extedning from ostium bursae to anterior margin of segment VII, membranous, with 16 compact revolutions, terminating in moderately enlarged elliptical vesicle located at posterior margin of segment VII.

Etymology. The specific epithet is derived from the Latin *acutus*, meaning “sharpen” in reference to the sharp, ridge-like signum on the corpus bursae.

Habitat. High altitude alpine meadows and low shrub zone in the eastern part of the Albertine Rift Mountains.

Host plant(s). Unknown.

Flight period. Adult has been collected in April.

Distribution (Fig. 378). Known only from the type locality in Kenya.

25. *Phyllonorycter brachylaenae* (Vári, 1961)

(Figs 59, 60, 206–210, 318, 379)

Lithocolletis brachylaenae—Vári (1961: 220–221; pl. 23, fig. 7; pl. 65, fig. 11; pl. 105, fig. 5); Bland (2010: 3).

Phyllonorycter brachylaenae—Vári & Kroon (1986: 17, 136, 157); Swain & Prinsloo (1986: 14); Kroon (1999: 12, 95); Dall’Asta *et al*. (2001: 33); Vári *et al*. (2002: 26) ; De Prins & De Prins (2005: 276); De Prins & Mozūraitis (2006: 59, fig. 2, 61 fig. 6).

Diagnosis. Second dorsal strigula in forewing and whitish abdomen ventrally are distinctive characters of *P. brachylaenae*, and distinguishes this species from *P. hibiscina*. In general, specimens of *P. brachylaenae* are slightly larger than those of *P. hibiscina*. However, due to variation in size of specimens, the second dorsal strigula/patch and other external characters are not sufficient to separate this species from other Afrotropical *Phyllonorycter* having two fasciae, two costal and one dorsal strigula, such as the *dombeyae*, *hibiscina*, and *rhynchosiae* species groups. Females of *P. brachylaenae* have short posterior and anterior apophyses which are easily distinguished from *P. hibiscina* which has very long posterior apophyses. The general morphology of male genitalia in both *P. hibiscina* and *P. brachylaenae* is very similar, except slight differences in aedoeagus. *P. brachylaenae* lacks tiny spine on vesica, which is present in *P. hibiscina*.

Material examined. *Holotype*: ♂, [1] [**South Africa**] ‘Pretoria / 20.x.1949 / [leg.] L. Vári / Ac.[quisition] no: 184’; [2] ‘*Lithocolletis* / *brachylaenae* Vari / Holotype’. [3] ‘G[enitalia] / 7126’. [4] ‘*Lithocolletis* / *brachylaenae* Vári / ♂ HOLOTYPE No 6414’, in TMSA.

Paratypes: 43♂ and 36♀, (including 2♀ genitalia preparations). **South Africa**: 1♀, Pretoria, 23.iv.1949, [leg.] L. Vári, Ac[quisition]. no 153; G.[enitalia] 7127♀, *Lithocolletis brachylaenae* Vári ♀ ALLOTYPE No 6415, in TMSA. 43♂, 35♀, Pretoria, 17.x.1949, 19.x.1949, 15.iv.1950, 19.iv.1950, 20.iv.1950, 21.iv.1950, 22.iv.1950, 25.iv.1950, 26.iv.1950, 28.iv.1950, 29.iv.1950, 01.v.1950, 02.v.1950, 03.v.1950, 12.v.1950, 15.v.1950, 28.vii.1950, 31.vii.1950, 02.viii.1950, 04.viii.1950, 05.viii.1950, 08.viii.1950, 09.viii.1950, 11.viii.1950, 12.viii.1950, 30.vi.1954, 05.vii.1954, 09.vii.1954, 11.vii.1954, 13.vii.1954, 13.iii.1955, 14.iii.1955, 15.iii.1955, 18.iii.1955, 21.iii.1955, 23.iii.1955, [leg.] L. Vári, Ac[quisition]. no 184, 206, 211, 221, 226, 262, 1334, 1545; *Lithocolletis brachylaenae* Vári PARATYPE No 6416—6493, in TMSA.

Additional material: 4♂ and 4♀ (including 3♂ and 2♀ genitalia preparations) and 69 specimens. **South Africa**: 1♂, Debengeni, vii.1954, [leg.] L. Vári, Ac[quisition]. no. 1327, gen. prep. 7128♂, in TMSA. 1♀, Rustenburg, 12.iii.1956, [leg.] L. Vári, gen. prep. 7680♀, Ac[quisition]. no. 1739, in TMSA. 1♂, Pretoria, 06.v.1985, R. B. Copley, gen. prep. 7723♂, in TMSA. 1♂, 2♀ (1♀ without abdomen), Pretoria, 18.iii.1955, 23.iii.1955, 11.viii.1971, [leg.] L. Vári, Ac.[quisition] no. 1545, *Phyllonorycter brachylaenae* (Vári), det. L. Vári 1961, gen. prep. De Prins 3695♂ (MRAC/KMMA 00368), specimen IDs: RMCA ENT 000004114—000004116, in RMCA. 1♂, 1♀, Pretoria, 15.iv.1950, 21.iv.1950, [leg.] L. Vári, Ac[quisition].no. 206, *Lithocolletis triarcha* Meyrick (misidentification), gen. prep. De Prins 3708♂ and 3709♀, and 3710♀, in ZMHB. 3 specimens, Debengeni, vii.1954, [leg.] L.Vári, Ac.[quisition] no. 1327, in TMSA. 4 specimens, Hartebeespoort Dam, Pret.[oria] Distr[ict]., 07.vii.1952, 04.viii.1952, 10.ix.1952, Ac[quisition]. no. 549, in TMSA. 56 specimens, Pretoria, 14.ix.1949, 26.x.1968, 23.vii.1971, 25.vii.1971, 28.vii.1971, 30.vii.1971, 31.vii.1971, 01.viii.1971, 04.viii.1971, 11.viii.1971, 15.viii.1971, 17.viii.1971, 18.viii.1971, 08.ix. 1971, 07.x.1975, 08.x.1975, 27.iv.1977, [leg.] L. Vári, Ac[quisition]. no 3170, 3454, in TMSA. 1 specimen, same locality data, 07.ix.1965, [leg.] G. Vári, in TMSA. 2 specimens, Pretoria N[orth], 20.vii.1961, 31.vii.1961, [leg.] D. W. Rorke, Ac[quisition]. no. 2310, in TMSA. 1 specimen, Pretoria, 27.ix.1958, [leg.] R. B. Copley, in TMSA. 2 specimens, Rustenburg 08.iii.1956, 11.iii.1956, [leg.] L. Vári, Ac.[quisition] no. 1739, in TMSA. 1 specimen, Rustenburg Natuurreservaat, 14.x.1975, Ac[quisition]. no. 3468, in TMSA. 1♀, Pretoria, 17.iv.1950, [leg.] L.Vári, Ac.[quisition] no. 211. This specimen is not mentioned in the original description (Vári 1961: 221) but it bears exactly the same data as paratype no 6428 in the TMSA and it is labeled as a paratype in the ZMHB.

Redescription. *Adult* (Figs 59, 60). Forewing length: 3.06–3.33 mm.

Head: Vertex tufted mainly with white, piliform scales with suffusion of ochreous piliform scales; lateral sides of vertex covered with short, ochreous, very slightly tufted scales; frons smooth, covered with long appressed, piliform, white scales. Labial palpus slightly longer than diameter of compound eye, drooping, directed latero-anteriorly or drooping and pointing ventrally, palpomere I white with dark brown, one large scale situated subapically on outer margin, palpomere II white with 2 smaller, dark brown scales situated longitudinally on outer margin, palpomere III with one tiny dark brown scale subbasally on outer margin; maxillary palpus white, haustellum developed, light beige. Antenna almost as long as forewing, flagellomeres light beige with fuscus infusion more intense at apices of flagellomeres, giving flagellum a slightly ringed appearance; pedicel beige with numerous very slender, fuscous longitudinal stripes; scape white at anterior half and ochreous posteriorly, 8–10 pecten pale ochreous, in some specimens ochreous pecten intermixed with a few white pecten.

Thorax: Ochreous golden with broad white arched band anteriorly, shiny golden ochreous posteriorly; tegula golden ochreous with white posterior half. Forewing elongate, ground colour golden ochreous with white markings consisting of basal streak, two transverse fascia, two costal strigulae and two dorsal strigulae; basal streak very fine, slightly oblique toward apex, not reaching first fascia, in most specimens not edged but a few blackish scales can be present on dorsal margin (in holotype); first white fascia at 1/4 of costa, twice broader at dorsum than at costa, oblique towards apex, 3× slightly curving, finally edged with black scales apically; second white fascia at 1/2 ca. twice broader at dorsum than at costa, slightly oblique towards apex, constricted at middle or subcostally, finelly edged with row of blackish scales basally and with a few dispersed scales on apical margin; first costal and first dorsal strigulae at 3/4 of forewing, opposite each other, almost of equal size (in holotype dorsal strigula is larger), triangular shaped, almost touching each other with their tips at midline or preserving small gap covered with blackish scales, first costal and first dorsal strigulae edged basally, first costal strigula in holotype edged on both sides, in many specimens only very few scales are present on apical margin of strigula, in majority of specimens apical margin of strigulae not bordered; second costal strigula at apex, brightly white, comma shaped, bordered with 7-8 black sparse scales along basal margin; 2 dorsal strigula at tornus indistinct, without bording; a patch of blackish scales at tornus surround second dorsal strigula; outer margin of tornal sector bordered with irregularly dispersed blackish scales; fringe short pale ochreous with a fringe line of a row of long blackish brown tipped scales running from apex to tornus, long light fuscous along dorsal margin. Hindwing uniformly pale fuscous, fringe light fuscous. Fore coxa pale fuscous, fore femur dark fuscous ochreous, fore tibia fuscous ochreous dorsally and dirty white ventrally, tarsomeres I and II white with fuscous apices, tarsomere III and IV entirely fuscous, tarsomere V dirty white. Mid-femur dirty white with oblique fuscous stripe basally and subapically, tibia white with oblique ochreous stripe subbasally and another latitudinal ochreous band subapically, tibial spurs white with dark ochrous subapices, tarsomere I white with broad fuscous ochreous band at subapix, tarsomere II white

with fuscous ochreous apex, tarsomere III entirely fuscous ochreous, tarsomeres IV–V dirty white. Hind femur dirty white with ochreous band basally, hind tibia white with golden ochreous apical 1/3, tibial spurs white, tarsomeres I and II with pale ochreous apices, terminal tarsomeres white with pale beige shine.

Abdomen: Dark fuscous dorsally with pale fuscous shiny terminal genital segments, dirty white ventrally. Sternum VIII of male short, rounded caudally.

Male genitalia (Figs 206–210). Tegumen very weakly sclerotized, conus shaped, with very short and slender setation at apical 1/4; a long stiff, thick macroseta is present on dorsal subapex of tegumen; basal half of tegumen twice broaden, covered with sparse round minute scale like soccets (visible at 200×), protrusion of tuba analis is visible. Subscaphium sharply pointed, apical sector without setae. Valvae symmetrical, ca. 250 µm long, slightly broadening apically, ventral margin only ca. 5% longer than dorsal, cucullus area somewhat quadrangular with rounded angles, slightly enlarged apically; a strongly sclerotized suture runs obliquely from 1/2 of dorsal margin towards ventroapex; median surface of valva between suture and dorsal margin is covered with long setae, sparse setae are distributed along ventral margin of valva. Vinculum sclerotized, half rounded, significantly broader caudally towards base of saccus; saccus slender, slightly bulbed caudally, moderately long, shorter than valva, ca. 217 µm long. Transtilla very strongly sclerotized, U-shaped, horizontal bar is broader than vertical ones, vertical bars narrow with blunt apices; anellus developed sclerotized, conus-shaped, strongly holding aedoeagus. Aedoeagus slightly longer than valva, ca. 306 µm in length, slightly broader at coecum and gently tapering towards blunt vesica; subvesica with two long, thick, rod-like cornuti, ca. 96 µm long, ca. 1/3 length of entire aedoeagus.

Female genitalia (Fig. 318). Papillae anales laterally compressed about twice as wide as long, anterior sector more heavily sclerotized than posterior, setose with long setae irregularly dispersed; sclerotized basal bar not developed. A slender needle-like strongly sclerotized projection, ca. 146 µm long, extending from papillae anales, reaching middle of segment VIII. Posterior apophyses sclerotized, slender, broad at bases, short, ca. 250 µm long, reaching posterior margin of segment VII with their apices, apices sharp. Segment VIII weakly sclerotized, connected dorsally and ventrally. Anterior apophyses slightly longer than posterior, ca. 270 µm long, broad at bases but bases are not fused to ring, slender with sharp apices, straight. Ostium bursae round with narrow ring-like sclerotized edge, located at middle of segment VII, antrum melanized, with narrow suture along anterior part of antrum, ca. 152 µm long, sterigma (lamella post-vaginalis) as small, lightly sclerotized cuticle fold. Ductus bursae moderate, narrow, without modifications; corpus bursae somewhat narrow oblong, with a large oval area set with minute spines and long narrow band-like signum, stretching all along corpus bursae, ca. 425 µm long, just not reaching caudal sector; signum squamose, covered with short fine spines. Ductus spermathecae rather short stretches from ostium bursae to anterior margin of segment VII, membranous with 15–16 compact convolutions terminating in moderately enlarged ellipsoid vesicle located at posterior margin of segment VII.

Variation. There is a significant variation of second dorsal strigula pattern on forewing. It can vary from a comma-shaped patch to only a few elongate dirty white scales which are hardly visible.

Habitat. Understory vegetation in secondary forests. Mines of *P. brachylaenae* can be found together with *P. hibiscina* (Vári, unpublished manuscript notes).

Host plant(s). Asteraceae: *Brachylaena discolor* DC and *B. rotundata* S. Moore—Vári 1961: 221, Swain & Prinsloo 1986: 14, Kroon 1999: 12, Dall'Asta *et al*. 2001: 33, De Prins & De Prins 2005: 276, manuscript notes of Vári: note No 0153 of 16/04/1949, note No 0184 of 03/10/1949, note No 0206 of 10/04/1950, note No 0211 of 13/04/1950, no No 0221 of 15/04/1950, No 0221 of 15/04/1950, note No 0226 of 21/04/1950, note No 0262 of 22/07/1950, No 1327 of 15/06/1954, note No 1334 of 27/06/1954, note No 1545 of 12/03/1955, note No 1739 of 04/03/1956, note No 2310 of 03/07/1961, note No 3170 of 18/07/1971, note No 3454 of 23/09/1975, and note No 3468 of 08/10/1975.

Mine. A moderate, semi-circular, semi-transparent tentiform mine on the underside of the leaf without folds; fine black frass along edge of mine; pupation in very slender, white cocoon; exuvium protrudes epidermis of a leaf before adult emerges (Vári 1961: 221, De Prins & De Prins 2005: 276). The mining period is ca. 4-14 days (See Material examined and Vári's notes: note No 0153 of 16/04/1949, note No 0184 of 03/10/1949, note No 0206 of 10/04/1950, note No 0211 of 13/04/1950, no No 0221 of 15/04/1950, No 0221 of 15/04/1950, note No 0226 of 21/04/1950, note No 0262 of 22/07/1950, No 1327 of 15/06/1954, note No 1334 of 27/06/1954, note No 1545 of 12/03/1955, note No 1739 of 04/03/1956, note No 2310 of 03/07/1961, note No 3170 of 18/07/1971, note No 3454 of 23/09/1975, and note No 3468 of 08/10/1975.

Flight period. Adults are confirmed as active at two separate periods during the year: 1) from early March to middle of May, and 2) from late June to late October. The great majority of specimens were collected in July and August.

Distribution. (Fig. 379). Recorded only from South Africa (Vári 1961: 221).

26. *Phyllonorycter dombeyae* De Prins, new species
(Figs 61, 211–213, 319, 380)

Diagnosis. The wing pattern of *P. dombeyae* is almost identical with that of *P. hibiscina*. Minor differences exist in thorax coloration. The anterior sector of the thorax of *P. hibiscina* is ochreous, whereas the rest of the thorax is white. In *P. dombeyae* the anterior sector of the thorax is white and the rest is ochreous. There are minor differences in coloration of mesothoracic legs as described above. Male genitalia of *P. dombeyae* closely resemble those of *P. hibiscina*, however, valvae in *P. dombeyae* are longer, more slender than in *P. hibiscina*. The suture on ventral valval surface follows the midline in *P. dombeyae*, whereas in *P. hibiscina* the suture is shorter and crosses the subcostal area of valval surface. The tegumen in *P. dombeyae* is longer and narrower and the apical part more elongate and cone shaped; in *P. hibiscina* the tegumen is short, broad, sharply narrowing; the length of the saccus in *P. dombeyae* is half that of the valva, whereas in *P. hibiscina* the saccus is as long as the valva or only slightly shorter. The aedoeagus is longer and slenderer in *P. dombeyae* than in *P. hibiscina*. The female genitalia of *P. dombeyae* can be easily distinguished from other species of the *hibiscina* group by their very long apophyses, almost reaching the anterior margin of segment VII, and the absence of a signum on corpus bursae.

Holotype: ♂, [1] '**South Africa /** KwaZulu-Natal / Hluhluwe-Imfolozi N.[ature] P.[ark] / Hilltop Camp / mine 15.vii.2008 / leg. C. Lopez-Vaamonde'; [2] 'e.l. *Dombeya* sp. / [Malvaceae] / 15.viii.2008'; [3] 'Gen. Prep. 3747♂ / De Prins'; [4] 'MRAC/KMMA / 00458'; specimen ID: [5] 'RMCA ENT 000005040'; [6] 'Holotype ♂ / *Phyllonorycter / dombeyae* / De Prins, 2012' in RMCA.

Paratypes: 3♂, 10♀ (including 1♂, 2♀ genitalia preparations). **South Africa:** 3♂, 10♀, KwaZulu-Natal, Hluhluwe-Imfolozi N.[ature] P.[ark], Hilltop Camp, mine 15.vii.2008, leg. C. Lopez-Vaamonde, e.l. *Dombeya* sp. [Malvaceae], 15.viii.2008, gen. prep. De Prins 3745♂, 3746♀, 3748♀ (MRAC/KMMA 00456, 00457, 00459), specimen IDs: RMCA ENT 000005037–000005039, 000005041, 000005043–000005049, in RMCA, 1♂, 1♀ in BMNH.

Description. *Adult* (Fig. 61). Forewing length: 2.28–2.48 mm.

Head: Vertex slightly tufted with pale ochreous piliform scales directed radially, intermixed with dirty white scales, latter more abundant in central part of head; frons smooth, snowy white with silver shine. Labial palpus slightly longer than diameter of compound eye, narrow, drooping apically, pointed downturned, dirty white, with dark ochreous round scales running along two terminal palpomeres laterally from inner side, with two tiny dark brown spots on both lateral sides of apex of basal palpomere; maxillary palpus pale beige, small with truncate-rounded apex, haustellum pale beige terminally 3–4× curved. Antenna slightly shorter than forewing, consisting of 30–31 flagellomeres; scape white at anterior half and light ochreous with dark brown tipped scales edging ochreous part of scape at posterior half; 8–10 dirty white pecten of variable length, often ca. half diameter of eye; pedicel smaller than scape, pale beige with dark ochreous in apical 1/3, following flagellomeres intermixed with dark ochreous; terminal flagellomeres entirely ochreous.

Thorax: Shiny white anteriorly with broad, pale ochreous band posteriorly, posterior tip of thorax white; tegula light ochreous with white posterior edge. Forewing light ochreous with white markings consisting of very short basal streak, two transverse fasciae, two costal strigulae, and one dorsal strigula; basal streak very short, slightly oblique, directed towards apex, not edged; first fascia at 1/4, broad, oblique towards apex, both margins parallel to each other, terminating just before costa, finely edged with blackish apically; second fascia at middle of forewing angulated, narrowed at middle, hour-glass shaped, broad at dorsum and at costa, finelly edged with blackish basally with a few blackish scales apically bordering constriction of fascia; first costal strigula at 3/4, triangular, not reaching middle of forewing, finally edged basally, extending partly to apical edge; first dorsal strigula opposite first costal strigula, triangular, as large as first costal strigula or slightly larger, ending just before middle of forewing, finely edged with black scales basally, with extention of black scale irroration between first costal and first dorsal strigulae; second costal strigula at apex, white, comma shaped, broadly and

irregularly edged on both sides with numerous blackish scales; fringe line long, distinct, consisting of brown tipped scales along termen; fringe short along termen to tornus with silver shine, long whitish with golden shine along tornus. Hindwing pale grey with slight ochreous shading and with long fringe concolourous with hindwing. Fore costa and fore femur greyish fuscous with slight ochreous shading, apical part of fore femur ochreous, fore tibia greyish fuscous, tarsomeres greyish fuscous except terminal, which is dirty white; mid-femur beige ochreous with white apex, mid-tibia dirty white with irroration of brownish ochreous, irregular patches on base, middle part and apex of mid-tibia, tibial spurs fuscous brownish with white apices, tarsomere I white at base and apex with dark fuscous elonagte patch in middle, tarsomere II dirty white with fuscous apex, tarsomere III fuscous, terminal tarsomeres dirty white; hind femur white with golden shine, hind tibia white at base and ochreous nearly to apex with long erect hairs, apical spurs white with fuscous subapical ring, medial spurs ca. 3/4 length of tibia, light fuscous with white apical part, tarsomere I white with subapical ochreous patch, tarsomere II white with ochreous base and apex, tarsomere III white with small, faint, ochreous spot on apex, terminal tarsomeres white.

Abdomen: Terga I–III light ochreous with bronze shine concolorous with fprewoing, following tergites ochreous–fuscous (darker than tergites I–III), genital segments beige-ochreous; abdomen whitish or pale beige ventrally. Descaled sternum VIII of males spade shaped, slightly tapering caudally with rounded caudal apex, densely set with tiny spicules.

Male genitalia (Figs 211–213). Tegumen long, ca. 302 µm, subconical, truncate and weakly sclerotized at apical part, arms of tegumen broaden towards apex, abuting to each other but not contiguous at apical 2/3 of tegumen, apical part spinulosae, tuba analis not protruded, Valvae symmetrical, elongate, gradually dilating towards apex, ca. 271 µm in length, with rounded apical part, slightly down-curved; a strongly sclerotized suture, ca. 169 µm long, extending obliquely from subdorsal margin toward ventroapex; median surface of valva sparsely setose with long setae on discal area and densely on apical area, apical margin of cucullus rough, protuberant. Vinculum short, strongly sclerotized, half rounded, with short more thickly sclerotized lateral margins, forming short concave arms articulating dorsally with tegumen and ventrally with dorsal margin of valva, significantly broader caudally towards base of saccus; saccus slender, of moderate length, ca. 140 µm, gently obtuse caudally. Transtilla complete, very strongly sclerotized, H-shaped, thick, horizontal part ca. 92 µm long, cephalic lobes ca. 71 µm long; anellus weakly sclerotized, fultura superior cone shaped, supporting aedoeagus. Aedoeagus longer than saccus, ca. 250 µm long, tubular, slightly broader at coecum and gently tapering towards vesica; vesica with two long (ca. 101 µm), slender cornuti, parallel (in holotype) or abuting and contiguous (in paratype).

Female genitalia (Fig. 319). Papillae anales laterally slightly compressed, dorsally ca. 50 µm high with a gradual decline ventrad of about 30%, caudally flattened, with dense, moderate (ca. 73 µm long) setae especially along caudal margin and with 6–7 long setae, ca. 83 µm long, on dorsoventral lateral surface. Sclerotized basal bar absent. Posterior apophyses sclerotized, slender, very long (ca. 402 µm) gently tapering, with sharp apices reaching anterior sector of segment VII. Segment VIII equally sclerotized posteriorly and anteriorly, ca. 138 µm long, slightly more than half as long as wide, rectangular well connected dorsally and ventrally. Anterior apophyses shorter than posterior apophyses, ca. 276 µm in lngth, slender, except for slight enmargement basally, straight, with sharp apices almost reaching anterior margin of segment VII. Bases of anterior apophyses small triangular shaped, situated at anterior margin of segment VIII. Ostium bursae narrow, ring-like, weekly sclerotized, located in posterior 1/3 sector of segment VIII, at upper part of arc-like sterigma; antrum tubular, very short and weakly sclerotized; sterigma (lamella post-vaginalis) well developed, occupying larger part of sternum VII, sclerotized, narrow, convex bow with rounded posterior top, sterigmatic arms broadly dilating anteriorly. Segment VII, large, ca. 351 µm long, strongly melanized, trapezoidal, posterior margin ca. 240 µm wide, anterior margin ca. 430 µm wide, margins not sclerotized. Ductus bursae weakly sclerotized, lightly curved, broad, significantly broader anteriorly, ca. 533 µm long; corpus bursae sac-like (200 × 150 µm), with gradual transition from ductus bursae to corpus bursae; a wrinkled, lightly sclerotized signum area covered with short tiny spinules occupying ventral half of corpus bursae, distinctive signum absent.

Etymology. The specific epithet is derived from the generic name of the host plant, *Dombeya.*

Variation. There is a significant variation in length and degree of obliquency of the first dorsal fascia.

Habitat. Mines of *P. dombeyae* were collected in savannah biotope intermixed with bushes and lower trees.

Host plant(s). Malvaceae: *Dombeya rotundifolia* (Hochst.) Planch.

Mine. A moderate tentiform mine ca. 10–15 mm long, broad, more or less square or slightly alongate, whitish-pale beige, on the underside of the leaf without folds.

Flight period. Adults were collected in August.

Distribution. (Fig. 380). The species is only known from the type locality on the eastern cost of South Africa.

27. *Phyllonorycter hibiscina* (Vári, 1961)

(Figs 8, 62–64, 130, 214–216, 320, 381, 421–423)

Lithocolletis hibiscina—Vári (1961: 219–220; pl. 23, fig. 6; pl. 65, fig. 10; pl. 105, fig. 3).

Phyllonorycter hibiscina—Vári & Kroon (1986: 41, 136, 157), Kroon (1999: 37, 105), Dall'Asta *et al*. (2001: 34), Vári *et al*. (2002: 26), De Prins & De Prins (2005: 301).

Diagnosis. *Phyllonorycter hibiscina* is most similar to *P. brachylaenae*. However, *P. hibiscina* has a very short, oblique, basal streak and lacks a second dorsal strigula on the forewing. Furthermore, it has stripes on the ventral surface of the abdomen. Females of *P. hibiscina* have very long posterior apophyses, whereas *P. brachylaenae* has short posterior apophyses. The general structure of male genitalia is similar in both species. The signum on the corpus bursae in *P. hibiscina* is as long as the posterior apophyses or slightly longer, whereas in *P. brachylaenae* the signum is more than 2× as long as the posterior apophyses.

Material examined. *Holotype*: ♂, [1] [**South Africa**] 'Hennops River / 12.ix.1950 / [leg.] L. Vári / Ac[quisition]. no: 270'; [2] '6';[3] 'HT';[4] 'G[enitalia] / 7129'; [5] '*Lithocolletis* / *hibiscina* Vári / ♂ HOLOTYPE No 6403', in TMSA.

Paratypes: 6♂ and 4♀ (including 1♂ and 2♀ genitalia preparations). **South Africa**: 1♀, Hennops River, 24.iii.1955, [leg.] L. Vári, Ac[quisition]. no. 1546; G.[enitalia] 7187; *Lithocolletis hibiscina* Vári ♀ ALLOTYPE No 6404, in TMSA. 5♂, 1♀, Hennops River, 12.iii.1955, 13.iii.1955, 15.iii.1955, 19.iii.1955, 21.iii.1955, [leg.] L. Vári, Ac.[quisition] no 1546; G.[enitalia] 7186♂; *Lithocolletis hibiscina* Vári PARATYPE No 6405-6410, in TMSA. 1♀, Pretoria, 23.v.1958, L. Vári; G.[enitalia] 7722♀; *Lithocolletis hibiscina* Vári PARATYPE No 6411, in TMSA. 1♂, 1♀, Rustenburg, 07.iii.1956, 09.iii.1956, [leg.] L. Vári, Ac.[quisition] no: 1737; G. 7679; *Lithocolletis hibiscina* Vári PARATYPE No 6412–6413, in TMSA.

Additional material: 43♂, 66♀ (including 9♂, 8♀ genitalia preparations) and 30 specimens. **Cameroon:** 1♂, Mannsquell Hütte, 2250 m, 07.v.1938, [leg.] S. G. Buhr, mine an Labiate [sic Labiateae], 05 [May], gen. prep. De Prins 3516♂, in ZMHB. **Kenya**: 1♀**,** Rift Valley, L. Bogoria, 1000 m, 12.vii.2007, [leg.] D. J. L. Agassiz, gen. prep. De Prins 3782♀, in the collection of David Agassiz. 3♂, 3♀, Nakuru National Park, Makalia Falls Camp Site 00°25'S 36°04'E, 1830 m, 11.x.2001, leg. J. De Prins, e. l. *Abutilon indicum* (L.) (=*mauritianum* (Jacq.) Medik.)[Malvaceae] 17.x.2001, 21.x.2001, 25.x.2001, 28.x.2001, in NMK; 14♂, 24♀, same locality and hostplant data, e. l. from 13.x.2001 to 26.x.2001, gen. prep. De Prins 3403♂, 3404♂, 3405♂, 3406♀, 3407♀ (MRAC/KMMA 00355, 00356, 00364–00366), descaled head prep. MRAC/KMMA 00531, specimen IDs: RMCA ENT 000004026—000004063, in RMCA. 1♂ same locality and hostplant data, e. l. 27.iv.2002, specimen ID: RMCA ENT 000003261, DNA voucher CLV12007, in CCDB; 1♀ same locality and hostplant data, e. l. 17.x.2001, specimen ID: RMCA ENT 000003262, DNA voucher CLV12807, in CCDB. 3♂, 4♀, Lake Nakuru N[ational]. P[ark]., 1825 m, 00°25'S 36°04'E, mine 18.iv.2002, leg. J. De Prins, e.l. *Abutilon mauritianum* (Jacq.) Medik. [Malvaceae] 22.iv.2002, 24.iv.2002, 30.iv.2002; in NMK. 19♂, 26♀, same locality and hostplant data, e. l. from 24.iv.2002 to 29.iv.2002, gen. prep. De Prins 3475–3479♂, 3477♀, 3480♀ (MRAC/KMMA 00357–00360, 00362, 00363), specimen IDs: RMCA ENT 000004066—000004109, in RMCA. **South Africa:** 1♀, Durban, 14.xii.1916, [leg.] van der Merwe, "*L. triarcha* teste Meyrick", 2491, G. 7500♀, Ac.[quisition] no. 24/20, coll. Janse, in TMSA. 1 specimen, Durban, 11.xii.1916, [leg.] van der Merwe, Ac.[quisition] no. 24, coll. Janse, in TMSA. 1 specimen, Durban, 19.iii.1922, [leg.] D. T. Boyce, coll. Janse, "*Acrocercops* spec…, A. J. T. Janse det", in TMSA. 2 specimens, Hennops River, -1955, [leg.] L.Vári, Ac.[quisition] no.1685, in TMSA. 1 specimen, Pretoria, 04.x.1958, [leg.] R. B. Copley, in TMSA. 1 specimen, Pretoria, 05.v.1962, [leg.] L. Vári, Ac.[quisition] no. 2534, in TMSA. 1 specimen, Lebombo Mountains, Jozini Dam, 18.i.1965, Ac.[quisition] no. 2760, in TMSA. 1 specimen, Pretoria, 07.x.1975, [leg.] L. Vári, Ac.[quisition] no. 3454, in TMSA. 2 specimens, Pretoria W.[est], 31.i.1968, [leg.] L. Vári, Ac[quisition]. no. 2923, in TMSA. 1 specimen, Hartebeespoort Dam, Brits Dist[rict]., 30.ix.1975, [leg.] L. Vári, Ac.[quisition] no.

3454, in TMSA. 1 specimen, Pretoria District, Die Hoekie, 06.x.1975, Ac.[quisition] no.3454, in TMSA. 5 specimens, Umdoni Park, 10.iv.1982, 14.iv.1982,[leg.] M. J. Scoble, Ac.[quisition] no. 3879, in TMSA. 10 specimens, Illovo Beach, 08.xi.1984, 09.xi.1984, 11.xi.1984, 12.xi.1984, 13.xi.1984, 15.xi.1984, 17.xi.1984, [leg.] L. Vári, Ac.[quisition] no. 3956, in TMSA; 1♀, Pretoria, 7.x.1975, [leg.] L. Vári, specimen ID: RMCA ENT 000004113, in RMCA. 1♂, 3♀, Gauteng, 1000 m, Tswaing Crater, 28°28'S 23°46'E, mine 16.ii.2002, e. l. *Hibiscus lunarifolius* Willd. [Malvaceae], 20.ii.2002, 24.ii.2002, 26.ii.2002, gen. prep. De Prins 3486♂ (MRAC/KMMA 00361), IDs: RMCA ENT 000003263, 000004110–000004112, in RMCA. 1♂, same locality data, 16.ii.2002, gen. prep. De Prins 3537♂ (MRAC/KMMA 00396), specimen ID: RMCA ENT 000003286, in RMCA, DNA voucher CLV15307, in CCDB; 1♀, same locality data, 16.ii.2002, specimen ID: RMCA ENT 000003263, DNA voucher CLV13807, in CCDB. **Zimbabwe:** 3 specimens, Lundi, S. Rh. [South Rhodesia], 16.iii.1964, 18.iii.1964, 21.iii.1964, [leg.] L.Vári, Ac.[quisition] no: 2615, in TMSA.

Redescription. *Adult* (Figs 62–64, 130). Forewing length: 3.0–4.1 mm.

Head: Vertex tufted with white scales predominant posteriorly, with faint intermixture of shiny ochreous, appressed scales and dark ochreous, apressed, piliform scales of different length on latero-occiput; frons smooth, shiny white. Labial palpus 1.5× longer than eye, apically pointed, more or less latero downturned, shiny white dorsally, second and third palpomere covered with a longitudinal row of fuscous scales from outer side; maxillary palpus dirty white, haustellum pale beige. Antenna almost as long as forewing, not clearly ringed, scape white anteriorly and dark ochreous posteriorly with bright ochreous pecten up to nine of same length as scape or shorter; pedicel dark fuscous, first flagellomere dirty white; remainder of flagellum golden ochreous striped with darker fuscous, very slender, piliform, longitudinal scales; pale bases on every flagellomere; terminal flagellomere entirely fuscous.

Thorax: Anteriorly ochreous with white transverse line, golden shiny posteriorly; tegula ochreous with white apex. Forewing ochreous dark golden with white markings consisting of very short basal streak, two transverse fasciae, two costal and one dorsal strigulae; basal streak very short, oblique, directed towards apex; a few black scales mark dorsal margin of basal streak; first fascia at 1/4, twice broader at dorsum than at costa, slightly oblique, finely blackish edged apically; second fascia at middle of forewing narrowed at middle (slightly below costa in holotype), finally blackish edged basally and with a few black scales near costa on apical edge of second fascia; first costal strigula at 3/4, triangular shaped, not reaching midline of forewing, finally edged basally with a few black scales dispersed on apical margin of first strigula, near costa; first dorsal strigula opposite first costal strigula, triangular shaped, almost reaching middle of forewing, finally edged basally; a congregation of black scales intersperse irregularly between first costal and first dorsal strigulae; second costal strigula at apex, indistinct, comma-shaped, without clear edging, but 3–5 blackish brown scales rarely situated along both margins; 3–4 irregular rows of dark brownish scales run along termen to tornus, not forming clearly defined fringe line; fringe short pale ochreous from apex to tornus, with blackish apices at tornus, long pale fuscous along dorsum. Hindwings pale fuscous with long, pale fuscous fringe. Fore costa fuscous, fore femur and fore tibia dark fuscous dorsally and dirty white ventrally, tarsomere I dark fuscous with white base, tarsomere II white with fuscous apex, tarsomeres III–IV fuscous, tarsomere V dirty white; mid-femur light with elngate large fuscous patch, mid-tibia white with fuscous base, oblique fuscous stripe and broad subapical fuscous ring at 1/2, tibial spurs with fuscous basal and white apical halves, tarsomere I white basally and fuscous at apical half, tarsomere II white with fuscous apex, tarsomere III white with fuscous base, terminal tarsomeres white; hind femur fuscous dorsally and white ventrally, hind tibia white with very large median fuscous patch, medial spurs white with congregation of dark fuscous scales medially, apical spurs with light fuscous scales subapically, hind tarsomeres I–III white with fuscous apex, tarsomere IV white with fuscous base, tarsomere V white.

Abdomen: Greyish dorsally, except pale shading on tergites I–III and shade of brown on genitalia; sternites white with ochreo-fuscous stripes anteriorly; genital sternites white. Sternite VIII of males slightly shorter than saccus, rounded caudally.

Male genitalia (Figs 214–216). Tegumen very weakly sclerotized, conus-shaped with very short and slender sparse setation from 2/3 to apex, basal 1/3 covered with sparse round minute scales like setae (visible at 200×), apex pointed. Valvae symmetrical, , slightly narrowed at 1/3, gently curved, ventral margin 1.2× longer than dorsal, ca. 230 µm long, with broadly round cucullus sector; a strongly sclerotized suture runs obliquely from 1/2 of dorsal margin towards ventroapex; median surface of valva between suture and dorsal margin is covered

with long setae, only a few sparse setae are distributed along ventral margin of valva. Vinculum strongly sclerotized, half rounded, significantly broader caudally towards base of saccus, vinculum arms strongly sclerotized and differentiated from base of saccus; saccus very slender, moderately long, ca. as long as valva. Transtilla very strongly sclerotized, arc-shaped, vertical bars narrow with sharp apices; anellus weakly sclerotized with two short horn-shaped projections. Aedoeagus about as long as saccus, slightly broader at coecum and gently tapering towards vesica; vesica with a short, weakly sclerotized spine and two very long thick rod-like cornuti ca. half as long entire aedoeagus.

Female genitalia (Fig. 320). Papillae anales laterally compressed, about twice as wide as long, trapezoidal, ventral and dorsal angles gently rounded with 8–10 long setae irregularly dispersed from basal margin towards apical margin with shorter setae along apical margin; basal bar not sclerotized. A slender needle-like, strongly sclerotized projection ca. 144–226 µm (n = 4) long extending from anterior bases of papillae anales to anterior half of segment VIII. Posterior apophyses well sclerotized, slender, also at bases, very slightly thickened at midden, with bluntly apices, long, 380–447 µm (n = 5) long, extending about midway into segment VII. Segment VIII weakly sclerotized, connected dorsally and ventrally. Anterior apophyses long, but slightly shorter than posterior apophyses, ca. 300–362 µm (n = 5) long; ratio length of posterior apophyses/length of anterior apophyses 1.22–1.24), broad at bases, very slender with sharp apices, slightly curved. Ostium bursae semiround, sclerotized, located at middle of segment VII, antrum tubular, very short with strong narrow sclerotization ca. 147–162 µm (n = 3) long; sterigma as lightly sclerotized cuticle fold. Ductus bursae enlarged anterior antrum, moderate, posterior 3/4 wider and stronger sclerotized, ca. 377–442 µm (n = 3) long; corpus bursae large, oblong, 538–573 µm (n = 3) long, 2.3–2.6× longer than wide, with a large oval area set with minute spines and long (377–469 µm; n = 5), strongly sclerotized, narrow, band-like signum, extending along entire corpus bursae, ending just before caudal region, covered with 3–4 irregular rows of short fine spines. Signum ca. as long posterior apophyses or slightly longer (ca. 1.1×).

Variation. There is slight variation in the width and curvature of the second forewing fascia. The degree of dark brown irroration in the termen area also varies slightly.

DNA sequences. Two COI barcodes are available for *P. hibiscina* (Molecular sample codes: Phib1[JX888183], Phib2 [JX888184]; Table S1).

Habitat. Mines of *P. hibiscina* were collected on lower level of secondary forests usually in blossoming or shortly after blossom period of host plants (Fig. 423)

Host plant(s). Malvaceae: *Abutilon mauritianum* (Jacq.) Medik.—**(new record)**. (Figs. 421, 422).

Hibiscus calyphyllus Cav.—Vári 1961: 220, Kroon 1999: 37, Dall'Asta *et al*. 2001: 34, De Prins & De Prins 2005: 301.

Hibiscus lunarifolius Willd.—**(new record)**.

Pavonia sp.—referring to the manuscript notes of Vári: note No 3956 of 07/11/1984; **(new record)**.

Asteraceae: *Brachylaena* sp.—referring to the manuscript notes of Vári: note No 3454 of 23/09/1975, note No 3879 of 30/04/1982, note No 3968 of 21/05/1985; **(new record)**.

Mine. A moderate, 7–12 mm long, narrow, yellowish, tentiform mine on the underside of the leaf with three folds; fine black frass loose throught mine; pupation in very slender, white cocoon; exuvium protrudes epidermis of a leaf before adult emergence (Vári 1961: 220, De Prins & De Prins 2005: 301). Vári (1961: 220) mentions up to four mines in one leaf. Our observation showed that there is usually only a single mine on a leaf. The mining period is ca. 3–15 days (see Materials examined and Vári's notes: No 0270 in the manuscript notebook of 27/08/1950, note No 1546 of 12/03/1955, note No 1655 of 14/04/1955, note No 2534 of 05/05/1962, note No 2615 of 03/03/1964, note No 2923 of 28/01/1968, note No 3454 of 23/09/1975, note No 3879 of 30/04/1982, note No 3956 of 07/11/1984 and note No 3968 of 21/05/1985).

Flight period. Adults are active almost all year round except in June, July, and August. Two peaks in abundance are recorded: one in April and the other in October.

Distribution. (Fig. 381). The species is spread throughout Eastern and Southern Africa: Kenya **(new record**), South Africa (Vári 1961: 220), and Zimbabwe **(new record**). In West Africa it is known only from one locality in Cameroon (**new record**). The only locality written is "Mannsquell Hütte" (Mannsquell Hut). This hut is located on Mount Cameroon, about 60 km NW of Douala.

28. *Phyllonorycter ipomoellus* De Prins, new species
(Figs 66, 67, 321, 382, 434, 444)

Diagnosis. *Phyllonorycter ipomoellus* most closely resembles *P. brachylaenae* and *P. hibiscina* and but the forewing ground colour of *P. ipomoellus* is slightly darker ochreous shading than in *P. brachylaenae* and *P. hibiscina*. *Phyllonorycter ipomoellus* can be separated from the latter species by the following external characters:

- The second fascia in *P. brachylaenae* and *P. hibiscina* is quite broad at dorsal margin of forewing with significant constriction in middle; the second fascia is narrow and nearly straight in *P. ipomoellus*.
- Tufted piliform scales of vertex are white in *P. brachylaenae*; white with infusion of ochreous in *P. hibiscina* and ochreous in *P. ipomoellus*.
- The thorax of *P. ipomoellus* is ochreous, the anterior part is snowy white in *P. brachylaenae* and *P. hibiscina*..
- Tegula ochreous with slight whitish shading at posterior end in *P. ipomoellus*; the posterior half of tegula is snowy white in *P. hibiscina* and *P. brachylaenae*.

The female genitalia of *P. ipomoellus* cannot be confused with *P. brachylaenae* due to the short posterior and anterior apophyses of the latter. Diagnostic differences between the female genitalia of *P. hibiscina* and *P. ipomoellus* are the following:

- The posterior edge of segment VII in *P. hibiscina* has minute scobination, the posterior edge is smooth and not sclerotized in *P. ipomoellus.*
- Anterior apophyses are 1/3 shorter than posterior apophyses in *P. hibiscina*, the anterior apophyses are almost as long as posterior apophyses in *P. ipomoellus.*
- The needle-like posterior apophysis is longer than 1/2 length of anterior apophysis in *P. hibiscina*; it is shorter than ½ length of anterior apophysis in *P. ipomoellus*.
- The convex lamella post-vaginalis of sterigma occupies less than 1/2 of the surface of sternum VII in *P. hibiscina*. It almost completely crosses sternum VII in *P. ipomoellus.*
- Corpus bursae in *P. hibiscina* is more than twice as long as broad (the form is oblong); corpus bursae in *P. ipomoellus* is 1.5× longer than broad (it is approximately round).
- Signum in *P. hibiscina* is long and approximately equal in girth along entire length (1/4 longer than signum in *P. ipomoellus*). It is narrow at posterior part of corpus bursae and very thick in caudal part of corpus bursae *P. ipomoellus*.

Holotype: ♀, [1] '**Rwanda** / Nyungwe N.[ational] P.[ark] 1900 m / 6 km S Pindura / 02°32'S 29°11'E / mine 31.vii.2008 / leg. J. & W. De Prins'; [2] 'e. l. *Ipomoea bracteata* Cav. / [Convolvulaceae] / 12.viii.2008'; [3] 'Gen. Prep. 3751♀ / De Prins; [4] 'MRAC/KMMA / 00484', specimen ID: [5] 'RMCA ENT 000005149'; [6] 'DNA voucher / DP08028, in UM-SI; [7] 'Holotype ♀ / *Phyllonorycter / ipomoellus* / De Prins, 2012', in RMCA.

Paratype: 1♀ (abdomen missing). **Rwanda:** ♀, Nyungwe N.[ational] P.[ark] 1900 m, 6 km S Pindura 02°32'S 29°11'E, mine 31.vii.2008, leg. J. & W. De Prins, e. l. *Ipomoea bracteata* Cav. [Convolvulaceae] 11.viii.2008, specimen ID: RMCA ENT 000005150, in RMCA, DNA voucher DP08024, in UM-SI.

Description: *Adult* (Figs 66, 67). Forewing length: 2.71–2.82 mm.

Head: Vertex tufted, with light ochreous piliform scales of different length with light suffusion of paler short scales on occiput; frons smooth, covered with shiny white long narrow piliform apppressed scales. Maxillary palpus small, shiny white. Labial palpus slightly longer than eye, drooping, white above with slight shine and fuscous on lateral sides fading from dark fuscous at basal palpomere to washed-out fuscous on terminal palpomere; terminal palpomere with pointed apex, directed downwards. Haustellum about 2× longer than labial palpus, curved distally, dirty white. Antenna slightly shorter forewing, consisting of 37–38 flagellomeres, each flagellomere (except scape and pedicel) light fuscous dorsally with narrow pale beige band at base, without ringed appearance; ventrally antenna dirty white basally and dark grey distally; pedicel slightly longer than following flagellomere with fuscous brown base followed by dirty white subasal area, median and apical part as in following flagellomeres—light fuscous; scape ochreous with a few round small dark brown scales mottled on posterior part of scape, 7–8 dirty thick, white, fuscous tipped pecten of similar length, slightly longer than scape.

Thorax: Ochreous with whitish irregular middle band; tegulae light ochreous anteriorly with smooth transition to ochreous whitish at posterior part. Forewing ground colour ochreous with white markings: two transverse fasciae, one costal, one dorsal strigulae and one apical patch; basal streak very short, just a couple of white scales with 1–2 black scales on dorsal margin; first fascia at 1/4 of forewing, slightly oblique, broader at dorsum gradually tapering towards sharp tip at costa, without any constrictions at midden, edged apically and only partly basally; second fascia at 1/2, broader than first fascia, gently curved with a slight constriction at subcostal part of forewing, edged with one row of black scales from both sides; first costal strigula at 3/4 of forewing, more or less triangular shaped, brightly white, not reaching midline of forewing, edged with regular one row of black scales from both sides; first dorsal strigula at 3/4 of forewing, situated opposite first costal strigula, half round or arc-shaped with broad base, bright white, just reaching midline of forewing, edged with a row of black scales basally, and with 2 rows of black scales apically; apical patch brightly white, rounded, surrounded by irregular 2–3 rows of black scales, which extends into an area of irroration of black tipped scales running along termen and bordering apical edge of dorsal strigula; fringe line long, running from apex along termen to tornus, fringe short pale beige at apex and termen, slightly longer with fuscous based scales at tornus and long pale grey along dorsum. Hindwing pale grey with slight bronze shading and shine with long fringe of same shading as hindwing, fringe gradually getting longer towards base of hindwing. Fore femur fuscous dorsally and dirty white ventrally foretibia and fore tarsus fuscous except terminal tarsomere ochreous whitish; mid-femur and mid-tibia ochreous fuscous, slightly mottled with dirty white medially, apical spurs median, white with fuscous median part, tarsus dirty white with three fuscous patches**,** tarsomere I fuscous with white patch subbasally, tarsomere II dirty white with pale grey apex, tarsomere III fuscous with pale grey apex, tarsomeres IV–V white, tip of tarsus ochreous; hind femur and tibia dark grey with ochreous shading, hind tibia with loosely appressed long piliform hairs; medial spurs short, with dirty white basal half and dark grey apical half, apical spurs ca. twice longer than median spurs, dirty white with blackish fuscous subapices; tarsus fuscous with three white irregular rings: tarsomere I fuscous, tarsomere II white at basal half and fuscous at apical half, tarsomeres III white with ochreous-fuscous subapex, tarsomere IV white, terminal tarsomere pale grey.

Abdomen: Dorsally dark fuscous, ventrally anterior half of sterna pale greyish beige, posterior half of sterna white.

Male genitalia. Unknown.

Female genitalia (Fig. 321). Papillae anales subconical shaped, with stronger sclerotized outer lateral parts, touching each other with inner lateral sides, with moderate setation of different length, longest setae on caudal part of papillae anales ca. 114 µm long; basal bar absent. A slender needle-like strongly sclerotized projection ca. 115 µm long extending from bases of papillae anales to middle of segment VIII; anterior end of needle-like projection thicker and slightly bulbed, posterior end very sharp. Posterior apophyses well sclerotized, slender, with long triangular bases smoothly fusing into apophyses, ca. 309 µm long; caudal parts pointed apically, slightly diverging from each other, extending to posterior 1/6 of segment VII. Segment VIII weakly sclerotized, connected dorsally and ventrally, long, almost as long as segment VII, cylindrical. Anterior apophyses very slightly shorter than posterior apophyses, ca. 297 µm long, without any distinct basal sclerotization, straight, slightly distancing from each other at caudal parts, sharp ended, reaching 1/3 anterior part of segment VII. Segment VII trapezoidal, melanized, as long as segment VIII. Ostium bursae crescent-like, sclerotized, located at middle of segment VII, antrum of ductus bursae with narrow longitudinal strongly melanized folds, except caudal broader part of ductus bursae; sterigma (lamella post-vaginalis) strongly narrow sclerotized broad arc-shaped suture almost crossing sternum VII. Ductus bursae moderate, with slender melanized folds, anterior 1/3 dilating before confluenting to corpus bursae; corpus bursae median, dinstictively separating from ductus bursae, quite round shaped, only 1.4 longer as broad (ca. 355 µm long and 246 µm wide), with a large oval area ca 1/6 as large as corpus bursae, set with minute spines and a long, strongly sclerotized, thick, ridge-like signum, 308 µm long, consinting of 4-5 rows of sharp barbs, extending along entire corpus bursae, ending just before caudal sector. Ductus spermathecae stout , melanized, extending along anterior half of segment VII, consisting of 15–16 tight convolutions, which are slightly broader at posterior end and tightining, as well as stronger melanized, towards anterior end; bulla spermathecae small, situated between segments VII and VI.

DNA sequences. Three COI barcodes are available for *P. ipomoellus* (Molecular sample codes: Pipo1 [JX888185], Pipo2 [JX888186]; Table S1).

Etymology. The specific name is derived from the generic name of the host plant, *Ipomoea*.

Habitat. Open clearings in montane wet forest at an altitude of 1800 m (Fig. 444).

Host plant(s). Convolvulaceae: *Ipomoea bracteata* Cav. (Fig. 434).

Mine. A small, tentiform, underside mine, between veins of the leaf, usually on subbasal part of the leaf. One-two mines are present on one leaf of the host plant.

Flight period. Adults are on the wing in mid-August.

Distribution (Fig. 382). Known only from the type locality in the south-west of Rwanda.

29. *Phyllonorycter turensis* De Prins, new species

(Figs 68, 322, 383)

Diagnosis. *Phyllonorycter turensis* is quite distinct from other species of the *hibiscina* group in possessing plain background wing colour without shine and indistinct forewing pattern. The female genitalia of *P. turensis* resembles that of *P. hibiscina*. Both species have long band-like heavily sclerotized signum on corpus bursae and long posterior and anterior apophyses. The ratio of the length of posterior apophyses to length of anterior apophyses is similar in both species (ca. 1.2), but in *P. turensis*, the apophyses are generally 1.2× longer than these in *P. hibiscina*. In *P. hibiscina* the signum on corpus bursae is as long or longer than the length of posterior apophyses*;* in *P. turensis* signum is more than 2× shorter than the length of posterior apophyses.

Holotype: 1♀, [1] **'Kenya,** Rift Valley / Turi, 8000 ft / 26.v.1999 / [leg.] D. J. L. Agassiz'; [2] 'Gen. Prep. 3493♀ / De Prins'; [3] 'DNA voucher [two hindlegs] / CLV15807', in CCDB; [4] 'Holotype ♀ / *Phyllonorycter / turensis /* De Prins**,** 2012', in BMNH.

Description. *Adult* (Fig. 68). Forewing length: 2.81 mm (holotype).

Head: Vertex tufted with plain dull light ochreous, dark brown tipped pilliform scales, with faint intermixtion of a few shiny ochreous appressed small scales on vertex and a few dark brown apressed longer piliform scales on latero-occiput; frons smooth, white with light beige shading, without shine. Maxillary palpus pale beige, tiny. Labial palpus ca.1.5× longer than eye, apically pointed, curved downward, dull white with a light beige shading and with a few light brown scales scattered on lateral sides on second and third palpomeres; haustellum pale beige, with dark brown long and narrow stripes ventrally, one time curved. Antenna almost as long as forewing, consisting of 39–41 flagellomeres, each flagellomere pale beige with longitudinal, very narrow, but clearly defined brown stripes, apical part of flagellomeres is slightly darker shading than basal part; scape light beige in ground colour with a few light brown small scales mostly anteriorly, scape bears numerous pale beige pecten of different length with majority of short ones; pedicel light beige almost whitish, without darker scales; terminal flagellomere whitish with two brown stripes.

Thorax: Pale beige entirely; tegula pale beige with narrow white apices. Forewing pale ochreous, with light grey shading, with whitish indistinct markings, consisting of very short basal streak, two transverse obscure fasciae, fused costal and dorsal strigulae, and apical patch; basal streak indistinct, obscure, pale beige, very short oblique towards apex, first fascia at 1/4 obscure, without any distict edging, oblique towards apex, second fascia at 1/2 more or less straight, obscure, without any distict edging, fused costal and dorsal strigulae with their tips almost form third fascia at 3/4 which is slightly angulated, with hardly visible basal edging at dorsal half, apical patch big, irregular shaped stretching along termen; 3–4 dark brown scales present on apex, forming hardly visible apical spot; a hardly visible irregular row of dark brownish scales run along termen to tornus, not forming clearly defined fringe line; fringe short whitish with slight beige shading along termen and long whitish with light beige shading. Hindwings whitish with light beige shading and silver shine; fringe long whitish beige not shiny. Fore femur and fore tibia dark fuscous dorsally and dirty beige ventrally, tarsus beige with golden lustre; midfemur and midtibia beige, midtibia with a small light brown spot on base, midsize spot in midden part and a large light brown patch on apex; tibial spurs beige with slight suffusion of darker brown shading, tarsus beige with two dark brown spots on subbase and subapex of tarsomere I. Hindlegs were used for DNA barcoding and are not available for description.

Abdomen: Greyish dorsally, and light grey ventrally.

Male genitalia. Unknown.

Female genitalia (Figs 322). Papillae anales laterally compressed almost round, with sparsely set long setae ca. 140 µm long, intermixed with dense short setae; basal bar absent. A slender needle-like sclerotized projection ca.

162 µm long extending along segment VIII, not reaching segment VII. Posterior apophyses sclerotized, very slender, also at bases, with sharp apices, very long (525 µm), reaching anterior 1/3 of segment VII. Segment VIII weakly sclerotized, connected dorsally and ventrally. Anterior apophyses long, but slightly shorter than posterior apophyses, ca. 410 µm long, with lightly sclerotized, broad rectangular plate at bases, very slender, with sharp apices, slightly curved; posterior apophyses ca 1.28x length of anterior apophyses. Ostium bursae round, lightly sclerotized, located at subanterior part of segment VII (ratio distance posterior margin ostium bursae/anterior margin ostium bursae 1.5), with sterigma as very narrow crescent-shaped small lamella antevaginalis, and broad lamella post-vaginalis as arc-like sclerotized suture. Antrum very short without sclerotizations. Ductus bursae and corpus bursae are not perceptible in preparation. Signum on corpus bursae of median length, ca. 252 µm long, strongly sclerotized, narrow, band-like, consisting of small spines arranged in a narrow row. Signum less than ½ lngth of posterior apophyses.

DNA sequences. A COI barcode is available (Molecular sample code: Ptur [JX888193]; Table S1).

Etymology. The specific epithet is derived from the name of the type locality, Turi.

Habitat. East African savannah.

Host plant(s). Unknown.

Flight period. Adults have been collected in late May.

Distribution (Fig. 383). Recorded only from the type locality in Rift Valley, Kenya.

The *hibiscola* group

The only species belonging to this group, *Phyllonorycter hibiscola* De Prins, n. sp. can readily be distinguished from many Afrotropical *Phyllonorycter* by the deep golden brownish ground colour and golden brownish shine of forewing that resembles *P. adderis, P. gato, P. lemarchandi, P. umukarus* and the European species *P. schreberella* and *P. tristrigella* that feed on *Ulmus* sp. The above-mentioned species also have a different male and female genital morphology and fall into different informal species groups. Therefore, only dissections provide means for the designation into species groups and species identification. The discovery of a male could resolve the taxonomic position of *P. hibiscola*. At the moment, we place *P. hibiscola* into its own species group. Female genitalia are characteristic for having a long, narrow, fold-like sclerotization of cuticle, ostium bursae situated at middle of segment VII, a heavy sclerotized ring encircling the anterior margin of segment VII, short ductus bursae, corpus bursae elongate, without signum. The *hibiscola* species utilizes Malvaceae as its host plant.

30. *Phyllonorycter hibiscola* De Prins, new species

(Figs 69, 323, 384, 441)

Diagnosis. *Phyllonorycter hibiscola* share deep golden brownish ground wing colour with a few Afrotropical and Palaearctic species in the genus (see *hibiscola* species group description above). Female genitalia characters are diagnostic: the heavily sclerotized ring encircling the entire anterior margin of segment VII and long folded narrow sterigmatic sclerotization on segment VII can separate this species easily from other Afrotropical *Phyllonorycter* species.

Holotype: ♀, [1] '**Kenya** / Kakamega Forest, 1590 m / 00°21'N 34°51'E / mine 28.iii.2003 / leg. J. & W. De Prins' ; [2] 'ex *Hibiscus* / *calyphyllus* Cav. / [Malvaceae] / 10.iv.2003' ; [3] 'Gen. Prep. 3630♀ / De Prins'; [4] 'MRAC/KMMA / 00387' ; specimen ID: [5] 'RMCA ENT 000003278'; [6] 'DNA voucher / CLV14507', in CCDB; [7] 'Holotype ♀ / *Phyllonorycter* / *hibiscola* / De Prins, 2012', in RMCA.

Paratypes: 2♀ (including 2♀ genitalia preparations). 1♀, **Kenya:** Kakamega Forest, Udo Camp, 1600 m, 00°21'N 34°52'E, mine 17.iv.2001, leg. J. De Prins; ex *Hibiscus calyphyllus* Cav. [Malvaceae] 29.iv.2001, gen. prep. De Prins 3409♀ (MRAC/KMMA 00384), specimen ID: RMCA ENT 000003266, in RMCA, DNA voucher CLV13007, in CCDB. 1♀, Kakamega Forest, 1500 m, 00°21'N 34°51'E, mine 28.iii.2003, leg. J. & W. De Prins, ex *Hibiscus calyphyllus* Cav. [Malvaceae] 10.iv.2003, gen. prep. De Prins 3631♀ (MRAC/KMMA 00388), specimen ID: RMCA ENT 000003279, in RMCA, DNA voucher CLV14607, in CCDB.

Description. *Adult* (Fig. 69). Forewing length: 2.1–2.4 mm (holotype = 2.4 mm).

Head: Vertex with two unicoloured dark brown tufts of piliform scales, directed dorsolaterally, separated by several very short, golden, shiny, appressed scales in median part of vertex; some shorter scales over occiput, with longer scales directed posteriorly, a row of short light scales slightly tufted dorso-anteriorly borders vertex and frons; frons covered with grey, long, appressed, piliform scales with silver shine, shorter and more slender appressed scales with ochreous shine on frontoclypeus and above eyes. Maxillary palpus greyish with silvery shine; proboscis yellowish beige. Labial palpus greyish white, with silver shine on first palpomere, slight ochreous shine on penultimate palpomere and apex of last palpomere, drooping, ca. 1.5× longer than eye, directed downwards, last palpomere sharply pointed. Antennae a little shorter than fore wing, dark fuscous at basal 2/3, slightly lighter with suffusion of ochreous shading towards terminal part dorsally, flagellomeres with slightly darker apices, but not ringed, ventrally dark grey with slight ochreous shading, pedicel coloured as rest of basal flagellomeres; scape brownish black dorsally, dark greyish beige ventrally, with pecten of up to six narrow greyish beige scales of same length as scape or shorter.

Thorax: Golden-brownish with dirty white posterior part and whitish median longitudinal line, tegula golden brownish. Fore wing elongate, ground colour golden brownish with dirty white markings, consisting of basal patch, two fasciae, one costal and one dorsal strigulae, and apical patch. Basal patch a small not edged silver shiny spot between midline and costa of forewing; first fascia at 1/5 of forewing, narrow, equaly wide on both costal and dorsal margins, straight, slightly oblique towards apex, edged with black scales apically; second fascia at 1/2 of forewing, running parallel to first fascia, slightly wider than first fascia, blackish edged basally, only a couple of black scales present on costal apical margin of second fascia, first costal strigula at apical 1/3 of forewing, triangular shaped, not reaching midline of forewing with its tip, blackish edged basally, first dorsal strigula opposite first costal strigula, but longer, curved towards apex, extending beyond midline of forewing with its tip, edged basally, a narrow gap filled with a couple of rows of dark brown scales separate first costal and first dorsal strigulae, both strigulae have no clear edging from apical side, but a concentration of dark brown scales bordering apical edge of first costal and first dorsal strigulae; apical spot dirty white with silver lustre; an irroration of dark brownish fuscous scales dispersed along termen; fringe line brownish fuscous at termen and tornum preceded by elongate, golden fuscous, dark-tipped scales at apex and golden brown elongate dark tipped scales at tornus; fringe short at apex and longer at tornum, gradually shading from dark grey at apex, greyish golden along termen and fuscous with wider golden tipped along tornus, pale beige along dorsal margin of forewing. Hind wing narrow, elongate, pointed, ground colour brownish fuscous, fringe of same shading as hindwing. Fore femur light fuscous, fore tibia fuscous with lighter subapical patch, tarsomere I pale beige with dark fuscous apex, tarsomere II pale beige with dark fuscous base, apical tarsomeres dark fuscous; mid-femur brownish fuscous, mid-tibia golden shiny beige with smaller browhish fuscous basal patch and median patch and a large apical patch; spurs dirty white shiny with median fuscous band, tarsomere I golden whitish with broad subapical fuscous band and narrow longitudinal stripes at base, tarsomere II dirty white, tarsomeres III–V dark fuscous; hind femur brownish beige, hind tibia golden brownish with whitish apex, medial spurs slightly lighter than tibia with dark fuscous basal halves, apical spurs silver beige with dark fuscous median patch, tarsomere I silver beige with gradually darkened subapex, tarsomere II pale fuscous with silver white apex, terminal tarsomeres pale fuscous with golden shine.

Abdomen: Dark fuscous on median terga, brownish shadow on anterior terga and genital segments.

Male genitalia. Unknown.

Female genitalia (Fig. 323). Papillae anales wide strongly compressed postero-anteriorly, ca. 4.8× as wide as long, ventral and dorsal angles form a rectangular, covered with seldom distributed long slender hair like setae almost of equal length most abundant along basal margin of papillae anales; bases of papillae anales without sclerotized bar; a slender needle-like sclerotized projection goes from posterior margin of segment VIII and reaches middle of segment VIII. Posterior apophyses ca. 0.50–0.51 mm long, reaching midway into segment VII, with small bases, straight, slender, but slightly bulbed in midway of segment VIII, gently tapering into narrowly pointed apices. Segment VIII ca. 2/3 lngth of segment VII, weakly membranous and weakly connected with segment VII. Anterior apophyses initiate from ventrolateral angles of segment VIII, without basal sclerotized plate in sternum VIII or broad bases, slightly shorter than posterior apophyses, ca. 0.47–0.49 mm long, running into anterior sector of segment VII, slender, straight with sharp apices. Ostium bursae at middle part of segment VII, sterigma an elongate cuticular fold, sac-shaped, lamella antevaginalis thick sclerotized crescent-shaped, ca. 160 µm long. Antrum broad, tubular, broad sack shaped. Ductus bursae short, ca. as long as segment VII, broader and membranous posteriorly, narrower anteriorly near junction with corpus bursae, curved twice at intersection with

ductus bursae. Segment VII strongly melanized with strongly sclerotized band of moderate width around anterior margin; dorso-lateral parts of band more strongly sclerotized than lateral ones. Corpus bursae ovoid, long sack shaped, without specialized membranous areas, no signum. Spermatheca large, oval, located at anterior margin of segment VII, ductus spermathecae forming ca. 26 coils, smaller in diameter at anterior part.

Etymology. The specific name is made combining the generic name of the host plant *Hibiscus* with the Latin suffix *-cola* meaning "inhabitant".

Habitat. Eastern part of primary Guineo-Congolian rain forest (Fig. 441).

Host plant(s). Malvaceae: *Hibiscus calyphyllus* Cav.

Mine. Semi-transparent, blotch under side mine, between veins of the leaf, usually on basal part of the leaf; fine black frass scattered at one end of mine.

Flight period. The species is recorded from late March to mid-April.

Distribution. (Fig. 384). Known only from the type locality in West Kenya.

E. The *jabalshamsi* group

The group includes one species: *P. jabalshamsi* De Prins, n. sp. The male genitalia of *P. jabalshamsi* resembles those of *P. aarviki* since both species possess a long process on sacculus. The female genitalia of *P. jabalshamsi* is strikingly different from that of the *melanosparta* species group which excludes *P. jabalshamsi* in the latter group or any other *Phyllonorycter* species groups. All the specimens we examined are worn, and the wing pattern could not be thoroughly examined. Male genitalia of *P. jabalshamsi* resemble that of European *P. coryli*, the latter which has larvae that make blotch upperside mines on Betulaceae. The male genitalia of the *jabalshamsi* group is similar to that of the *melanosparta* group because the sacculus bears a long sharp spine. However, it differs from the *melanosparta* group in that the saccus in *jabalshamsi* species group is broad, U-shaped with rounded apex. Female genitalia possess long sharp apophyses anteriores with bases located at the anterior margin of segment VIII. Lack of data on the biology of *P. jabalshamsi*, unknown wing pattern and recorded differences in male and female genitalia restrain us to group it with *melanosparta*, and we thus place *P. jabalshamsi* in its own species group.

31. *Phyllonorycter jabalshamsi* De Prins, new species

(Figs 71, 217–220, 324)

Diagnosis. The male genitalia of *P. jabalshamsi* can superficially be confused with *P. aarviki* and the European species *P. coryli* due to the long spine-like process on sacculus. In females of *P. jabalshamsi* the anterior apophyses are not modified: they initiate at anterior margin of segment VIII. There are significant differences in female genitalia of *P. jabalshamsi* compared with those of *P. coryli*. Compared to *P. coryli*, the sterigma and antrum of *P. jabalshamsi* are not heavily sclerotized. *Phyllonorycter aarviki* and *P. jabalshamsi* can be easily separated by the following characters of the male genitalia:

TABLE 3. Diagnostic differences between *P. aarviki* and *P. jabalshamsi*.

	Sacculus	Valva	Apical region of valva	Tegumen	Saccus	Sternum VIII
P. aarviki	Clasper long, ca. as long as basal part	Almost rounded	Smooth	ca. as long as sternum VIII	Stick-shaped slightly dilating caudally	Sharply acuminates caudally
P. jabalshamsi	Basal part ca. 2× longer than clasper	Elongate, almost 2× longer than broad	With small triangular projection and 2 barbs	1.5× longer than sternum VIII	Elongate, broad U-shaped	Lateral margins gradually approaching each other towards rounded apex

Holotype: ♂, [1] '**Oman,** Northern Region / Jabal Shams / 19 km NW Al Hamra, 1100 m / 07.i.1993/ leg. B. Skule'; [2] 'Gen. Prep. 3714♂ / De Prins'; [3] 'Holotype ♂ / *Phyllonorycter* / *jabalshamsi* / De Prins, 2012', in ZMUC.

Paratypes: 4♂, 1♀ (including 2♂, 1♀ genitalia preparations). **Oman:** 2♂, Northern Region, Jabal Shams, 19 km NW Al Hamra, 1100 m, 07.i.1993, leg. B. Skule, in ZMUC. 2♂, same locality data, gen. prep. De Prins 3712♂ (MRAC/KMMA 00420), De Prins 3713♂ (MRAC/KMMA 00421), IDs: RMCA ENT 000004453, 000004454, in RMCA. 1♀, same locality data, gen. prep. De Prins 3711♀, in ZMUC.

Description. *Adult* (Fig. 71). Forewing length: 2.50–2.55 mm.

Head: Vertex slightly tufted with pale-ochreous shiny scales intermixed with dark brown; frons smooth, consisting of long, piliform scales, front whitish with beige shade, lateral piliform scales white, stretching from vertex along frontoclypeus, central part of frontoclypeus pale beige with weak intermixture of very slender, darker brown tipped scales. Maxillary palpus beige, small. Labial palpus dirty white with beige shade, drooping, palpomeres carry a few small light brown, elongate scales arranged in a row on outer lateral margin, palpomeres second and third lighter in shading than basal one, terminal palpomere sharp caudally, directed downwards. Haustellum short, bent, beige. Antenna slightly shorter than forewing, consisting of 45–46 flagellomeres, each flagellomere beige with brown apices, but not clearly ringed; scape pale ochreous anteriorly and ochreous posteriorly with 8–10 dirty white pecten of different length; pedicel dirty white with beige shade.

Thorax: Pale beige; tegulae light ochreous with whitish posterior margin. Forewing (see *Remarks* below). Hindwings whitish with golden shine; fringe slightly lighter than hindwing, long, twice as long as width of hindwing at basal part. Fore femur and tibia dorsally brownish fuscous intermixed with beige, ventrally beige, tarsomere I brownish fuscous, tarsomere II brownish fuscous with dirty white basal 1/4, tarsomere III brownish fuscous with dirty white apical part, tarsomere IV dirty white, terminal tarsomere dark brownish fuscous; mid-femur pale beige, mid-tibia pale beige with three oblique brown stripes: at basal, mid- and in apical sectors, tibial spurs pale beige without markings, tarsus with three brownish rings: basal small, consisting only of few dark brown scales, median and subapical broadly ringed, tarsomere I pale beige with brown small basal and broad subapical ring, tarsomere II pale beige, tarsomere III beige with brown basal half, tarsomeres IV–V entirely beige; hind femur shiny pale beige with brown basal and subapical patches, hind tibia dirty white with brown subapical patch, medial spurs long white at basal at apex and dark brown at median part, apical spurs white without markings; tarsus white with three brown rings, two basal broad subapically narrow, and brown apex, tarsomere I white with brown base and apex, tarsomere II white with brown base and apex, tarsomere III white with brown base, tarsomeres IV dirty white with fuscous apex, tarsomere V grey with dark fuscous tip.

Remarks. All specimens that we examined were worn. We therefore cannot provide a detailed description of the wing pattern.

Abdomen: Light fuscous with silver shine on genital segments dorsally, dirty white ventrally. Sternum VIII of male subtriangular flap shaped, 270–315 µm in length, spinulose, with an obtuse apex.

Male genitalia (Figs 217–220). Tegumen slightly asymmetrical in width, subconical, with left side slightly shorter than right, angled, moderately sclerotized, ca. 315 µm from apex to pedunculus, apex truncate, strongly sclerotized, covered with short slender cilia, tuba analis not protruding; tegumenal (pedunculi) arms narrow, strongly sclerotized, short, running to basal 1/4 of tegumen length, parallel to each other. Valvae symmetrical, valva somewhat elliptical, acuminating at cucullus, with obtuse apex producing into large pointed barb, valva ca. as long as 330–340 µm; sacculus with two broad, sharp barbs, one at caudal part of valva and one subcaudally; strong spine, ca. 120 µm long, bearing filament on outer surface of sacculus, at bases of subcaudal barb, which is directed ventrolaterrally (in preparations De Prins 3712♂ and 3714♂ spine bearing filament is broken); slender sinuate seta from subterminal part of caudal barb, another long arched seta, ca.105 µm long, on ventral margin of valva just basal of subcaudal barb; subterminal part of valva densely setose with long bristly setae accumulated into bunch, discal area basal to subcaudal barb covered with few disperse, slender, somewhat bristly setae mostly at subventral area and along ventral margin of valva, whereas setae rather sparsely distributed ont subcostal surface of valva, sacculus and basal part of valva without setae. Vinculum rather long, ca. half of valval length, 156–160 µm, U-shaped, with smoothly round apex, without distinctly produced saccus. Transtilla complete with a pair of wide lateral lobes on cephalic margin. Aedoeagus rather long, slightly longer than valve, 360–417 µm, with swollen coecum, sharply tapering apically with blunt apex, vesica with two slender abuting cornuti, 52–63 µm long, apical part of vesica squamosae with sparsely distributed, short, sharp spinules (observed at 400× enlargement).

Female genitalia (Fig. 324). Papillae anales flattened, almost as broad as long, connected subapically, weakly sclerotized, with dense setation along posterior surface and with scarce setation on basally lateral sides of papillae anales; setae of medium length 122 µm laterally and slightly shorter posteriorly, sclerotized bar not developed. Posterior apophyses long, as long as ca. 310 µm, broad at basal 1/4 (ca. 80 µm), sharply acuminating towards apices, slightly dilating from each other, reaching subanterior sector of segment VII. Segment VIII short, tightly fused with segment VII, anterior margin with sclerotized half ring open ventrally and bearing elongate triangular basal extensions of anterior apophyses. Anterior apophyses 1/3 shorter than posterior apohyses, ca. 200 µm long, very slender, sharply acuminating towards pointed apex, slightly dilating from each other, strongly sclerotized, reaching subanterior sector of segment VII. Segment VII relatively long, more or less trapezoid, posterior margin borders with sclerotized semi-ring holding basal plates of anterior apophyses. Ostium bursae, as narrow gap, situated at left side of ventromesal line at segments VIII close to junction with segment VII, antrum not distinctive, sterigmatic plate on segment VII absent. Ductus bursae tubular, long, almost twice longer than length of segment VII, ca. 800 µm long; girth of ductus bursae broad, inner canal membranous, mostly anteriorly at junction to corpus bursae. Corpus bursae globular, bearing one signum round plate situated at posterior part of corpus bursae close to junction with ductus bursae, signum plate crossed by slender and dentate signum, ca. 60 µm long. Ductus spermathecae short, sinuating, with more or less compact 13 convolutions, vesica elongate sac-shaped, situated at anterior 1/3 of segment VII.

Etymology. The new name refers to the highest mountain at the type locality situated in north-eastern Oman. Jabal Shams (جبلألشمس in Arabic) means 'mountain of sun'.

Habitat. Dry, sunny, rocky and sandy disturbed areas at altitude of ca. 1000 m.

Host plant(s). Unknown.

Flight period. Adults have been collected in early January.

Distribution. Known only from the type locality, the Al Hajar Mountain range in north eastern Oman.

The *lemarchandi* group

The *lemarchandi* group includes one species, *P. lemarchandi* (Viette, 1951). This species can superficially be confused with species of *Porphyrosela*, but it differs in male and female genitalia. Because it differs considerably with any of the other *Phyllonorycter* species groups, we place it in its own group.

Valva extraordinally narrow, with sharp apex, transtilla semi-rounded, arc-shaped, sternum VIII descaled, almost rounded.

Female genitalia are unique among Afrotropical *Phyllonorycter* in having a very broad, highly melanized, long, tube-shaped antrum.

32. *Phyllonorycter lemarchandi* (Viette, 1951)

(Figs 72, 221–223, 325–327, 385**)**

Lithocolletis lemarchandi—Viette (1951: 131–132, fig. 3), Paulian & Viette (1955: 153, 156: fig. 14).
Phyllonorycter lemarchandi—Viette (1990: 30), Dall'Asta *et al*. (2001: 34–35), De Prins & De Prins (2005: 312).

Diagnosis. Hindwing white markings are diagnostic for this species. *Phyllonorycter lemarchandi* is also the only Afrotropical *Phyllonorycter* that has a long, narrow, curved valva with sharp long apices in male genitalia. The female genitalia of *P. lemarchandi* are characteristic in having a very large tubular antrum, ridged ostium bursae and narrow band on anterior dorsal margin of segment VII. The female genitalia superficially resembles that of *P. hibiscola*, but differs in the position of ostium bursae, shape of antrum and form of sterigma. An easy difference between *P. lemachandi* and *P. hibiscola* is that the ostium bursae of *P. lemarchandi* is located at the posterior margin of segment VII, whereas it is located in the middle of segment VII in *P. hibiscola*.

Material examined. *Holotype*: ♂, [1] [**Madagascar**]: '439(1) Elev du 3.i.1949 / Eclos le 22.i.1949 / Inst[itut]. Scient[ifique]. [de] Madagascar, chenille mineuse de *Solanum* sp. / de Tsimbazaza / [leg.] A. R.'; [2] '*Lithocolletis* / *lemarchandi* n. sp. / Holotype, P[ierre]. Viette'; [3] 'TYPE'; [4] 'Gen. Prep. 3564♂ / De Prins', in MNHN.

Additional material: 3♂ and 3♀, (including 3♂ and 3♀ genitalia preparations). **Madagascar:** 2♂, Tananarive-Tsimbazaza, Elev. Elev. 3.ix.1957, 24.xii.1957, Eclos. 14.ix.1957, 26.xii.1957, N°1263, N°3286b, mineur de feuille de sida Malvaceae, [leg.] H. Legrand, gen. prep. De Prins 3561♂, 3563♂, in MNHN. 1♂, 3♀, mineur de feuille de *Sida rhombifolia* Malvacée, Madagascar-Centre, Elev. 4.i.1960, 23.xii.1969, Eclos. 15.i.1960, 28.xii.1969, No 372, 1380, [leg.] H. Legrand, gen. prep. De Prins 3558♀, 3559♀, 3560♂, 3562♀, in MNHN.

Redescription. *Adult* (Fig. 72). Forewing length: 2.0–2.3 mm.

Head: Vertex tufted with ochreous brown piliform scales. Labial palpus ca. 1.5× longer than eye, straight, directed latero-ventrally, fulvous. Antenna slightly shorter than forewing, fulvous.

Thorax: Ochreous brown with golden yellow scales. Forewing ground colour yellowish-ochreous with white markings consisting of basal streak, three costal strigulae, one angulated fascia, and 3 dorsal strigulae; basal streak runs to 1/6 of forewing, broader at base, and gently tapering towards apical end, slightly curved towards apex, both margins costal and dorsal edged with a row of black scales; first costal strigula just beyond 1/4, thick, rod shaped, truncate, oblique toward tornus of forewing, reaching slightly beyond midline of forewing; first dorsal strigula at 1/4, just below tip of basal streak, shaped as elongate patch along dorsal margin, edged with black scales costally, first fascia just beyond 1/2, angulated at midline of forewing of 90°, with its median part retracted (in holotype first fascia interrupted), edged with black scales basally, some black scales border apical edge of first fascia; second costal strigula at 3/4 of forewing, elongate triangular, borderd with black scales basally, second dorsal strigula opposite second costal strigula, edged basally, reaching midline of forewing (in some paratypes both markings: second costal and second dorsal strigulae can touch each other (Viette: 1951:131)), third costal strigula small, elongate comma shaped in apical sector of forewing, without distinctive edging; third dorsal strigula at tornus sector, opposite third costal strigula, broader and shorter than third costal strigula, without distinctive edging; an irregular but clear apical spot consisting of assembly of black scales present on apex of forewing; fringe line greyish dark with dark brownish tipped scales at apex and along termen, with brownish golden shine at termen; fringe along dorsal margin light fuscous ochreous with golden lustre. Hindwings pale grey with long pale greyish ochreous fringe of lighter shading than hindwing. Legs golden fuscous.

Abdomen: Dorsally dark brown. Anal tergite golden ochreous with tufted piliform scales. Sternum VIII in males almost rounded, with sparse long setae.

Remarks. In the original description of *P. lemarchandi*, Viette (1951: 131), wrote “Les pattes sont gris vert doré avec l’abdomen brun sombre et la touffe anale gris vert doré” Perhaps it could be considered a little bit too subjective to describe legs and anal tuft of *P. lemarchandi* as golden greyish green. We would suggest considering the mentioned “golden greyish green” as lustre, but not as the colour. Although Viette (1951: 131) clearly lists all white markings present on the forewings of *P. lemarchandi*, which entirely coincide with the markings of forewing of the examined holotype of *P. lemarchandi*, the following four characteristic markings are omitted in Viette’s (1951:135, fig. 3) illustration of *P. lemarchandi*: 1) basal stripe, 2) first dorsal strigula, 3) angulated, medialy retracted first fascia with clearly illustrated dorsal part, and 4) third dorsal strigula.

Male genitalia (Figs 221–223). Tegumen slightly longer than sternum VIII, elongate cone shaped, more strongly sclerotized and thicker in basal half, apex double-peaked sharp pointed, without visible setae at 100×, a longitudinal suture divides tegumen into two equal lateral halves; tuba analis slightly protruding. A sclerotized plate (scaphium) at middle of tegumen; a pair of sclerotized very slender arms subbasally directed upward and not joining (subscaphium). Valvae symmetrical, valva curved and bent, elongate, almost as long as tegumen + sternum VIII, tapering to very slender distally, setose with long and slender setae, more dense dorsally; dorsal margin of valva rough, very strongly sclerotized, scobinated. Vinculum strongly sclerotized, very broad especially towards base of saccus; saccus long, as long as sternum VIII, slender, gently rounded caudally. Transtilla well developed, strongly sclerotized, narrow, arc-shaped, anellus with well sclerotized ring-liked fultura superior bearing an extended, short, ventral appendix. Aedoeagus long, ca. 1.5× longer than saccus, cylindrical, gently curved postmedially, with broad unsclerotized coecum, vesica tapering to cone-like pointed apex, with a long, gently curved, rod-like cornutus almost 1/6 length of aedoeagus.

Female genitalia (Figs 325–327). Papillae anales wide and equally compressed laterally, ca. 2.5× as wide as long, covered with long slender hairs like setae, almost of equal length, most abundant dorsally; short rare setulae present ventrally and arise from round scaled tubercules along base of posterior apophyses; basal bar strongly sclerotized at basal part of posterior apophyses and non sclerotized dorso-ventrally; a slender, needle-

like, strongly sclerotized projection runs from posterior margin of segment VIII and reaches basal area of apophyses anteriores. Posterior apophyses long, reaching beyond midway into segment VII, straight, slender gently tapering into narrowly pointed apex, with broad triangular bases, about 1/4 as wide as width of papillae anales. Segment VIII very short, shorter than papillae anales, slightly longer dorsally than ventrally, weakly membranous, weakly connected with segment VII; connection between VII and VIII segments has narrow lateral gap. Anterior apophyses initiate at ventrolateral angles of segment VIII, without sclerotized plate, with broad triangular bases, 1/4 shorter than posterior apophyses, slender, slightly curved with sharp apices. Ostium bursae located at posterior part of segment VII, exposes curved ridge sterigma, consisting of two dorsal and two ventral sclerotized sinusoid depressions with dorsal margins projecting anteriorly; special cuticle projections of segment VII absent. Dorsal anterior margin of segment VII with strongly sclerotized, narrow band. Antrum broad, heavily sclerotized, tubular, long, as long as segment VII, transiting into ductus bursae, curved twice. Ductus bursae short, slightly broadening anteriorly, weakly membranous, with posterior part slightly heavier membranous than anterior part. Corpus bursae oval sack form, without special membranous areas, no signum. Spermatheca large, oval located close to median part of corpus bursae, ductus spermathecae form 26–28 coils, with slightly larger diameter posteriorly.

Variation. There is a slight variation in forewing pattern: the proximal region of the first fascia can be interrupted or obsolete. Corpus bursae in female genitalia varies from oval or drop-shaped to a elongate narrow sack.

Habitat. Surroundings of Anatananarivo in Madagascar.

Host plant(s). Solanaceae: *Solanum* sp.—Viette (1951: 132), Paulian & Viette (1955: 153), Dall'Asta *et al*. 2001: 34, De Prins & De Prins 2005: 312) (see *Remarks* below).

Malvaceae: *Sida rhombifolia* L.—(**new record**).

Mine. The illustration of the *P. lemarchadi* mine in Paulian & Viette (1955:156, fig. 14) shows an abaxial, oval, blotch mine situated close to the base of the leaflet, initiating at the base of the median vein and abruptly enlarging towards the edge of the leaf. The mine occupies ca. 1/8 of the leaf area.

Remarks. Although Paulian & Viette (1955:156) illustrate the mine of *P. lemarchandi* on a leaf of *Solanum* sp., all other specimens of this species, except the holotype, are reared on Malvaceae. The record of *Solanum* sp. requires confirmation.

Flight period. Adults were collected during two periods of the year: in early September and between late December–early January.

Distribution. (Fig. 385). Recorded from two localities close to Antananarivo in Madagascar.

The *leucaspis* group

The *leucaspis* group includes six species: *P. albertinus* De Prins, n. sp., *P. caudasimplex* Bland, 1980, *P. leucaspis* Triberti, 2004, *P. ololua* De Prins, n. sp., *P. ruizivorus* De Prins, n. sp., and *P. trochetellus* De Prins, n. sp. Adults of this group possess a well defined first fascia, very oblique, directed towards apex; a median fascia, narrow at costal margin and broad at dorsal margin. Larvae of the *leucaspis* group feed on Malvaceae plants. The external features in the *leucaspis* group are mostly superficial, not well defined, usually subtle, and if specimens are worn the external characters fail to define this group. Hence, genitalia dissections provide the only means for the assignment of species to the *leucaspis* group and further accurate identification.

The male genitalia of the *leucaspis* group are reduced, with a truncate tegumen; long valvae, more than 1.6× the length of sternum VIII, with a widened subapical part; and a slender strongly folded saccus at the junction with vinculum. The transtilla is well developed, heavily sclerotized, thick, and half square-shaped; the aedoeagus of all species of this group is shorter than the valva, blunt, cylindrical.

The female genitalia of the *leucaspis* group are characterized by a sinuous, narrow ductus bursae anteriorly, gradually widening to the corpus bursae, lacking a distinct junction of the two, and the absence of a signum. The ostium bursae of all species within this group opens almost at the posterior margin of segment VII, close to the junction with sternum VIII.

Key to males of *leucaspis* group based on genitalia*

1. Cucullus with emargination. 2
– Cucullus without emargination, valva smoothly enlarged subapically and bluntly tapering caudally 3
2. Emargination of cucullus from midline of valva towards valval costa straight, sacculus thick, short, slightly longer than 1/2 of valval width at the broadest part, in intact genitalia saccus reaches apical 2/3 of sternum VIII (Fig. 227, 228) . . . 35. *leucaspis*
– Emargination of cucullus from midline of valva towards costa deep arc-shaped, sacculus slender, almost as long as valval width at the broadest part, in intact genitalia saccus slightly longer than sternum VIII (Fig. 230) . . . . . 36. *ololua*
3. Saccus 1/3 shorter than vinculum (Fig. 224). . . . . 33. *albertinus*
– Saccus longer than vinculum. 4
4. Cucullus with abrupt rounded apex with very short bluntly pointed appendicule on ventral margin (Fig. 231) . . . 37. *ruizivorus*
– Cucullus with gently tapering and elongate apex (Fig. 234). . . . . 38. *trochetellus*

* male genitalia of *P. caudasimplex* unknown.

Key to females of *leucaspis* group based on genitalia*

1. Anterior apophyses longer than posterior apophyses (Fig. 330). . . . . 37. *ruizivorus*
– Anterior apophyses shorter than or of equal length of posterior apophyses 2
2. Anterior apophyses slightly shorter than posterior apophyses, antrum small and rounded (Fig. 329). . . . . 35. *leucaspis*
– Anterior apophyses equal in length to posterior apophyses, antrum broad, slightly less than half as broad as posterior margin of segment VII, rectangular shaped (Fig. 328) . . . . . 34. *caudasimplex*

* female genitalia of *P. albertinus*, *P. ololua*, and *P. trochetellus* unknown.

33. *Phyllonorycter albertinus* De Prins, new species

(Figs 74, 224–226, 386)

Diagnosis. *P. albertinus* is very similar in wing pattern to *P. leucaspis*, *P. caudasimplex*, *P. trochetellus* and *P. ruizivorus*. *P. albertinus* differs from the latter species by slightly fuscous shading of ground colour and washed basal margin of first fascia and apical margin of second fascia. These margins in all the other species belonging to *leucaspis* group are well bordered. The main diagnostic differences are in male genitalia. The species can be separated by a combination of the following characters: a) shape of cucullus of valva, b) width of vinculum c) length of saccus, and d) length of sternum VIII. According to the shape of cucullus *P. albertinus* reminds mostly *P. trochetellus*. However, in *P. albertinus* the subcuculus area is more dilated, apex of cucullus more sharpened, than in *P. trochetellus*. Caudal part of vinculum in *P. albertinus* is about twice as broad as in *P. trochetellus*. Saccus in *P. albertinus* is ca. as long as width of caudal area of vinculum; saccus in *P. trochetellus* is ca. 2.5× longer than width of caudal part of vinculum. In *P. albertinus* both lateral margins of sternum VIII sharply abuting, which makes sternum almost triangular shaped, however with gently rounded narrow caudal apex; in *P. trochetellus* both margins run almost parallel to each other gently rounding at apex, which gives sternum VIII a elongate half orbital shape. Females of both closely related species: *P. trochetellus* and *P. albertinus* are unknown.

Holotype: ♂, [1] '**Kenya,** Rift Valley Prov.[ince] / Turi, 8000 ft / 5.ii.1999 / [leg.] D. J. L. Agassiz'; [2] 'Gen. Prep. 3504♂ / De Prins'; [3] 'Holotype ♂ / *Phyllonorycter / albertinus* / De Prins, 2012', in BMNH.

Paratype: 1♂ (including 1♂ genitalia preparation). **Kenya:** 1♂, Rift Valley, Prov[ince]. Turi, 8000 ft, 18.i.1999, [leg.] D. J. L. Agassiz; specimen ID: RMCA ENT 000006147, gen. prep. De Prins 3731♂ (MRAC/KMMA 00656), in RMCA, DNA voucher CLV13707, in CCDB.

Description. *Adult* (Fig. 74). Forewing length: 3.36 mm (holotype) and 3.27 mm (paratype).

Head: Vertex tufted with light beige piliform scales, intermixed with dirty white medially, a small bunch of short, dirty white, piliform scales directed latero-posteriorly on central part of occiput, a small bunch of brightly ochreous, short, piliform scales directed posteriorly on lateral side of occiput, behind eyes; frons smooth, white with silver shine, a row of long broad smooth scales borders vertex, and a layer of more slender long piliform scales covers frontoclypeus. Labial palpus slightly longer than eye, straight, directed ventrally, white with silver shine dorsally and dark brown except basal part of palpomere I laterally from outer side, terminal palpomere dark

beige with sharp apex; maxillary palpus porrect, dirty white with beige base, haustellum developed, medially long, 2.5× curved, light beige. Antenna almost as long as forewing, consisting of 41–42 flagellomeres, flagellomeres dorsally light ochreous intermixed with dark ochreous at basal 1/3 and smoothly transiting to greyish median apically, all flagellomeres with darker tipped apices, however, antenna lacking ringed appearance; pedicel pale beige with narrow dark brown apex; scape dirty white anteriorly and beige posteriorly with 8–10 white pecten of different length.

Thorax: Ochreous with white lateral and anterior margins; tegulae dark ochreous anteriorly and shiny white posteriorly. Forewing greyish ochreous with white markings consisting of short basal streak, two transverse fasciae, two costal and one dorsal strigulae; basal streak short, straight, in midline of forewing, parallel to costa, not edged; first fascia at basal 1/4, slightly curved, reaches costa, basal margin obscure, with light pale ochreous transition area, apical margin curved, dorsal margin ca. 2× broader than costal, edged with irregular row of black scales; second fascia at middle of forewing, narrow at costal margin, ca.3× broader at dorsal margin, with constriction at midline, fine edged with irregular row of black scales basally; obscure smoothly transitting to ground colour apically, an irregular midsize black patch on midline of forewing bodering apical margin of second fascia, first costal strigula at 3/4, small triangular shaped, not reaching midline of forewing, richly edged on both sides; first dorsal strigula opposite first costal strigula, broad triangular shaped, significantly larger than first costal strigula, reaching midline of forewing, finely edged basally, a few dark brownish scales edging top of first dorsal strigula apically; an irroration of black scales connects tips of first costal and first dorsal strigulae, a white elongate spot at apex of forewing; termen irrorated with black scales; black irregular spot at apex, on edge of forewing, beyond white spot, fringe line not expressed. Fringe short silver grey with intermixture of a few hairs possessing white base along termen, long dirty white with silver shine along dorsum. Hindwing dark beige with fuscous shading fringe long greyish. Fore femur dark brown with fuscous shading dorsally and whitish ventrally, fore tibia brownish fuscous with white subapical patch, tarsus brown with three dirty white patches, tarsomere I dirty white with brown apical 1/3, tarsomeres II dirty white with brown apical half, tarsomeres III–IV brown, tarsomere V and tip of fore leg dirty white; mid-femur light beige with fuscous spot at apex, mid-tibia pale beige with three fuscous longitudinal patches: small basally, longitudinal row medially and large irregular shaped apically, tibial spurs whitish with fuscous basal parts, tarsus pale brownish fuscous with two broad dirty white rings, tarsomere I dirty white with pale brownish fuscous apex, tarsomere II dirty white with pale brownish fuscous base and apex, terminal tarsomeres pale brownish fuscous; hind femur dirty white with brown base and ochreous median patch, hind tibia dirty white basal half and brown apical half, tibial spurs long, whitish with fuscous median parts, tarsus pale fuscous with dirty white irregular patches, tarsomeres I pale fuscous with dirty white apex, tarsomere II pale fuscous with white bases, terminal tarsomeres pale grey, except tarsomere IV, which is dirty white.

Abdomen: Dorsally fuscous, ventrally unicolorously pale beige. Sternum VIII of males long, ca. 470 µm, finally setose, acuminating caudally, with gently rounded apex.

Male genitalia (Figs 224–226). Tegumen sclerotized, subconical, of medium size, ca. 415 µm long, subscaphium arms narrow, approaching each other forming inverted U, fused subapically, apex of tegumen well sclerotized, conus-shaped, obtuse, covered with numerous tiny microtrichiae, tuba analis not protruding. Valvae symmetrical, valva long, about 2× longer than sternum VIII, ventral margin ca. 810 µm in length, costal margin oblique ventrad to half of valval length, ventral margin of valva slightly bent, costal margin of valva sinuates at cucullus area, subcucullus area enlarged, gradually acuminating towards elongate and narrow sacculus; two narrow sclerotized seams run from basal sector to middle of valva on median ventral surface; a row of short, narrowly spaced setae along ventral margin of valva; ventral surface of valva and costal margin at subcucullus area densely covered with long stiff setae, more abundant towards margins, basal and apical parts of valval ventral surface are setae free. Vinculum strongly sclerotized, half rounded, very broad caudally, as broad as ca. 210 µm; saccus slender, folded on junction with vinculum, slightly bulbed caudally, ca. as long as caudal part of vinculum (ca. 215 µm). Transtilla complete, strongly sclerotized, rectangular shaped lateral arms bi-parted, lateral lobes on cephalic margin without appendices, angled 90°. Aedoeagus about 2.5× longer than saccus, ca. 625 µm long, slightly broader at coecum and gently tapering towards blunt vesica; vesica unsclerotized, wrinkled at apex, apical part of aedoeagus with two long, slender cornuti, ca. 160 µm long, parallel to each other dilating at vesica.

Female genitalia. Unknown.

Etymology. The species' name refers to the Albertine Rift Valley, the area of occurrence.

Habitat. Savannah areas with intermixed secondary vegetation.

Host plant(s). Unknown.

Flight period. Specimens have been attracted to light from mid-January to early February.

Distribution (Fig. 386). Known only from the type locality—Albertine Rift in Kenya.

34. *Phyllonorycter caudasimplex* Bland, 1980

(Figs 75, 328, 387)

Phyllonorycter caudasimplex—Bland (1980: 31–33, figs; 1e, 2c), Dall'Asta *et al*. (2001: 33), De Prins & De Prins (2005: 277), Guillermet (2011: 118–120; figs a–d, pl. 3, fig. 2).

Diagnosis. *P. caudasimplex* is indistinguishable in wing pattern from *P. trochetellus* and *P. ruizivorus*. Species in this group show the main diagnostic differences in male genitalia. Male genitalia of *P. caudasimplex* are unknown. Beside *P. caudasimplex* female genitalia of two *leucaspis* group species are known: those of *P. leucaspis*, and *P. ruizivorus*. Diagnostic features of female genitalia are defined by measuring the ratio of length of apophyses and by observing the shape of antrum. Posterior apophyses in *P. leucaspis* are longer than anterior apophyses, in *P. caudasimplex* both apophyses are about of equal length and in *P. trochetellus* anterior apophyses are 1.2× longer than posterior apophyses. Antrum in *P. caudasimplex* broad rectangular shaped, almost as long as broad, antrum in *P. trochetellus* ca. 4× broader than long and in *P. leucaspis* it is small and rounded. Furthermore, it is the only species recorded from West Africa belonging to the *leucaspis* group. A very large geographical distance separates this species from any other member of this group and the unique shape of antrum suggests that this species distantly related to other species in the *leucaspis* group. No doubt that the discovery of the male will help to resolve both the diagnosis and the position of *P. caudasimplex* in the *leucaspis* group.

Material examined. *Holotype*: ♀, [1] 'Holotype'; [2] '**Nigeria**: Ile –Ife / W State 30 Dec 1971 / Col. J. T. Medler'; [3] 'Gen[italia]. slide / B. 183.'; [4] 'Brit[ish]. Mus[eum]. / 1979-377'; [5] 'B.[ritish] M.[useum] ♀ / Genitalia slide / No. 21279'; [6] 'Type / *Phyllonorycter* / *caudasimplex* / Bland.', in BMNH.

Redescription. *Adult* (Fig. 75). Forewing length: 3.2 mm.

Head: Vertex tufted with ochreous brown piliform scales; frons smooth, shiny white. Labial palpus white. Antenna slightly shorter than forewing, flagellomeres lightly ringed by sequence of fuscous and pale ochreous brown scales, pedicel with pale ochreous shine, scape shiny white anteriorly and ochreous brown posteriorly.

Thorax: Shiny white anteriorly and pale fuscous posteriorly. Tegula ochreous brown anteriorly and white posteriorly. Forewing ochreous brown with white markings, consisting of short basal streak, two fascia, two costal and one dorsal strigulae; basal streak oblique and directed towards costa, finely edged posteriorly, first fascia at 1/5 oblique, directed towards apex, tapering, gently curved towards apex becoming obsolete before costa; second fascia at 1/2, broadest at dorsum, basal edge oblique, apical edge runs almost straight, second fascia constricts above midline of forewing before costa and at subcostal sector it broadens to half as broad as at dorsum, edged on both sides, first dorsal strigula and first costal strigula at 3/4 opposite each other, meeting above midline of forewing, separated by irroration of black scales; first dorsal strigula triangular shaped, bigger than first costal strigula, both strigulae edged basally; second costal strigula small, obscure, white, surrounded by dark fuscous and brown scales scattered in termen and tornal sectors at apical part. Hindwing fuscous with long, light fuscous fringe. Legs white with mixture of fuscous and brown scales.

Male genitalia. Unknown.

Female genitalia (Fig. 328). Papillae anales connected dorsally, rounded, longer than wide, weakly sclerotized, covered with scarce short setae, basal bar very narrow, imperceptible at preparation. Posterior apophyses sclerotized, slender, rather long, reaching posterior margin of segment VII. Segment VIII weakly sclerotized, weakly connected with segment VII. Anterior apophyses slightly shorter than posterior apophyses, slender, pointed, reaching posterior 1/3 of segment VII. Ostium bursae located at posterior edge of segment VII, antrum straight short tubular shape, sclerotized, ductus sinusoid at initial part, ductus bursae broadly tubular, smoothly merging with corpus bursae without visible transitional marking; ductus bursae + corpus bursae ca. 1.5× length of segment VII; signum on corpus bursae absent.

Biology. Habitat not known.

Host plant(s). Unknown.

Note: The records taken from labels of reared specimens from *Ruizia cordata* Cav. and *Dombeya acutangula* Cav. [Malvaceae] at the BMNH should be excluded from the host list of *P. caudasimplex*, since the specimens which are referred to in De Prins & De Prins (2005: 277) revealed that it is a misidentification. Specimens belong to the species *P. ruizivorus* sp. n. which is described in this publication.

Flight period. Specimens were collected in late December.

Distribution. (Fig. 387). Known only from the type locality in Nigeria (Bland 1980: 25, 33).

Note: The record from Reunion Island (Guillermet 2011: 119, figs a–d, pl. 3, fig. 2) is misidentidication of *P. ruizivorus* sp. n.

35. *Phyllonorycter leucaspis* Triberti, 2004

(Figs 76, 227–229, 329, 388)

Phyllonorycter leucaspis—Triberti (2004: 81–82; fig. 5: A–C, fig. 6: D), De Prins & De Prins (2005: 392).

Diagnosis. *P. leucaspis* is almost indistinguishable in wing pattern from the species belonging to *leucaspis* group: *P. caudasimplex, P. ololua, P. albertinus, P. trochetellus* and *P. ruizivorus.* The main diagnostic characters are in the male genitalia. According to genital characters, *P. leucaspis* is closely related to *P. ololua*. These two species can be separated by the following characters: a) the middle part of the valva in *P. leucaspis* is slightly narrowed before the abrupt enlargement of the cucullus area, whereas in *P. ololua* the valva enlarges gradually to the caudal part of the cucullus area; b) the cucullus emargation in *P. leucaspis* has a straight caudal vertical margin extending from the middle of the valva to the costal margin, whereas the caudal margin of the cucullus in *P. ololua* has a deep, arc-shaped, emargination; c) the sacculus is thick, short, and slightly longer than 1/2 of the valval width at the broadest part of valva, and the sacculus is slender, almost as long as the valval width at the broadest part of valva in *P. ololua*; d) the saccus in intact genitalia of *P. leucaspis* reaches the apical 2/3 of the sternum VIII, whereas the saccus in intact genitalia of *P. ololua* is slightly longer than sternum VIII (saccus in *P. ololua* is 1.5× longer than saccus in *P. leucaspis*); e) in *P. ololua* the apex of the vesica has four crossed, slender, short cornuti and the subapex of the vesica has 8 tiny barbs, whereas cornuti and barbs are absent in the vesica and caudal part of the aedoeagus in *P. leucaspis.* The female genitalia of *P. ololua* are not known. In regards to the female genitalia of other species within the *leucaspis* group, such as *P. caudasimplex* and *P. ruizivorus*, the diagnostic differences are in the ratio of the length of the apophyses and the shape of the antrum: a) the posterior apophyses in *P. leucaspis* are longer than the anterior apophyses in *P. caudasimplex* where both apophyses are of about equal length and in P. *ruizivorus* the anterior apophyses are 1.2–1.4× longer than the posterior apophyses; b) antrum in *P. leucaspis* small and rounded, and in *P. caudasimplex* it is broad rectangular shaped, almost as long as broad, in *P. ruizivorus* it is funnel-shaped and ca. 4× broader than long.

Material examined. *Holotype*: ♂, [1] '**Namibia:** 18.iii.2001 / Brandberg, 1940 m / Wasserfallfläche / leg. W. Mey, LF'; [2] '*Phyllonorycter leucaspis* / Holotypus / det. P. Triberti (I/03) / slide 2791♂'; [3] 'Holotype', in ZMHB.

Paratypes: 5♂ and 1♀, (including 2♂ and 1♀ genitalia preparations). **Namibia**: 1♂, 22.iii.2001, Brandberg, 1940 m, Wasserfallfläche, leg. W. Mey, LF'; *Phyllonorycter leucaspis* Paratypus det. P. Triberti (I/03); Paratypus; gen. prep. De Prins 3732♂; MRAC/KMMA 00424; specimen ID: RMCA ENT 000004446, in RMCA. 4♂ and 1♀, 18.iii.2001, same label data; gen. prep. trb 2796♂ and trb 2793♀, in ZMHB.

Redescription: *Adult* (Fig. 76). Forewing length: 3.53 mm (holotype).

Head: Vertex tufted with golden piliform scales with a suffusion of white scales most predominantly posteriorly; frons smooth, shiny white, covered with long appressed piliform scales, with light beige shading on frontoclypeus. Labial palpus ca. 1.5 longer than eye, straight, directed latero-anteriorly, palpomeres I and II white from inner lateral side and light ochreous on outer lateral side, palpomere III sharply pointed, covered with ochreous fuscous scales on outer lateral side; maxillary palpus porrect, small, white, haustellum developed, short, light beige. Antenna slightly shorter than forewing, consisting of 41–42 light ochreous flagellomeres; pedicel pale beige with a ring of fuscous tipped scales encircling apex; scape white anteriorly and light ochreous posteriorly with whitish 9–11 pecten of different length.

Thorax: Golden ochreous with narrow white proximal band, edging lateral sides and anterior part of thorax; tegulae golden ochreous with narrow white apical tips. Forewing golden ochreous with white markings consisting of short basal streak, two transverse fasciae, two costal and one dorsal strigulae; basal streak short, oblique, directed towards apex, not edged, only a few black scales present on dorsal margin; first fascia at basal 1/4, sharply oblique, finely black edged apically, a few black scales present at dorsal margin basally; second fascia at middle of forewing narrowed below costa and twice as broad at dorsal margin, finely blackish edged on both sides; first costal strigula at 3/4, triangular shaped, not reaching midline of forewing, finely edged on both sides with more expressed edging basally, a few black scales separate first costal and first dorsal strigulae; second costal strigula at apex, indistinct, comma shaped, without clear edging, apical area sprinkled with dark brown scales, first dorsal strigula opposite first costal strigula, triangular shaped, larger than first costal strigula, almost reaching midline of forewing, finely edged basally. Fringe pale greyish golden, ochreous, tipped dark brown at termen forming a short indistinct fringe line. Hindwings light fuscous with pale greyish golden fringe. Legs ventrally white, dorsally spotted with fuscous and ochreous markings. Forefemor and fore tibia light fuscous, tarsus dark fuscous with white spots, tarsomeres I dark fuscous with white basal and median spot, tarsomere II dark fuscous with white basal half, tarsomere III dirty white with fuscous apex, terminal tarsomeres fuscous; mid-femur golden beige with small dark brown dot at base, mid-tibia white, with fuscous basal longitudinal stripe, median band and broader apical irregular fuscous band, tibial spurs white with median fuscous patch, tarsomere I with small fuscous subbasal and large subapical patches, tarsomere II white with fuscous apical half, tarsomere III fuscous, terminal tarsomeres dirty white; hind femur pale beige with shiny ochreous median patch, hind tibia pale beige with very large subapical dark brown patch, tibial spurs very long, just slightly shorter than tibia, light golden beige with a row of dark fuscous scales extending from middle to subapex, tarsomeres dirty white with dark brown subapices.

Abdomen: Light ochreous dorsally, ventrally whitish. Sternite VIII of males moderate, elongate, gently rounded caudally.

Male genitalia (Figs 227–229). Tegumen significantly reduced, weakly sclerotized, ca. 420 µm long, i.e., ½ length of valva; arms of subscaphium fused subapically into truncated conus, apex of tegumen sharp, conus-shaped, covered with very short and slender setation mostly at apex, tuba analis not protruded. Valvae symmetrical, long, significantly differing in length at costal and ventral margin, costa ca. 640 µm long, ventral margin ca. 820 µm long, strongly sclerotized in basal half, projecting slightly downward, slightly narrowing to mid-valva with significantly enlarged cucullus area bearing long, thick, bluntly pointed “appendix” extending ventro-laterally at ventral angle of caudal part of valva; two narrow sclerotized seams extending from basal sector to middle of valva along median ventral valval surface; margins of valva distally from median seams covered with dense thick long setae, ventral margin margin of valva setose along almost entire valval length except basal part, costal margin setose distally; 8–10 tubercules bearing stiff short setae, situated at apical edge of cucullus. Cucullus with shallow L-shaped emargination, of which horizontal bar smoothly extends to sacculus, and vertical part of emargination which connects sacculus with costal margin of valva, is almost straight. Vinculum strongly sclerotized, half rounded, significantly broader caudally towards base of saccus, as broad as ca. 145 µm; saccus slender, strongly folded at junction with vinculum, slightly bulbed caudally, moderately long, 240 µm, ca. 1.3 shorter than sternum VIII. Transtilla strongly sclerotized, rectangular-shaped, sharp angulated laterally, anellus developed, lightly sclerotized with short broad lightly sclerotized futura keeping aedoeagus at apical 1/3. Aedoeagus longer than sternum VIII and ca. 1.8× longer than saccus, 590 µm, slightly broader at coecum and gently tapering towards blunt vesica; vesica with two long, slender cornuti, ca. 1/4 length of entire aedoeagus, ca. 135 µm, which cross each other.

Female genitalia (Fig. 329). Papillae anales laterally compressed, as wide as long, posterior sector of papillae anales stronger sclerotized than anterior one, covered with setae of different length, shorter but more abundant posteriorly. Posterior apophyses sclerotized, also at bases, slender, broader at bases, reaching posterior margin of segment VII, apices sharply pointed. Segment VIII weakly sclerotized, connected dorsally and ventrally. Anterior apophyses slightly shorter than posterior ones, broader at bases, straight and slender, with sharp apices. Ostium bursae located at posterior margin of segment VII, antrum short, small rounded, strongly sclerotized; sterigma simple. Ductus bursae very short, narrower than antrum initially, sinuous, slender, abruptly broadening anteriorly to almost same diameter as corpus bursae. Corpus bursae origining at posterior margin of segment VII, very long, cylinder-shaped, without signum.

Habitat. Richly vegetated valleys between 1600 and 1900 m elevation dominated by *Acacia hereroensis*, *Dombeya rotundifolia* and *Rhus* spp. (Mey 2004: 10).

Host plant(s). Unknown.

Flight period. Adults were collected in March.

Distribution. (Fig. 388). The species is only known from the type locality in Namibia (Triberti 2004: 82).

36. *Phyllonorycter ololua* De Prins, new species

(Figs 77, 230, 389, 439)

Diagnosis. *P. ololua* is hardly distinguishable from species in the *leucaspis* group since all of them possess two white fasciae and two costal and one dorsal strigulae. However, the vertex in *P. ololua*, differently from the other *leucaspis* group species, is pure white. The main diagnostic characters are in the male genitalia. According to genital characters *P. ololua* is closely related to *P. leucaspis* (see diagnosis of *P. leucaspis*).

Holotype: ♂, [1] '**Kenya** Nairobi / Ololua Forest / NMK-PR Compound / 01°22'S 36°43'E 1800 m / Mercury Vapour Light / 23.v.1999 / [leg.] B. Bytebier; [2] 'Gen. Prep. 3649♂ / De Prins'; [3] 'MRAC/KMMA / 00369'; specimen ID: [4] 'RMCA ENT 000003274'; [5] 'DNA voucher / CLV14107', in CCDB; [6] 'Holotype ♂ / *Phyllonorycter / ololua* / De Prins, 2012', in RMCA.

Description: *Adult* (Fig. 77). Forewing length: 3.23 mm.

Head: Vertex covered with pure white, appressed, piliform scales, tufted on occiput; frons smooth, covered with long appressed, piliform scales, shiny white bordering to vertex and white with pale beige shading on frontoclypeus. Labial palpus ca. 1.5× longer than eye, straight, directed ventro-anteriorly, narrow, acuting, sharply pointed caudally, white with very light beige shading on palpomeres I and II; maxillary palpus porrect, white, haustellum developed, short, light beige. Antenna slightly shorter than forewing, consisting of 41–42 light flagellomeres, pale beige dorsally and whitish beige ventrally; pedicel pure white; scape white with elongate, narrow, light ochreous patch anteriorly, with 13–15 white pecten of varying length.

Thorax: Golden ochreous with a white band along anterior and lateral margins; basal half of tegula ochreous and apical half of tegula white. Forewing golden ochreous with white markings consisting of short basal streak, two transverse fasciae, two costal and one dorsal strigulae; basal streak short, broad triangular shaped, oblique, directed towards apex, not edged, a few black scales present at dorsal margin; first fascia at basal 1/4, slightly oblique, curving, finely black edged apically, a few black scales present at basal margin at subdorsum; second fascia at middle of forewing, broad at dorsum to midline of forewing, very narrow at costa and as straight band running to midline of forewing, abruptly dilating from midline to dorsum and becoming 4–6× broader at dorsum than at costa, finelly blackish edged on both margins, with more expressed edging basally and interruptedly edged apically; first costal strigula at 3/4, small triangular shaped, not reaching midline of forewing, finely edged on both sides, second costal strigula at apex, white irregular patch shaped, without clear edging, first dorsal strigula opposite first costal strigula, triangular shaped, significantly larger than first costal strigula, almost reaching midline of forewing, finely edged basally, black scale edging of first dorsal strigula extends towards midline of forewing joining with black edging of first costal strigula. Hindwing pale beige with pale grey fringe. Legs brownish spotted dorsally and dirty whitish ventrally. Fore femur and fore tibia dark brown, tarsomere I dark dirty white with dark brown apex, remainder of tarsomeres dark brown; mid-femur white, mid-tibia white, with small dark brown basal, median and apical patches, tibial spurs white with median fuscous patch, tarsomere I white with small fuscous subapical patch, tarsomere II white, tarsomere III white with dark brown apex, tarsomere IV dark brown, tarsomere V white. Hindlegs removed for DNA study and not available for description.

Abdomen: Light ochreous dorsally, ventrally whitish. Sternite VIII of males moderate, elongate, ca. 440 µm, gently acuminating towards rounded caudally apex.

Male genitalia (Fig. 230). Tegumen reduced, ca. 450 µm long, sclerotized subapically, having much weaker sclerotization apically, subscaphium arms narrow, ca. 320 µm in length, fused subapically in arc-shaped junction, apex of tegumen conus-shaped with sparse short slender setation, tuba analis not protruded. Valvae symmetrical, strongly sclerotized in basal half, projecting slightly downwards, slightly and gradually enlarging at middle, costal margin ca. 660 µm, ventral valval margin ca. 775 µm, significantly enlarged at cucullus area with long narrow pointed sacculus "appendix", ca. 185 µm long at ventral caudal margin; two narrow sclerotized seams extedning from basal sector to middle of valva on median ventral surface; cucullus with a deep half-rounded emargination,

cucullus covered with dense, thick, long setae, sparse stiff short setae situated on ventral margin of valva. Vinculum strongly sclerotized, half rounded, broader caudally towards base of saccus, as broad as ca. 125 µm; saccus slender, moderately long, 370 µm in length, ca. 2× shorter than valva at ventral margin and 1.2× shorter than sternum VIII, curved at junction with vinculum, slightly bulbed caudally. Transtilla complete, strongly sclerotized, rectangular shaped lateral arms divided, lateral lobes on cephalic margin without appendices, angled 90°; anellus developed, lightly sclerorized with short unsclerotized futura. Aedoeagus slightly longer than sternum VIII, ca. 575 µm, slightly broader at coecum and gently tapering towards blunt vesica with constriction in middle; two long, slender cornuti, ca. 143 µm, crossing near mid-length at subvesical area; vesica wrinkled with two pairs of very slender, short, oblique cornuti, parallel to each other, subapical ventral margin of vesica with 8 tiny barbs (observed at 250× enlargement).

Female genitalia. Unknown.

Etymology. The species' name refers to the name of its type locality.

Habitat. Dry highland forest at about 1500 m with stands of very high trees (Fig. 439).

Host plant(s). Unknown.

Flight period. The specimen was collected in late May.

Distribution (Fig. 389). Known only from the type locality in Kenya.

37. *Phyllonorycter ruizivorus* De Prins, new species

(Figs 78, 79, 231–233, 330)

Diagnosis. *P. ruizivorus* is indistinguishable in wing pattern from *P. caudasimplex* and *P. trochetellus*. According to male genitalia *P. ruizivorus* is closely related to *P. trochetellus*. Both species have short and compact tegumen, broad rounded vinculum and bent saccus of median length, complete rectangular transtilla, long, and sinusoid valva. However, *P. ruizivorus* differs from the other species of *leucaspis* group by the form of cucullus of valva. Valva in *P. leucaspis* and *P. ololua* emarginated at cucullus, cucullus in *P. albertinus* and *P. trochetellus* without emargination but gently tapering to narrow and round tipped apex, cucullus in *P. ruizivorus* gently enlarged with sinusoiding margins. Female genitalia of *P. ruizivorus* appears very much like to that of *P. leucaspis*. In female genitalia the evident diagnostic differences are present in ratio of length of apophyses and the shape of antrum: the posterior apophyses in *P. leucaspis* are longer than the anterior apophyses, in *P. caudasimplex* both apophyses have about equal length and in *P. ruizivorus* the anterior apophyses are 1.2–1.4× longer than the posterior apophyses. Antrum in *P. caudasimplex* broad rectangular, almost as long as broad, antrum in *P. leucaspis* small and rounded and in *P. ruizivorus* it is funnel shaped ca. 4× broader than long. Larvae of *P. ruizivorus* can share the same host plant as those of *P. caudasimplex* and *P. trochetellus.*

Holotype: ♂, [1] '**Reunion /** Bassin Plat / St. Pierre / sur Bois de Senteur, 140 m / 02.x.1998 / ex leaves *Ruizia cordata* / [leg.] S. Quilici'; [2] 'BMNH(E) 1999–144' ; [3] 'Gen. Prep. De 3723♂ / Prins'; [4] 'BMNH / 31639'; [5] 'Holotype ♂ / *Phyllonorycter / ruizivorus* / De Prins 2012', in BMNH.

Paratypes: 11♂, 14♀ (including 2♂, 4♀ genitalia preparations). **Reunion:** 1♂, Bassin Plat, St. Pierre, sur Bois de Senteur, 140 m, 02.x.1998, ex leaves *Ruizia cordata*, [leg.] S. Quilici, BMNH(E) 1999–144, gen.prep. De Prins 3729♂ (BMNH 32527), in BMNH. 4♀, same locality and host plant data except the date 04.ix.1998, gen. prep. De Prins 3725♀ (BMNH 32528), 3728♀ (BMNH 32529), in BMNH. 6♂, 5♀, Basin Plat, 11.vi.1998, ex leaves *Dombeya acutangula*, gen. prep. De Prins 3722♀ (BMNH 32531), 3724♀ (BMNH 32532), 3730♂ (BMNH 32530) in BMNH; 1♂, 1♀, Le Port, Pépinière communale, 20°55'S 55°17'E, mine 28.viii.2009, leg. J. Rochat, e. l. *Ruizia cordata*; ID: RMCA ENT 000005298–000005299. 2♂, 1♀, Bassin Plat, St. Pierre, 250 m, 04.ix.1998, ex leaves *Ruizia cordata*, in CIRAD. 1♂, Ravine de La Grande Chaloupe, parking de l'entrée du terrain militaire, 10 m, 13.vii.2010, e. l. *Ruizia cordata*, leg. Ch. Guillermet, gen. prep. G 2281♂, in coll. of Ch. & I. Guillermet. 3♀ Ravine de La Grande Chaloupe, Arboretum, 15 m, 12.vii.2010, e. l. *Ruizia cordata*, leg. Ch. Guillermet, gen. prep. G 2282♀, in coll. of Ch. & I. Guillermet.

Description. *Adult* (Figs 78, 79). Forewing length: 2.80–2.91 mm.

Head: Vertex tufted with bright ochreous piliform scales, lateral sides of vertex covered with shorter scales, directed mainly dorso-laterally, central part of vertex whitish consisting of white intermixed with light ochreous longer piliform scales directed latero-dorsally, pure white scales at posterior half and white intermixed with brown

tipped scales at anterior half of vertex, a bunch of short thicker, ochreous, piliform scales directed to all directions on lateral sides of occiput; frons smooth, pure white with silver shine, smooth piliform scales cover frontoclypeus. Labial palpus slightly longer than eye, straight, directed latero-ventrally, basal palpomere dirty white, palpomere 2 pale beige, terminal palpomere acuminating, brownish beige; a row of dark brown roundish scales runs on external side of palpomeres 2 and 3; maxillary palpus porrect, white, haustellum developed, medium long, one time curved, light beige. Antenna almost as long as forewing, consists of 54–56 flagellomeres, flagellomeres from light ochreous intermixed with darker ochreous at basal 1/3, apical flagellomeres dark tipped scales; pedicel white with tiny dark brown dots; scape dirty white with intermixed pale beige shading posteriorly, with 10–12 dirty white pecten of variable length.

Thorax: Shiny ochreous at anterior 1/3 and shiny white at posterior 2/3; tegula golden ochreous at anterior half and shiny white apically. Forewing golden ochreous with white markings consisting of very short basal streak, two transverse fasciae, one costal and one dorsal strigulae and two terminal spots; basal streak very short, oblique, directed towards apex, a few black scales present at dorsal margin; first fascia at basal 1/4, slightly oblique, in three specimens do not reach costa, basal margin oblique towards apex, apical margin curved, costal margin narrow, dorsal margin broad, ca. 4× as broad as costal margin, first fascia finely black edged on both sides with more dense edging at apical side; second fascia at middle of forewing, narrow at costa to midline and ca. 4× broader at dorsal margin, fine edged with 2 rows of black scales from both sides; first costal strigula at 3/4, elongate triangular, reaching midline of forewing (in three paratypes fusing with dorsal strigula), finely edged on both sides with more thick edging basally; first dorsal strigula opposite first costal strigula, broad triangular shaped, significantly larger than first costal strigula, reaching midline of forewing, finely edged basally, a few dark brownish scales edging top of first dorsal strigula apically; two white spots opposite each other, connected by broad band of black scales, stretching from apical edge of costal spot to tip of dorsal spot at midline of forewing at termen sector; termen same colour as ground colour of forewing; fringe line short, interrupted, narrow, black visible at tornus. Fringe short, silver pale grey along termen and long pale grey along dorsum. Hindwings light fuscous with long greyish fringe. Fore femur fuscous dorsally and whitish ventrally, fore tibia dark fuscous, tarsus fuscous with white base and middle patch, tarsomere I fuscous with white base, tarsomere II dirty white, tarsomeres III–IV fuscous, tarsomere V pale beige; mid-femur light beige with fuscous spot at apex, mid-tibia dirty white, with three fuscous longitudinal patches: small basally, medium medially and large apically, tibial spurs whitish with fuscous median parts, tarsus dirty white with small subbasal fuscous patch and two broad fuscous rings, tarsomere I dirty white with fuscous subbasal patch and fuscous subapical ring, tarsomere II dirty white with fuscous apex, tarsomere III fuscous, tarsomere IV dirty white, tarsomere V dirty white with grey tip; hind femur dirty white, hind tibia shiny ochreous, tibial spurs long, whitish with fuscous median parts, tarsus dirty white with four narrow fuscous rings, tarsomere I dirty white with narrow subapical fuscous ring, tarsomere II dirty white with fuscous median part, tarsomere III dirty white with fuscous apical half, tarsomere IV dirty white, tarsomere V dark fuscous, tip of tarsum pale beige.

Abdomen: First three terga pale fuscous intermixed with ochreous, terga IV–VI pale beige anterior half and pale fucous posterior half, genital segment fuscous, sterna unicolours pale beige. Sternum VIII of males long, ca. 400 µm, acuminating caudally, with gently rounded apex, finally setose at apical half.

Male genitalia (Figs 231–233). Tegumen sclerotized, subconical, of medium size, ca. 425 µm; a pair of narrow subscaphium arms approache each other and joine postero-dorsally forming inverted U, fusing subapically to sclerotized conus shaped projection, covered with numerous tiny, stout microtrichiae; tuba analis not protruding. Valva symmetrical, long, about 2× length of sternum VIII, ca. 875 µm in length, basally narrower and stronger sclerotized, costal and ventral margin parallel, margins of valva dilating at apical half and cucullus, then sinuate, forming a broad and curved cucullus with obtuse apex; ventral marginal surface of cucullus covered with tiny tubercules and short, slender, stiff, setae, median surface setae free. Vinculum strongly sclerotized, half rounded, broad caudally towards base of saccus; saccus slender, folded on junction with vinculum, slightly bulbed caudally, moderately long, 437 µm. Transtilla complete, strongly sclerotized, rectangular shaped, lateral lobes on cephalic margin without appendices, angled 90°. Aedoeagus about 1.3× shorter than valva, ca. 680 µm long, slightly broader at coecum and gently tapering towards blunt vesica; vesica wrinkled (8–12 deep wrinkles of different length crossing each other) with unsclerotized appendix; two thick cornuti, parallel at base, fused from mid-length, ca. 295 µm long, situated along apical part of aedoeagus and basal part of vesica.

Female genitalia (Fig. 330). Papillae anales half rounded, not fused, surrounded by slender membrane, ca. 145 µm long, ca. 124 µm wide, covered along caudal margin with sparsely set short setae, basal bar absent. Posterior apophyses with broad elongate triangular bases, sclerotized, slender, ca. 200 µm long, reaching posterior 1/3 of segment VII, apices bluntly pointed. Segment VIII weakly sclerotized, very short, connected with segment VII dorsally and ventrally. Anterior apophyses longer than posterior apophyses, ca. 254 µm long, with slightly thicker, elongate bases, gently dilating, straight and slender, terminating with bluntly pointed apices. Segment VII sclerotized, long, ca. 510 µm, with a strongly sclerotized band at anterior margin, slightly convex at posterior margin. Ostium bursae located at posterior margin of segment VII, just posterad of connection of segment VII, antrum short, broad, funnel-shaped, lightly sclerotized, sterigmatic sclerotized structures absent. Ductus bursae short, broad, strongly melanised, with longitudinal wrinkles. Corpus bursae long, ca. 1.20 mm, large, originating at posterior 1/3 of segment VII, cylindrical, without signum. Ductus spermathecae situated in posterior part of segment VII, short, straight, with less compact at caudal part and strongly compact at basal part, with 25–29 revolutions; bulla spermathecae elongate sac-shaped, situated just anterad of sclerotized band of anterior margin of segment VII.

Etymology. This species is named after the specific epithet of its host plant.

Habitat. Habitats of islands in southern Indian Ocean.

Host plant(s): Malvaceae: *Ruizia cordata* Cav., *Dombeya acutangula* Cav.

Mine. The underside tentiform mine is slightly elongate or oval, more or less opaque creamy (Martiré & Rochat 2008: 209 as 'Mine de *Phyllonorycter* sp. sur Bois de Senteur blanc (*Ruizia cordata* Malvaceae)'.

Flight period. Mines have been collected in mid-June, September and early October. All records are from reared adults. There are no direct data from the true flight period but very probably adults are on the wing in the same months.

Distribution. Known only from Reunion Island.

38. *Phyllonorycter trochetellus* De Prins, new species

(Figs 80, 234–236)

Diagnosis. *P. trochetellus* is indistinguishable in wing pattern from *P. caudasimplex* and *P. ruizivorus* and according to male genitalia it is closely related to *P. ruizivorus* (see diagnosis of *P. ruizivorus)*. Discovery of the female likely will help elucidate additional diagnostic characters, especially separating this species from *P. caudasimplex* and *P. ruizivorus*. Although all three species can feed on *Dombeya acutangula*, many more specimens of *P. trochetellus* and *P. ruizivorus* were collected from native Malvaceae plants on the Mascarene islands. Until now, *P. trochetellus* was found only on Mauritius island.

Holotype: ♂, [1] '**Mauritius** / ex *Trochetia blackburniana* / [Malvaceae] / iv.2004 / leg. C. Müller'; [2] '*Phyllonorycter / loxozona* (Meyrick) / det. G. S. Robinson, 2004 [misidentification]'; [3] 'Gen. Prep. 3720♂ / De Prins'; [4] 'BMNH 31636'; [5] 'Holotype ♂ / *Phyllonorycter / trochetellus* / De Prins, 2012', in BMNH.

Paratypes: 2♂ and 1 specimen (abdomen missing) (including 2♂ genitalia preparations). **Mauritius:** 1♂, ex *Trochetia blackburniana* (Malvaceae), iv.2004, leg. C. Müller, gen. prep. De Prins 3719♂ (BMNH 31637), '*Phyllonorycter loxozona* (Meyrick) det. G. S. Robinson, 2004' [misidentification], in BMNH. 1 specimen, same locality and host plant data, in BMNH. 1♂, ex *Dombeya acutangula*, 13.xii.1983, 'T. Rawananshah 62/83, C. I. E. A. 15621', 'Pres by Comm. Inst. Ent. B. M. 1983–1', gen. prep. De Prins 3721♂ (BMNH 31638), '*Phyllonorycter loxozona* Meyr. det. J. D. Bradley, 1984'[misidentification], in BMNH.

Description. *Adult* (Fig. 80). Forewing length: ca. 2.75 mm.

Head: Vertex slightly tufted with shorter ochreous piliform scales, directed dorso-anteriorly, longer ochreous piliform scales directed latero-dorsally, a bunch of white piliform scales of different length on occiput, shorter scales directed posteriorly, longer scales directed latero-posteriorly; frons smooth, dirty white, covered with angulated flat scales on ventro-frontoclypeus, white narrow piliform scales on dorso-frontoclypeus with shiny golden narrow transition band between frontoclypeus and vertex shading into white on frons. Labial palpus slightly longer than eye, gently bent upwards, directed latero-dorsally, basal palpomere whitish pale beige with a small dark brown spot apically, terminal palpomere acuminate, brownish fuscous; maxillary palpus porrect, pale beige, haustellum developed, medium, 2× curved, light beige.

Antenna almost as long as forewing, consisting of 56–57 flagellomeres, flagellomeres light ochreous intermixed with darker ochreous, apical flagellomeres with a slender row of dark tipped scales at apices; pedicel white; scape white anteriorly and ochreous posteriorly with white 10–12 pecten ca. half as long as diameter of compound eye.

Thorax: Shiny white at anterior half and ochreous at posterior half; tegula golden ochreous at anterior half and shiny white apically. Forewing golden ochreous with white markings consisting of very short basal streak, two transverse fasciae, one costal and one dorsal strigulae and two terminal spots; basal streak very short, oblique, directed towards apex, a few black scales present at dorsal margin; first fascia at basal 1/4, slightly oblique, apical margin slightly bent, basal margin irregularly curved, dorsal margin ca. 2× broader than costal margin, finely black edged on both sides however, with thicker edging at dorsal half; second fascia at middle of forewing, narrow at costa to midline and ca. 4× broader at dorsal margin, edged with 2–3 rows of blackish brown scales from both sides; first costal strigula at 3/4, drop shaped, not reaching midline of forewing, finely edged on both sides with thicker edging basally; a few blackish scales separate first costal strigula and first dorsal strigula; first dorsal strigula opposite first costal strigula, triangular shaped, larger than first costal strigula, almost reaching midline of forewing, finely edged basally, a few dark brownish scales edging top of first dorsal strigula apically; two dirty white spots opposite each other at termen, both spots connected by blackish brown scales, termen slightly darker than ground colour of forewing; fringe line short, visible at tornus. Fringe pale greyish. Hindwings light fuscous with greyish fringe with golden shine. Fore femur and fore tibia dark fuscous, tarsomeres I–II dark fuscous with dirty white basal halves, tarsomeres III–IV fuscous, tarsomere V dirty white; mid-femur light ochreous with fuscous spot at apex, mid-tibia light ochreous, with three fuscous longitudinal patches: smaller basal, medium medially and large apically, tibial spurs whitish ochreous with fuscous median parts, tarsus whitish pale ochreous with basal fuscous patch and two broad fuscous rings, tarsomere I whitish pale ochreous with fuscous basal patch and fuscous apex, tarsomere II whitish pale ochreous with fuscous apex, tarsomere III fuscous, tarsomere IV pale ochreous, tarsomere V pale ochreous with darker ochreous tip; hind femur dirty white with pale ochreous shading, hind tibia pale at basal 1/3 with broad, bright ochreous stripe extending obliquely from subbasal to subapical region of tibia, apex dirty white, tibial spurs long, whitish pale ochreous with fuscous apices, tarsus dirty white with two fuscous rings, tarsomeres I–II dirty white with fuscous apices, tarsomeres III–V dirty white, tip of tarsomere V dark ochreous.

Abdomen: Dark fuscous dorsally with paler shading on genital segments, ventrally white, sterna I–III with narrow ochreous bands. Sternum VIII of males long, ca. 510 µm, lateral margins running almost parallel, setose, gently rounded caudally.

Male genitalia (Figs 234–236). Tegumen sclerotized, subconical, of medium size, ca. 435 µm long, arms of subscaphium narrow, ca. 300 µm long, approaching each other forming inverted U, fused subapically, apex of scaphium well sclerotized conus shaped, ca. 110 µm long, obtuse, covered with numerous tiny, stout microtrichiae, tuba analis not protruding. Valvae symmetrical, very long, valva about 2× length of sternum VIII, 1.15 mm in length, narrowing towards tip, costal and ventral margin of valva parallel in basal 1/3, dilated at mid-valva, sinuate towards apex, both margins converging to narrow, blunt apex; ventral surface of valva, mostly along margins and at cucullus, covered with tubercules and short stiff setae, median surface of valva is setae free. Vinculum strongly sclerotized, half rounded, broad caudally; saccus slender, folded on junction with vinculum, slightly bulbed caudally, moderately long, ca. 455 µm. Transtilla complete, strongly sclerotized, rectangular shaped lateral arms biparted, lateral lobes on cephalic margin without appendices, angled. Aedoeagus about 1.4× shorter than valva, ca. 785 µm, slightly broader at coecum and gently tapering towards blunt vesica; vesica unsclerotized, irregular shaped, wrinkled, apical part of aedoeagus with long cornutus, ca. 215 µm thick, attenuate at vesica.

Female genitalia. Unknown

Etymology. The species' name refers to the name of the host plant.

Habitat. Island habitats in southern Indian Ocean.

Host plant(s). Malvaceae: *Dombeya acutangula* Cav., *Trochetia blackburniana* Boj.

Flight period. Mines have been collected in April and in mid-December. All records are from reared adults. There are no data of the true flight period but adults are probably active during the same months.

Distribution. Known only from Mauritius.

The *loxozona* group

The forewing pattern in the *loxozona* group resembles very closely that of the majority of Afrotropical *Phyllonorycter* species. Larvae of the *loxozona* group feed on *Dombeya* spp. [Malvaceae]. Developed mines appear to resemble gall-like swellings.

The *loxozona* group consists of three species: *P. didymopa* (Vári, 1961), *P. loxozona* (Meyrick, 1936), and *P. madagascariensis* (Viette, 1949). *Phyllonorycter madagascariensis* was described from a single specimen without abdomen by Viette (1949). We made all possible efforts to find the holotype of *P. madagascariensis* (see *Remarks* below). A neotype designation is very much anticipated. We believe that with the kind help of the lepidopterists' community it will be possible in the near future to obtain a neotype of this species reared from *Dombeya spectabilis* which grows in the Botanical Garden of Tsimbazaza, Antananarivo, Madagascar (type locality of *P. madagascariensis*). Based on the original description, the forewing pattern of *P. madagascariensis* resembles that of *P. didymopa*. All three species make a long, semi-transparent gallery during the development of early instars and feed on *Dombeya* ssp. [Malvaceae] (*P. didymopa* feeds on *D. rotundifolia*, *P. loxozona* on *D. emarginata* and *D. rotundifolia*, and *P. madagascariensis* feeds on *D. spectabilis*). We, therefore, tentively included *P. madagascariensis* into this informal species group. Unfortunately, the unavailability of genitalia prevent a proper diagnosis between *P. madagascariensis*, *P. loxozona* and *P. didymopa*.

Male genitalia are known only for *P. loxozona*. They show a few, rather particular set of features characterizing this species: tegumen rather short, tuba analis long, protruding ca. 1/2 length of tegumen, long sinuate narrow valva covered with dense setation on cucullus (similar to *Cameraria*), crescent-shaped vinculum with very short saccus, sternum VIII truncate, strongly tapering caudally with blunt weakly bidentate apex.

Female genitalia of the *loxozona* group, like those of *Cameraria*, are characterized by the location of ostium bursae opening at posterior margin of segment VII. Antrum in the *loxozona* group is broad and sclerotized, with strongly sclerotized ring encircling the opening of ostium bursae. Ductus bursae in the *loxozona* group like in *Cameraria* (the *hexalobina* and the *landryi* groups) might be crossed by a small plate situated anteriad antrum (in *P. loxozona*). Corpus bursae of the *loxozona* group without signum.

Remarks. Vári (1961: 222) wrote the following: "It is an interesting peculiarity to find a gall-forming species in *Lithocolletis*, as most species make tentiform mines and no special growth of the leaf tissue is induced. A further interesting matter is the presence of the long, semi-transparent gallery, made during the early stages, whereas all other species are sapfeeding during this period, and no semi-transparent galleries are made". This would indicate that the early instars of this group might possess a slightly different metamorphic development of mouthparts from the rest of *Phyllonorycter*. The male and female genitalia of the *loxozona* group resemble these of *Cameraria*. However such characters, as general pattern of forewing, absence of clearly notable setae on apex of tegumen, strongly developed complete transtilla, put these species close to *Phyllonorycter*. Probably, the *loxozona* group species might require a designation of a new genus. However, it seems preferable at the moment to follow a more conservative approach leaving this species group in *Phyllonorycter*, as initially proposed by Meyrick (1936: 33) until detailed larval and pupal morphology is studied and molecular characters are obtained.

Key to the species of *loxozona* group based on external characters and host plants

1. Second fascia at 1/2 of forewing slightly oblique towards apex, broader at dorsum and slightly tapering towards costa, blunt at costa (Figs 81, 82, 85) 2
– Second fascia at 1/2 of forewing straight transverse, swelled at dorsal sector and bluntly tapering at costa; larvae feed on *Dombeya emarginata* and *D. rotundifolia*. [Malvaceae] (Figs 83, 84) . . . . . 40. *loxozona*
2. Larvae feed on *D. rotundifolia* [Malvaceae] . . . . . 39. *didymopa*
– Larvae feed on *D. spectabilis* [Malvaceae] . . . . . 41. *madagascariensis*

Key to females of *loxozona* group based on genitalia*

1. Anterior apophyses only slightly shorter than posterior apophyses; margin of ostium bursae not sclerotized (Fig. 331) . . . . . 39. *didymopa*

– Anterior apophyses more than 2× shorter than posterior apophyses; margin of ostium bursae heavily sclerotized (Fig. 332) . . . . . .40. *loxozona*

* female genitalia of *P. madagascariensis* are unknown.

39. *Phyllonorycter didymopa* (Vári, 1961)

(Figs 81, 82, 331, 390)

Lithocolletis didymopa—Vári (1961: 223, pl. 105: 6).

Phyllonorycter didymopa—Vári & Kroon (1986: 28, 136, 157), Kroon (1999: 24, 101, 152), Dall'Asta *et al*. (2001: 33), Vári et al. (2002: 26), De Prins & De Prins (2005: 288).

Diagnosis. *Phyllonorycter didymopa* is very similar to *P. loxozona* and *P. madagascariensis*, but the shape of the second fascia helps to separate the first two: in *P. didymopa* the second fascia is gently tapering whereas it is bulbed in *P. loxozona*. Some subtle differences in the margins of the fasciae help separate *P. didymopa* and *P. madagascariensis*, although these characters are very subtle and can be examined on fresh specimens only. *Phyllonorycter didymopa* and *P. madagascariensis* are best separated geographically and by their host plants (see diagnosis of *P. madagascariensis*). The female genitalia of *P. didymopa* do not show specific outstanding characters, except the long tubular antrum. Females of *P. didymopa* possess simple sterigma, without cuticular sclerotizations, signum on corpus bursae absent. However, the combination of female genitalic characters makes this species easily distinguishable from the externally similar *P. loxozona*. For further details see diagnosis of *P. loxozona.*

Material examined. *Holotype*: ♀, '**South Africa**: [1] 'Saltpan [Tswaing] / Pretoria Dist[rict]. / 16.i.1955 / Ac[quisition]. no.: 1500'; [2] '16'; [3] 'G[enitalia]. / 7169'; [4] '*Lithocolletis* / *didymopa* Vári / ♀ HOLOTYPE No 6494', in TMSA.

Paratype: ♀ (including ♀ genitalia preparation). **Namibia**: Abachaus [Abaehaus], S.W.A. [South West Africa], Mar[ch][19]43, [leg.] G. Hobohm; G[enitalia] 7794; *Lithocolletis didymopa* Vári ♀ PARATYPE No 6495, in TMSA.

Additional material: **South Africa**: 1♀: Gauteng 1100 m, Tswaing Crater Reserve, 25°24'S 28°05'E, 16.xi.2004, leg. J. & W. De Prins, specimen ID: RMCA ENT 000003287, gen. prep. De Prins 3700♀ (MRAC/KMMA 00402), in RMCA, DNA voucher CLV15407, in CCDB.

Redescription. *Adult* (Figs 81, 82). Forewing length: 2.9–3.2 mm.

Head: Vertex tufted with white piliform scales intermixed with brown ochreous, more abundant posteriorly; frons shiny white. Labial palpus white with a few fuscous scales apically. Antenna shorter than forewing, weakly ringed by sequence of light fuscous and light ochreous scales, pedicel light golden; antennal scape dirty white anteriorly and ochreous posteriorly.

Thorax: White, tegula ochreous anteriorly and white posteriorly. Forewing elongate, ground colour ochreous brown with white markings consisting of basal streak, two fasciae, one costal strigula and one dorsal strigula; basal streak short 1/10 of forewing, parallel to costa, edged posteriorly, first fascia close to wing base, obliquely directed towards apex, slightly tapering, blunt at costa, fine edged apically with row of black scales, second fascia at 1/2 slightly oblique towards apex, broader at dorsum and slightly tapering towards costa, blunt at costa, edged on both sides with row of black scales, costal strigula at 3/4 triangular, not reaching midline of forewing, edged basally, dorsal strigula opposite costal strigula, larger than costal, triangular, reaching midline of forewing, edged on both sides. Irroration of blackish scales separates costal and dorsal strigulae, and extends from apical to tornal sectors; a elongate white patch at apical sector; fringe as long as width of forewing, light with golden metallic shine. Hindwing light, beige with long light beige, slightly shiny fringe. Fore leg light fuscous, mid-femur dirty white, mid-tibia dirty white with two ochreous patches, mid-tarsus white, with terminal tarsomere ochreous; hind femur white with ochreous median patch, hind tibia white, median and apical spurs white with ochreous patches subapically, hind tarsus dirty white, tarsomeres I–II with ochreous apices.

Male genitalia. Unknown.

Female genitalia (Fig. 331). Papillae anales connected dorsally, rounded, as wide as long, weakly sclerotized, covered with scarce short setae, basal bar very narrow a little wider at basal of posterior apophyses, weakly

sclerotized. Posterior apophyses sclerotized, smoothly tapering towards sharply pointed apices which reaching posterior margin of segment VII. Segment VIII weakly sclerotized, short, weakly connected with segment VII. Anterior apophyses slightly shorter and more slender than posterior ones, equally slender, sharply pointed, starting at posterior 1/3 of segment VII and reaching its anterior edge. Ostium bursae located at middle of segment VII, antrum cylindrical ca. half as long as segment VII, sclerotized, ductus bursae moderate in length, corpus bursae small, membranous, no signum.

Variation. The two female specimens known do not show any variation except a slight difference in ground colour shading of forewing.

DNA sequences. A COI barcode is available (Molecular sample code: Pdid [JX888178]; Table S1).

Habitat. Mines of *P. didymopa* were found together with mines of *P. loxozona* (Vári, unpublished note No 1500 in manuscript notebook from 06/01/1955; 1961: 223).

Host plant(s). Malvaceae: *Dombeya rotundifolia* (Hochst) Planch.—Vári 1961: 223, Kroon 1999: 24, Dall'Asta *et al*. 2001: 33, De Prins & De Prins 2005: 288.

Mine. A long narrow gallery, mainly along the margin of the leaf; which later swells into a gall-like swelling near the petiole of the leaf; mines cannot be separated from those of *P. loxozona* (Vári 1961: 223, De Prins & De Prins 2005: 288). The mining period lasts ca. 10 days (Vári, unpublished note No 1500 in manuscript notebook of 06/01/1955).

Flight period. Specimens were reared from mines collected in mid-January and mid-March.

Distribution. (Fig. 390). This species is recorded only from two localities south of 19°S: Abachaus in Namibia and Saltpan [present name Tswaing] in South Africa (Vári 1961: 223).

40. *Phyllonorycter loxozona* (Meyrick, 1936)

(Figs 83, 84, 237–239, 332, 391)

Lithocolletis loxozona—Meyrick (1936: 33), Vári (1961: 221–223, pl. 23: 8, pl. 49: 5, pl. 106: 5).

Phyllonorycter loxozana [sic]—Bland (1980: 33) n. comb., Lopez-Vaamonde *et al*. (2003: 1818) [misidentification], Lopez-Vaamonde *et al.* (2006: 7) [misidentification].

Phyllonorycter loxozona—Vári & Kroon (1986: 51, 136, 157), Kroon (1999: 46, 101), Dall'Asta *et al*. (2001: 34), Vári *et al*. (2002: 26), De Prins & De Prins (2005: 314), De Prins & Mozūraitis (2006: figs 1, 5).

Diagnosis. The forewing pattern resembles very closely that of *Phyllonorycter didymopa.* But slight differences in external characters enable to separate *P. loxozona* from *P. didymopa*. Male and female genitalia of *P. loxozona* are highly distinctive from all the other Afrotropical *Phyllonorycter* species by the set of characters presented below.

Material examined. *Holotype*: ♀, [1] 'Type'; [2] '**Uganda** / Busunju / 2.x.1935 / [leg.] H. C. Taylor; [3] 'Larvae mines at / base of leaf of / *Dombeya emarginata*'; [4] 'B.M. ♀ / Genitalia slide / No. 6110'; [5] 'Pres. by / Imp.Inst. Ent. / B.M. 1936-552; [6] '*Lithocolletis loxozona* n. sp.', in BMNH.

Paratypes: 2♂ (including 1♂ genitalia preparation). **Uganda:** 1♂, Cotype; Busunju, 2.x.1935, [leg.] T. H. C. Taylor; larvae mines at base of leaf of *Dombeya emarginata*; Pres. by Imp. Inst. Ent., B.M. 1936-552; *Lithocolletis loxozona* n. sp., E. Meyrick det., in BMNH. 1♂, Paratype; Busunju, Uganda, TT. bred 10.35; genitalia prep. B.M. 3924♂, *Lithocolletis loxozona* Meyr., det. E. Meyrick, in Meyrick Coll., B.M. 1938-290, in BMNH.

Additional material: 3♂, 4♀ and 1 specimen (including 3♂ and 4♀ genitalia preparations). **South Africa**: 1♀, Hartbeespoort Dam, Pta.Dist. [Pretoria District], 17.xii.1958, Ac[quisition]. no. 1701, gen. prep. 7796♀, *Dombeya rotundifolia*, in TMSA. 1♀, same locality data, 16.xii.1955, gen. prep. 7682♀, in TMSA. 1♂: same locality data, 20.ii.1955, Ac[quisition]. no. 1528, gen. prep. 7681♂, in TMSA. 1♂, same locality data, 01.ii.1955, gen. prep. 7188♂, in TMSA. 1♂: same data except date 21.ii.1955; gen. prep. 7798♂, in TMSA. 1♀: Rustenburg, Natuurreservaat, 10–17.xi.1976, [leg.] Potgieter & Molekane; gen. prep. De Prins 3697♀, in TMSA.

Redescription. *Adult* (Figs 83, 84). Forewing length: 2.8–3.2 mm.

Head: Vertex tufted with white piliform scales intermixed with brown ochreous, more abundant posteriorly and dorsolaterally; frons shiny whitish. Labial palpus, slightly longer than eye, directed downwards, drooping, with sharp apex, white with a few fuscous scales ventrally, more abundant on ventral side of palpomere III. Maxilary palpus very short, porrect, white; haustellum pale beige. Antenna slightly shorter than forewing, with 46 flagellomeres, not clealy ringed; each flagellomere with sequence of light ochreous and light beige smooth scales,

pale ochreous light to ca. 2/3 length, gradually darkened to fuscous at apical 1/3 dorsally, ventrally flagellomeres dirty white, pedicel pale beige ochreous; antennal scape white anteriorly and ochreous posteriorly, with dark brown tipped scales; 8–10 pecten white of different length, longest ones ca. as long as scape.

Thorax: White, tegulae ochreous anteriorly and white posteriorly. Forewing elongate, ground colour ochreous brown with white markings consisting of basal streak, two fasciae, two costal strigulae and one dorsal strigula; basal streak short, broader at base of dorsum, parallel to costa, not edged, first fascia close to base, oblique, directed towards apex, tapering, blunt at costa, fine edged apically with row of black scales, second fascia at 1/2 straight transverse, swelled at dorsal sector and bluntly tapering at costa, edged on both sides with row of black scales, costal strigula at 3/4 triangular, almost reaching midline of forewing, edged basally, dorsal strigula opposite costal strigula, larger than costal, triangular, reaching midline of forewing, edged basally; apical strigula comma shaped, narrow, rather long, terminating beyond midline of forewing, not edged. Irroration of blackish scales separates first costal and first dorsal strigulae, extending to apical termen and tornal sectors; fringe as long as width of forewing, light ochreous with fuscous metallic shine. Hindwing fuscous with long shiny fringe of same colour as hindwing. Fore coxa whitish, fore femur light brown fuscous dorsally and pale whitish beige ventrally, tibia fuscous with subbasal white patch, tarsomere I fuscous with white basal half, tarsomere II fuscous with dirty white subapical patch, tarsomere III fuscous, terminal tarsomeres light ochreous; mid-femur dirty white irrorated with dark fuscous scales subbasally, mid-tibia dirty white with 3 dark fuscous ochreous patches: small basal, median, and largest apical, tibial spurs white with dark brown subapices; tarsomeres I white with light ochreous median patch, tarsomere II white, tarsomere III white with pale ochreous apical part, terminal tarsomeres dirty white; hind coxa dirty white with some ochreous scales, hind femur white with ochreous median patch, hind tibia white with light ochreous patch stretching from middle to subapex and mixed with fuscous scales, median spurs dirty white with small dark brown subbasal patch and large elongate subapical patch, apical spurs dirty white with patch subbasaly and other patch subapically of equal size or only with one patch subapically, tarsomeres I–II white with faint fuscous patches subapically, tarsomere III white, terminal tarsomeres dirty white.

Abdomen. mainly dark fuscous, terga I–II greyish ochreous, terga III–V silverish grey, terga VI–VIII dark fuscous; underside pale, whitish, sterna I–IV gradually shading to light ochreous, sterna V–VIII light ochreous. SternumVIII in males short, truncate, strongly tapering caudally with blunt, light bidentate apex.

Male genitalia (Figs 237–239). Tegumen rather short, weakly sclerotized; tuba analis long, protruding, membranous, naked, truncate apically. A pair of setae on apex of tegumen at sides of tubal analis appendage. Valvae symmetrical, ca. twice as long as sternum VIII, curved, broader basally, costal and dorsal margins parallel to 1/5, costal margin sinuate from 1/5 to 2/3, narrowest at 2/3; apical 1/3 curved, broadened, gently rounded at apex; very strongly setose at apical 1/3 with fine short hairs, transtilla as broad as diameter of aedoeagus, sclerotized; vinculum broad half moon shaped, strongly sclerotized, saccus short, bluntly pointed; aedoeagus slightly longer than valva, curved, tubular, tapering towards vesica, bluntly pointed, coecum heavily, vesica weakly sclerotized.

Female genitalia (Figs 332). Papillae anales connected laterally, oval with broadly rounded apices, ca 1.3 longer than wide, weakly sclerotized, covered with scarce short setae on apical sector of papillae anales and long fine scarce setae on lateral surface; basal bar raher broad, sclerotized, bases of posterior apophyses laterally elongate wide, triangular, well sclerotized. Posterior apophyses well sclerotized, slightly sinuate, twice wider at basal half, narrow at apical half with sharply pointed apices, ca. 270–290 µm (n = 3) long, nearly reaching posterior margin of segment VII. Anterior apophyses slightly more slender than posterior apophyses, equally slender throughout, slightly curved, sharply pointed, slightly shorter than posterior apophyses, ca. 220–240 µm (n = 3) long, reaching subanterior sector of segment VII. Segment VIII weakly sclerotized, weakly connected with segment VII. Segment VII sclerotized, broad trapezoidal, sternum VII shorter than tergum VII, with strongly sclerotized, bowed edges anteriorly, ca. 320 µm long. Ostium bursae located at posterior edge of segment VII, with narrow but heavily sclerotized posterior edge, ringed, antrum tubular, saccular, 2/3 as long as sternum VII, gently tapering into ductus bursae, sclerotized, densely covered with microspinules arranged in regular rows; ductus bursae long, about as long as corpus bursae (ca. 522–553 µm long), a small sclerotized plate appressed to ductus bursae anteriad of antrum; corpus bursae moderate, simple, slightly elongated, gently rounded caudally, ca. 540 µm long, ca. 350 µm wide; no signum. Bulla spermathecae tiny, kidney-shaped, located between segments VII and VI, ductus spermathecae, short, tightly compacted from 36–39 spirals.

Variation. There is a little variation in the width and margin of the first fascia of the forewing.

Biology. *Hostplants*. Two species of *Dombeya* [Malvaceae] have been recorded as hosts: *D. buettneri* K. Schum. (= *D. emarginata* A. E. Bruce)—Meyrick (1936: 33), Vári (1961: 223), Dall'Asta *et al*. (2001: 34), De Prins & De Prins (2005: 314) ; and *D. rotundifolia* (Hochst.) Planch.—Vári (1961: 223), Kroon (1999: 46), Dall'Asta *et al*. (2001: 34), De Prins & De Prins (2005: 314).

Remarks. The record of *C. loxozona* feeding on *D. bagshawei* Baker f. (online database HOSTS, De Prins & De Prins 2005: 314) needs confirmation, since we could not find any specimen matching the HOSTS database references. *Dombeya torrida* (J. F. Gmel.) Bamps should be excluded from the host list of *C. loxozona*, since the check of voucher material used for the publication (Lopez-Vaamonde 2003: 1818) revealed that this record is a misidentification of the species *C. torridella*.

Mine. A long, narrow, semi-trasparent gallery, mainly along edge of leaf; later on a gall-like swelling near the petiole of the leaf (Vári 1961: 222).

Flight period. The specimens were collected in two periods of the year: from early February to middle of May and from early October to middle of December.

Distribution. (Fig. 391). This species is recorded in South Africa (Vári 1961: 223) and Uganda (Meyrick 1936: 33).

Remarks.The record on *P. loxozana* [sic] collected in Zuni [recte Turi], Kenya (Lopez-Vaamonde 2003: 1818) is excluded from the distribution map since it is a misidentification of *Cameraria torridella* De Prins, sp. n.

41. *Phyllonorycter madagascariensis* (Viette, 1949)

(Figs. 85, 392, 436)

Lithocolletis madagascariensis—Viette (1949: 175–176, fig. 5), Paulian & Viette (1955: 153, 157: fig. 15).
Phyllonorycter madagascariensis—Viette (1990: 30), Dall'Asta *et al*. (2001: 34), De Prins & De Prins (2005: 316).

Diagnosis. Wing pattern closely resembles that of *Phyllonorycter didymopa*. Based on the original description of the wing pattern, *P. madagascariensis* hardly can be distinguished from *P. didymopa*. *Phyllonorycter madagascariensis* is the only *Phyllonorycter* species that feeds on *Dombeya spectabilis*.

Holotype: '**Madagascar**, Tananarive [Antananarivo], Tsimbazaza, [leg] (R. Paulian). Coll. Muséum National d'Histoire Naturelle.'

Since the holotype of *Lithocolletis madagascariensis* Viette, 1949 cannot be found the original illustrations of the name-bearing type specimen were studied.

Remarks. *Phyllonorycter madagascariensis* is described only from the holotype which is missing its abdomen. Unfortunately, all efforts to find the holotype and additional specimens of *P. madagascariensis* were unsuccessful. We have searched the type collection of Viette at the MNHN; written letters to Paolo Triberti, who has worked on the Gracillariinae material in the MNHN, and corresponded with the late P. Viette. Referring to the letter of P. Viette dated 15 September 2002 the only type specimen (the holotype without abdomen) of *P. madagascariensis* cannot be found.

(Re)description (based on the original description).

Adult. (Fig. 85).

Head: Covered with silvery white scales. Labial palpus silvery white with dark apex. Antennae ringed brown and light grey; scape covered with silvery white scales.

Thorax: Covered with silvery white scales; forewing very pale ochreous, golden, marked with two silvery white fascia; basal streak of same colour; first fascia, slightly oblique, situated at proximal 1/3 of wing, narrower at costa than at dorsum; second fascia submedian, almost straight, basally bordered with black scales, especially in its costal half; first coastal and first dorsal strigulae at distal 1/4, right triangular shape, slightly oblique towards apex, both first dorsal and first costal strigulae connected at midline of forewing, bordered basally and apically with black scales; apical sector of wing distally from apical edging of first costal and first dorsal strigulae, forms a semi-circle; apex with white dot, tornal sector covered with sparse black scales; fringe pale ochreous golden, a little darker than ground colour of forewing with black apical fringe line. Underside yellowish grey with scattered black scales. Hindwings dorsally and ventrally equally dark grey.

Abdomen. Unknown.

Male and female genitalia. Unknown.

Habitat. The species has been found in the Botanical garden of Tsimbazaza, housing mainly indigenous Malagasy plant species.

Host plant(s). Malvaceae: *Dombeya spectabilis* Bojer—Paulian & Viette, 1955: 153 (Fig. 436).

Mine. Larvae mine leaves from June—August. Early instars form a long narrow semi-transparrent, curved gallery which terminates as an irregular, more or less rounded blotch on the abaxial side of the leaf without folds, but with slight swelling on the adaxial side of the leaf. Many mines can be observed on one leaf (Paulian &Viette 1955: 157, fig. 15).

Flight period. Probably July-August (Paulian &Viette 155: 153).

Distribution. (Fig. 392). This species is recorded only from Antananarivo, Tsimbazaza in Madagascar (Viette 1949: 176, Paulian & Viette 1955: 153, Viette 1990: 30).

The *melanosparta* group

The *melanosparta* group includes three species: *P. aarviki* De Prins, n. sp., *P. anchistea* (Vári, 1961) and *P. melanosparta* (Meyrick, 1912a). Adults belonging to this group can be easily distinguished from all other Afrotropical *Phyllonorycter* species groups by external characters. This is the only species group among Afrotropical *Phyllonorycter* with only dark fuscous markings on forewings without traces of white. Superficially, dark fuscous markings on forewings of the *melanosparta* species group can be confused with those of *Cameraria hexalobina* (Vári, 1961), however, the pattern and form of markings are different. The dark fuscous markings on forewings can be characterized as follows:

- first marking from base is a costal strigula, slightly shorter than half of width of forewing, oblique towards apex;
- second marking from base is a sharply angulated fascia;
- third marking from base is the second costal strigula, running parallel to the first costal strigula;
- the inverse Y on subapical part of forewing;
- termen and apex irrorated with blackish fuscous scales.

Externally, species within the *melanosparta* group are hardly distinguishable. Minor differences are found in vertex coloration and in markings of tarsa. However, these superficial features can be detected only if the specimens are not worn. Dissections provide the only means for an accurate identification. Larvae of the *melanosparta* species group create abaxial tentiform mines on leaves of Fabaceae and Malvaceae.

The valvae of the *melanosparta* species group are broad, enlarged at the base and very narrow distally, tegumen long, narrow weakly sclerotized, transtilla complete, narrow. Sternum VIII moderately large, significantly tapering caudally to pointed apex.

Female genitalia in the *melanosparta* species group possess modified anterior apophyses. This diagnostic character easily separates them from the rest of the Afrotropical *Phyllonorycter*: inner cuticle appendages of sterigma act as short curved anterior apophyses. Ductus bursae of *melanosparta* species group is long and narrow, corpus bursae, very small—a slight enlargement of caudal region of ductus bursae or bulbed with clearly visible distinction between corpus and ductus bursae. Corpus bursae with one small signum or one round/oval signum plate with one small signum.

The most conspicuous synapomorphies for this species-group in relation to other *Phyllonorycter* groups are: (i) valva narrow distally, which can acuminate sharply into a spine-like apex, (ii) inner cuticular appendages acting as anterior apophyses in female genitalia.

The *melanosparta* species group is restricted to coastal areas of the Indian Ocean, stretching along the south-eastern coast of Africa and reaching the Arabian Peninsula (Oman).

Key to males of *melanosparta* group based on genitalia

1. Valva broad at its base, sinuous along costal margin, strongly tapering beyond middle, apical half very narrow, transition between the broad basal part and narrow apical part smooth 2

– Valva rounded or oval with a long dagger-like sacculus (Fig. 240) . . . . . 42. *aarviki*
2. Transition from broad basal part to narrow apical part of valva gradual, apex of valva bifid, saccus short (Figs 246, 248, 249) . . . . . 44. *melanosparta*
– Transition from broad basal part to narrow apical part of valva with the sharp perpendicular declination, apex consisting of one unit, sharp and pointed, bearing long stiff bristle, saccus long (Figs 243, 245)4 . . . . . 3. *anchistea*

Key to females of *melanosparta* group based on genitalia

1. Posterior apophyses straight or gently curved, anterior apophyses, as sterigmatic appendages, initiate at posterior sector of segment VII, corpus bursae drop-like, just a slight enlargement of caudal part of ductus bursae, one small sclerotized signum on corpus bursae, signa plate absent 2
– Posterior apophyses angulated, anterior apophyses, as sterigmatic appendages, initiate at subanterior sector of segment VII, corpus bursae round or slightly oval sac-shaped, with signa plate with signum (Fig. 335) . . . . . 44. *melanosparta*
2. Anterior apophyses as sterigmatic appendages angulated, initiate at mid-sector of cone-like sterigma, antrum sclerotized, tubular, signum on corpus bursae tiny, pointed (Fig. 334) . . . . . 43. *anchistea*
– Anterior apophyses as sterigmatic appendages gently bended, initiate at anterior margin of heavily sclerotized crescent-shaped sterigma, antrum not sclerotized, signum on corpus bursae small, heavily sclerotized, oval-shaped, with two tiny lateral barbs (Fig. 333) . . . . . 42. *aarviki*

42. *Phyllonorycter aarviki* De Prins, new species

(Figs 86, 240–242, 333, 393, 445)

Diagnosis. The wing pattern of *P. aarviki* superficially resembles *P. anchistea* and *P. melanosparta*. However, *P. aarviki* is generally smaller and has a slightly lighter coloration than the latter two species. Male genitalia are distinguishable by the long, strong, dagger-like distal part of valva, which is narrower than in *P. melanosparta* and *P. anchistea* and resembles the spine-like process on sacculus of *P. jabalshamsi.*

Female genitalia of *P. aarviki* resemble those of *P. anchistea*, but show at least four diagnostic differences:

- Base of appendages of sterigma in *P. anchistea* situated at the posterior margin of sterigmatic plate, whereas in *P. aarviki* appendages originate from anterior margin of sterigmatic plate.
- Appendages angulated in *P. anchistea* and gently curved in *P. aarviki*.
- Antrum sclerotized in *P. anchistea* and not so in *P. aarviki*.
- Segment VII is significantly longer in *P. anchistea* than in *P. aarviki*.

Holotype: ♀, [1] '**Tanzania** / Morogoro Distr[ict]. & / Town, 550–600 m / 25.iii.1992 / leg. L. Aarvik'; [2] 'Gen. Prep. 3497♀ / De Prins'; [3] 'MRAC/KMMA 00370'; specimen ID: [4] 'RMCA ENT 000004128'; [5] 'Holotype ♀ / *Phyllonorycter / aarviki* / De Prins, 2012', in RMCA.

Paratype: ♂, **Yemen**: prov.[ince] Shabwah, Abdalla Garib Plateau, 1335 m, 63 km NW [Al] Mukalla, 2.v.1999, leg. M. Fibiger *et al.*; specimen ID: RMCA ENT 000006149, gen. prep. De Prins 3716♂ (MRAC/KMMA 00658), in RMCA.

Description. *Adult* (Fig. 86). Forewing length: ca. 2.3 mm. Wing span ca. 6.0 mm.

Head: Vertex tufted, brown ochreous with a suffusion of white scales; predominant on occiput, directed posteriad; frons smooth, shiny snowy white, covered with long appressed piliform scales. Labial palpus ca. 1.5 longer than eye, straight, directed downwards, palpomeres white dorsally,with a few of ochrous scales aligned in a longitudinal row on palpomeres I and II; maxillary palpus white; haustellum light beige. Antenna slightly shorter than forewing, pale ochreous grey dorsally, dirty whitish ventrally; flagellomeres, except pedicel, with fuscous subapices; pedicel white basally with dark ochreus brown apex; scape golden ochreous with 8-9 white pecten of similar length about half diameter of eye.

Thorax: Light ochreous; tegulae uniformly ochreous. Forewing ground colour bright ochreous with blackish fuscous markings consisting of basal streak, two transverse fasciae, three costal strigulae, and marked blackish-fuscous area along termen; basal streak very slender, consisting only from one row of scales, angulated, runs parallel to dorsum to 1/5 of forewing; first costal strigula at 1/4, narrow, rod shaped, truncate, oblique toward apex of forewing; first fascia at 1/3, sharply angulated medially, thicked at angle; second costal

strigula short and thick rectangular just beyond middle of forewing, second fascia at apical 1/3 of forewing, reversed Y-shaped, one forked branch sinuate –to apical 1/3 of dorsum, other branch sinuate to tornus; third costal strigula rod shaped, fusing with blackish fuscous apical marking at apex; blackish fuscous apical marking broadly spread along termen; fringe along termen white tipped, shiny golden along dorsal margin. Hindwing pale grey with long pale fuscous fringe of same shading than hindwing. Fore femur dark fuscous dorsally, dirty white ventrally, fore tibia irrorated with dark ochreous scales dispersed irregularly, tarsomere I dirty white with brown ochreous subapex, tarsomere II dirty white with ochreous apex, terminal tarsomeres shiny ochreous. Mid-femur light ochreous, mid-tibia white with three brownish fuscous markings: basal circular band and two oblique tapering longitudinal stripes, one running from 1/2 of tibia to subapex, other smaller from subapex to apex, tibial spurs dirty white; tarsomere I white with narrow ochreous subbasal and apical patches, tarsomere II white ochreous apex; tarsomere III–IV dirty white; tarsomere V ochreous. Hind femur beige with some ochreous scales medially, hind tibia pale beige, medial spurs white with 1–2 dark brown scales medially, apical spurs white with narrow brown line submedially, tarsomere I white with a 2 small ochreous scales medially, tarsomere II–III dirty white with dark brown apices, tarsomere IV white with golden shine, tarsomere V ochreous with darker apex.

Abdomen: Greyish fuscous dorsally except for ochreous shade on genitalia; whitish with ochreous shade ventrally. Sternum VIII of male triangular, ca. 295 µm long, tapering to narrowly rounded caudal apex.

Male genitalia (Figs 240–242). Tegumen long, conical, ca. 460 µm long, angled medially, tegumenal arms relatively broad, well sclerotized, narrower, but longer than saccus, ventral surface of tegumen along longitudinal axis densely setose with slender short, horizontally arranged in tree-shape, setulae (visible at 250× enlargement), apex gently truncate, covered with multiple micro spinulae. Valvae symmetrical, valva elliptical, ca. 245 µm long and ca. 140 µm wide, gently rounded at cucullus, sacculus with a long (significantly longer than width of valva), dagger-like spine, ca. 210 µm long; slender, sharp, needle-like spinule from subcaudal part of dagger-like appendage, directed towards cucculus and forming ca. 30° angle with major spine, spinule almost half length compared with major dagger-like appendage. Double tipped spinule present on apical ventral margin of cucculus; ventral apical area of cucculus with 6 tiny spinules and several tubercules bearing stiff setae, setose tubercules are randomly distributed along apical half of ventral surface and subcostal margin of valva. Vinculum rather long, ca. half of valval length, V-shaped, producing relatively broad saccus of median length, saccus becomes narrow medially, and lightly widens caudally. Transtilla complete, slender, trapezoid, with two sharply pointed lateral barbs on cephalic margin. Aedoeagus rather long, more than twice as long as valva, slightly longer than ca. 500 µm, with broaden coecum (caudal part of coecum abrupt), gently tapering towards narrow truncate apex, vesica with two slender cornuti, ca. 105 µm long, somewhat parallel, but joint at apex with small sclerotized plate (observed at 400× enlargement).

Female genitalia (Fig. 333). Papillae anales slightly ventrodorsally compressed, rather long, ventrally longer than dorsally, oval shaped, with slender long setation of equal length distributed over entire surface of papillae anales; basal bar absent, bases of posterior apophyses diamond-shaped. Posterior apophyses very long, almost straight, slender, with slight enlargent at posterior 1/3, reaching middle of segment VII, apically pointed. Segment VIII long and narrow, weakly sclerotized; anterior apophyses absent. Segment VII rather short and weakly sclerotized. Ostium bursae located at subposterior sector of segment VII, sterigma large volcano-shaped projection of cuticle with appendages initiating at lamella antevaginalis; appendages short and narrow, about 1/4 as long as posterior apophyses, gently curved with pointed apices. Antrum not sclerotized. Ductus bursae moderate, slightly longer than segment VII, very narrow, sinuous. Corpus bursae very small, elongated, with a tiny oval signum with two terminal barbs on lateral edges.

Note: It it possible that both specimens of different sexes representing this species belong to two cryptic species. We provisionally consider them a single species based on external morphology until future studies provide more precise information.

Etymology. The species is named after Leif Aarvik, collector of the holotype, to honour his contribution to the studies of Afrotropical micromoths. He is a lepidopterist at the Natural History Museum of the University of Oslo.

Habitat. Dry semi urbanized areas along the Indian Coast and in Eastern Africa (Fig. 445).

Host plant(s). Unknown.

Flight period. Adults fly in late March (Eastern Africa) and in early May (Coast of Arabian Peninsula).

Distribution. (Fig. 393). Recorded from two localities: one in Tanzania and the second in Yemen. There are no records between these two distant localities, but we postulate that this species can be found in the area between.

Life-History: *P. aarviki* is larviparous (Fig. 333).

43. *Phyllonorycter anchistea* (Vári, 1961)

(Figs 87, 88, 128, 243–245, 334, 394)

Lithocolletis anchistea—Vári (1961: 210–211; pl. 22, fig. 5; pl. 65, fig. 2; pl. 104, fig. 2).

Phyllonorycter anchistea—Vári & Kroon (1986: 9, 136, 157), Swain & Prinsloo (1986: 14), Kroon (1999: 5, 104), Dall'Asta *et al*. (2001: 33), Vári *et al*. (2002: 26), De Prins & De Prins (2005: 269).

Diagnosis. *Phyllonorycter anchistea* can be easily confused with *P. melanosparta* and *P. aarviki* which have a similar forewing pattern. In general, *P. aarviki* is smaller and lighter. Hind tarsomere I dotted in *P. anchistea*, but not so in *P. melanosparta* and *P. aarviki*. The male genitalia of *P. anchistea* is most similar to *P. melanosparta*, and thus these two species may be closely related. In males of *P. anchistea* the apex of valva consists of one unit and is straight, sharp, and pointed. Furthermore, the apex of the valva in *P. anchistea* has a bristle, whereas in *P. melasnosparta* the apex of valva is bifurcate and lacks a bristle; the saccus in *P. anchistea* is rather long (ca. 1/3 of valval length), whereas it is short and broad in *P. melanosparta.* The female genitalia of *P. anchistea* are more similar to *P. aarviki* than to *P. melanosparta.* Female genitalia of *P. anchistea* and *P. melanosparta* can be easily separated by the form of corpus bursae: in *P. anchistea* it is elongate teardrop-shaped with a tiny signum, whereas it is round or slightly oval, with a signum plate with signum in *P. melanosparta*. A signum plate is absent on the corpus bursae of *P. anchistea*. The main diagnostic difference between the female genitalia of *P. anchistea* and *P. aarviki* are*:*

- the base of cuticle appendages initiate at the mid-sector of sterigma in *P. anchistea*, whereas the base of appendages in *P. aarviki* originate at the anterior margin of sterigma.
- antrum of *P. anchistea* is well sclerotized and tubular. It is not diffentiated from the remainder of ductus bursae in *P. aarviki*.

Material examined. *Holotype*: ♂, [1] [**South Africa**]: 'Louis Trichardt / 11.v.1953 / [leg.] L. Vári / Ac.[quisition] no: 708'; [2] '11'; [3] 'HT'.[4] 'G[enitalia] / 7138♂'; [5] '*Lithocolletis* / *anchistea* Vári / ♂ HOLOTYPE No 6348', in TMSA.

Paratypes: 1♂ and 2♀ (including 1♂, 2♀ genitalia preparations) and 12 specimens. **South Africa**: 1♀, Louis Trichardt, 10.v.1953, [leg.] L. Vári Ac[quisition]. no. 708'; G.[enitalia] / 7139♀; *Lithocolletis anchistea* Vári ♀ ALLOTYPE No 6349', in TMSA. 1♂, Pretoria, 15.ii.1955, [leg.] L. Vári, Ac.[quisition] no. 1521; G.[enitalia] 7170♂'; *Lithocolletis anchistea* Vári PARATYPE No 6356, in TMSA. 1♀, Pretoria, 31.xii.1951, [leg.] L. Vári, Ac.[quisition] no. 431; G.[enitalia] 7133♀; *Lithocolletis anchistea* Vári PARATYPE No 6354, in TMSA. 4 specimens, Louis Trichardt, 08.v.1953, 08.iv.1955, 09.iv.1955, 14.iv.1955, [leg.] L. Vári, Ac.[quisition] no. 752, 1588'; *Lithocolletis anchistea* Vári PARATYPE No 6350–6353, in TMSA. 8 specimens, Pretoria, 31.xii.1951, 14.ii.1955, 16.v.1955, 16.xii.1955, 18.xii.1955, 07.i.1957, [leg.] L. Vári, Ac.[quisition] no. 431, 1521, 1655, 1696, 1990; *Lithocolletis anchistea* Vári PARATYPE No 6355, 6357–6363', in TMSA.

Additional material: 2♂ and 2♀, (including 2♂ and 2♀ genitalia preparations) and 25 specimens. **Botswana:** 1♀, 2 specimens, Selinda, Mount, 13.iv.1956, 14.iv.1956, 18.iv.1956, L. Vári, Ac[quisition]. no. 1786, gen. prep. 7525♀, in TMSA. **South Africa**: 1♂, 1♀, Pretoria, 02.i.1979, 18.i.1979, L. Vári, Ac[quisition]. no. 3734, gen. prep. 10702♂, 10703♀, in TMSA. 17 specimens, Pretoria, 15.xii.1964, 22.i.1965, 24.i.1965, 26.i.1965, 27.i.1965, 21.ii.1973, 28.xii.1978, 29.xii.1978, 30.xii.1979, L. Vári, Ac[quisition]. no. 2789, 3135, 3190, 3734, in TMSA. 1 specimen, Pretoria N[orth]., 28.iii.1980, L. Vári, Ac[quisition]. no. 3789, in TMSA. 4 specimens, Buffelspoortdam, Marikana, 29.vi.1971, 13.vii.1971, 20.vii.1971, Ac[quisition]. no. 3149, in TMSA, 1♂ same locality data, De Prins 3696♂ (MRAC/KMMA 00382), specimen ID: RMCA ENT 000004151, in RMCA.

Remarks. 1♂, Pretoria, 10.ii.1955, L. Vári, Ac[quisition]. no. 1521, in ZMHB. 1♀, Pretoria, 20.xii.1955, L. Vári, Ac[quisition]. no. 1696, in ZMHB. These two specimens are not mentioned in the original description (Vári 1961: 210–211) but they bear exactly the same data as paratypes no 6356 and 6361 in the TMSA and they are labeled as paratypes in the ZMHB.

Redescription. *Adult* (Figs 87, 88, 128). Forewing length: 2.5–3.3 mm.

Head: Vertex tufted with brown ochreous piliform scales intermixed with a suffusion of white tufted scales; white shorter scales predominant on occiput and directed posteriad, dark brown very short piliform scales collected in a bunch on laterovertex above eyes and directed anteriad; frons smooth, shiny white, covered with long appressed piliform scales, a few ochreous scales border frons with vertex. Labial palpus ca. 1.5 longer than eye, straight, directed downwards, palpomeres white dorsally, blackish fuscous ventrally; maxillary palpus white; haustellum light beige. Antenna slightly shorter than forewing, dorsally pale ochreous fuscous, flagellomeres, except pedicel, with apical fuscous halves appearing slightly ringed, ventrally first two flagellomeres whitish, remainder pale fuscous; pedicel dark fuscous; scape golden ochreous with 8–11 whitish pecten of different length.
Thorax: Ochreous with dorsal white stripe usually indistinct; tegulae uniformly ochreous. Forewing ground colour ochreous blackish fuscous, markings consisting of two transverse fasciae, three costal strigulae, one dorsal strigula and marked blackish-fuscous area along termen; first costal strigula at 1/4, narrow, rod shaped, truncate, oblique toward apex of forewing, whitish edged apically; first fascia at 1/3, sharply angulated at middle, often interrupted, costal part of first fascia twice thicker than dorsal, costal part weakly-edged apically, second costal strigula short and thick triangular shaped, just beyond middle of forewing, whitish edged apically, second fascia at apical 1/3 of forewing, reversed Y shaped, forked branches of second fascia sinuate—one branch to apical 1/3 of dorsum, other branch sinuate to tornus, third costal strigula a rod-like stripe at apex fusing with an irregular blackish fuscous apical patch, expended on apical area and along termen, apical dot is not well perceptible in all specimens; dark fuscous patch can be slightly darker in apical area like in paratypes 6349, 6355, 6357; first dorsal strigula at basal 1/6 of forewing, very narrow stripe running from dorsum strightforward up to midline of forewing, consisting only from one row of black scales; fringe line with blackish-tipped scales, more distinct from middle of termen to dorsum; fringe along dorsal margin pale fuscous. Hindwing pale grey with long pale fuscous fringe of slightly darker shading than hindwing. Fore femur dark fuscous dorsally, dirty white ventrally, fore tibia dark fuscous, tarsomeres dark fuscous, except tarsomere I, which is dirty white with fuscous apical patch. Mid-femur dirty white with brownish numerous fuscous dots irregularly distributed dorsally, midtibia white with three brownish fuscous markings: basal circular band and two oblique tapering longitudinal stripes, one running from 1/2 of tibia to subapex, other smaller from subapex to apex, tibial spurs dirty white with tiny brownish fuscous scales subbasally, tarsomere I white with fuscous subbasal and apical patches, tarsomere II white with tiny basal fuscous patch, tarsomere III–IV brownish fuscous, tarsomere V dark fuscous. Hind femur dark beige mottled with numerous dark brown spots, hind tibia pale ochreous with irregularly mottled dark brown dots, medial spurs pale ochreous with a few dark brown scales, apical spurs dirty white with narrow subapical brown ring, tarsomere I white with golden shine, a few brownish ochreous small round scales alighned longitudinally, narrow dark ochreous band subapically, tarsomere II whitish at basal half and fuscous subapically, tarsomere III–IV white basal halves and fuscous subapices, tarsomere V dark fuscous.

Abdomen: Greyish fuscous dorsally except for ochreous shade on genitalia; ventrally uniformly whitish except genitalia. Sternum VIII of male moderately large, significantly tapering caudally to pointed apex.

Male genitalia (Figs 243–245). Tegumen moderate, sclerotized, ventally slightly folded, covered with numerous slender microsetulae, more abundant in apical area and laterally, tegumen arms broad, strongly sclerotized, of equal width, running parallel to basal 1/3 of tegumen, tuba analis not protruded. Valvae symmetrical, valva moderate, weakly setose, broad to 1/3, then just beyond 1/3 sharply becoming very narrow and strongly tapering, becoming very long and narrow with a pointed apex, a fine long bristle 1 present just before tip of apex, bristle 2 with forked distal part shorter than bristle 1 and situated at apical 1/3 of valva, just before valval apical part becomes straight and narrow, single bristle 3, shorter than bristle 2, situated just slightly beyond bristle 2, moved towards base of valva; basal edge of valva has two projections: one—short, broad triangular at ventral basal edge of sacculus and other projection long, ca. 1/4 of basal valval length, straight, narrow, terminating with sharply pointed apex. Broad basal part of valva covered with short but stiff setae. Broad ventral margin of valva well sclerotized. Transtilla developed; it connects apices of dorsal basal valval projections with a short sclerotized movable junction. Vinculum strongly sclerotized, very narrow; saccus slightly longer than narrow part of valva, very broad basally and gently tapering to about 1/3 of its length, then becoming straight and slender to apex, apex of saccus slightly dilating, and gently rounded. Aedoeagus long, about twice as long as genital capsule, tubular, straight, dorsal margin of basal half stronger sclerotized, vesica with minute hook before truncated apex.

Female genitalia (Fig. 334). Papillae anales slightly ventrodorsally compressed, rather long, triangular shaped, with slender setation, basal bar not developed. Posterior apophyses very long, almost straight, slender, reach middle of segment VII, slightly broadening at basal 1/4, apically pointed. Segment VIII long and narrow weakly sclerotized. Ostium bursae located at subposterior sector of segment VII, sterigma cone-like projection of cuticle, appendages of sterigma short and narrow, about 1/4 as long as posterior apophyses, angulated at 1/2, pointed at apices. Antrum moderate, tubular, sclerotized. Ductus bursae moderate, almost twice as long as segment VII, very narrow, slender, sinuous Corpus bursae moderate, slightly elongate teardrop-shaped, with a tiny pointed signum.

Variation. The specimen from Tanzania is smaller and brighter than those from Botswana and South Africa. In many specimens, the basal streak is very narrow and usually consists of a row of dark fuscous scales, which are hardly visible. Furthermore, the streak can appear as a vertical row of scales that begin at middle of the forewing and runs up to the dorsal margin. The apical area of forewing can show a slight variation in fuscous coloration.

Habitat. Savannah or semi-urban areas with low growing trees and bush vegetation.

Host plant(s). Malvaceae: *Grewia occidentalis* L.—Vári 1961: 210, Swan & Prinsloo 1986: 14, Kroon 1999: 5, Dall'Asta *et al*. 2001: 33, De Prins & De Prins 2005: 269, manuscript notes of Vári: note No 0431 of 26/12/1951, note No 0708 of 04/05/1953, note No 0752 of 06/05/1953, note No 1521 of 05/02/1955, note No 1655 of 14/04/1955, note No 1786 of 08/04/1956, note 1990 of 01/01/1957, note No 2789 of 19/01/1973, note No 3149 of 29/06/1971, note No 3190 of 12/02/1973.

Mine. A moderate, oblong, semi-transparent, tentiform mine on the underside of the leaf with four or five folds; upper epidermis finelly mottled or with irregular patches; black frass loosely scattered throughout mine, but mainly in a cluster at one end of it; pupation in very slender white cocoon; exuvium protrudes through lower epidermis before adult emerges (Vári 1961: 210, De Prins & De Prins 2005: 269). The mining period is ca. 5–10 days (notes of Vári).

Flight period. Adults are on the wing almost all year round except from August–November.

Distribution. (Fig. 394). This species is recorded from Botswana (**new record**) and South Africa (Vári 1961: 210–211).

44. *Phyllonorycter melanosparta* (Meyrick, 1912)

(Figs 17, 89, 90, 129, 246–251, 395, 424–426, 441)

Lithocolletis melanosparta—Meyrick, E. (1912a: 21), Vári (1961: 208–210; pl. 22, fig. 4; pl. 65, fig. 1; pl. 104, fig. 1).
Phyllonorycter melanosparta—Vári & Kroon (1986: 54, 136, 157), Kroon (1999: 50, 104, 114, 120), Dall'Asta *et al*. (2001: 34), Vári *et al*. (2002: 26), De Prins & De Prins (2005: 319–320), De Prins *et al*. (2009: 53–67).

Diagnosis. The wing pattern of *P. melanosparta*, *P. anchistea* and *P. aarviki* are largely indistinguishable. Vertex of *P. melanosparta* has slightly more abundant white suffusion than *P. anchistea*. The male genitalia of *P. melanosparta* is very similar to *P. anchistea*, suggesting that the two may be closely related. The main diagnostic differences between the male genitalia of these two species are in the shape of curved valva, which is broad at its base and very narrow distally with a bifid sharp pointed apex in *P. melanosparta*, whereas in *P. anchistea* the apical half of valva is very narrow, sharply pointed, without forking, but bear a stiff bristle (absent in *P. melanosparta*). Saccus in *P. melanosparta* U-shaped, short, whereas it is long in *P. anchistea*. The female genitalia of *P. melanosparta* and *P. anchistea* differ by four main differences:

Posterior apophyses angulated in *P. melanosparta*; posterior apophyses straight in *P. anchistea*

- Ostium bursae opens at subanterior part of segment VIII in *P. melanosparta*; ostium bursae opens in subposterior part of segment VIII in *P. anchistea*.
- Corpus bursae with signum plate bearing small signum in
- *P. melanosparta*; corpus bursae with tiny pointed signum withpout signum plate in *P. anchistea*.
- *P. melanosparta* feeds on Fabaceae; *P. anchistea* feeds on Malvaceae.

Material examined. *Holotype*: ♀, [1] [**South Africa**] 'Barberton / 31.xii.1910 / [leg.] A. J. T. Janse'; [2] '47/41'; [3] '*L. melanosparta* / 4741'; [4] 'G[enitalia] / 7142'; [5] '*Lithocolletis* / *melanosparta* M. / Type No 360', in TMSA.

Additional material: 21♂ and 13♀ (including 10♂ and 5♀ genitalia preparations), and 59 specimens. **Kenya:** 1♀, Kakamega Forest, Primary Forest, 1600 m, 00°20'N 34°52'E, 19.iv.2001, leg. J. De Prins, gen. prep. De Prins 3410♀ (MRAC/KMMA 00373), specimen ID: RMCA ENT 000004144. 8♂, 7♀, Kakamega Forest, 1590 m, 00°21'N 034°51'E, mine 28.iii.2003, leg. J. & W. De Prins, e.l. *Hylodesmum repandum* (Vahl) H. Ohashi & R.R. Mill [Fabiaceae] from 29.iii.2003 to 21.iv.2003, Wing venation prep. De Prins 3688♂, gen. prep. De Prins 3613♂ (MRAC/KMMA 00371) 3688♂ (MRAC/KMMA 00372), 3689♀ (MRAC/KMMA 00374), specimen IDs: RMCA ENT 000004129–000004143, in RMCA. 1♀, same locality data, specimen ID: RMCA ENT 000003273, in CCDB. 7♂, same locality data, pheromone trap attracted from 27.iii.2003 to 03.iv.2003, gen. prep. De Prins 3642♂ (MRAC/KMMA 00375), 3639♂ (MRAC/KMMA 00376), 3691♂ (MRAC/KMMA 00377), 3690♂ (MRAC/KMMA 00378), 3701♂ (MRAC/KMMA 00403), wing venation prep. De Prins 3688♂ (MRAC/KMMA 00497), specimen IDs: RMCA ENT 000003272, 000003273, 000004146–000004150, 000003288, in RMCA, DNA vouchers CLV11107, CLV14707, CLV13907, CLV15507, in CCDB. 2♂, same locality data, specimen IDs: RMCA ENT 000003179, 000003180, DNA vouchers CLV11207, CLV11307, in CCDB. **South Africa:** 1♂, Debengeni, Tvl.[Transvaal], vii.1954, [leg.] L. Vári, Ac[quisition]. no 1313, gen. prep. 7675♂, in TMSA. 1♂, Glenmore, Port Edward, 12.iv.1971, specimen ID: RMCA ENT 000004145, in RMCA. 36 specimens, same locality data, Ac[quisition]. no 3135, leg. L. Vári, 12.v.1971, 17.v.1971, 18.v.1971, 19.v.1974, 21.v.1971, 23.v.1971, 24.v.1971, 26.v.1971, 27.v.1971, 29.v.1971, 30.v.1971, 02.vi.1971, 03.vi.1971, 04.vi.1971, 07.vi.1971, in TMSA. 1 specimen, Kruger National Park Survey, Punda Milia, 24.v.1975, nihil, Ac[quisition]. no. 3416, in TMSA. 1♂, Pretoria, 26.iv.1952, [leg.] L. Vári, "*Lithocolletis melanosparta* Meyrick, Metallotype 6347", gen. prep. Vári 6925♂, Ac[quisition]. no. 514, in TMSA. 1♂, 2♀, 19 specimens, same locality, 10.i.1949, 11.i.1949, 12.i. 1949, 13.i.1949, 25.iv.1952, 26.iv.1952, 27.iv.1952, 28.iv.1952, 29.iv.1952, 30.iv.1952, 02.v.1952, 29.i.1965, 05.iv.1980, 01.i.1981, [leg.] L. Vári, Ac[quisition]. no 91, 514, 2789, 3847, 3789, wing venation prep. Vári 2505♂, gen. prep. Vári 6926♀, 7136♀, in TMSA. 1 specimen, Rustenburg, Natuurreservaat, 09.iv.1976, nihil, Ac.[quisition] no. 3593, in TMSA. 1♂, 1♀, Pretoria, 26.iv.1952 and 27.iv.1952, [leg.] L. Vári, Ac.[quisition] no. 514; "*Lithocolletis melanosparta* Meyr., Metaparatype", in ZMHB. 2 specimen, Umdoni Park, 28.iv.1975, 05.v.1975, [leg.] L. Vári, Ac[quisition]. no. 3383, in TMSA. **Zimbabwe:** 1♀, Umtali, 28.iv.1956, L. Vári, gen. prep. 7676♀, in TMSA.

Redescription. *Adult* (Figs 89, 90, 129). Forewing length: 2.5–2.8 mm.

Head: Vertex tufted with whitish cream piliform scales, mainly whitish on occiput posteriorly and with a suffusion of fulvous appressed scales on vertex anteriorly, with a row of ochreous short scales along margin of eye, with brownish ochreous anterior-lateral tufts medially over anterior part of vertex, and with short, light ochreous scales running along anterior part of vertex; frons smooth, white, with golden shine, covered with long appressed piliform scales. Labial palpus ca. 1.5× longer than eye, straight, directed latero-ventrally, white dorsally, on lateral outer side a row of small dark brown scales runs along palpomeres, ultimate palpomere with sharp apex; maxillary palpus porrect, pale beige; haustellum light yellow. Antenna slightly shorter than forewing, ventrally pale beige with narrow fuscous longitudinal stripes on each flagellomere, dorsally flagellomeres, except pedicel, dark brown with light beige bases, last two flagellomere entirely dark grey; pedicel brightly white dorsally, and brown with white basal 1/3 ventrally; scape shiny white at anterior half and light ochreous at posterior half with white pecten up to 9–12 narrow scales of same length as scape or shorter.

Thorax: Ochreous with whitish longitudinal stripe medially, and very narrow whitish stripes laterally; tegula reddish ochreous with darker reddish lustre at bases, and with whitish shading at apices. Forewing ground colour ferruginous-ochreous with blackish fuscous markings consisting of three costal strigulae, two angulated fasciae, and marked blackish-fuscous area along termen; basal streak absent, but 3–5 dark fuscous scales are present slightly below midline of forewing in middle between base of forewing and first costal strigula; first costal strigula just before 1/3, rod shaped, truncate, oblique toward tornus of forewing, reaching almost midline of forewing; first fascia almost at 1/2, sharply angulated above middle, costal part of first fascia ca. twice broader than dorsal part of first fascia, second costal strigula beyond 1/2 of forewing, shorter, thicker than first costal strigula, second fascia at apical 1/3 of forewing, more straight than first fascia, reversed Y-shaped, thick at angle, with obsolete dorsal part, short and narrow line of dark fuscous scales connects angle of second fascia with termen area, third costal strigula close to apex of forewing, but separated from apex by ochreous area, short, comma shaped, directed straight towards termen, termen area to tornus covered with dark fuscous scales, forming a broad terminal irregular band; fringe line faint fuscous with blackish-tipped scales running from apex to tornus; fringe along dorsal margin light fuscous ochreous with golden lustre. Hindwings pale grey with silver shine, with long pale fuscous fringe of lighter

shading than hindwing. Fore femur blackish fuscous dorsally and lighter ventrally, fore tibia blackish fuscous with a small subbasal and median white patch on outer side (both patches in some specimens absent or only a small subapical white patch on outer side present), tarsomere I dark fuscous with white basal half and white apex, tarsomere II with white basal half and fuscous apical half, tarsomere III completely fuscous, tarsomeres IV–V ochreous white. Mid-femur dirty white with dark fuscous patches at base and subapex, mid-tibia with blackish fuscous base and two very oblique blackish fuscous stripes streching from 1/3 to 1/2 of mid-tibia and third stripe streching from 2/3 of mid-tibia to apex, tibial spurs white with tiny brownish fuscous scales subapically, tarsomere I white with a subbasal and a subapical fuscous patches, tarsomere II white with blackish fuscous apex, tarsomere III basal 2/3 blackish fuscous and apical 1/3 white, tarsomeres IV–V dirty white or dark grey. Hind coxa dark fuscous, hind femur pale beige with median dark fuscous patch, hind tibia irrorated with dark fuscous scales, becoming dense at subapex and apically, tibial spurs white with dark fuscous apical halves, tarsomeres I–III white with dark fuscous subapical patch, tarsomere IV white, tarsomere V pale grey.

Abdomen: Dorsally greyish brown, ventrally whitish beige. Tergite VII dark grey, tergite VIII, elongate and narrow, pale grey, sternum VIII of male large, gently tapering posteriorly with pointed apex.

Male genitalia (Figs 246–251). Tegumen moderate, ca. 530 µm, slightly longer than sternum VIII, elongate cone shaped, sclerotized; apex of tegumen covered with tiny short and numerous microtrichiae, median sector of tegumen is less sclerotized, covered with tiny short setae laying along longitudinal axis of tegumen, subscaphium arms heavily sclerotized, short, parallel not joining with each other, but entering apical part of conus shaped tegumen. Valva symmetrical, moderate, weakly setose, broad to 2/3, ca. 300 µm, then strongly tapering very narrow, long bifid pointed apex, ca. 170 µm long; projecting ventro-laterally, dorsal margin and especially postmedial region of dorsal margin with long, stiff, well-spaced setae, subapical region of valva just before bifurcation with 6 round tubercules with long, hair-like setae directed antero-medially and 7 dentate, sharp, thickly sclerotized barbs situated in following order: well spaced 2+1 on postmedial subventral margin of valva and 4 in a longitudinal row along subdorsal subapical margin of valva; bifid apex slightly curved, shorter arm with fine bristle at apex. Vinculum strongly sclerotized, narrow, with short, broad bell-shaped saccus ca. 100 µm long. Transtilla well developed, complete, trapezoidal, with broad, strongly sclerotized lateral arms. Aedoeagus slightly longer than valva, ca. 530 µm in length, slender, cylindrical, straight to slightly beyond middle, apical part slightly sinuate, vesica truncate, with two very long sinuate cornuti extending along subapex of aedoeagus, and one shorter, curved cornutus on vesica.

Female genitalia (Fig. 335). Papillae anales small ventro-dorsally compressed, short with setation of variable length mainly apically, basal bar absent. Posterior apophyses very long, with broad triangular bases, slightly angulated, slender, reaching middle of segment VII, apically pointed. Segment VIII long and narrow, very weakly sclerotized, connected dorsally only with narrow band; anterior apophyses absent. Ostium bursae oval, located at anterior 1/3 of segment VII, with ventral margin shortly projecting anteriorly; sterigma consisting of two large piramid-like lamella antevaginalis, jointed laterally, ostium bursae opens at subanterior part of segment VIII, cuticular appendages of sterigma run at median part of segment VII, cuticular appendages with broad funnel-like bases, initiating just above ostium bursae and terminating with sharp apices. Antrum, tubular, long, with one curve with light sclerotization. Ductus bursae long, almost twice as long as segment VII, narrow, well-sclerotized at proximal 1/5, posterior sector to 4/5 weakly sclerotized, moderate slender, distal 1/5 gently broadened. Corpus bursae round, small, membranous, bearing round, sclerotized signum area with a short, rod-like signum in center; bulla seminalis weakly-membranous; ductus seminalis arising from anterior end of antrum. Spermatheca large, oval, located in segment VI, ductus spermathecae form 25–26 coils of equal diameter.

Remarks. Vári, in the description of female genitalia of *P. melanosparta*, wrote that corpus bursae with no signum (1961: 209). However, in the illustration of female genitalia of *P. melanosparta* (1961: plate 104:1), Vári illustrates a signum. Corpus bursae in the preparation slide 7142 of the holotype is not well perceptible, but the examination of additional material clearly reveals the presence of a signum.

Variation. A slight variation in colour was observed in patches of fore tibia and apical tarsomeres of mid-legs. Corpus bursae in female genitalia varies from round to spade-like form.

DNA sequences. Two COI barcodes are available for *P. melanosparta* (GU073235 and GU073239; Table S1). These sequences were previously published in De Prins *et al.* (2009).

Habitat. Secondary woodland where forest flora intermixes with savannah plants (Fig. 441).

Host plant(s). Four species of Fabaceae:

Flemingia grahamiana Wight & Arn., *Rhynchosia caribaea* (Jacq.) DC, *Vigna* sp.—Vári 1961: 210, Kroon 1999: 50, Dall'Asta *et al*. 2001: 34, De Prins & De Prins 2005: 320, manuscript notes of Vári: note No 0091 of 06/01/1949, note No 0514 of 14/04/1952, note No 1313 of 14/06/1954, note No 1904 of 20/04/1956, note No 3135 of 10/05/1971, note 3383 of 19/04/1975, note No 3416 of 12/05/1975, note No 3593 of 06/04/1976, note No 3847 of 29/12/1980.

Hylodesmum repandum (Vahl) H. Ohashi & R.R. Mill—**new record** (Figs 424–426).

Mine. 15–20 mm long, oblong, semi-transparent, tentiform mine on the underside of the leaf, usually near petiole of the leaf, with five or six folds; central fold along the longitudial axis of mine very long, running almost along all length of mine, length of other folds varies from 1/3 of mine to very short ones. Upper epidermis strongly mottled with irregular patches; black frass loosely scattered throughout mine, but part is collected in a cluster at one end of the mine; pupation in very slender, white cocoon; exuvium protrudes through lower epidermis before adult emerges. Very rarely protruding through upper epidermis (Vári 1961: 210, De Prins & De Prins 2005: 320). Mining period is ca. 5–15 days (the notes of Vári here above).

Flight period. Adults fly in two periods of the year: from late December to late January and from late March to July.

Distribution (Fig. 395). *Phyllonorycter melanosparta* has a disjunct distribution along southeastern Africa. It is recorded in western Kenya (De Prins *et al*. 2009), several localities in the north-eastern South Africa (Meyrick 1912a: 21; Vári 1961: 210), and one locality in eastern Zimbabwe (Vári 1961: 210).

The *melhaniae* species group

The *melhaniae* group consists of two species: *P. melhaniae* (Vári, 1961) and *P. rongensis* De Prins, n. sp. Adults belonging to this group can be distinguished from other groups by their genitalia. There are slight differences in wing pattern between both species of the *melhaniae* group in shape of fasciae and intensity of edging of white markings. However, wing markings should not be used as the primary diagnostic feature as differences are generally minor. Therefore, only dissections of genitalia provide the means for accurate identification of adult moths. Larvae of the *melhaniae* species group feed on plants in the family Malvaceae.

The male genitalia of the *melhaniae* species group resemble those of the *rhynchosiae* species group, ventral surface of valva with no valval process. Cucullus slightly enlarged, setose. The female genitalia are characterized by large cone-like sterigma, which is connected to segment VII anteriorly and loose posteriorly, forming a broad and short extension of segment VII. Ostium bursae opens on truncate apex of sterigmatic extension, at a distance from the main sternum of segment VII. Ductus bursae broad and short approximately as long as segment VII, corpus bursae elongate, of medium size, with a small elongate signum at junction of ductus and corpus bursae, caudal part of corpus bursae at about anterior margin of segment VI.

Key to the species of *melhaniae* group based on external characters

1. Frons white with irroration of dark, ochreous-tipped scales; first fascia equally narrow on costal and dorsal margin of forewing, edged basally and apically; second fascia more or less rectangular shaped, of more or less equal width on costal and basal margins of forewing, equally edged basally and apically (Fig. 91–93) . . . . . .45. *melhaniae*
– Frons entirely white; first fascia ca. 3× broader on dorsal margin than on costal margin of forewing, edged apically with only a few scales present basally at subcostal sector; second fascia more or less triangular shaped very broad at dorsal and very narrow costal costal margin of forewing, edged basally (Fig. 94) . . . . . 46. *rongensis*

Key to females of *melhaniae* group based on genitalia

1. Anterior apophyses ca. 2/3 as long as posterior apophyses; sclerotized ring absent on sterigmatic extension (Fig. 336) . . . . . .45. *melhaniae*
– Anterior apophyses only slightly shorter than posterior apophyses; a strongly sclerotized ring present on median part of sterigmatic extension (Fig. 337). . . . . 46. *rongensis*

45. *Phyllonorycter melhaniae* (Vári, 1961)
(Figs 91–93, 132, 252, 253, 336, 396)

Lithocolletis melhaniae—Vári (1961: 218–219; pl. 23, fig. 5; pl. 65, fig. 8; pl. 105, fig. 4). *Phyllonorycter melhaniae*—Vári & Kroon (1986: 54, 136, 157), Kroon (1999: 50, 108), Dall'Asta *et al*. (2001: 34), Vári *et al*. (2002: 26), De Prins & De Prins (2005: 320)

Diagnosis. A white frons with an irroration of dark, ochreous- tipped scales, transverse fasciae of more or less equal width on costal and dorsal margins of forewing make this species easily distinguishable from *P. rongensis*. In females, the anterior apophyses are ca. 2/3 as long as posterior apophyses in *P. melhaniae*, whereas in *P. rongensis* anterior apophyses are only slightly shorter than posterior apophyses.

Material examined. *Holotype*: ♂, [1] [**Zimbabwe**] 'Hot Springs, S[outh]. Rh[odesia] / 29.iv.1956 / [leg.] L. Vári / Ac[quisition]. no: 1889'; [2] '17'; [3] 'G[enitalia] / 7495'; [4] '*Lithocolletis / melhaniae* Vári / ♂ HOLOTYPE No 6396', in TMSA.

Paratypes: 1♂, 5♀, (1♀ genitalia preparation). **Zimbabwe**: 1♀, Hot Springs, 29.iv.1956, L. Vári, Ac. no 1889; G.[enitalia] 7496; *Lithocolletis melhaniae* Vári ♀ ALLOTYPE No 6397. 1 ♂, 4♀, Hot Springs, 23.iv.1956, 03.v.1956, 10.v.1956, [leg.] L. Vári, Ac.[quisition] no 1889; *Lithocolletis melhaniae* Vári PARATYPE No 6398-6402', in TMSA.

Additional material: 1♀ and 11 specimens. **South Africa**: 1♀, Limburg Tvl. [Transvaal], Potgietersrus Distr[ict]., 26.iv.1968, specimen ID: RMCA ENT 000003361, in RMCA. 11 specimens, Limburg Tvl. [Transvaal], Potgietersrus Distr.[ict], from 14.iv.1968 to 26.iv.1968, Ac. no: 2926, in TMSA. **Zimbabwe**: 1♀, Hot Springs, 23.iv.1956, [leg.] L. Vári, in ZMHB (see *Remarks* below).

Remarks. This specimen is not mentioned in the original description (Vári 1961: 219) but it bears exactly the same data as paratype no 6400 in the TMSA and it is labeled as a paratype in the ZMHB.

Redescription. Adult (Figs. 91–93, 132). Forewing length: 2.4–2.8 mm.

Head: Vertex tufted with white, piliform scales posteriorly and irrorated with white, shorter, ochreous-tipped scales postero-laterally above eyes, very short, ochreous scales tufted medially on occiput; frons shiny white with irrorated dispersed 18–20 dark brown scales. Labial palpus white with a few dark fuscous scales, proboscis pale beige. Antenna almost as long as forewing, pale fuscous above, not clearly ringed but with flagellomeres brownish tips; underside whitish; scape white intermixed with dark ochreous scales, pecten very short white, with a few dark ochreous tipped scales, pedicel white at base and dark ochreous from subapical 3/4 to apex.

Thorax: Light ochreous with a transverse, white line in middle, tegulae ochreous with white apices and 5–6 black scales dispersed transverse of tegula. Forewing elongate, ground colour ochreous with white markings consisting of very short basal streak, two transverse fasciae, two costal and one dorsal strigulae; basal streak very short oblique, directed towards apex, edged apically with a row of black scales; first fascia at 1/4 of forewing, gently curved twice, slightly oblique, equally broad along dorsal and costal margins, finely edged with black scales from both sides; second fascia at middle of forewing, almost straight with gentle constriction in midden, finely edged with a row of black scales from both sides; first costal and first dorsal strigulae at 3/4 of forewing, comma-shaped, not reaching middle of forewing with their tips, clearly edged basally and indistinctly edged apically; an irroration of dark brown and black scales running from area between first costal and first dorsal strigulae along termen to dorsum area; second costal strigula at apex, comma-shaped, not edged, few dispersed blackish scales are found near costal margin of second costal strigula; fringe short pale ochreous from apex to tornus, and long dirty white along dorsal margin of forewing and tornus. Hindwing greyish pale beige, slightly shiny; fringe pale beige. Fore coxa shiny beige, femur and tibia fuscous, tarsomere I fuscous with a white subapical spot, tarsomere II fuscous with white apex, tarsomere III fuscous at basal half and white at apical half, tarsomere IV ochreous, tarsomere V pale beige; mid-femur irrorated with fuscous subbasally and subapically, tibiae irrorated with fuscous base and two oblique, fuscous stripes at mid-tibia and apex, apical spurs white with irroration of dark fuscous scales; tarsomere I with a subapical irrorated fuscous patch, tarsomere II white with ochreous-brown apex, tarsomere III ochreous, tarsomere IV–V white; hind femur whitish with irroration of fuscous scales subbasally, tibia covered with dense irroration of dark brown scales, median spurs with dispersed, sparse, dark brown scales, apical spurs with dark brown subapices, tarsomere I whitish with fuscous subapex, tarsomere II pale beige with median light fuscous patch, tarsomeres III–V pale beige.

Abdomen: Very pale fuscous dorsally, sterna I–III dirty white, sterna IV–VII dirty white with dense irroration of dark brown scales. Sternum VIII in males moderate, rounded caudally.

Male genitalia (Figs 252, 253). Tegumen short, 1/5 shorter than valva, sclerotized. Valva moderate, very slightly curved at ventral margin, smoothly dilating toward apex, cuculus sector is ca. 2× broader than basal sector of valva, weakly setose. Vinculum narrow, strongly sclerotized, with slender slightly curved short saccus about 3× shorter than valva; transtilla developed, thickly sclerotized. Aedoeagus rather short, cylindrical, almost straight, apex truncated, vesica with a bunch of elongate cornuti.

Female genitalia (Fig. 336). Papillae anales moderate, oval, flattened distal-proximatelly, with setation of variable length, basal bar narrow, weakly sclerotized. A slender needle-like sclerotized projection runs from basal bar of papillae anales reaches posterior 1/3 of segment VIII. Posterior apophyses with broad triangular bases, slender, a little dilated at 1/3, slightly sinuating. Segment VIII narrow, weakly sclerotized, connected dorsally and ventrally. Anterior apophyses as long 2/3 of posterior apophyses, almost straight, slender, reaching posterior sector of segment VII. Antrum located close to anterior 1/4 of segment VIII, sclerotized, short and slender, sterigma around antrum forming a sclerotized large cone-like projection on top of which ostium bursae opens; ductus bursae wide, slightly sclerotized, short. Corpus bursae moderate, oval, with irregular tiny sclerotized signum on posterior margin of corpus bursae, close to junction with ductus bursae.

Variation. There is a slight variation in width and curving of second fascia of forewing. The degree of dark brown irroration in termen area can slightly vary.

Habitat. Mines of *P. melhaniae* were collected in southern Africa from latitudes between 29°S to 24°S.

Host plant(s). Malvaceae: *Melhania velutina* Forsk—Vári 1961: 219, Kroon 1999: 50, Dall'Asta *et al*. 2001: 34, De Prins & De Prins 2005: 320.

Mine. A moderate, oblong, opaque, tentiform mine on the leaf underside with two or three folds; fine black frass loosely throughout the mine; pupation without cocoon; exuvium protrudes epidermis of a leaf before adult emerges (Vári 1961: 219, De Prins & De Prins 2005: 320). The mining period is up to 5 days (Vári's note No 1889 in the manuscript notebook of 18/04/1956 and note No 2926 of 14/04/1968).

Flight period. Adults fly from mid-April (earliest record: 10 April in 1968) to mid-May (latest record: 10 May in 1956).

Distribution. (Fig. 396). Recorded from two localities: one in Zimbabwe and the other in South Africa (Vári 1961: 219).

46. *Phyllonorycter rongensis* De Prins, new species

(Figs 94, 337, 397)

Diagnosis. Adults of *P. rongensis* are slightly similar to those of *P. melhaniae*, but their shiny white frons and marginated fasciae easily separates *P. rongensis* from *P. melhaniae*. The latter has a frons irrorated with dark ochreous-tipped scales, and the first fascia is marginated only apically and the second fascia marginated only basally. The length of apophyses is a useful diagnostic character separating *P. melhaniae* from *P. rongensis*: anterior apophyses in *P. rongensis* are long, only slightly shorter than posterior apophyses. In *P. melhaniae* anterior apophyses are shorter, ca. 2/3 of length of posterior apophyses. The sclerotized ring-like structure on sterigma in *P. rongensis* makes this species unique among Afrotropical *Phyllonorycter*.

Holotype: ♀, [1] '**Kenya**, Rift Valley / Rongai, 6500 ft. / 6.i. 2000 / leg. D. J. L. Agassiz'; [2] 'Gen. Prep. 3494♀ / De Prins'; [3] 'MRAC/KMMA / 00383'; specimen ID: [4] 'RMCA ENT 000003269'; [5] 'DNA voucher / CLV13307', in CCDB; [6] '*Phyllonorycter / rongensis* / De Prins, 2012', in RMCA.

Description. *Adult* (Fig. 94). Forewing length: 2.7 mm.

Head: Vertex tufted with white, piliform scales posteriorly with an irroration of ochreous, brown-tipped scales postero-laterally around bases of antennae, with longer, tufted, white scales directed latero-dorsally over posterior part of vertex, short white tuft of appressed scales projecting posteriorly over occiput; frons white, shiny, with golden lustre bordering anterior part of vertex. Labial palpus white with a few dark fuscous scales distributed longitudinally on lateral outer side of palpomeres; maxillary palpus white, haustellum pale yellowish beige. Antenna slightly shorter than forewing, flagellomeres dirty white with brown-tipped scales at apex, giving antenna blurred ringed appearance dorsally, flagellomeres whitish, pale beige with very

narrow brown line at apex ventrally; scape whitish ochreous with a few brown scales dorso-medially, pecten of different length, white, with a few dark ochreous-tipped scales, pedicel white with dark brown apex dorsally.

Thorax: Shiny whitish with infusion of light ochreous anteriorly and posteriorly, tegula white with some light ochreous scales at bases. Forewing elongate, ground colour golden ochreous with white markings consisting of basal streak, two transverse fasciae, two costal and one dorsal strigulae; basal streak very short and broad, triangular, initiating at middle of base of forewing and reaching dorsal margin of it, directed towards apex, weakly edged with a few black scales apically; first fascia at 1/4 of forewing, gently curved apically, slightly oblique basally, 3× broader along dorsal margin than along costal margins, finely edged with black scales apically, only few black scales close to costa present on basal margin; second fascia at middle of forewing, slightly oblique towards apex, narrowed subcostally, finely edged with a row of black scales basally; first costal and first dorsal strigulae at 3/4 of forewing, triangular shaped, almost reaching middle of forewing with their tips, 1 costal strigula edged on both sides, first dorsal strigula edged basally with black scales; an irroration of dark brown and black scales extends from tips between first costal and first dorsal strigulae along termen to dorsum; second costal strigula at apex, comma shaped, not edged, a few dispersed blackish scales are found near costal margin; fringe line not expressed, light fuscous, elongate scales bordering apical area; fringe short, pale fuscous from apex to tornus, with a few dark brown-tipped scales at tornal area. Hindwing narrow, elongate, pointed, ground colour pale fuscous; fringe pale fuscous, lighter than forewing. Fore femur and fore tibia ochreous-fuscous with dirty white, small, spottish irroration, tarsomeres I dirty white with fuscous median part, tarsomere II fuscous with white base, tarsomere III–IV completely fuscous, tarsomere V dirty white; midfemur whitish beige, mid-tibiae dirty white, irrorated with dark brown scales basally and apically with 2–3 brownish black scales medially, apical spurs white with 1–2 dark brown-tipped long scales; tarsomere I white at apical half and dark fuscous at basal half, tarsomere II white with dark fuscous band basally.

Abdomen: Fuscous dorsally, with ochreous VIII and genital segments.

Male genitalia. Unknown.

Female genitalia (Fig. 337). Papillae anales moderate, broader dorsally than ventrally, slightly compressed latero-dorsally, with setation of variable length, mainly distally with some sparse setae along dorsal margin, basal bar absent. A slender needle-like, sclerotized projection runs from posterior margin of segment VIII to median sector of segment VIII. Posterior apophyses with broad pear-like bases, slender, reaching about half way of anterior apophyses in posterior sector of segment VII, sharply pointed. Segment VIII narrow, weakly sclerotized, connected dorsally and ventrally. Anterior apophyses initiate from small triangular basal plate at about middle of segment VIII, long, slightly shorter than posterior apophyses, straight, slender, with their sharp apices reaching median sector of segment VII. Ostium bursae located at posterior margin of segment VII, broadly round-shaped, antrum long and broad, slightly smaller diameter than ostium bursae, sterigma around antrum forms a large truncate sclerotization, loose at posterior margin on which ostium bursae opens, narrow but strongly sclerotized ring encircles subposterior part of sterigmatic sclerotization; ductus bursae wide and short, melanized anteriorly. Corpus bursae moderate, elongate oval-shaped with a small signum plate posteriorly bearing a tiny sclerotized rod-shaped signum orientated along longitudinal axis of corpus bursae.

Etymology. The species is named after its type locality, Rongai.

Habitat. Albertina Rift Valley intermixed with savannah flora and agricultural fields.

Host plant(s). Unknown.

Flight period. Adults have been recorded in early January.

Distribution. (Fig. 397). Known only from the type locality in Albertine Rift, in Kenya.

The *mida* group

The *mida* group consists of two species: *P. mida* De Prins, sp. n. and *P. tsavensis* De Prins, sp. n. External features do not readily distinguish the *mida* group from species belonging to the *encaeria*, *rhynchosiae*, *hibiscina*, and *silvicola* groups. The female genitalia contains superficially similar characters with these in the other groups, such as: i) needle-like appendix originating from base of papillae anales, ii) well developed sterigmatic fold on segment VII, iii) posterior and anterior apophyses of medium length, and iv) corpus bursae with a stellate signum. However,

the *mida* group has a structured sterigma lamella post-vaginalis which is highly sclerotized, covered with spines situated posteriad a small fold-like sterigmatic sclerotization of cuticle—lamella antevaginalis.

Key to females of *mida* group based on genitalia

1. Lamella post-vaginalis spherical, covered with spines, with arc-shaped margins (Fig. 338). . . . . 47. *mida*
– Lamella post-vaginalis saddle-shaped, with slight excavation, without arc-shaped margins (Fig. 339) . . . . . .48. *tsavensis*

47. *Phyllonorycter mida* De Prins, new species

(Figs 95, 96, 338, 398, 437)

Diagnosis. The spherical lamella post-vaginalis of sterigma, episterigmatic cuticle covered with spines, antrum clasped by semi-ringed shaped, heavily sclerotized lobes of *P. mida* as described below makes this species fairly distinctive from other Afrotropical *Phyllonorycter* species.

Holotype: ♀, [1] '**Kenya** /Arabuko Sokoke Forest / 6 km W Gede, 70 m / 03°17'S 039°59'E / 27.iii.2004 / leg. J. & W. De Prins'; [2] 'Gen. Prep. 3643♀ / De Prins'; [3] 'MRAC/KMMA 00392', specimen ID: [4] 'RMCA ENT 000003282'; 'DNA voucher / CLV14907', in CCDB; [5] 'Holotype ♀ / *Phyllonorycter* / *mida* / De Prins, 2012', in RMCA.

Paratypes: 2♀ (including 2♀ genitalia preparations). **Kenya:** 1♀, Environment Watamu, Mida Creek, 0 m, 03°22'S 039°56'E, 07.iv.2004, leg. J. De Prins, gen. prep. De Prins 3648♀ (MRAC/KMMA 00391), specimen ID: RMCA ENT 000003281, in RMCA, DNA voucher CLV14807, in CCDB. **Yemen**: 1♀, prov[ince]. Shabwah, Abdalla Garib Plateau, 63 km NW Mukalla, 1335 m, 02.v.1999, leg. M. Fibiger *et al*., gen. prep. De Prins 3715♀, in ZMUC.

Description. *Adult* (Figs 95, 96). Forewing length: 1.82–2.07 mm.

Head: Vertex tufted, light ochreous, with some scales of lighter shading on middle of occiput; frons shiny white. Labial palpus white outwards and with dark brown scales inwards, maxillary palpus rudimental, pale beige; proboscis pale beige. Antenna slightly shorter than forewing, light ochreous, not ringed, a few piliform scales in each flagellomere dark brown giving a flagellomere longitudinally light striped appearance, apical part of antenna with fuscous shading; underside whitish; scape whitish anteriorly and light ochreous posteriorly with a few dark brown scales at middle of scape, 7–8 pecten of different size, whitish, longer at base of scape and ferruginous ochreous, shorter at apical part of scape, pedicel does not differ from other basal flagellomeres.

Thorax: Shiny bronze with white posterior half, tegulae bronze ochreous with white apical halves. Forewing elongate, ground colour bronze ochreous with white markings consisting of very short basal line, two transverse fasciae, two costal and one dorsal strigulae; first fascia at 1/4 of forewing slightly oblique towards apex, edged with a row of black scales apically and a few disperse scales basally; second fascia at middle of forewing, parallel to first fascia, slightly broader than fascia first fascia, with weak constriction at subcostal area, edged with blackish scales from both sides; first costal and first dorsal strigulae at 3/4 of forewing, triangular shaped, second costal strigula at apex, indistinct; an irroration of blackish scales runs along termen area to tornus; fringe short shiny whitish beige from apex to tornus, and long at dorsal margin and tornus. Hindwing pale beige with silver lustre; fringe very long of same colour as hindwing but having slightly darker shading. Fore coxa pale beige, fore femur beige with brownish apex, fore tibia with four patches of equal size: white basal and subapical patches and brown median and apical patches, tarsomere I fuscous with dirty white base and dark fuscous apex, tarsomere II with fuscous basal half and white apical half, tarsomere III dirty white basal half, and fuscous apical half, tarsomere IV entirely fuscous, tarsomere V beige; mid-femur pale beige with dark brown patches subbasally, mesially, and apically, mid-tibia pale whitish beige with a few brown scales extending in a longitudinal row to middle of tibia, apex brown, ground colour of tibial spurs same as that of tibia, dark brown scales scattered irregularly all over tibial spurs, not forming rings or regular pattern, tarsomere I shiny white with fuscous subapex, tarsomere II white with fuscous apex, tarsomere III entirely fuscous, terminal tarsomeres dirty white. Hind femur pale beige, hind tibia pale beige with a few dark brown scales on base and apex, tibial spurs dirty white with dark brown subapical ring, tarsomere I dirty white with dark brown apical third, 2–3 dark brown scales subbasally on tarsomere I, tarsomere II dirty white, terminal tarsomeres broken.

Abdomen: Pale brownish dorsally, pale fuscous on terga III–V with ochreous shading on genital segments; ventrally whitish with pale beige shine.

Male genitalia. Unknown.

Female genitalia (Fig. 338). Papillae anales moderate, oval, flattened distally with long (94–114 µm) setation equally dispersed over caudal surface of papillae anales, basal bar narrow, not completely encircling papillae, strongly sclerotized laterally and ill-sclerotized dorso-ventrally. A slender needle-like sclerotized projection ca. 132–144 µm long extending from basal bar of papillae anales to posterior portion of segment VIII. Posterior apophyses with small triangular bases, 222–232 µm, narrow, straight, slightly broadened in basal 1/3, gently tapering apically, converging at blunt apices, reaching posterior margin of segment VII. Segment VIII very short, weakly sclerotized, connected dorsally and ventrally. Anterior apophyses almost as long as posterior apophyses, 180–214 µm, with broad triangular bases, straight, slender, abuting apically, reaching just beyond middle of segment VII, at sector of about ostium bursae, apically pointed. Ostium bursae located at posterior 1/3 of segment VII, with thickly sclerotized margins of lamella with smoothly transition to antrum of complicated sclerotized structure consisting of round spinulosae ball of two spirally weaved semi rings with sharply tapering ends; sterigma very well developed, cuticle sclerotization of sterigma and round it covered with numerous thick, short, sharp spines; lamella antevaginalis is a large cuticle fold with ventral depression and mid-suture, covered with numerous small spines; lamella post-vaginalis covered with numerous thick short spines as well. Ductus bursae slender, narrow posteriorly, broadening anteriorly, 521–546 µm long. Segment VI with narrow but strongly sclerotized anterior dorsal margin. Spermatheca small kidney shaped sitated at segment VI with short efferent canal forming 42–43 convolutions of tiny diameter. Corpus bursae oval, teardrop-shaped, with weakly melanized wall, a rough, squamose, irregularly shaped sclerotized coverage as large as half of corpus bursae attached to anterior part of corpus bursae. Corpus bursae with medially stellate circular signum set with 13 (in holotype) and 17–19 (in paratypes) broad marginal dentate rays in outer margin and 4 (in holotype)–9 (in paratypes) short blunt central spines in inner circus. Signum is as large as ca. 65 µm diameter in outer margin from tip to tip of ray and 25 µm diameter in inner circular margin.

Etymology. The name of this species is formed from the name of the locality Mida Creek, taking the first word of compound name as a single noun in nominative case. The feminine specific name is not agreeing in gender with the masculine generic name of species but we prefer to retain the original spelling of the locality where the paratype was collected in the specific name of *Phyllonoryter mida* as a noun in nominative case in apposition. This combination of species-group name agrees with Art 31.2.1 of the ICZN.

Variation. A slight variation in the form of signum on corpus bursae was observed.

DNA sequences. A COI barcode is available (Molecular sample code: Pmida [JX888189]; Table S1).

Habitat. Coastal areas of the Indian Ocean (Fig. 437).

Host plant(s). Unknown.

Flight period. Adults have been recorded in late March and early April.

Distribution. Known from two localities in East Kenya and one locality in Yemen.

48. *Phyllonorycter tsavensis* De Prins, new species

(Figs 97, 339, 399, 438)

Diagnosis. The unique saddle-shape sterigma (lamella post-vaginalis) with numerous short spines, and round ostium bursae distinguishes this species from other Afrotropical *Phyllonorycter* species.

Holotype: ♀, [1] '**Kenya** / Tsavo National Park / Taita Discovery Centre, 530 m / 03°40'S 038°45'E / 11.iv.2002 / leg. J. De Prins'; [2] 'Gen. Prep. 3522♀ / De Prins'; [3] 'MRAC/KMMA / 00394'; specimen ID: [4] 'RMCA ENT 000003268'; [5] 'DNA voucher / CLV13207', in CCDB; [6] 'Holotype ♀ / *Phyllonorycter / tsavensis* / De Prins, 2012', in RMCA.

Paratype: 1♀ (including 1♀ genitalia preparation). **South Africa:** Pretoria North, 15.i.1917, C. J. Swierstra, G.[enitalia] 7501, in TMSA.

Description. *Adult* (Fig. 97). Forewing length: 2.2 mm (holotype).

Head: Vertex tufted, ochreous with intermixed white piliform scales equally distributed all over vertex and occiput; frons shiny white. Labial palpus white, drooping, slightly shorter than eye, terminal palpomere sharp

caudally. Maxillary palpus white, proboscis white with pale beige shading. Antenna slightly shorter than forewing, ochreous with pale fuscous shading above, not ringed, base colour of flagellomeres light ochreous, flagellomeres attain a few fuscous longitudinal pilifom scales more abundant at apical halves of each flagellomere; underside of antenna dirty white; scape ochreous dorsally,dirty white ventrally with 6–8 whitish, pale beige pecten, shorter than eye, pedicel as remaining flagellomeres.

Thorax: Ochreous anteriorly and white posteriorly with irregular transition line at middle, tegula white with narrow, ochreous sector posteriorly. Forewing elongate, ground colour bronze ochreous with white markings consisting of very short basal streak, two transverse fasciae, two costal and one dorsal strigulae; basal streak very short, oblique towards apex, with a few black scales dorsally, first fascia at 1/4 of forewing, narrow, curved, oblique, 2× broader at dorsal than at costal margin, finely edged with black scales from both sides; second fascia at middle of forewing, parallell to first fascia, with slight constriction at middle of forewing, dorsal edge slightly broader than costal, finely edged with a row of black scales from both sides; first costal and first dorsal strigulae at 3/4 of forewing, opposite each other, triangular shaped, just not reaching middle of forewing with their appices, edged basally and rather indistinctly apically, a gap between first costal and first dorsal strigulae filled with separate black scales; second costal strigula at apex, comma-shaped, not edged, apical sector darker ochreous, filled with an irroration of blackish scales more abundant along termen of forewing; fringe short, pale beige stretching from apex to tornus, and long, lighter along dorsal margin; a short fringe line stretches from apex of forewing to tornus. Hindwing pale beige with silver shine; fringe slightly darker than ground colour of hindwing, with fuscous shading. Fore femur brownish ochreous, fore tibia brownish with a small subbasal dirty white patch, tarsomere I dirty white basally and brownish at apical half with pale silver shiny apex, tarsomere II dirty white with ochreous apex, tarsomeres III–IV pale fuscous, terminal tarsomere dirty white; mid-femur dirty white with dark fuscous subbasal patch and light ochreous apex, mid-tibia dirty white with three oblique ochreous stripes at base, at mid, and at apex, tibial spurs long, dirty white with a few ochreous scales subbasally and at middle of spurs; tarsomere I dirty white with ochreous subapical patch, tarsomere II dirty white, tarsomeres III–V pale fuscous with a light golden shading; hind femur dirty white, hind tibia dirty white with a large apical brown ochreous patch, median spurs dirty white with sparse dark brown scales, apical spurs dirty white with dark brown subapices, hind leg tarsomere I dirty white with ochreous subapex, tarsomere II dirty white with ochreous apex, tarsomere III ochreous at basal half and white at apical half, tarsomeres IV–V dirty white.

Abdomen: Pale fuscous dorsally with ochreous genital segments.

Male genitalia. Unknown.

Female genitalia (Fig. 339). Papillae anales moderate, half rounded, with dense setation of equal length on caudal part and rarely dispersed setae along basal part of papillae anales, basal bar narrow, partly sclerotized, wider at bases of posterior apophyses. A slender needle-like sclerotized projection runs from basal bar of papillae anales and reaches posterior midway of segment VIII. Posterior apophyses narrow, slightly curved in middle with pointed apices, ca. 208 µm long. Segment VIII narrow, weakly sclerotized, and weakly connected to segment VII. Anterior apophyses slightly shorter than posterior, slightly curved in apical part, slender, almost reaching ostium bursae, parallel to each other, apically pointed. Ostium bursae located more or less in middle of segment VII, lamella post-vaginalis very strongly sclerotized, saddle-shaped; sterigma set with numerous thick, short spines, margin of sterigma bordered by thick spines directed outwardly; antrum short, tubular, set with thick, short spines; cuticle of segment VII (lamella antevaginalis) forming a small sclerotized fold, supporting sterigmatic sclerotizations and ventral part of antrum. Segment VII significantly broadened anteriorly, melanized. Ductus bursae initially narrow, with stronger sclerotization anterad. Corpus bursae moderate, drop shaped, with evident distinction between ductus bursae and corpus bursae, with a circular signum bearing 19 thick, teeth-shaped rays of variable length along its margin.

Etymology. The name of this species is formed from the name of the type locality “Tsav-o” and the Latin suffix “-ensis”, denoting location.

Habitat. East African savannah (Fig. 438).

Host plant(s). Unknown.

Flight period. Adults fly during the hottest period of the year: they are recorded in mid-January (South Africa) and mid-April (Kenya).

Distribution. (Fig. 399). Known from Kenya and South Africa.

The *obandai* group

The *obandai* group includes one species, *P. obandai* De Prins & Mozūraitis. Its unique wing pattern and distinct male and female genitalia has led us to treat this species in its own species group. The rounded cucullus of valva lacking appendices, strongly sclerotized transtilla with long bent proximal arms, very long saccus, long aedoeagus with long, narrow cornuti are unique to this group. Female genitalia are characteristic in having M-shaped sterigma, very long and narrow ductus bursae with sclerotized central sector, small corpus bursae that lacks signum.

DNA barcode data indicate a significant genetic difference between specimens collected in two localities that are separated by ca. 300 km. However, at the moment we did not detect any noticeable morphological difference in both habitus and male genitalia of these two populations. Moreover, the chemical compound Z8-tetradecen-1-yl acetate acts as sex attractant for males in both populations. We presume that more detailed population genetic studies of *P. obandai* across a larger area of East Africa might likely uncover cryptic diversity within this species group.

49. *Phyllonorycter obandai* De Prins & Mozūraitis, 2006

(Figs 98, 254–256, 340, 341, 400, 441)

Phyllonorycter obandai—De Prins & Mozūraitis (2006: 55–68, figs 4, 8, 9).

Diagnosis. The forewing pattern alone distinguishes this species from all other Afrotropical *Phyllonorycter*. The male genitalia slightly resemble those of *P. brachylaenae* in the form of the valvae. However, this species can be distinguished from *P. brachylaenae* in that *P. obandai* lacks a clearly defined suture on the ventral surface of the valva and has an aedoeagus that is twice as long as the saccus. The female genitalia of *P. obandai* are unique among Afrotropical *Phyllonorycter*, with an M-shaped sterigma, a very long ductus bursae with a sclerotized central region, and a small corpus bursae without signa. Sterigmatic appendices are present in *P. aarviki*, *P. anchistea*, and *P. melanosparta*, but the defined apophyses anteriores are absent in these species, whereas in *P. obandai* they are present and originate at segment VIII.

Material examined. *Holotype*: ♂, [1] '**Kenya** / Gatamaiyu Forest, 2280 m / 00°58'S, 036°41'E / 04.iv.2003 / leg. J. & W. De Prins'; [2] '*Z*8-tetradecen-1-yl / acetate'; [3] 'Gen. Prep. 3664♂ / De Prins'; [4] 'MRAC/KMMA 00251'; Specimen ID: [5] 'RMCA ENT 000002420'; [6] 'HOLOTYPE ♂ / *Phyllonorycter* / *obandai* / De Prins & Mozūraitis, 2006', in RMCA.

Paratypes: 21♂: (including 6♂ preparations). **Kenya:** 1♂, Rift Valley, Turi, 8000 ft, 27.ii.2000, leg. D.J.L. Agassiz; gen. prep. De Prins 3502♂; PARATYPE ♂ *Phyllonorycter obandai* De Prins & Mozūraitis, 2006, in BMNH. 1♂, Gatamaiyu Forest, 2280 m, 00°58'S, 036°41'E, 04.iv.2003, leg. J. & W. De Prins; *Z*8-tetradecen-1-yl acetate; Gen. Prep. De Prins 3640♂; 'PARATYPE ♂ *Phyllonorycter obandai* De Prins & Mozūraitis, 2006'; MRAC/KMMA 00252; Specimen ID: RMCA ENT 000002421, in RMCA. 3♂, Gatamaiyu Forest, 2280 m, 00°58'S, 036°41'E, 04.iv.2003, leg. J. & W. De Prins; *Z*8-tetradecen-1-yl acetate; gen. prep. De Prins 3640♂; PARATYPE ♂/ *Phyllonorycter obandai* De Prins & Mozūraitis, 2006; Specimen IDs: RMCA ENT 000002431–000002433, in RMCA. 1♂, Gatamaiyu Forest, 2280 m, 00°58'S, 036°41'E, 04.iv.2003, leg. J. & W. De Prins; *Z*8-tetradecen-1-yl acetate; gen. prep. De Prins 3641♂; 'PARATYPE ♂ *Phyllonorycter obandai* De Prins & Mozūraitis, 2006'; in BMNH, DNA voucher CLV25407, in CCDB. 1♂, Kakamega Forest, 1590 m, 00°21'N 034°51'E, 28.iii.2003, leg. J. & W. De Prins; *Z*8-tetradecen-1-yl acetate; PARATYPE ♂ *Phyllonorycter obandai* De Prins & Mozūraitis, 2006, in BMNH. 2♂, same label data, in NMK. 10♂, Specimen IDs: RMCA ENT 000002423–000002428, 000002430–000002432, 000002934, wing venation prep. De Prins 3769♂, MRAC/KMMA 00493, in RMCA, DNA voucher CLV12607, in CCDB. 1♂, Kakamega Forest, 1590 m, 00°21'N 034°51'E, 28.iii.2003, leg. J. & W. De Prins; *Z*8-tetradecen-1-yl acetate; gen. prep. De Prins 3662♂; 'PARATYPE ♂ *Phyllonorycter obandai* De Prins & Mozūraitis, 2006'; MRAC/KMMA 00253; Specimen ID: RMCA ENT 000002431, in RMCA. 1♂, Kakamega Forest, 1590 m, 00°21'N 034°51'E, 28.iii.2003, leg. J. & W. De Prins; *Z*8-tetradecen-1-yl acetate; gen. prep. De Prins 3663♂; 'PARATYPE ♂ *Phyllonorycter obandai* De Prins & Mozūraitis, 2006; MRAC/KMMA 00254; specimen ID: RMCA ENT 000002429, in RMCA.

Additional material: 2♀ (including 1♀ genitalia preparation). **Kenya**: 1♀, Rift Valley, Prov.[ince] Turi, 8000 ft, 8.xii.1998, D. J. L. Agassiz, gen. prep. De Prins 3503♀, in BMNH. 1♀, Central Castle Forest Lodge, 2000 m, 0°22'51"S 37°18'35"E, 5.xii.2010, leg. D. Agassiz & L. Aarvik, in BMNH.

Redescription. *Adult* (Fig. 98). Forewing length: 3.0–3.3 mm (n = 15).

Head: Vertex tufted with golden brown, piliform scales intermixed with white; frons smooth, shiny white, with pale brown suffusion apically. Labial palpi light fuscous, whitish distally. Maxillary palpus dirty white, proboscis light ochreous. Antenna as long as forewing or slightly shorter, whitish brown, flagellomeres with brownish scales in their posterior half, but not clearly ringed; scape white above, yellowish brown beneath, pecten light ochreous, ca. 1/3 as long as diameter of compound eye.

Thorax: Golden brown, with a white, bent, transverse band, tegulae whitish with brownish suffusion posteriorly. Forewing elongate, ground colour golden brown with markings consisting of slender, straight basal streak reaching almost 1/4 of forewing, not edged; and with three costal and three dorsal strigulae; first dorsal strigula at 1/3, narrow, reaching 3/4 of forewing width, obliquely curved towards apex, finely edged with blackish posteriorly and elongate with whitish towards base along dorsum, sometimes connected with basal streak; second dorsal strigula triangular, at 1/2, with slight suffusion of golden scales posteriorly and sharply edged with row of black scales basally; third dorsal strigula at 7/10, subtriangular, blackish edged basally; first costal strigula at 1/2, narrow, directed dorsally, edged basally with two rows of black scales; second costal strigula at 2/3, small, subtriangular, situated opposite third dorsal strigula, oblique, blackish edged basally, with suffusion of black scales separating it from next strigula; third costal strigula just before apex, comma shaped, directed basally, not edged with black; with suffusion of black dispersed scales in apical part of forewing; dark brown fringe line preceded by ochreous shade, fringe pale golden shiny brown. Hindwing pale fuscous, fringe pale golden ochreous. Fore femur and tibia dark fuscous, tarsomere 1 dark fuscous, terminal segments dirty white; mid-femur dirty white with three vertical short rows of dark brown scales separated by light ochreous scales at 1/4, at 1/2 and subapically; mid-tibia dirty white with narrow fuscous patches basally and at 1/2; tibial spurs dirty white in basal half, fuscous in apical half; tarsomeres 1 and 2 fuscous, apical segments dirty white; hind femur almost uniformly pale ochreous, hind tibia dirty white with an elongate brownish patch extending from 1/2 to apex of tibia; tarsus dirty white, medial apical spurs of hindleg dirty white with fuscous subapices.

Abdomen: Brown dorsally, lustrous white ventrally; conspicuous sex-scaling absent. Eighth sternum of male rounded, rounded caudally, apex slightly concave.

Male genitalia (Figs 254–256). Tegumen short, sclerotized, apex evenly rounded. Valvae symmetrical, moderate, 1.5× longer than 8th sternum, ca. 350 µm long, straight in basal half and gradually broadened and rounded distally, slightly curved ventrally, bearing longitudinal ridges in apical section and line of subcostal and subdorsal setae stretching from subbasal section to middle; basal section without hairs. Vinculum narrow, short, rounded; saccus very long, 1.8× longer than valva, ca. 620 µm long, slender, bearing small apical process. Transtilla developed and sclerotized with long bent proximal arms. Aedoeagus very long, approximately 2.5× longer than valva, ca. 780 µm long, slender, almost straight and parallel sided; vesica with 2 narrow, needle-like cornuti, extending parallel, ca. 1/5 length of aedoeagus (clearly visible at 200×).

Female genitalia (Figs 340, 341). Papillae anales, slightly sclerotized, laterally compressed, trapezoid, with few short scare setae mostly along posterior and lateral margins, also intermixed with a few long setae and tiny micro-setae, mostly situated laterally; basal part of papillae anales strongly sclerotized bent, separated, not joint to form basal bar, but remaining as two strongly sclerotized bows. Posterior apophyses with broad bent, triangular bases, straight, parallel to each other, gently tapering to narrowly rounded apices, 328 µm long, reaching posterior margin of segment VII. Segment VIII melanized, gradually widening towards anterior margin, strongly connected with segment VII ventro-dorsally and laterally. Anterior apophyses slightly more sclerotized than posterior apophyses with small triangular bases extending to sclerotized bands laterally, slightly shorter than posterior apophyses, 230 µm long, parallel to each other, gently tapering, slightly curved and directed dorsad towards pointed apices. Segment VII, trapezoidal, stronger melanized posteriorly. Ostium bursae in anterior 1/3 of segment VII, in a rectangular depression of sterigmatic formation; sterigma consisting of three parts: well developed rectangular lamella antevaginalis and two raised lateral sides of sterigma which bear curved, deviating, directed anterad slender, sclerotized appendices with sharp apices. Antrum tube-formed, short, stronger melanized than fowwing part of ductus bursae. Ductus bursae very long (1.12 mm), slender, narrow, gradually widening towards corpus bursae with a small sclerotization anterad junction with ductus seminalis. Ductus seminalis originating

slightly posteriad of median portion of ductus bursae, bulla seminalis long and narrow, much smaller than corpus bursae. Corpus bursae long, oval with smooth gradual transition to ductus bursae, without signum.

Variation. There is little variation other than the forewing length and shape of the third strigulae. The colour intensity of fore wing varies slightly from golden ochreous to golden brown. The colour shading of ochreous-fuscous patch on the outer side of the hind tibia can vary from almost invisible to dark fuscous.

DNA sequences. Two DNA barcodes are available for *P. obandai* (Molecular sample codes: Poba1 [JX888190], Poba2 [JX888191]; Table S1).

Habitat. *Phyllonorycter obandai* was found at three sites in Kenya: Rift Valley, the mountainous Gatamaiyu Forest, and the tropical Kakamega rainforest. These sites are located at altitudes between 1600 and 2400 m. In all three known sites the Guineo-Congolian flora is intermixed with savannah vegetation and the climate is cooler and less humid in comparison with related equatorial forests of Central Africa (Fig. 441). Photographs of the type locality and other collecting sited are shown in De Prins & Mozūraitis (2006).

Hostplant(s). Unknown.

Mine. Unknown.

Flight period. Moths are on the wing from early December to early April.

Sex attractant. Z8-tetradecen-1-yl acetate (De Prins & Mozūraitis 2006).

Distribution. (Fig. 400). Known from three localities in Kenya bordering the Albertine Rift closely situated at just less than a degree around the equator (De Prins & Mozūraitis 2006).

The *rhynchosiae* group

The *rhynchosiae* group consists of eight species: *P. farensis* De Prins & De Prins, 2007, *P. fletcheri* De Prins, n. sp., *P. gozmanyi* De Prins & De Prins, 2007, *P. maererei* De Prins, n. sp., *P. mwatawalai* De Prins, n. sp., *P. ocimellus* De Prins, n. sp., *P. pavoniae* (Vári, 1961) and *P. rhynchosiae* (Vári, 1961).

Wing pattern of the *rhynchosiae* species group possesses the following white markings: a basal strigula/fascia, median fascia, costal and basal strigulae opposite of each other at 3/4 of forewing, white patch or narrow strigula at apex; basal streak very short or absent with slight diagnostic specific differences: only basal edge of median fascia is angulated in *P. gozmanyi*, *P. pavoniae* and *P. fletcheri*; median fascia is very narrow and sinuate in *P. ocimellus* and *P. maererei*, basal margin of white markings strongly edged with black scales in *P. mwatawalai*.

Species in the *rhynchosiae* species group feed on a variety of plants belonging to Fabaceae, Malvaceae and Lamiaceae.

Male genitalia possess projection(s) of different shapes on ventral margin of valva; transtilla well developed, broad, strongly sclerotized, long proximal arms and short distal arms, horizontal bar broad; saccus long, significantly longer than sternum VIII; aedoeagus long, longer than saccus.

The female genitalia contain a large fold-like sterigmatic sclerotization (lamella antevaginalis) and short, sclerotized tubular antrum shortly protruding as sclerotized margins of ostium bursae. Corpus bursae in the *rhynchosiae* group with a oval signum area covered with fine, short spines and a stellate signum with broad teeth along the margin.

Key to the species of *rhynchosiae* group based on external characters

1. Fascia at 1/2 of forewing broad, basally angulated 3
– Fascia at 1/2 of forewing narrow, crossing forewing either almost straight or sinuating towards apex of forewing 3
2. Median fascia strongly angulated basally and apically 5
– Median fascia angulated only basally and running almost straight apically (Figs 101, 102, 103, 107, 108) . . . . . 51. *fletcheri**, 52. *gozmanyi**, 56. *pavoniae**
3. Apex of forewing with narrow horizontal white streak initiating at termen of forewing and reaching the tips of basal and costal strigulae situated opposite each other at 3/4 of forewing (Figs 99, 100) . . . . . 50. *farensis*
– Apex of forewing with white apical spot located at a distance from other white markings of forewing 4
4. Narrow median fascia crosses forewing almost straight, apical part of forewing densely irrorated with black scales (Fig. 106) . . . . . 55. *ocimellus*
– Narrow median fascia with a turn towards apex, apical part of forewing without black area (Fig. 104) . . . . . 53. *maererei*

5. Median fascia and subapical strigulae finely edged with one row of black scales, fringe line absent (Figs 109, 110) . .57. *rhynchosiae*
– Median fascia and subapical strigulae strongly edged with double row of black scales, fringe line present (Fig. 105) . . . . . 54. *mwatawalai*

* for species identification please refer to the characters of male and female genitalia.

Key to males of the *rhynchosiae* group based on genitalia*

1. Horizontal part of transtilla very broad, half crescent-shaped, saccus ca. 3× longer than valva, aedoaegus ca. 4× longer than valva (Figs 257–258). . . . . .50. *farensis*
– Transtilla highly sclerotized but H-shaped with long proximal arms, saccus and aedoeagus are not longer than 2× of valval length. 2
2. Valval projection stretches along entire ventral valval surface (Figs 262–264) . . . . . 52. *gozmanyi*
– Valval projection attached to ventral margin of valva is not longer than 1/2 of ventral margin of valva. 3
3. Valval projection attached to sacculus area. 4
– Valval projection attached to subapical part of ventral surface of valva. 5
4. Valval projection narrow, long digitate, straight; saccus ca. as long as valva; aedoeagus bent, slightly longer than valva, shorter than 1.5× valval length (Figs 271–272) . . . . . .56. *pavoniae*
– Valval projection hooked, hockey stick-shaped, saccus slightly longer than valva, aedoaegus straight, ca. 2× longer than valva (Figs 265–267) . . . . . .53. *maererei*
5. Valva broad with sharply acuminating apex, ventral valval projection with sharp apex, proximal arms of transtilla longer than horizontal bar (Figs 268–270). . . . . 55. *ocimellus*
– Valva of medium width or narrow, with acuminating but gently rounded apex, ventral valval projection harp or trapezoid shaped with rounded angles, horizontal bar of transtilla longer than proximal arms 6
6. Valva 4.7× longer than broad, valval ventral projection harp-shaped, saccus ca. 1.4× longer than valva, the ratio aedoeagus / saccus 1.4 (Figs 273–274). . . . . 57. *rhynchosiae*
– Valva 2.7× longer than broad, valval ventral projection trapezoid shaped, saccus ca. 1.1–1.2 longer than valva, the ratio aedoeagus / saccus 1.7 (Figs 259–261) . . . . . 51. *fletcheri*

* male genitalia of *P. mwatawalai* are unknown.

Key to females of the *rhynchosiae* group based on genitalia*

1. Posterior apophyses longer than anterior apophyses. 2
– Posterior apophyses ca. as long as anterior apophyses 3
2. Corpus bursae consisting of two sectors, signum membranous, semirounded area set with short spines, larger corpus bursae itself, stellate signum set with 5 fine spines in middle and with 14 broad marginal dentate rays (Fig. 345) . . . . . 55. *ocimellus*
– Corpus bursae consisting of one part, oval membranous area, set with short and fine spines smaller than corpus bursae, stellate signum with 11 small spines in middle and 11 fine dentate rays (Figs 347, 348). . . . . 57. *rhynchosiae*
3. Stellate signum on corpus bursae with more than 20 marginal dentate rays (Figs 342, 343). . . . . 50. *farensis*; 52. *gozmanyi***
– Stellate signum on corpus bursae with less than 20 marginal dentate rays. 4
4. Stellate signum on corpus bursae with ca. 16 marginal dentate rays (Fig. 346). . . . . .56. *pavoniae*
– Stellate signum on corpus bursae with ca. 9–10 marginal dentate rays (Fig. 344) . . . . . 54. *mwatawalai*

* female genitalia of *P. fletcheri* and *P. maererei* unknown
** female genitalia of *P. farensis* and *P. gozmanyi* are indistinguishable. Please refer to the male genitalia for identification.

50. *Phyllonorycter farensis* J. & W. De Prins, 2007
(Figs 99, 100, 257, 258, 342, 401)

Phyllonorycter farensis—De Prins & De Prins (2007: 56–58; figs 2, 4, 6, 8, 10, 12).

Diagnosis. The wing pattern of this species resembles other Afrotropical *Phyllonorycter* that possess two fasciae, two costal and one dorsal strigulae on the forewing. It resembles *P. gozmanyi* very closely, but differs from the latter by its brighter, golden ochreous coloration without any fuscous greyish shading in the costal and tornal sectors of the forewing. In male genitalia *P. farensis* is easily distinguishable from most of the Afrotropical

Phyllonorycter by the very broad and modified transtilla, an extraordinary long saccus, and aedoeagus (see description below). Female genitalia of *P. farensis* are similar to *P. pavoniae* and *P. ocimellus* for sharing sterigmatic fold-like cuticle sclerotization on segment VII, small ring-like sterigmatic lamellae around ostium bursae, large membranous signum area on corpus bursae and stellate signum. Females of *P. farensis* can be separated from *P. pavoniae* and *P. ocimellus* only by a combination of external and internal (genital) morphological characters (as described below). Female genitalia of *P. farensis* are almost indistinguishable from those of *P. gozmanyi*, except very subtle differences like ostium bursae in *P. farensis* is located on segment VII anteriad than in *P. gozmanyi*. The ratio of distance between ostium bursae and anterior margin of segment VII versus the distance between ostium bursae and posterior margin of segment VII is about 2 (1.87 and 2.07 respectively) in *P. farensis* and more than 3 in *P. gozmanyi.*

Material examined. *Holotype*: ♂, [1] '**Cameroon**: / North Province / Faro riverside, 289 m / 08°23'N, 012°49'E / 24.xi.2003 / leg. J. De Prins'; [2] 'gen. prep. De Prins / 3634♂'; [3] 'DePrins 102'; [4] 'MRAC/KMMA 00279'; [5] 'HOLOTYPE ♂ / *Phyllonorycter* / *farensis* / De Prins & De Prins, 2006; Specimen ID: [6] 'RMCA ENT 000002948', in RMCA.

Paratype: 1♀ (including 1♀ genitalia preparation). **Cameroon**: North Province, Faro riverside, 289 m, 08°23'N 012°49'E, 25.xi.2003, leg. J. De Prins; gen. prep. De Prins 3633♀; MRAC/KMMA 00282; 'PARATYPE ♀ *Phyllonorycter farensis* De Prins & De Prins, 2006'; specimen ID: RMCA ENT 000002962, in RMCA; DNA voucher CLV13607, in INRA.

Additional material: 1♀ (including 1♀ genitalia preparation). **Democratic Republic of the Congo**: Ht [Haut] Katanga, Tshinkolobwe, 18.iv.1931, J. Romieux, gen. prep. De Prins 3525♀, in MHNG.

Redescription. *Adult*. (Figs 99, 100). Forewing length: 2.7 mm.

Head: Vertex tufted with golden brown scales; frons shiny, white, with few intermixed brown piliform scales below antennae. Labial palpus slightly longer than eye, whitish beige with infusion of sparse brown scales outwardly, with ratio of segments from base 1:2:1. Maxillary palpus and proboscis light beige. Antenna as long as forewing or slightly shorter, pedicel whitish shiny above and ochreous beneath; flagellomeres with dark ochreous suffusion of stripes, apical flagellomere ochreous; scape golden light beige, with pecten consisting of a few piliform white scales as long as scape.

Thorax: Golden brown with mixture of whitish scales, tegula brown. Forewing elongate, ground colour golden ochreous brown with white markings consisting of one transverse fascia, two costal and two dorsal strigulae; with suffusion of white scales not forming clearly defined streak basally. first dorsal strigula at 1/4, long, extending along 3/4 of width of forewing, oblique, tapering towards costa but not reaching it; first fascia at 1/3, angulated, irregular, broader at dorsum and forming patch, edged with a row of black scales basally; a row of a few black scales basally edging fascia and reach midline of forewing; first costal and second dorsal strigulae at 2/3, not regularly shaped, opposite each other, with a few black scales interspersed irregularly between them; second costal strigula at apex, indistinct, white, comma-shaped; with few black scales at tornus; outer margin of apical sector not edged with dark scales; fringe long, ochreous apically and dirty white dorsally. Hindwing pale fuscous, shiny; fringe pale fuscous, shiny. Fore coxa dark fuscous; for femur dark brown with suffusion of black scales; for tibia and tarsomeres dark brown, with beige apices. Midleg femur ochreous; mid-tibia dirty white with suffusion of a few dark ochreous scales; tarsomeres I–IV dirty white; apex of terminal tarsomere ochreous. Hindleg femur white basally and brown apically; hind tibia dirty white with some ochreous scales subapically, tibial spurs white, short; tarsomeres I–IV white; last tarsomere dirty white.

Abdomen: Greyish brown dorsally, white ventrally; without conspicuous sex-scaling. Sternum VIII of male moderate, rounded caudally.

Male genitalia (Figs 257, 258). Tegumen lightly sclerotized, apex conical with slender sparse scobination from 1/2 to apex; tuba analis not protruding. Valvae symmetrical, of moderate width, costal margin running almost straight, ventral margin roundly tapering from broad basal part to smoothly pointed apex; basal sector wide, 1/2 as broad as length of valva; valva with short thick setae from 1/2, more densely set at apex; each valva from 1/2 to apex with rounded, elongate, weakly sclerotized, half-moon shaped projection; projection as broad as half of valva at base, covered with abundant setae that become more dense, thicker, and shorter towards apex. Vinculum broad, U-shaped, thickly sclerotized, broadening caudally towards base of saccus; saccus very long and slender, twice as long as valva. Transtilla very strongly modified, broad, slender, covering base of valva. Aedoeagus very long, ca. 3× as long as valva and ca. 1.5× as long as saccus, slightly enlarged at coecum; vesica with four narrow needle-like

cornuti parallel to one another along about 1/7 total length of aedoeagus; dorsal surface of distal 1/3 of aedoeagus covered with tiny scales (visible at 400×).

Female genitalia (Figs 342). Papillae anales moderate, flatterened caudally, with gently rounded lateral sides, 1.5× wider than long, light sclerotized except anterior margins, with long setae of equal length mostly basally; basal sclerotized bar rather wide, strongly sclerotized ventrad from posterior apophyses, narrower dorso-ventrally; a slender needle-like weakly sclerotized projection going from basal bar of papillae anales and reaching middle of segment VIII. Posterior apophyses strongly sclerotized, ca. 230 and 250 µm (n = 2) long, with broad triangular bases, straight, broader at basal 1/2, gently tapering from 1/2 to apex, apically pointed. Segment VIII sclerotized, connected ventrally with weak dorsal connection, about 1.5 as long as papillae anales; anterior apophyses slightly longer than posterior ones, ca. 240 and 260 µm (n = 2) long, slender, gently tapering towards apices, almost parallel to each other, reaching middle of segment VII. Ostium bursae located in submedial sector of sternum VII, antrum short tube, well sclerotized; sterigma forming large sclerotized boomerang-like fold of cuticle. Ductus bursae about 0.60 mm long, 1/3 diameter of antrum, with initial section more sclerotized, as long as boomerang-like fold, followed by long unsclerotized section. Corpus bursae moderate, rounded, about half as long as ductus bursae, with large irregular membranous area set with fine short spines, also with small, stellate circular signum set with 21 and 23 (2 specimens) broad, marginal, dentate rays.

Variation. There is a slight variation in the coloration intensity of the hind and mid-legs. Stellate signum has 21 rays in the paratype and 23 rays in the additional specimen.

DNA sequences. A COI barcode is available (Molecular sample code: Pfar [JX888179]; Table S1).

Habitat. Adults were collected at a black-light in small grassy area with randomly distributed trees less than 5–7 m tall on the Faro riverbank close to water (De Prins & De Prins 2007: 55).

Host plant(s). Unknown.

Flight period. Adults fly in mid-April and late November.

Distribution. (Fig. 401). Known from the North Province of Cameroon (De Prins & De Prins 2007: 58) and from the south of the Democratic Republic of the Congo **(new record)**.

51. *Phyllonorycter fletcheri* De Prins, new species

(Figs 101, 259–261, 402)

Diagnosis. *Phyllonorycter fletcheri* closely resembles *P. rhynchosiae* and *P. maererei*. The fascia situated medially is strictly angulated, oblique towards apex in *P. rhynchosiae* and slightly bent with narrow straight subcostal portion and very broad triangular sudorsal portion in *P. fletcheri*. All three palpomeres in *P. fletcheri* carry dark brown scales whereas in *P. rhynchosiae* only terminal palpomere with dark brown scales. Thorax whitish in *P. fletcheri* and ochreous with a curved white line in *P. rhynchosiae*. The specimen of *P. maererei* is in poor condition to compare the external characters in detail. Valva in *P. fletcheri* is proportionally wider than in *P. rhynchosiae* and in *P. maererei*. It is 2.7× longer than broad in *P. fletcheri* and it is 4.7×longer than broad in *P. rhynchosiae* and 4.0× in *P. maererei*. Valval ventral projection is trapezoid shaped in *P. fletcheri*, in *P. rhynchosiae* it is harp-shaped, and it is hockey stick-shaped in *P. maererei*. The shape of valva and its projection resemble these of *P. encaeria*, however, in *P. encaeria* saccus is ca. 2× shorter than valva. Saccus in *P. fletcheri* is 1.2× longer than valva; it is 1.4× longer in *P. rhynchosiae* and as long as valva in *P. maererei*. Aedoeagus more than ca. 2× longer than valva in *P. rhynchosiae* and *P. fletcheri* and it is 1.7× longer in *P. maererei*. The apical third of aedoeagus in *P. fletcheri* differs from *P. maererei* in that it is squamose and lacks a cornutus. Lateral process of transtilla terminates with large rounded club in *P. fletcheri*; obtuse in *P. rhynchosiae* and *P. maererei*.

Holotype: ♂, [1] '**Uganda** Ruwenzori Range / Ibanda, 4,700 ft. / 4–12.ix.1952 / [leg.] D. S. Fletcher' / [2] 'Ruwenzori Exped[ition]. / B[ritish].M[useum]. 1952-566'; [3] 'Gen. Prep. 3653♂ / De Prins'; [4] 'BMNH 32533'; [5] 'Holotype ♂ / *Phyllonorycter / fletcheri* / De Prins, 2012', in BMNH.

Description. *Adult* (Fig. 101). Forewing length: 2.6 mm.

Head: Vertex tufted, with shorter ochreous appressed scales, with a tuft of longer white, piliform scales directed radially on occiput; frons white shiny from antennae along eyes and light creamy in central part of fronto-clypeus. Labial palpi directed downwards, dirty white on inner margin, pale ochreous frontally, lateral outer margin of palpomeres I and II with row of ochreous apically dark brown tipped scales, terminal palpomere sharply pointed,

apex white. Maxillary palpi small, pale beige; haustellum with one large curve, pale beige, base darker shiny beige. Antenna slightly shorter than forewing, consisting of 36 flagellomeres dorsally ochreous greyish with slightly brownish apices (except first two flagellomeres), ventrally dark ochreous, terminal flagellomere brownish fuscous; scape white anteriorly and ochreous posteriorly with 13–14 long, longer than half of eye pecten; pedicel and first flagellomere white.

Thorax: White anteriorly with pale ochreous shading medially, posterior half ochreous, tegulae ochreous with white apices. Forewing elongate, ground colour golden ochreous white markings consisting short basal streak, two angulated fasciae, two costal and one dorsal strigulae; basal streak oblique towards apex, not edged, first fascia at 1/4, angulated, lightly edged basally with a few black scales, second fascia at 1/2, basal margin ark shaped, apical margin angulated, broad, clearly edged with large dark brown round scales basally and a few small scales apically, first costal strigula at 3/4, triangular shaped, not reaching midline of forewing, edged basally, first dorsal strigula at 3/4, opposite first costal strigula, edged basally, second costal strigula at apex, narrow stripe shaped, without expressed edging, an irroration of dark brown scales separates first costal and first dorsal strigulae and extends to termen; fringe pale ochreous at tornus pale grey, slightly longer. Hindwing pale fuscous, fringe pale fuscous with ochreous shading. Fore femur ochreous suffused with dark fuscous, tibia dark fuscous, tarsomeres I and II fuscous with dirty white bases, tarsomeres III–IV dark fuscous, terminal tarsomere grey. Midfemur and tibia fuscous dorsally dirty white ventrally, tibial spurs short fuscous, tarsomere I fuscous with very small basal dirty white patch, rest of tarsomeres pale whitish ochreous. Hindlegs broken and not available for description.

Abdomen: Greyish fuscous dorsally, whitish, without conspicuous sex-scaling ventrally. Eighth sternum of male moderate, rounded caudally.

Male genitalia (Figs 259–261). Tegumen lightly sclerotized, ca. 280 µm long, triangular, arms forming elongate inverted V, narrowly connected at apex, apex covered with numerous very short straight slender microtrichiae, tuba analis not protruding. Valvae symmetrical, of moderate width, as long as tegument, ca. 280 µm long and ca. 100 µm wide at medially basad valval projection, and ca. half as wide as aedoeagus, slightly concave at middle of dorsal margin with a light lump at 3/5, valval distal part of dorsal margin with oblique declivity to apex; costal margin thickly sclerotized to about half of valval length; apex gently rounded; ventral margin of valva gently curved; moderately covered with slender sclerotized setae of moderate length; two sclerotized folds connect ventral valval surface with weakly sclerotized ventral valval projection; ventral valval projection broad trapezoid shaped, extended beyond median valval surface, subapical and apical surface of ventral projection covered with numerous short and slender setae. Vinculum moderate, U-shaped, thickly sclerotized, especially laterally, significantly broadening at middle of caudal sector; saccus slender, longer than valva, ca. 340 µm long, straight along entire length, blunt caudally. Transtilla well developed, U-shaped, complete, broad, approximately as long and broad as vinculum; two lateral processes of transtilla with large rounded club on cephalic margin. Aedoeagus about twice as long as valva, ca. 585 µm, of moderate width, parallel-sided, gradually tapering, becoming slender and straight at distal 1/3; apical third of aedoeagus and vesica covered with numerous longitudinal rod like scales (clearly visible at 200×) more abundant along distal third but significantly reduced at vesica; vesica without spines, weaker sclerotized.

Female genitalia. Unknown.

Etymology. The species' name honours D. S. Fletcher, the author of "The generic names of moths of the world" and the collector of the holotype.

Habitat. Montainous forest at altitude above 1000 m.

Host plant(s). Unknown.

Flight period. Only a single specimen is known, an adult that was collected in early September.

Distribution. (Fig. 402). Known only from the type locality in Uganda (Ruwenzori Range).

52. *Phyllonorycter gozmanyi* J. & W. De Prins, 2007

(Figs 102, 103, 262–264, 343, 403)

Phyllonorycter gozmanyi—De Prins & De Prins (2007: 49–56; figs 1, 3, 5, 7, 9–11).

Diagnosis. *Phyllonorycter gozmanyi* is generally similar in appearance to *P. farensis, P. pavoniae* and *P. rhynchosiae*. However, it differs from *P. farensis* by its darker ochreous reflection along costa and presence of

black scales at tornus. Male genitalia have some definite distinguishable features. Valva with two lobe projections is unique within the genus. In females, the strongly sclerotized boomerang-like fold sterigma around antrum, membraneaous area and a stellate signum are shared with other species in the *rhynchosiae* species group. Female genitalia of *P. gozmanyi* are very similar to those of *P. farensis*, but the ratio of distance between ostium bursae and anterior margin of segment VII versus the distance between ostium bursae and posterior margin of segment VII is larger than 3 in *P. gozmanyi* (3.86 and 3.09 respectively) and approximately 2 in *P. farensis*.

Material examined. *Holotype*: ♂, [1] '**Cameroon**: / North Province / Faro riverside, 289 m / 08°22'N, 012°51'E / 29.xi.2003 / leg. J. De Prins'; [2] 'gen. prep. De Prins 3635♂'; [3] 'DePrins 103'; [4] 'MRAC/KMMA 00278'; [5] 'HOLOTYPE ♂/ *Phyllonorycter* / *gozmanyi* / De Prins & De Prins, 2007'; [6] Specimen ID: 'RMCA ENT 000002959', in RMCA

Paratypes: 2♀ (including 2♀ genitalia preparations). **Cameroon**: 1♀, North Province, Faro riverside, 289 m, 08°22'N, 012°51'E, 01.xii.2003, leg. J. De Prins; gen. prep. De Prins 3636♀; MRAC/KMMA 00280; PARATYPE ♀ *Phyllonorycter gozmanyi* De Prins & De Prins, 2007; specimen ID: RMCA ENT 000002960, in RMCA. 1♀, North Province, Faro riverside, 289 m, 08°22'N, 012°51'E, 01.xii.2003, leg. J. De Prins; gen. prep. De Prins 3637♀; MRAC/KMMA 00281; PARATYPE ♀ *Phyllonorycter gozmanyi* De Prins & De Prins, 2007; specimen ID: RMCA ENT 000002961, in RMCA; DNA voucher CLV13507, in CCDB.

Redescription. *Adult* (Figs 102, 103). Forewing length: 3.1 mm.

Head: Vertex tufted with golden brown, intermixed with white, piliform scales; frons shiny white with sparse piliform scales and smooth white scaling without sheen below antennae. Maxillary and labial palpi light beige, proboscis dirty white. Labial palpus slightly longer than eye, with suffusion of brown scales outwardly, drooping. Antenna as long as forewing or slightly shorter, pedicel and flagellomeres golden brown above with dark ochreous suffusion, more intense in coloration apically; scape golden brown, whitish along ventral margin; sparse white pecten, reaching 1.5× flagellomere length.

Thorax: Mesothorax golden brown with mixture of whitish scales, tegulae brown, darker at their bases with paler whitish scales apically; metathorax shiny golden ochreous. Forewing elongate, ground colour golden ochreous brown with white markings consisting of two transverse fasciae, two costal and one dorsal strigulae; basal streak absent; first fascia at 1/5, angulated, irregular, broader at dorsum, running from base of forewing and forming a patch in which white scales intermix with shiny bronze scales; a row of sparse black scales basally edging first fascia and reaching midline; second fascia at 1/3, angulated, edged with row of black scales basally; first costal and first dorsal strigulae at 2/3, opposite each other, almost of equal size, narrow, comma-shaped, tapering towards apex, touching each other at midline; some black scales stretching irregularly from junction of costal and dorsal strigulae into apical sector; apical sector covered with greyish fuscous brown, intermixed with black and few dirty white scales; second costal strigula at apex, dirty white, comma-shaped, without shine, bordered basally by small patch consisting of 6–8 black scales along costa; posteriorly with row of 4–5 black scales around apex, not reaching costa, and with patch of black scales at middle of apical sector; outer margin of apical sector edged with line of black scales; with second faint parallel line at tornus; fringe long, pale golden with slight shine, preceded by dirty ochreous shade. Hindwing pale fuscous, shiny; fringe shiny pale gold to grey. Fore coxa greyish fuscous; femur dark greyish fuscous; tibia and tarsomeres dark fuscous except pale grey bases of first two tarsomeres and apex of tarsomere V. Mid-leg femur white; tibia dirty white, with two rows of dark blackish brown scales preceded by ochreous brown and forming circular band at base, with two rows of dark blackish brown scales intermixed with ochreous and dark fuscous at 1/2 forming obscure band, and with irregular patch of dark blackish intermixed with fuscous subapically; tarsomeres I–III dirty white, clearly ringed with blackish brown subapically; tarsomere IV golden white; apex of terminal tarsomere pale golden. Hindleg femur pale beige; hind tibia dirty white becoming dark grey dorsally from 1/2 to apex and with row of 4–5 brown scales subbasally, tibial spurs white with slight intermixture of few darker scales, terminated with white hair-like scales reaching 2/3 of tarsomere I; apices of tarsomeres I–III marked with dark brown scales, terminal tarsomeres white.

Abdomen: Greyish brown dorsally, white ventrally. Eighth sternum of male slightly tapering to rounded apex.

Male genitalia (Figs 262–264). Tegumen lightly sclerotized, apex conical, tuba analis not protruding. Valvae symmetrical, valva of moderate width, 1.5× longer than eighth sternum, gradually widening, 1.5× wider at apex than at base, rounded apically; costal margin more thickly sclerotized, medially with sparse short setation from middle to apex; each valva with bilobed projections extending from base to apex; ventral projection gradually broadening at 2/3, tapering distally, with rounded apex; both projections forming a 90° angle; dorsal (upper)

projection broadening from very narrow bases, forming a triangular pointed peak at ¼, followed by slight depression, then to both margins of projection running parallel and connecting with apex of valva; both projections covered medially with sparse setae becoming slightly thicker at apical sector of dorsal projection; dorsal projection slightly more thickly sclerotized than ventral one; median surface of valva overlapping with surface of dorsal projection. Vinculum narrow, U-shaped, thickly sclerotized, especially laterally, slightly broadening caudally; saccus slender 2/3 as long as valva, slightly broadening caudally. Transtilla well developed, U-shaped strongly sclerotized, as long as vinculum but slightly thicker with two lateral processes as long as horizontal bar of U-shaped transtilla and attached to vinculum arms and aedoeagus. Aedoeagus about twice as long as valva, bulging proximally, gradually tapering, becoming slender and straight near middle, parallel-sided distally; coecum about 1/4 total length of aedoaegus; vesica with two elongate, rod-like, thickly sclerotized cornuti on dorsal and ventral sides (clearly visible at 200× enlargement), about 1/5 total length of aedoeagus.

Female genitalia (Fig. 343). Papillae anales moderate, connected dorsally, 1.5× wider than long, shaped like reverse triangles, weakly sclerotized except anterior margins, with few longer setae mostly basally, 1/2 shorter setae along apical margin intermixed with small and slender microtrichiae; basal sclerotized bar rather wide ventrad from posterior apophyses, narrower dorsally; a slender needle-like weakly sclerotized projection going from basal bar of papillae anales and reaching middle of segment VIII. Posterior apophyses thickly sclerotized, ca. 240 and 250 µm (n = 2) long, with triangular bases, straight, of medium width in basal half, gently tapering in apical half, apex pointed. Segment VIII thickly sclerotized, connected ventrally by weak dorsal connection, about as long as papillae anales; anterior apophyses slightly longer than posterior ones, ca. 250 and 260 µm (n = 2) in length, slender, gently tapering towards apices, almost parallel to each other, reaching anterior 1/3 of segment VII. Ostium bursae located in posterior 1/3 of sternum VII; antrum thickly sclerotized and shaped like short tube; sterigma lamella antevaginalis forming large sclerotized boomerang-like fold on which is ostium bursae is located. Ductus bursae almost twice as long as sternum VII, 560 and 690 µm (n = 2) long, ca. 1/3 as wide as antrum, with initial section more thickly sclerotized, followed by long unsclerotized section. Corpus bursae moderate, rounded, about half as long as ductus bursae, with large oval membranous area, set with fine short spines, also with small, stellate circular signum set with 16 fine spines in middle and 21 broad, marginal, dentate rays; spermatheca located in posterior part of segment VI, ductus speermathecae is short, consisting of tightly compact 31–32 spiral curves, smaller in diameter in anterior half of ductus spermathecae.

Variation. There is a slight variation in amount of black scales present at tornal sector.

Habitat. Adults were collected at light in savannah, north of the Faro River basin. The vegetation at this site is dominated by *Terminalia* (Combretaceae). A photograph from the type locality is shown in De Prins & De Prins (2007: 55).

Host plant(s). Unknown.

Flight period. Adults fly at the end of November and early December.

Distribution. (Fig. 403). Known only from one locality in Faro River Reserve, North Province of Cameroon (De Prins & De Prins 2007: 56).

53. *Phyllonorycter maererei* De Prins, new species

(Figs 104, 265–267, 404, 445)

Diagnosis. Male genitalia most resembles those of *P. rhynchosiae*. However, there are noticeable diagnostic differences. The margins of apical half of valvae in *P. maererei* are dentate and rough; they are smooth in *P. rhynchosiae*. The valval projection of ventral margin in *P. maererei* is bent caudally, L-shaped; it is straight, gently rounded caudally in *P. rhynchosiae*. Saccus in *P. maererei* is as along as valva, it is significantly longer (1.4–1.5×) in *P. rhynchosiae*.

Holotype: ♂, [1] '**Tanzania** / Morogoro 500 m / Mazimbu Orchard / 06°47'S 37°37'E / 13.vii.2009 / leg. J. & W. De Prins'; [2] 'Gen. Prep. 3779♂ / De Prins'; [3] 'MRAC/KMMA 00524'; specimen ID: [4] 'RMCA ENT 000005330'; [5] 'Holotype ♂ / *Phyllonorycter / maererei* / De Prins, 2012', in RMCA.

Paratype: 1♂ (including 1♂ genitalia preparation). **Yemen**: Prov[ince]. Ta'izz, Wadi Warazan, 5 km NW Ar Rahidah, 1080 m, 27.iv.1998, leg. M. Fibiger *et al*., gen. prep. De Prins 3718♂, in ZMUC.

Description. *Adult* (Fig. 104). Forewing length: 2.1 mm.

Head: Vertex tufted, with white, long, appressed scales with slight intermixture of shorter beige scales; frons snowy white. Labial palpus directed downwards, long, slightly longer than eye, whitish pale beige, with a few brown scales on palpomeres I, and II laterally. Maxillary palpus small, pale beige; haustellum mediately long, curved, pale beige. Antenna golden ochreous with intermixed, dark brownish, piliform scales extending along entire length of flagellomeres, no rings are perceptable; scape pale ochreous with a few, dark brown, small, rounded scales proximately, pecten whitish, long, longer than scape, numerous, ca. 15–20; pedicel pale ochreous whitish.

Thorax: Pale ochreous with some white anteriorly and laterally, tegulae pale ochreous with narrow white band posteriorly. Forewing elongate, ground colour golden ochreous with white markings including two dorsal strigulae, one angulated fascia and one apical strigula; basal streak absent, first dorsal strigula at 1/4 oblique towards apex, broad, long, extending beyond middle of forewing, truncate caudally, edged at costal part by a row of sparsely set, dark brown, round scales, second fascia at 1/2 of forewing, dorsal edge of fascia significantly more basally situated than costal edge, mid-part of fascia narrow, parallel to costa, connecting dorsal and costal parts of first fascia with 90° angle, edged more dense basally at dorsal part and more dense apically at costal part with a few dark scales situated on opposite edges; second dorsal strigula at 3/4 of forewing, broad triangular shaped, not reaching middle of forewing, edged basally, a few dark brown scales connecting costal edge of first fascia with top of second dorsal strigula, apical strigula, rod-shaped, reaching middle of forewing, surrounded by sparsely distributed, dark brown scales, fringe line not clearly expressed, tornal part of forewing covered by elongate pale ochreous grey, dark brown-tipped scales. Fringe long, white. Hindwing pale grey with silver shine. Fore femur pale ochreous suffused with dark fuscous, dorsally, whitish ventrally; fore tibia dark ochreous fuscous, tarsomere I white, tarsomere II brownish fuscous, terminal tarsomeres greyish with brownish fuscous tips. Mid-femur pale ochreous, mid-tibia white with three dark ochreous patches of similar size: at base, at middle and at apex, tibial spurs white with a few scales, dark ochreous at base, tarsus dirty white with dark ochreous patch at middle, terminal tarsomere dark greyish. Hind femur light ochreous, hind tibia golden ochreous with white, oblique stripe in middle, tarsus white with grey tip.

Abdomen: Dorsally dark grey ochreous with gradual transition to ochreous towards caudal part. Caudal terga ochreous, covered with narrow, stout, pale grey scales on lateral sides. Sterna whitish ochreous with silver shine. Eighth sternum of male small, only ca. 65 µm long, rounded caudally.

Male genitalia (Figs 265–267). Tegumen sclerotized, ca. 220 µm long, triangular, arms very narrow, forming elongate inverted V, sharply connected at apex, subapical ventral surfice covered with numerous tubercles bearing very short, tiny spicules (visible at 400× enlargement), tuba analis not protruding. Valvae symmetrical, broader at base and about half as wide at cucculus area, shorter than tegumen, ca. 175 µm long and ca. 100 µm wide; ca. 44 µm wide at median part just distad of ventral projection, costal margin thickly sclerotized, almost straight, cucullus area gently rounded, apical half of costal margin dentate, ventral surfice of valval apical half covered with large, round nodules more abundant towards apical and ventral margins, each nodule bearing a stiff, short bristle; ventral margin of valva gently concave with thick, weakly sclerotized, quarter rounded hockey stick-shaped projection ca. 96 µm long, subapical and apical surface of ventral projection covered with numerous tubercles with thick, short, stiff setae. Vinculum median, U-shaped, thickly sclerotized, not connected with tegumen, slightly broadening at middle of caudal sector; saccus slender, slightly longer that valva, ca. 185 µm long, slightly bent caudad, acuminate caudally. Transtilla well developed, H-shaped, complete, broad, approximately as broad as vinculum, with two lateral processes with obtuse apices on cephalic margin. Aedoeagus about twice as long as valva, ca. 305 µm, of moderate width, parallel-sided, straight, gradually tapering; subapical third of aedoeagus with long cleft-like cornutus (visible at 200×), vesica without any distinct cornutus, weaker sclerotized. Anellus developed, tubular, without sclerotized fulturae.

Female genitalia. Unknown.

Etymology. Named after Amon Maerere, professor at the Sokoine University of Agriculture in Tanzania, to honour his interest and support to the studies of the micromoths in East Africa.

Habitat. Dry areas but with low green vegetation at altitude of ca. 500–1000 m (Fig. 445).

Host plant(s). Unknown.

Flight period. Adults on the wing were recorded in April and July.

Distribution (Fig. 404). Known from Tanzania and Yemen.

54. *Phyllonorycter mwatawalai* De Prins, new species
(Figs 105, 344, 405, 445)

Diagnosis. *Phyllonorycter mwatawalai* resembles *P. farensis*, *P. gozmanyi*, and *P. pavoniae*. However, *P. mwatawalai* is significantly smaller than the other three species. The wing pattern of *P. mwatawalai* resembles most similarly *P. gozmanyi* and *P. farensis*, but the shape of central fascia is different: in *P. mwatawalai* the central fascia lacks a defined apical margin, in *P. farensis* and *P. gozmanyi* this fascia is shaped like a sand clock. *Phyllonorycter pavoniae* has a much darker ground colour, and basal first white marking is clearly defined almost straight fascia, edged on both sides. The basal first white mark of *P. mwatawalai* is a strongly oblique strigula, without margining. The colour of tuft on posterior part of head is different in both species as well: in *P. mwatawalai* it is ochreous, the same colour as the ground colour of forewing, in *P. pavoniae* it is snowy white. *Phyllonorycter mwatawalai* differs from *P. farensis* by size and ground colour: *P. farensis* possesses much lighter shading of ground colour. Females of the *rhynchosiae* species group are characterized by possessing a strongly sclerotized boomerang-like or pyramid-shaped cuticle fold of sterigma on segment VII, and a stellate signum on corpus bursae. Females of *P. mwatawalai*, however, clearly differ from the other species of the *rhynchosiae* group in possesing a crescent-shaped lamella post vaginalis and sclerotized narrow ring-like lamella antevaginalis; the number of rays in stellate signum in *P. farensis* and *P. gozmanyi* is 21–23 and in *P. mwatawalai* 9–10.

Holotype: ♀, [1] '**Tanzania** / Morogoro 500 m / ca. 10 km SE of Mikese / 06°46'S 37°55'E / 14.vii.2009 / leg. J. & W. De Prins'; [2] 'Gen. Prep. 3781♀ / De Prins'; [3] 'MRAC/KMMA 00525', specimen ID: [4] 'RMCA ENT 000005331'; [5] 'Holotype ♀ / *Phyllonorycter* / *mwatawalai* / De Prins, 2012', in RMCA.

Paratype: 1♀ (including 1♀ genitalia preparation). **Tanzania**: Morogoro, SUA Horticultural Unit, 06°50'S 37°39'E, 500 m, 13.v.2010, leg; J. & W. De Prins, gen. prep. De Prins 3794♀ (MRAC/KMMA 00536), specimen ID: RMCA ENT 000005913, in RMCA.

Description. *Adult* (Fig. 105). Forewing length: 1.7 mm.

Head: Vertex tufted, with light ochreous, appressed scales; frons snowy white. Labial palpus directed downwards, slightly longer than eye, white. Maxillary palpus small, white; haustellum mediately long, curved, pale beige. Antenna greyish ochreous gradually darkening in shading towards apex, consisting of 30–31 flagellomeres, each flagellomere ochreous at basal half and grey apically, terminal flagellomeres grey intermixed with darker ochreous shading; scape ochreous with ca. eight pecten of variable length; pedicel pale ochreous.

Thorax: Ochreous with some white anteriorly, tegulae ochreous with light ochreous apices. Forewing elongate, ground colour ochreous with golden lustre, and with white markings including two dorsal strigulae, one angulated fascia and two apical strigulae; basal streak very small, just a small white dot at base of middle of forewing, first dorsal strigula at 1/4 oblique towards apex, narrow, long, extending beyond middle of forewing, terminal part not shaped clearly, without defined edging, second fascia at 1/2 of forewing, sharply angulated, tip of sharp angle in subcostal region, fascia quite broad, however, apical margin with borders anastomosed, indistinct, basal edge margined with black scales; second dorsal strigula at 3/4 of forewing, broad triangular shaped, not reaching middle of forewing, edged basally; first costal strigula at 3/4 of forewing, opposite second dorsal strigula, broad triangular shaped, reaching middle of forewing, edged basally, a suffusion of black scales apical strigula, rod shaped, not reaching middle of forewing, without edging, a row of black scales, at subtermen streching from apex to tornus, following shape of termen, which corresponds to a long fringe line; termen covered with elongate ochreous scales with greyish tips, fringe light grey with silver shading. Hindwing pale grey with silver shine, fringe long, same colour as hindwing. Fore femur and fore tibia white with silver shine, tarsus dirty white intermixed with grey, tarsomere I grey, tarsomere II dirty white with dark grey apex, tarsomere III grey, tarsomere IV dirty white, terminal tarsomere dark grey. Mid-femur dirty white with dark brown apex, mid-tibia white with three dark ochreous patches of similar size, on base, at middle and at apex, tibial spurs white, tarsus dirty white with five dark ochreous patches, tarsomere I dirty white with two large ochreous patches at base and at apex, and a small ochroeus patch at middle, tarsomere II white with dark ochreous apex, tarsomere III greyish ochreous, tarsomere IV dirty white, terminal tarsomere dark grey. Hind femur dirty white with ochreous base, hind tibia ochreous with whitish midden part, tarsus white with two ochreous patches, tarsomeres I–II white with ochreous apices, tarsomere III–IV white, terminal tarsomere grey.

Abdomen: Dorsally dark grey ochreous, ventrally ochreous with silvery shine.

Male genitalia. Unknown.

Female genitalia (Fig. 344). Papillae anales moderate, flattened caudally, with distant long setae at outer margin and dense setae in middle of papilla, setae of approximately equal length, ca.100–102 µm; basal parts of anterior apophyses narrow, elongate, separated; a slender slightly curved and unequal needle-like strongly sclerotized projection ca. 84 µm long (holotype), extending from basal bar of papillae anales to middle of segment VIII. Posterior apophyses strongly sclerotized, 173 µm long (holotype), with narrow triangular bases, straight, broader at basal 1/2, gradually tapering with sharp pointed apices. Segment VIII sclerotized, connected ventrally and dorsally, quite short, ca. 1/3–1/2 length of posterior apophyses; anterior apophyses as long as posterior ones (171 µm in holotype), slender, with broader triangular bases, gently tapering towards apices, slightly curved, parallel to each other, reaching middle of segment VII. Segment VII trapezium-shaped, thick, without any special strong sclerotizations. Ostium bursae located in subposterior sector of sternum VII, antrum short, sclerotized tube, 30 µm long, with stronger sclerotized anterior part, and a bifurcate plate, situated just anteriad sterigmatic, cuticle sclerotization; sterigma lamella antevaginalis forms large, sclerotized, triangular fold on posterior margin of segment VII, a narrow sclerotized ring on anterior part of antrum, sterigma lamella post-vaginalis shaped as strongly sclerotized small crescent. Ductus bursae about 660 µm long, broad at initial section close to antrum gradually tapering towards mid-sector and again broadening close to corpus bursae. Corpus bursae moderate, oval shaped, as large as 270 × 187 µm (in holotype); membranous area covered with sharp spicules, a stellate circular signum set with 9–10 broad, marginal, dentate rays, situated in middle of corpus bursae; ductus spermatecae short, 177 µm long, arising from anterior part of segment VII, with about 21–22 spiraled tight convolutions terminating in large bean-shaped bulla spermathecae, situated in segment VI, close to posterior margin.

Etymology. Named after Maulid Mwatawala, entomologist at the Sokoine University of Agriculture in Tanzania, to honour his efforts to organize the entomological activities in East Africa.

Habitat. Adults were collected in a small, partially degraded savannah-like, natural biotope rich in low-growing woody *Acacia* tree and bushes and thick low dry herbarious vegetation. The area was surrounded by cultivated agricultural areas (orchards and maize fields) (Fig. 445).

Host plant(s). Unknown.

Flight period. Adults fly from mid-May to mid-July.

Distribution. (Fig. 405). Known only from the type locality, Morogoro area, Tanzania.

55. *Phyllonorycter ocimellus* De Prins, new species

(Figs 106, 268–270, 345, 406, 431, 440)

Diagnosis. Freshly emerged moths of *P. ocimellus* have distinctive deep ochreous ground colour of forewings, very slender and weakly edged fascia, rather large area of dark brown–blackish scales at termen. Relying only on genital characters, *P. ocimellus* can be superficially confused with *P. farensis*, *P. rhynchosiae* and *P. fletcheri*. All four species possess a long saccus, a very long aedoeagus, and bluntly pointed valva bearing one projection. *P. ocimellus* can be superficially confused with *P. farensis*, but a narrow transtilla, shorter saccus, and 14-ray stellate signum on bursa copulatrix of females distinguish *P. ocimellu*s from *P. farensis*. *P. ocimellus* differs from *P. farensis*, *P. fletcheri*, and *P. rhynchosiae* in having longer valvae with a curved ventral margin; and the transtilla in *P. ocimellus* is moderate with lateral apophyses longer than horizontal bar of transtilla. Female genitalia of *P. ocimellus* and other species of the *rhynchosiae* group (except *P. mida* and *P. mwatawalai*) are similar in having a large boomerang-like fold of the sterigma, an oval signum area, and a stellate signum on the corpus bursae. The star-like signum edged by 14 dentate rays in the female genitalia of *P. ocimellus* distinguishes it from all other species.

Holotype: ♂, [1] '**Kenya** / Taita Hills, 1600 m / Ngangao / 03°22'S 38°21'E / mine 09.iv.2001 / leg. J. & W. De Prins'; [2] 'ex *Ocimum suave* Willd. / 24.iv.2001'; [3] 'Gen. Prep. 3692♂ / De Prins'; [4] 'MRAC/KMMA / 00352'; specimen ID: [5] 'RMCA ENT 000003353'; [6] 'Holotype ♂ / *Phyllonorycter* / *ocimellus* / De Prins, 2012', in RMCA.

Paratypes: 4♂, 5♀ (including 3♂ and 2♀ genitalia preparations). **Kenya:** 3♂, Taita Hills, 1600 m, Ngangao, 03°22'S 38°21'E, mine *Ocimum suave*, 09.iv.2001, leg. J. & W. De Prins; ex *Ocimum suave* Willd., 13.iv.2001, 24.iv.2001, 03.v.2001, gen. prep. De Prins 3400♂ (MRAC/KMMA 00349), 3402♂ (MRAC/KMMA 00350), specimen IDs: RMCA ENT 000003351, 000003352, in RMCA, 1♂ in BMNH. 5♀, same locality data, ex *Ocimum*

suave Willd., from 13.iv.2001 to 26.iv.2001, gen prep. De Prins 3401♀ (MRAC/KMMA 00460), 3693♀ (MRAC/KMMA 00353), specimen IDs: RMCA ENT 000003350, 000003356, 000003357, 000003364; in RMCA, 1♀ in BMNH, 1♀, specimen ID: RMCA ENT 000003264, DNA voucher CLV12707, in CCDB. 1♂, Kakamega Forest, 00°20'N 034°51'E, 1645 m, mine 14.x.2001, leg. J. De Prins; e.l. *Ocimum gratissimum* L. (Lamiaceae/Labiateae) 03.xi.2001, gen. prep. De Prins 3408♂ (MRAC/KMMA 00351), specimen ID: RMCA ENT 000003355, in RMCA.

Description. *Adult* (Fig. 106). Forewing length: 3.1–3.4 mm (Holotype: 3.41 mm)

Head: Vertex tufted, projected medially over fronto-clypeus, piliform scales ochreous with intermixed white, predominantly posteriorly; frons white with faint touch of golden sheen. Haustellum developed, light beige. Maxilary palpus golden white. Labial palpus drooping, golden whitish, 1.5× as long as diameter of compound eye, with a few dark brown scales laterally. Antennae almost as long as forewing with 39–40 flagellomeres, chestnut brown intermixed with white and ochreous piliform scales dorsally and dirty white ventrally; pedicel whitish with a few chestnut brown scales dorsally forming an irregular patch; scape ochreous dorsally and dirty white ventrally, pecten very short.

Thorax: Ochreous with white, irregular, arc-line anteriorly; tegulae brown with yellowish white bases. Forewing elongate, ground colour dark ochreous, with white markings consisting of very short basal streak, two fasciae, two costal strigulae and one dorsal strigula; basal streak very short, a few white scales, first fascia at 1/6, narrow, twice curved, oblique towards costa, not clearly edged but a few black edging scales can be found at costal sector of first fascia (holotype and 4 paratypes, 2 paratypes without any black scaling at first fascia); second fascia broader than first fascia, almost straight, gently narrowing and with a slight curve at midline of forewing, edged mainly basally with a few black scales apically at middle of second fascia, a row of black scales runs along dorsal margin of forewing between first and second fascia; 1 costal at 3/4, small triangular shape, reaching 1/4 of forewing width, sparsely edged on both sides, first dorsal strigula opposite first costal strigula, small triangular shape, reaching to 1/4 of forewing; a broad intermediate ochreous area separating first strigulae with a small area of black scales, forming reactangular spot which extends from top of first costal strigula to middle of forewing; second costal strigula irregular hardly visible at apical area surrounded by black scales become more numerous at termen; fringe line is not clearly expressed, but a short line of brown scales is present at outer margin of tornus; fringe long, light fuscous, with golden shine to tornus, bright ochreous at tornus, and short pale ochreous at apex. Hindwing greyish fuscous with fringe of same colour as hindwing but tinged with golden shine towards apex. Legs white with dark fuscous markings; fore coxa dirty whitish, femur dark fuscous dorsally, whitish ventrally, tibia fuscous, tarsomere I dark brown with median dirty white patch, tarsomere II with dirty white basal and dark fuscous apical halves, tarsomere III dirty white with fuscous apex, tarsomeres IV dark fuscous, tarsomere V dirty white. Mid-femur pale beige with a few brown scales, tibia brownish fuscous with dirty white median band, tibial spurs dirty white with fuscous median patch, tarsomeres dirty white with dark fuscous subapical band, tarsomere II dirty white with fuscous apex proceeding on tarsomere III, tarsomeres IV-V dirty white. Hind femur dirty white with fuscous basal patch, tibia dirty white basal half with few fuscous scales laterally and fuscous apical half, medial spurs fuscous with dirty white bases and apices, apical spurs dity white with median brownish fuscous patch, tarsomere I dirty white with fuscous subapix, tarsomeres II–III dirty white with fuscous apical half, tarsomeres IV–V dirty white.

Abdomen: Dark fuscous dorsally, light grey ventrally. Sternite VIII in males broad and short, strongly sclerotized at subbasal lateral margin, gently rounded at apex.

Male genitalia (Figs 268–270). Tegumen rather short, poorly sclerotized, slightly enlarged subdorsally, narrowing posteriorly forming triangle covered with microsinules and microtrichiae (seen at 200× enlargement), tuba analis not protruding. Valva sclerotized, costal margin gently curved, ventral margin almost parallel to costal to 1/2 of valval length, apical half of valva sharply narrowing and ends with blunt apex; ventral margin of valva with weakly sclerotized, ellipsoid, eye-shaped projection which starts at middle of ventral margin of valva, runs parallel to valval margin, and not extends beyond apex; numerous micro tubercules and long setae as long as width of projection dispersed along entire ventral surface of valval projection, more dense at ventral margin of projection; a slender, sclerotized line running parallel to ventral margin of valva, a second strongly sclerotized, dentate line adorned with 5 short, medially directed teeth on lateral surface of valva from middle to apex; apical 3/4 of ventral surface of valva covered with scale tubercules and soft long setae. Vinculum moderate width, strongly sclerotized U-shaped, ventral section of same width, with slender cylindrical saccus 1.5× length of valva, slightly broadering

and bulged caudally; transtilla well developed, thickly sclerotized, U-shaped, with broader horizontal bar and sharp lightly tapering lateral apophyses. Aedoeagus, very long, almost 2× as long as valva and about 1.4× as long as saccus, cylindrical, gently narrowing from broader coecum to very narrow vesica; vesica with two long, thick, rod-like cornuti, ca. 1/3 length of aedoeagus.

Female genitalia (Figs 345). Papillae anales wide and flat with rather abundant long setation on whole posterior sector, especially toward midden area; basal bar thickly sclerotized, narrow, widening ventrad at bases of posterior apophyses; a slender needle-like well sclerotized projection going from posterior sector of papillae anales and reaching posterior margin of segment VII. Posterior apophyses straight, blunt needle-shaped, strongly sclerotized, especially basal and apical thirds, reaching beyond ostium bursae to middle of segment VII. Segment VIII slightly longer than papillae anales weakly connected with lateral sclerotized connections. Anterior apohyses slightly shorter than posterior one, straight, narrow, parallel to each other with blunt apices, reaching anterior 1/4 of segment VII. Ostium bursae circular, located in posterior 1/3 of segment VII, antrum thickly sclerotized and shaped as sclerotized round cup covered with minute scobination; sterigma with lamella antevaginalis forming large sclerotized boomerang-like fold, occupying midden sector of segment VII. Ductus bursae twice as long as sternum VII, very slender; with short and thicker sclerotized antrum. Ductus seminalis arising from anterior end of antrum. Ductus spermathecae with efferent canal forming 21 coils having smaller diameter before vesicle; vesicle in posterior sector of segment VI. Corpus bursae moderate, rounded, consisting of two sectors, large semirounded area covered with fine short spines and smooth area with circular signum located subterminally; stellate signum set with 5 fine spines which are assembled close to each other inside circle, directed laterally and 14 broad marginal dentate rays.

DNA sequences. A DNA barcode is available (Molecular sample code: Poci [JX888192]; Table S1).

Etymology. The species name is formed from the root of the host plant generic name *Ocimum* and the Latin suffix –ellus, having a diminutive meaning. Latin ending –us denotes masculine gender.

Habitat. Mines of *P. ocimellus* have been found in humid, secondary forests at an altitude of around 1600 m (Fig. 440).

Host plant(s). Lamiaceae: *Ocimum gratissimum* L. (= *O. suave* Willd.) (Fig. 431).

Mine. An underside tentiform mine, elongate or oval, 16–19 mm long. The mine is opaque, creamy or light brown. Pupation in white cocoon. Exuvium protrudes epidermis of leaf before adult emergence. Mines were found locally but abundant in a small area at the edge of a forest where mostly *Ocimum suave* was growing among other green low vegetation. The constant green vegetation in Taita Hills is due to the high humidity of 80% and low temperature (ca. 18°C) on the Ngangao top of the Taita Hills in early April. A single mine was found in mid-October after the short rainy season at the edge of Kakamega Forest, where *O. gratissimum* is abundant.

Flight period. Adult specimens emerged from mines in mid-April, early May and early November.

Distribution. (Fig. 406). Known only from the type locality in East Kenya and one locality in West Kenya.

56. *Phyllonorycter pavoniae* (Vári, 1961)

(Figs 107, 108, 131, 133, 271, 272, 346, 407)

Lithocolletis pavoniae—Vári (1961: 217–218; pl. 23, fig. 4; pl. 65, fig. 7; pl. 105, fig. 2.)
Phyllonorycter pavoniae—Vári & Kroon (1986: 66, 136, 157), Kroon (1999: 61, 110), Dall'Asta *et al*. (2001: 34), Vári *et al*. (2002: 26), De Prins & De Prins (2005: 331).

Diagnosis. The wing pattern of *P. pavoniae* does not provide sufficient diagnostic characters to separate this species from many other *Phyllonorycter* species that posess two fasciae, two costal strigulae and one dorsal strigula. The main means for identification are the male genitalia. Only in *P. pavoniae* is the valval ventral process narrow, long digitate. The shape of valval process makes *P. pavoniae* readily diagnosable among the *rhynchosiae* species group. The longer tubular antrum and stellate signum with 16 marginal rays can separate *P. pavoniae* from the remaining species in the *rhynchosiae* species group.

Material examined. *Holotype*: ♂, [1] [**South Africa**] 'Chipise, [Tshipise (Vári 1961: 218)] T[rans]v[aa]l. / 28.v.1953 / [leg.] L. Vári/ Ac.[quisition] no: 770'; [2] '12'; [3] 'G[enitalia] / 7140'; [4] '*Lithocolletis / pavoniae* Vári / ♂ HOLOTYPE No 6391', in TMSA.

Paratypes: 3♀, 1♂ (including 2♀ genitalia preparations). **South Africa**: 1♀, Chipise, T[rans]v[aa]l., 11.v.1953, [leg.] L. Vári, Ac.[quisition] no 770; G.[enitalia] 7141; *Lithocolletis pavoniae* Vári ♀ ALLOTYPE No 6392, in TMSA. 1♀, Chipise, Tvl.[Transvaal], 22.v.1953, [leg.] L. Vári, Ac.[quisition] no 770; 3102; *Lithocolletis pavoniae* Vári PARATYPE No 6393, in TMSA. 1♂, Chipise, Tvl. [Transvaal], 18.v.1953, [leg.] L. Vári, Ac[quisition]. no 770; *Lithocolletis pavoniae* Vári PARATYPE No 6395, in TMSA. 1♀, Alexandria (Langebos), 9.xii.1954, Ac.[quisition] no 1456; G.[enitalia] 7497; *Lithocolletis pavoniae* Vári PARATYPE No 6394, in TMSA. *Additional material:* 1♂, 1♀ (including 1♂ and 1♀ genitalia preparations) and 12 specimens. **South Africa**: 1♀, Barberton, 17.xii.1910, [leg.] A. J. T. Janse, G.[enitalia] 7503, teste Meyrick, 3006, in TMSA. 1♂, Kruger National Park Survey, Punda Milia, 18–30.v.1975, Ac.[quisition] no. 3412, gen. prep. De Prins 3694♂ (MRAC/KMMA 00354), specimen ID: RMCA ENT 000003360, in RMCA. 12 specimens, the same locality data, in TMSA.

Redescription. *Adult* (Figs 107, 108, 131, 133). Forewing length: 2.5–3.0 mm.

Head: Vertex tufted ochreous, with a bunch of white piliform scales posteriorly; frons whitish with a very faint pale ochreous suffusion. Labial palpus white outwards and with dark fuscous scales inwards, proboscis pale beige. Antenna slightly shorter than forewing, fuscous above, not clearly ringed but apical scales of flagellomeres brown tipped; underside whitish; scape pale ochreous anteriorly and dark ochreous posteriorly, 8–10 short pecten dirty white, pedicel as rest of flagellomeres.

Thorax: Shiny bronze ochreous with a curved transverse white line in middle, tegula bronze ochreous with white apex. Forewing elongate, ground colour bronze ochreous with a few white and black scales at base, forming a very short line; white markings consisting of two transverse fasciae, two costal and one dorsal strigulae; first fascia at 1/4 of forewing, very slightly curved in middle, 2× broader at dorsal than at costal margin, finely edged with dark brown scales basally, apical margin is not clearly defined, anastomosing to ground ochreous colour (in holotype), but clearly edged apically in many other specimens; second fascia at middle of forewing, gently angulated subcostally, broader than first fascia, dorsal margin twice as broad as costal one, finely edged with a row of dark brown scales basally (in holotype), edged on both sides in many other specimens; first costal and first dorsal strigulae at 3/4 of forewing, triangular shaped, reaching middle of forewing with their angles, clearly edged basally and indistinctly defined apically, second costal strigula at apex, comma shaped, edged with dispersed dark brown blackish scales, apical sector darker ochreous, an irroration of blackish scales extends from junction of first costal and first dorsal strigulae along termen sector; fringe short pale ochreous from apex to tornus, and long pale greyish along dorsal margin and tornus. Hindwing pale greyish beige, slightly shiny; fringe very pale fuscous. Fore femur blackish fuscous, tibia with a small subbasal and median light fuscous patch on outer side, tarsomeres I –III fuscous, tarsomeres IV–V beige, mid-femur with base and apical half irrorated with dark fuscous, mid-tibia with blackish fuscous base and two very oblique, blackish-fuscous stripes at 1/3 and 2/3, tarsomere I with a subbasal and a subapical blackish fuscous patches, tarsomere II white with blackish-fuscous apex, tarsomere III with basal two thirds blackish-fuscous, tarsomere IV white, tarsomere V pale beige; hind femor with a basal and a subapical fuscous patch, tibia beige, median spurs with dispersed sparse dark brown scales, apical spurs with dark brown subapices, in male hind tarsomere I and II with a faint subapical ochreous patch, tarsomere III with very faint subapical ochreous patch, tarsomere IV–V dirty white; in female hind tarsomere I with faint subapical ochreous patch, tarsomeres II–V dirty white.

Abdomen: Fuscous dorsally and pale ochreous whitish ventrally. Segment VIII in males is moderate, shorter than tegumen.

Male genitalia (Figs 271, 272). Tegumen arms narrow, sclerotized, running parallel, not jointed at apex, about 2/3 of length of valva, broad basally, more thickly sclerotized at basal part and short, weakly sclerotized, triangular, bluntly pointed at apex, covered with short stiff small microsetae. Valva moderate, projected laterally; basal 1/4 of lateral surface broad, slightly puffed, without setae; apical 3/4 of valva consisting of two valval longitudinal surfaces of different length and distinctive sacculus; dorsal and median surfaces joint by narrow suture; dorsal margin gently sinuates, median surface extends significantly, apical half of valva covered with sparse but long setae; sacculus bears a process with 7–8 long setae at apex. Vinculum broad, strongly sclerotized, U-shaped with slender saccus, about same length as segment VIII; transtilla well developed, thickly sclerotized half rounded, bow shaped. Aedoaegus rather long, slightly longer than valva, slender, almost straight, enlarged at coecum; vesica with one thick, rod-shaped, submarginal and subapical cornutus, ca. 1/10 as long as aedoeagus.

Female genitalia (Fig. 346). Papillae anales moderate, oval, flattened distal-proximatelly, with setation of variable length, basal bar narrow, weakly sclerotized, slightly wider ventrad posterior apophyses. A slender needle-

like sclerotized projection extends from basal bar of papillae anales and reaches posterior 2/5 of segment VIII. Posterior apophyses narrow, apically slightly separating, with pointed apices, straight, reaching posterior margin of segment VII. Segment VIII narrow, weakly sclerotized, connected dorsally and ventrally. Anterior apophyses almost as long as posterior, slightly curved, slender, reaching middle of segment VII, beyond of ostium bursae, parallel to each other, apically pointed. Antrum located in posterior 1/3 of segment VII, thickly sclerotized shaped as short tube; ostium bursae circular, sterigma anteriad antrum forming a sclerotized fold, which occupies midden sector of segment VII. Ductus bursae narrow, slender, moderately long, lightly sclerotized. Corpus bursae moderate, globular, with a large oval area set with fine and short spines and a circular signum with 16 fine dentate rays along its margin.

Variation. *Phyllonorycter pavoniae* is a variable species. The pattern of forewing can vary in following markings: the first costal and first dorsal strigulae can be joined into a third fascia, and the apical costal strigula can be reduced to form an obscure, dirty pale patch; the apical edging with blackish scales of first and second fascia can be absent; the apical sector of forewing can be of different shading from darker ochreous to brown. In male genitalia a ventral process of sacculus can vary slightly in length. The antrum in the female genitalia may have one or two transverse, obliquely pointing folds; the sterigma and cuticular fold forming part of lamella antevaginalis varies slightly in size; and the position of the stellate signum on the corpus bursae varies slightly, depending of how shrivelled the corpus bursae is in dissected specimens.

Habitat. Mines of *P. pavoniae* were collected in southern Africa between the southern latitudes of 22° and 33°.

Host plant(s). Malvaceae: *Pavonia burchellii* (DC) R. A. Dyer, *P. praemorsa* Cav.—Vári 1961: 218, Kroon 1999: 61, Dall'Asta *et al*. 2001: 34, De Prins & De Prins 2005: 331.

Mine. A very small, oblong, semi-transparent, tentiform mine on the underside of the leaf; fine black frass at one end of mine; exuvium protrudes epidermis of the leaf before adult emerges (Vári 1961: 218, De Prins & De Prins 2005: 331). The mining period is ca. 10 days (Vári's note No 1456 in the manuscript notebook of 29/11/1954).

Flight period. Adults were collected in the period from early December (earliest record: 9 December in 1954) to late May (latest record: 30 May in 1975).

Distribution. (Fig. 407). Recorded from several localities in South Africa (Vári 1961: 218).

57. *Phyllonorycter rhynchosiae* (Vári, 1961)

(Figs 109, 110, 273, 274, 347, 348, 408)

Lithocolletis rhynchosiae—Vári 1961: 216–217; pl. 23, fig. 3; pl. 65, fig. 9; pl. 105, fig. 1; pl.112, fig. 6.

Phyllonorycter rhynchosiae—Vári & Kroon (1986: 76, 136, 157), Kroon (1999: 68, 114), Dall'Asta *et al*. (2001: 35), Vári *et al*.(2002: 26), De Prins & De Prins (2005: 341), De Prins & Mozūraitis (2006: figs 3, 7).

Diagnosis. *Phyllonorycter rhynchosiae* closely resembles *P. pavoniae, P. gozmanyi, P. farensis, P. fletcheri,* and *P. mida*. However, the species differs from the others belonging to the *rhynchosiae* species group in that the median fascia of *P. rhynchosiae* is strongly angulated both basally and apically. Male genitalia resemble those of *P. farensis, P. fletcheri,* and *P. maererei* in having one sclerotized projection on the ventral surface of valva and long slender saccus and aedoeagus. A very broad transtilla in *P. farensis* separates this species from *P. rhynchosiae*. Three species have one ventral flap-like projection, originating at mid- or subapical sector of ventral margin of valva, narrow transtilla, long saccus and aedoeagus: *P. rhynchosiae, P. fletcheri,* and *P. maererei*. Differences between *P. rhynchosiae* and the other two species are in the shape of valva, shape of valval projection and ratio of valval/saccus/aedoaegus length. Valva is 4.7× longer than broad in *P. rhynchosiae* and 4.0× in *P. maererei*. It is 2.7× longer than broad in *P. fletcheri*. Valval ventral projection in *P. rhynchosiae* harp-shaped, in *P. fletcheri* trapezoid shaped; it is hockey stick-shaped in *P. maererei*. Saccus in *P. rhynchosiae* is 1.4× longer than valva; it is 1.12–1.13× longer in *P. fletcheri* and *P. maererei*. Aedoeagus is more ca. 2× longer than valva in *P. rhynchosiae* and *P. fletcheri* and it is 1.7× longer in *P. maererei*. The ratio aedoeagus/saccus is 1.40 in *P. rhynchosiae*, 1.72 in *P. fletcheri* and 1.65 in *P. maererei*. The female genitalia of *P. rhynchosiae* are distinguished from *P. farensis* by the location of ostium bursae which is in the middle of VII segment in *P. farensis* and at the posterior margin of segment VII in *P. rhynchosiae*. The female genitalia of *P. fletcheri* and *P. maererei* are unknown.

Material examined. *Holotype*: ♂, [1] [**South Africa**] 'Pretoria / 14.iii.1949 / [leg.] L. Vári' ; [2] 'Ac.[quisition] no.130'; [3] '3'; [4] '4'; [5] 'HT'; [6] 'G[enitalia] / 7122'; [7] 'photo'; [8] '*Lithocolletis / rhynchosiae* Vári / ♂ HOLOTYPE No 6379', in the TMSA.

Paratypes: 3♂, 9♀ (including 2♂ and 2♀ genitalia preparations). **South Africa:** 1♂, Pretoria, 15.viii.1949, [leg.] L. Vári, Ac.[quisition] No. 176; G[enitalia] 7124; *Lithocolletis rhynchosiae* Vári PARATYPE No 6385, in TMSA. 1 ♂, Hartebeestpoort Dam, P.[re]t[ori]a Dist.[rict], 11.ii.1955, [leg.] L. Vári, Ac.[quisition] No. 1535; G[enitalia] 7498'; *Lithocolletis rhynchosiae* Vári PARATYPE No 6390, in TMSA. 1♀, Pretoria, 09.vi.1949, [leg.] L. Vári, Ac.[quisition] No. 165; G[enitalia] 7123; AT; *Lithocolletis rhynchosiae* Vári ALLOTYPE No 6380, in TMSA. 1♀, Pretoria, 01.iii.1949, [leg.] L. Vári, Ac.[quisition] No. 132; G[enitalia] 7125; *Lithocolletis rhynchosiae* Vári PARATYPE No 6386, in TMSA. 7 specimens, Pretoria, 16.viii.1949, [leg.] L. Vári, Ac.[quisition] No. 176; *Lithocolletis rhynchosiae* Vári PARATYPE No 6381; same locality data, 09.i.1951, [leg.] L. Vári; *Lithocolletis rhynchosiae* Vári PARATYPE No 6382; same locality data, 30.vi.1952, [leg.] L. Vári, Ac.[quisition] No. 529'; *Lithocolletis rhynchosiae* Vári PARATYPE No 6383; same locality data 15.viii.1949, [leg.] L. Vári, Ac.[quisition] No. 176, *Lithocolletis rhynchosiae* Vári PARATYPE No 6384; same locality data 23.vii.1949, [leg.] L. Vári, Ac.[quisition] no. 176; *Lithocolletis rhynchosiae* Vári PARATYPE No 6387; same locality data, 10.viii.1949, [leg.] L. Vári, Ac.[quisition] no. 176; *Lithocolletis rhynchosiae* Vári PARATYPE No 6388; same locality data, 12.iii.1949, [leg.] L. Vári, Ac.[quisition] No. 132, *Lithocolletis rhynchosiae* Vári PARATYPE No 6389, in TMSA.

Additional material: **South Africa**: 1♀ 'Pretoria 15.viii.1949/ [leg.] L. Vári/ Ac[quisition]. no. 176', in ZMHB. This specimen is not mentioned in the original description (Vári 1961: 217) but it bears exactly the same data as paratype no 6388 in the TMSA and it is labeled as a paratype in the ZMHB.

Redescription. *Adult* (Figs 109, 110). Forewing length: 3.0–3.3 mm.

Head: Vertex tufted, with shorter golden ochreous scales directed anteriorly, appressed over anterior part of vertex, with longer, white, piliform scales posteriorly; frons shiny white. Labial palpi white with a few greyish scales on terminal palpomere. Antenna slightly shorter than forewing, pale ochreous greyish, not clearly ringed but with fuscous apical thirds of flagellomeres, ventrally whitish; scape white anteriorly and ochreous posteriorly; pedicel and first flagellomere white.

Thorax: Ochreous with a curved white line anteriorly, tegulae ochreous with white apices. Forewing elongate, ground colour golden ochreous with some white scales at base, but not forming a line; white markings consisting one angulated fascia (in three paratypes fascia interrupted), two costal and two dorsal strigulae; fascia in middle of forewing angulated towards apex, edged with black scales basally and with a few black scales apically; first costal strigula at 3/4 triangular, not reaching middle of forewing, edged basally, second costal strigula at apex; first dorsal strigula at 1/4, oblique, running beyond midline of forewing, but not reaching costa, blackish-edged on both sides, second dorsal strigula opposite first costal strigula, triangular blackish-edged basally, dark brown scales dispersed in tornal sector. Hindwing pale greyish, slightly shiny; fringe very pale fuscous, with whitish apical halves. Fore femur suffused with dark fuscous, tibia dark fuscous with a median and subapical white patch on outer side, tarsomeres I and II white with dark fuscous apical halves, tarsomere III blackish fuscous, tarsomeres IV and V blackish fuscous in male, whitish or greyish in female. Mid-tibia dirty white with two oblique, narrow, ochreous fuscous lines at 1/3 and 2/3, tarsomere I dirty white with a basal and subapical dark fuscous patch, segment III with basal half, terminal tarsomere entirely dark fuscous. Hind coxa dirty white, hind tibia with a small subapical ochreous-fuscous patch on outer side, tarsomere I dirty white with a few dark fuscous scales near base, tarsomere II with a small apical fuscous patch, tarsomere III–IV dirty white, terminal tarsomere dark fuscous.

Abdomen: Greyish fuscous dorsally, whitish, without conspicuous sex-scaling ventrally. Eighth sternum of male moderate, rounded caudally.

Male genitalia (Figs 273, 274). Tegumen short membranous, truncate apically; tuba analis not protruding. Valvae symmetrical, valva moderate length, broadened at middle as a small bulge, slightly tapering towards cuculus, finely setose; ventral margin of valva starting from small bulge possesses well developed weakly sclerotized rounded caudally projection which is broader than subapical width of valva. Vinculum narrow, U-shaped, moderate sclerotized; saccus slender and very long, 1/3 longer than valva. Transtilla well developed, strongly sclerotized. Aedoeagus almost straight and very long, twice as long as valva and 1.5× as long as saccus.

Female genitalia (Figs 347, 348). Papillae anales triangular gently rounded apically, sparsely covered with setae, basal bar broad, strongly sclerotized; a slender needle-like slerotized projection going from basal part of papillae anales and reaching anterior sector of segment VIII. Posterior apophyses strongly sclerotized, long, 3× as

long as width of papillae anales, twice thicker at basal half, reach middle of anterior apothyses, with blunt apices. Segment VIII weakly sclerotized, well connected ventrally and dorsally. Anterior apophyses slender, almost straight, 1/3 shorter than posterior ones, reaching middle of segment VII. Antrum, simple, very short, weakly sclerotized, ostium bursae located at posterior margin of segment VII, circular, weakly sclerotized. A sterigmatic fold like cuticle sclerotization on segment VII. Ductus bursae very long, narrow, weaklysclerotized. Corpus bursae moderate, almost rounded with a large oval membranous area, set with short and fine spines and with a small circular, sclerotized stellate signum with 11 fine dentate margin and 11 small spines in middle.

Habitat. Mines of *P. rhynchosiae* were collected on urban hills of Pretoria (above Pierneefstraat, in Meintjeskop, Adcockstraat, Hartbeespoortdam (Vári, unpublished notes No 0120 from 30/01/1949; No 0130 from 27/02/1949; 0165 from 31/05/1949; 0176 from 20/07/1949; 0529 from 07/06/1952; No 1300 from 30/05/1954; and No 1535 from 06/02/1955).

Host plant(s). Fabaceae: *Eriosema psoraloides* (Lam.) Baill., *Rhynchosia confusa* Burtt Davy, and *Rhynchosia nitens* Benth. ex Harv.—Vári 1961: 217, Kroon 1999: 68, Dall'Asta *et al*. 2001: 35, De Prins & De Prins 2005: 341.

Mine. A rather small, oval, semi-transparent, infra tentiform mine, arbitrarily in disc, no distinct folds, fine black frass loosely throughout mine, but later used to cover the whitish cocoon; pupa protrudes through lower epidermis before adult emerges (Vári 1961: 217, De Prins & De Prins 2005: 341). Mining period is ca 7–15 days (Vári note No 0130 in manuscript notebook of 27/02/1949, No 0165 from 31/05/1949, No 0529 from 07/06/1952).

Flight period. Specimens were collected during two periods of the year: from early January to mid-March and from early June to mid-August.

Distribution. (Fig. 408). Presently known from South Africa (Pretoria city and the Hartebeespoort Dam in the suburb of Pretoria) (Vári 1961: 217).

The *ruwenzori* group

This group, which includes one species, *Phyllonorycter ruwenzori* De Prins, n. sp., is phenotypically very distinct and is thus treated in its own group. Three almost parallel white fasciae on forewing easily separate this species group from other species groups. Male genitalia are also very distinct, with short, truncate, broad tegumen and long lobe-like valva with broadly enlarged cucullus. The male genitalia is somewhat similar to the *leucaspis* group, but the straight saccus and highly divergent female genitalia undoubtfully distinguishes the two groups apart. Female genitalia of the *ruwenzori* and *melhaniae* species groups have a sclerotized area on corpus bursae situated close to the interception of ductus bursae. However, the sclerotized sterigma is reduced in the *ruwenzori* species group and developed in the *melhaniae* species group.

58. *Phyllonorycter ruwenzori* De Prins, new species

(Figs 111, 275–277, 349, 409)

Diagnosis. Externally *Phyllonorycter ruwenzori* is very similar to *Phyllonorycter triarcha* (Meyrick, 1908), a pest species feeding on cotton leaves, *Gossypium* spp. [Malvaceae]) and distributed in India, Indonesia, West Malaysia, Philippines, and Thailand (the female holotype of *Phyllonorycter triarcha* was not found in the collection of the BMNH on 15.xii.2011; for illustrations see Kuroko & Lewvanich 1983: figs 2, 10, 15; for distribution and host plants see De Prins & De Prins 2012).

Holotype: ♂, [1] '**Uganda** / Ruwenzori Range / Bundibugyo, 3,440 ft / 22.viii–3.ix.1952 / [leg.] D. S. Fletcher'; [2] 'Ruwenzori Exped.[ition], B.[ritish] M.[useum] 1952-566'; [3] 'B.[ritish] M.[useum] ♂ No. 10147'; [4] 'Holotype ♂ / *Phyllonorycter / ruwenzori* / De Prins, 2012', in BMNH.

Paratypes: 4♂, 5♀ (including 1♂ and 1♀ genitalia preparations). **Uganda**: 1♂, Ruwenzori Range, Bundibugyo, 3,440 ft, 22.viii–3.ix.1952, [leg.] D. S. Fletcher, Ruwenzori Exped.[ition], B.M. 1952-566, in BMNH. 4♀, same locality data, gen. prep. De Prins 3652♀ (BMNH 32534), in BMNH. 3♂, Ruwenzori Range, Semliki Forest, 2,850 ft, 22.viii–3.ix.1952, [leg.] D. S. Fletcher, Ruwenzori Exped.[ition], B.M. 1952-566, gen. prep. De Prins 3654♂ (BMNH 32535), in BMNH. 1♀, same locality data, in BMNH.

TABLE 4. Diagnostic comparisons between adults of *P. ruwenzori* and *P. triarcha*.

Character	*ruwenzori*	*triarcha*
Basal streak	absent	present
White curved stripe on apex of forewing	absent	present
Black irroration on apex and termen of forewing	absent	present
Male genitalia: valvae	long, longer than tegumen	short, compact, shorter than tegumen
Male genitalia: cucullus	a beak-shaped projection absent	terminates with a beak-shaped projection
Male genitalia: aedoeagus	~ 2× longer than tegumen	~ as long as tegumen
Female genitalia: sterigmatic sclerotization on segment VII	not developed	arc-shaped, strongly sclerotized suture
Female genitalia: ductus bursae	~ as long as segment VII	~ twice as long as segment VII
Female genitalia: corpus bursae	large, ca. twice longer than segment VII	small, shorter than segment VII
Female genitalia: signum on corpus bursae	posterior wall of corpus bursae bears heavily sclerotised area of ca. 30–32 sharp and thick, small spines	small transverse signum situated in middle of corpus bursae

Description. *Adult* (Fig. 111). 2.3–2.5 mm.

Head: Vertex tufted with shiny white, blunt, piliform scales; frons smooth, shiny white covered with long, narrow, appressed, white scales, between eyes light ochreous. Labial palpus as long as diameter of compound eye, dirty white with golden shine. Maxillary palpus bright white, proboscis light golden. Antenna as long as forewing, light ochreous-white, shiny, not ringed; smooth scaled, dirty white slender scales in flagellomere intermixed with light ochreous narrow smooth blunt scales, terminal flagellomere dark ochreous; pedicel shiny golden white; scape snow-white in anterior half intermixed with a few light ochreous scales posteriorly, pecten white, stout, and as long as diameter of eye.

Thorax. shiny white with light ochreous scales posteriorly, with some shiny golden scales, tegulae shiny white. Forewing elongate, ground colour ochreous brown with white markings consisting of one costal strigula and three fascia. Basal streak absent. First costal strigula is a small dot shape round white patch at costal base of forewing, not edged, first fascia at 1/3 narrow oblique, transverse band, of almost equal width at dorsal and costal margins, directed towards apex, edged on both sides with a row of small, sparse, black scales; second fascia at 1/2, wider than first fascia, almost parallel to first fascia, edged by a row of black scales from both sides, third fascia at 5/6, constricted from outer margin at midline of forewing, edged basally by thin black line; irroration of dark fuscous scales at tornus, two rows of black scales along margin of costal region of third fascia and reaching constriction, apex dark ochreous; fringe short ochreous on apical margin of forewing, short ochreous with fuscous apices on termen and long light golden on dorsal margin of forewing. Hindwing light fuscous with long, golden, shiny fringe. Fore femur dirty white, fore tibia ochreous fuscous dorsally and dirty white ventrally, tarsomeres I–III intermixed with white, light shiny ochreous and fuscous scales, tarsomere IV light white basally and fuscous apically, segment V dirty white. Mid-femur and mid-tibia white, tarsomere I white, segment II white with fuscous encircled apex, segment III fuscous, segments IV–V white, tip of mid-leg light ochreous; apical spurs white with 2–3 ochreous scales subapically. Hind femur white basally and light ochreous at apical 1/3, hind tibia white with light fuscous apex, tarsomeres dirty white with intermixed, separated, ochreous scales, medial and apical spurs of hindlegs white.

Abdomen. Shiny ochreous at anterior 1/3, fuscous at median part dorsally, terminal terga dirty white, ventrally dirty white. Segment VIII in males gently tapering caudally with rounded apex.

Male genitalia (Fig. 275–277). Tegumen broadly triangular at basal 2/3 and truncate at posterior 1/3; basal narrow arms strongly sclerotized, distal 1/3 of tegumen narrow straight of equal width to apex, long curving cornuti

of irregular shape at subapex; right wall thicker sclerotised than left wall, scobinate, with short thick setae and with one long barb at posterior margin (visible at 400×); tuba analis very slightly protruding, truncate apically. Valvae symmetrical, of medium width at base, gradually enlarging posteriorly until reaching twice basal width at apex; apical margin gently rounded with protruding short triangular apical projection at cucullus; apical sector and median surface covered with numerous tubercules of rather stiff setae of medium length, shortest ones at apical and subterminal dorsal margins, longest at apical sector reaching middle of valva, setae of moderate length along subdorsal sector, base and ventral half of valva without setae; valva twice as long as sternum 8th, slightly longer than saccus and of 2/3 length of aedoeagus. Vinculum broad, sclerotized, U-shaped clearly differentiated from long narrow pointed caudally saccus slightly shorter than valva. Transtilla well sclerotized, butterfly-shaped with lateral sides broader than horizontal bar. Aedoeagus very long, 1/3 longer than valva, and twice as long as saccus, narrow cylinder-formed, slightly larger at base, broader at coecum, medial part slightly stronger sclerotised than apical half; vesica bifurcate at apex, with long, straight, narrow cornutus extending along distal third of aedoeagus.

Female genitalia (Fig. 349). Papillae anales semicircular, slightly broader than long, connected dorsally, from basal bar to middle covered with long setae mostly along anterior sclerotized bar; basal bar of moderate width, strongly sclerotized, slightly narrowing dorsally. Posterior apophyses slightly wider at bases, gently curved, gently tapering to sharp apex, rather short, reaching anterior edge of segment VII. Segment VIII, ill sclerotized, cylindrical. Anterior apophyses even 1/3 shorter than posterior apophyses, bases situated at anterior margin of segment VIII, narrow, sharply pointed just reaching into segment VII. Ostium bursae situated close to anterior margin of sternum VIII, wide, circular. Sterigmatic sclerotization(s) on segment VII not developed. Ductus bursae short, as long as segment VII, antrum narrower than ostium bursae gently towards corpus bursae with a sclerotized ring on posterior 1/3; wall of antrum anterior half of ductus bursae serrated with short microscopic signulae. Corpus bursae big, oval, 1/3 longer than ductus bursae. Posterior wall of corpus bursae, close to incerption of ductus bursae, bears heavily sclerotised area of ca. 30–32 sharp and thick, small spines (clearly visible at 200–400×).

Variation. There is a slight variation in shape, width and curving of the third fascia of the forewing.

Etymology. The species is named after the Ruwenzori Range, its known area of occurrence.

Habitat. Montainous forest at altitudes above 1000 m.

Host plant(s). Unknown.

Flight period. Adults are known to fly in late August and early September.

Distribution. (Fig. 409). Known from two localities in the Ruwenzori Range, Uganda, close to the border of the Democratic Republic of the Congo.

The record of *Phyllonorycter triarcha* from South Africa, Transvaal (Meyrick 1921: 121) is based on a misidentification (Vári 1961: 207).

The *silvicola* group

The *silvicola* group, consisting of one species, *P. silvicola* De Prins, n. sp., is very similar to the *rhynchosiae* and *hibiscina* species groups. However, differences in female genitalia prevent its placement to either of those groups. Since the male is unknown, its discovery might help to resolve the taxonomic placement of this species. Female genitalia possess a large sterigma shaped into a broad triangular fold, and the ostium bursae opens at the junction of segments VIII and VII as in the *rhynchosiae* species group. The *silvicola* species group has a signum that is needle-shaped and positioned posteriorly on the corpus bursae, which differs from corpus bursae of the *encaeria* species group and the *rhynchosiae* species group, which have a stellate signum positioned caudally.

59. *Phyllonorycter silvicola* De Prins, new species

(Figs 112, 350, 410, 441)

Diagnosis. The wing pattern of *P. silvicola* differs from the *rhynchosiae* and *hibiscina* species groups in that *P. silvicola* has a very large volcano-shaped sterigma and very long posterior and anterior apophyses. In *P. silvicola*, the ostium bursae is situated at the junction of segments VIII and VII and the antrum is not sclerotized. The rod-

like signum on corpus bursae located close to anterior margin of sternum VII. The combination of the above mentioned characters makes *P. silvicola* easily recognisable.

Holotype: ♀, [1] '**Kenya** / Kakamega Forest 1575 m / 00°19'N 34°52'E / 31.iii.2003 / leg. J. & W. De Prins'; [2] 'Gen. Prep. 3629♀ / De Prins'; [3] 'MRAC/KMMA 00386', specimen ID: [4] 'RMCA ENT 000003277';[5] 'DNA voucher / CLV14407', in CCDB; [6] 'Holotype ♀ / *Phyllonorycter silvicola* / De Prins, 2012', in RMCA.

Description. *Adult* (Fig. 112). Forewing length: 2.7 mm.

Head: Vertex tufted with whitish scales with a faint intermixtion anteriorly of tufted dark brown-tipped, greyish scales; frons smooth, white with silver shine with a elongate beige patch between antennae. Labial palpus ca. 2× as long as eye, narrow, drooping apically pointed, downturned, light beige with tiny, ochreous, intermixed with dark brown scales running along outer side of palpomeres; maxillary palpus white, haustellum pale beige with faint orange tint. Antenna slightly shorter than forewing, flagellomeres golden yellow with dark fuscous apical 1/3, giving antenna slightly ringed appearance, shading of flagellomeres darkened towards apex, terminal flagellomeres light fuscous; scape light ochreous, dirty white at apical 1/3 with 12–14 dirty white pecten, 3–4 pecten with dark brown bases; pedicel almost as large as scape, dirty white, with light ochreous apex.

Thorax: Ochreous at anterior half and white posteriorly; tegulae ochreous anteriorly and white posteriorly bordering with white posterior part of thorax. Forewing light ochreous with white markings consisting of basal strigula, two transverse fasciae, two costal strigulae and one dorsal strigula; basal dorsal strigula short, oblique, directed towards apex, not edged; two black scales present on apical margin of basal strigula; first fascia at 1/4, slightly broader at dorsum than at costa, slightly oblique, with irregularly curved margins, one larger curve at subdorsal part, finely edged with blackish scales apically; second fascia at middle of forewing narrowed at middle, sand-clock shaped, twice broader at dorsum than at costa, finely blackish edged basally; first costal strigula at 3/4, triangular shaped, not reaching midline of forewing, finaly edged on both sides; first dorsal strigula opposite first costal strigula, triangular shaped, mirror shaping first costal strigula, almost reaching middle of forewing, finaly edged on both sides with a numeric assemblage of black scales between them; second costal strigula at apex, indistinct, comma shaped, without clear edging, but 3–5 blackish brown scales rarely situated along both margins; a congregation of black scales form an irregular spot intermixing with edging scales of first dorsal strigula at tornus; fringe line consisting of 12 black tipped scales at tornus; fringe short with silver shine along termen to tornus, long pale grey along dorsal margin. Hindwing pale fuscous with silver shine with long fringe of same colour and shading of hindwing. Fore costa light beige, fore femur and fore tibia dark fuscous, tarsomere I dark fuscous, tarsomere II dirty white, terminal tarsomeres light fuscous; mid-femur pale beige, mid-tibia dirty white with three ochreous patches, small patch at base, oblique elongate narrow patch at 1/2 of femur, third broad patch at subbasal part, apex white, short tibial spurs unicolour white, longer spurs with fuscous basal halves and white apices, tarsomere I white at base and apex with dark fuscous elongate patch at 1/2, tarsomere II dirty white with light fuscous apex, tarsomere III fuscous, terminal tarsomeres dirty white; hind femur light beige, hind tibia dirty white at base with very large median fuscous patch extending almost to apex, apical spurs white with a couple of dark fuscous scales at base and medially, medial spurs very long, light beige with irregular long fuscous patch at middle part, tarsomere I dirty white with subapical dark ochreous patch, rest of tarsomeres dirty white without special markings.

Abdomen: Brownish fuscous dorsally, except shade of pale brown scales on genitalia.

Male genitalia. Unknown.

Female genitalia (Fig. 350). Papillae anales not visible in preparation. A slender needle-like strongly sclerotized projection runs from bases of posterior apophyses and reaches middle of segment VIII. Posterior apophyses highly sclerotized, slender, very long (0.371 mm) gently tapering, with blunt apices reaching about midway into segment VII. Segment VIII strongly sclerotized at posterior half and weakly sclerotized at anterior half, transition without sclerotized bar, weakly connected with segment VII. Anterior apophyses slightly shorter than posterior apophyses (0.290 mm), slightly broader at bases, slender, straight, with blunt apices. Bases of anterior apophyses small, triangular shaped, situated at posterior sclerotized half of segment VIII. Edge between segments VIII and IX is sharp and clear. Ostium bursae narrow ring-like, unsclerotized, located at junction of segment VII and VIII, antrum tubular, very short and weakly sclerotized; sterigma strongly developed, occupying larger part of segment VII (ca. 0.230 mm²) triangular with blunt posterior top, conical, anterior margin of sterigma broadly bent, edged by highly sclerotized narrow bow. Segment VII, large, strongly melanized, but without sclerotized band edging anterior margin of segment VII. Ductus bursae widened anteriad antrum, broader and

stronger sclerotized anteriorly; corpus bursae long, reaching well into segment V, narrow; a spine like signum present on corpus bursae close to anterior margin of segment VII.

Etymology. The specific epithet is a compound word consisting of two components in Latin: 'silva' (=forest) and 'colere' (=to dwell). It means "inhabitant of forest", referring to the habitat in which it was found.

Habitat. Found on the eastern edge of primary rainforest intermixed with savannah vegetation (Fig. 441).

Host plant(s). Unknown.

Flight period. The adult specimen was collected in late March.

Distribution. (Fig. 410). Known only from the type locality in West Kenya.

The *umukarus* group

The *umukarus* species group includes one species, *P. umukarus*. is characterized by the broad, black band following the apical edge of first fascia. The lack of male genitalia and the divergent female genitalia inhibit the confident placement of *P. umukarus* De Prins, n. sp. in either of the other proposed informal species groups. The female genitalia are characterized by an appressed, arc-shaped sterigma with broad sclerotized posterior margin, very narrow strongly sclerotized ductus bursae, pear-shaped corpus bursae with a large, diamond-shaped, signum area located at median part of corpus bursae. Larvae of *P. umukarus* mine leaves of Tiliaceae.

60. *Phyllonorycter umukarus* De Prins, new species

(Figs 113, 351, 411, 432, 433, 444)

Diagnosis. The broad, black band following the apical edge of first fascia is a unique and highly distinctive character making this species easily recognizable among Afrotropical *Phyllonorycter*. Female genitalia of this species can be recognized by appressed, pouch-like sterigma with very broad apical sclerotized region, spinosae cuticle along margin of sterigma; narrow, strongly melanized ductus bursae and pear-shaped corpus bursae with medially diamond-shaped, sclerotized signum area crossed by long, needle-like signum.

Holotype: ♀, [1] '**Rwanda** / Nyungwe National Park / Busoro 1800 m / 02°32'S 29°11'E / mine 28.vii.2008 / leg. J. & W. De Prins';[2] 'e.l. *Triumphetta* sp. / [Tiliaceae] / 12.viii.2008'; [3] 'Gen. Prep. 3754♀ / De Prins'; [4] 'MRAC/KMMA 00487'; specimen ID: [5] 'RMCA ENT 000005152'; [6] 'DNA voucher / DP08026', in UM-SI; [6] 'Holotype ♀, *Phyllonorycter* / *umukarus* / De Prins, 2012', in RMCA.

Paratypes: 6♂. 4♀, **Rwanda:** same locality data, e. l. *Triumphetta cordifolia* A. Rich. [Tiliaceae] from 10.viii.2008 to 17.viii.2008, specimen IDs: RMCA ENT 000005153, 000005154, 000005156, 000005157, in RMCA, 1♀, same locality data, in BMNH, DNA vouchers DP08022, DP08023, DP08025, DP08027, in UM-SI. 1♀, same locality data, specimen ID: RMCA ENT 000005158, in RMCA, DNA voucher [abdomen, legs, hindwings] DP08030, in UM-SI.

Description. *Adult* (Fig. 113). Forewing length: 2.95–3.14 mm.

Head: Vertex tufted, consisting of ochreous with golden gloss, short piliform scales projecting radially from median part of vertex; frons smooth, strongly metally shiny. Labial palpus slightly longer than eye, metallic shiny with light ochreous shading, lateral sides slightly darker, drooping, terminal palpomere with pointed apex, directed latero-ventrally. Maxillary palpus small, greyish fuscous, apex obtuse; proboscis pale beige, quite long, ca. 2.5× longer than labial palpus, not curved, except caudal part, with flattened caudal tip. Antenna slightly shorter than forewing, consisting of 40–42 flagellomeres, each flagellomere (except scape and pedicel) fuscous dorsally with narrow ochreous base, ventrally flagellomeres are entirely fuscous; pedicel slightly thicker and longer than following flagellomere, entirely ochreous; scape ochreous with 8–10 ochreous pecten of similar length, ca. as long as scape.

Thorax: Ochreous with golden shine; tegula ochreous with golden shine with fuscous shading at anterior edge. Forewing ground colour ochreous with golden shine and with shiny silver white markings: two transverse fasciae, one costal and one dorsal strigulae and a small spot on termen area of forewing; no traces of any basal streak or basal spot; first fascia at 1/4 of forewing, moderate in width, slightly angled towards apex at midline of forewing, edged apically with very broad band of black scales, as broad as ca. 1/2 of distance between first and second fascia,

apical edging of first fascia broadening at middle of forewing, and narrowing at dorsum; second fascia at 1/2, slightly curved; in two paratypes second fascia consisting of two distinct, opposite strigulae converging and meeting at their tips: short costal and long dorsal, well exceeding midline of forewing, edged by 1–2 rows of black scales on both sides; first costal strigula at 3/4 of forewing, broad triangular, terminating just before midline of forewing, edged on both sides by 1–2 rows of black scales; first dorsal strigula at 3/4 of forewing, situated opposite first costal strigula, broad triangular, terminating just before midline of forewing, distinctly edged by 1–2 rows of black scales basally and with irregular grey-tipped scales apically, an irregular line of two rows of black scales connecting tips of first costal and first dorsal strigulae; apical part of forewing covered with elongate greyish black scales, a shiny white small spot, circled with black scales, present just above midline of forewing at termen area, white spot on termen sometimes divided into two, differing slightly in size, even asymmetrical from right to left forewing of same specimen, tornus covered with elongate greyish ochreous black-tipped scales; fringe line not clearly defined, extending to edge of forewing, blackish at apex, pale grey at termen and blackish grey at tornus. Fringe short, grey at apex, getting longer and ochreous at termen and becoming long, greyish ochreous at tornus. Hindwing greyish beige with long fringe of same shading as hindwing; fringe obtaining slightly darker shade at apex of hindwing. Fore femur greyish ochreous, fore tibia fuscous dorsally and fuscous-ochreous ventrally, tarsus greyish fuscous, tarsomere I grey at basal half and fuscous at apical half, tarsomere II grey with fuscous apex, rest of tarsomeres greyish fuscous; mid-femur and mid-tibia pale fuscous with bronze shading, apical spurs short, pale grey with slightly lighter bases and apices, tarsomere I fuscous, remaining tarsomeres dirty white; hind femur pale grey with light metallic shine, hind tibia grey with light ochreous shading and bronze shine with loosely appressed hairs; medial spurs short light grey, apical spurs slightly longer than median spurs, dark grey with sharp light grey apices, tarsus light grey with gradual darkening towards terminal tarsomeres.

Abdomen: Fuscous with light bronze shading dorsally, and strongly metallic ventrally with genital segments dark fuscous.

Male genitalia. Unknown.

Female genitalia (Fig. 351). Papillae anales flattened, fused, caudally setose, setae more or less of equal length of about 123 µm; basal bar narrow, only partly sclerotized, just at bases of apophyses posteriores. Posterior apophyses with midsize triangular bases, slender, with enlarged swelling at ca. 1/3 of their length (ca. 150 µm anterad bases), long (423 µm), extending to posterior part of segment VII, apices of posterior apophyses blunt. A slender, straight, needle-like sclerotized projection 153 µmlong, extending from bases of papillae anales to swelling of posterior apophyses at about 1/3 length of segment VIII, needle-like projection narrow and weakly sclerotized at posterior end and getting thicker and stronger sclerotized at anterior end. Segment VIII weakly sclerotized, connected dorsally and ventrally, of medium length, slightly shorter than posterior apophyses, slightly enlarging anteriorly. Anterior apophyses initiate at anterior part 1/3 of segment VIII, bases of anterior apophyses fused into broad, medially sclerotized ring, anterior apophyses shorter than posterior apophyses, ca. 304 µm, straight, narrow, strongly sclerotized, reaching with their sharp apices middle of segment VII. Segment VII trapezoidal, melanized. Ostium bursae short funnel-shaped with strongly sclerotized margins, located at posterior 1/3 of segment VII, antrum melanized, short; ca. 80 µm, sterigma developed as separate attached appressed sack or poach with very strongly sclerotized arch shaped poach margins; narrow at anterior end, getting broader and thicker caudat towards posterior end and forming a subconical apex with crescent ostium bursae at top, fold between sternum VII and sterigma is covered with tiny sharp strongly sclerotized barbs. Ductus bursae ca 680 µm long, weakly melanized following antrum and strongly melanized at anterior half. Connection between ductus bursae and corpus bursae abrupt and clear; corpus bursae median, pear shaped with enlarged caudal part, weakly melanized, medially with a diamond-shaped, sclerotized signum area crossed by long very narrow, needle-like signum, 193 µm long; second signa area a thick, irregularly shaped sclerotization, situated at caudal part of corpus bursae, covered with tiny sclerotized barbs. Ductus spermathecae slender, weakly melanized, strongly convoluted of ca. 26 revolutions, 237 µm long, running from posterior part to middle of segment VII; bulla spermathecae medium sized, ca. 60 µm long, ca. 30 µm wide, strongly melanized, situated in middle of segment VII.

DNA sequences. Three COI barcodes are available for *P. umukarus* (Molecular sample codes: Pumu1 [JX888194], Pumu2 [JX888195], Pumu3 [JX888196]; Table S1).

Etymology. The specific epithet is derived from the vernacular adjective “umukara”, meaning “black” in Kirwanda, referring to the black, large band between the first and second forewing fasciae.

Habitat. Open clearings in montaine wet forest at an altitude of approximately 1800 m (Fig. 444).

Host plant(s). Malvaceae: *Triumfetta cordifolia* A. Rich. (Figs 432, 433).
Flight period. Adults were collected in early August.
Distribution. (Fig. 411). Known only from the type locality in southwestern Rwanda.

"Lithocolletis" aurifascia Walker, 1875

L.[ithocolletis] aurifascia, Walk.—Walker (1875: 192–193).

This species does not belong to Lithocolletinae according to external morphology. Differently from all Lithocolletinae genera defined by the character indicated in the original description that labial palpi "filiform, drooping " (Stainton 1854: 264), labial palpi in *aurifascia* are long, porrect; second palpomere with a long tuft beneath, terminal palpomere as long as the second palpomere or slightly longer (Figs 134, 135).

Note: All five type specimens of *L. aurifascia* lack abdomens.

Holotype ♂, [abdomen lacking], **S[ain]t Helena**:[1] **'**Type',[2] 'St Helena**,** [leg.] Wollaston, 79-68', [3]'*aurifascia* Walk'. [on the reverse side of the label 3: '500 feet lower'].

Paratypes: 2♂, 2 specimens [abdomens and hindwings lacking]. **S[ain]t. Helena:** [1] 'St Helena**,** Wollaston, 79-68', in BMNH.

Cremastobombycia Braun, 1908

Cremastobombycia Braun 1908: 272 (key), 349. Type species: *Lithocolletis solidaginis* Frey & Boll, 1876, by subsequent designation by Meyrick 1912b: 11. *Cremastobombycia* was established to denote a subgenus of *Lithocolletis* Hübner, 1825.

Historic account. Based on the stalked M_1 and M_2 in both forewing and hindwing, Braun (1908) erected the subgenus *Cremastobombycia* after differentiating it from the genus *Lithocolletis*. Braun (1908) also presented a dichotomous key and added valuable information on the immature stages of *Cremastobombycia*. She presented five putative characters that diagnose the immature stages of *Cremastobombycia*: i) larva cylindrical without prolegs on segment X; ii) host plants restricted to the family Asteraceae, iii) mines constructed on the lower (abaxial) surface of the leaf, except *C. grindeliella* which can mine on both sides; iv) the loosened epidermis of the mature mine very much wrinkled, and v) the cocoon rests suspended inside the mine on silken threads attached at the posterior and anterior ends. Braun (1908) placed five North American species into *Cremastobombycia*: *C. grindeliella* (Walsingham, 1891), *C. solidaginis* (Frey & Boll, 1876), *C. ambrosiella* (Chambers, 1871), *C. ignota* (Frey & Boll, 1873), and *C. verbesinella* (Busck, 1900). Busck (1909) gave credit to the work of Braun (1908), however, he continued to search for the placement of *Cremastobombycia* within Lithocolletinae. Busck (1909) concluded that despite the structurally identical characters present in the imaginal stages, each group of Lithocolletinae has retained its typical larval development, feeding habits, peculiar cocoons and its typical forewing coloration. Busck (1909) followed Braun (1908) and postulated the placement of *Cremastobombycia* in Lithocolletinae. He placed *Cremastobombycia* Braun and *Porphyrosela* Braun in equal merit of the classification rank as *Phyllonorycter* and *Cameraria*, however not transferring officially these former taxa to the genus rank and clearly recognized only two genera: *Phyllonorycter* and *Cameraria*, considering *Cremastobombycia* as a subgenus of *Phyllonorycter*. However, he (Busck 1909: 100) wrote the following: "We have been doing our classification too much horizontally, so to say …. without sufficient regard to its origin. This does not produce a natural system." However, a year later, probably after reading the argumentation and phylogenetic considerations on the relationship of species groups within Lithocolletinae by Braun (1909), Busck (1910) described a sixth species, *Cremastobombycia lantanella*, feeding on *Lantana* sp. (Verbenaceae) from Honolulu, Oahu, Hawaiian Islands and assigned it to the genus *Cremastobombycia*. In 1902, *C. lantanella* was intentionally introduced from Mexico into the Hawaiian islands to aid in the control of *Lantana* sp. (Busck 1910; Swezey 1910, 1913). No additional species have been added since then. Meyrick (1912b) catalogued *Cremastobombycia* as a taxon of generic rank and designated the type species *Lithocolletis solidaginis* Frey & Boll, 1876. The more specific studies that followed later mainly addressed evolutionary (Braun 1914; Ely 1918, Davis & Robinson 1998), morphological (DeGryse

1916; Mosher 1916; Needham *et al*. 1928), biological (Swezey & Bryan 1929; Fontes *et al*. 1994; Palmer & Pullen 1995; Broughton 2000), taxonomic (Fletcher 1929; Zimmerman 1978; Aarvik *et al*. 2000), and faunistic aspects of the genus (Forbes 1923; McDunnough 1939; Brower 1984; Handfield 1997; van Orden Covell 1999; Powell & Opler 2009). The phylogenetic position of *Cremastobombycia* at the time was unstable, but Braun (1914) was convinced that the genus is of "comparatively recent origin". Vári (1961), illustrated the type species, *C. solidaginis* for comparitive purposes, the genus has not been found in Africa until now. According to Vári (1961) *Cremastobombycia* is related to *Protolithocolletis*, but differs from the latter genus by the absence of vein R_2 in the forewing. A preliminary phylogeny of Gracillariidae places *Cremastobombycia* clearly within Lithocolletinae, as the sister genus to *Phyllonorycter* (Kawahara *et al*. 2011), a result that is corroborated by wing venation (Braun 1908; Busck 1909).

Cremastobombycia was thought to be distributed only in the New World and *C. lantanella* to the Neotropical region (Busck 1910; Palmer & Puller 1995; Baars & Neser 1999). There was no evidence yet that *C. lantanella* occurs in the Afrotropical region (Baars & Neser 1999, Urban *et al*. 2011). We have discovered two native Afrotropical *Cremastobombycia* species, *C. kipepeo* De Prins, n. sp. and *C. morogorene* De Prins, n. sp., and describe both herein.

Diagnosis. We define the genus *Cremastobombycia* as the assemblage of species-group taxa which fall into the clade *Cremastobombycia* (Fig. 4). According to wing venation *Cremastobombycia* is similar to *Phyllonorycter* Hübner, 1822 (Braun 1908; Busck 1909), *Protolithocolletis* Braun, 1929 (Vári, 1961) and in adult external features to *Cameraria*: adults are rust-colored moths with silvery-white outwardly margined fasciate and/or strigulate markings on the forewing. Vertex more or less smooth with tufted filiform hairs mainly on occiput, what differs this genus from *Cameraria* which attain the tufted vertex. *Cremastobombycia* can be separated from *Cameraria* and other Lithocolletinae genera in that the forewing M_1 is stalked with M_2, attaining a total of 6 apical veins, much like in *Hyloconis* and *Protolithocolletis* whereas forewing of *Porphyrosela* possess 5 apical veins as in *Cameraria* and *Phyllonorycter*. In the hindwing, the median vein is bipartite, forming M_1 and M_2 like in *Porphyrosela*, *Hyloconis*, and *Protolithocolletis*. The interocular suture is thick and strongly sclerotized, arc-shaped (well seen in descaled head). Occular indices of *Cremastobombycia* similar to *Cameraria* and *Phyllonorycter*: the occular index is approximately 0.6 and the interocular index is ca. 1.3. Palpi of *Cremastobombycia* are similar as in other Lithocolletinae genera: maxillary palpus small, rudimental, bi-segmented, apical maxillary palpomere almost globular, labial palpus moderate, porrect, filiform, drooping, straight, with ratio of segments from base 1 : 1.4 : 2. Sternum VIII in males forms a characteristic flap laying ventrally under the valvae as in many lithocolletine genera except *Chrysaster*, *Leucanthiza*, *Macrosaccus*, and *Protolithocolletis*, mostly tapering caudally, with rough lateral edges, setose. *Cremastobombycia* differs from *Cameraria* and other Lithocolletinae, except *Hyloconis*, in the number of apical setae of the tegumen: beside the main pair of long setae, the apex of the tegumen in *Crematobombycia* has 2–4 additional pairs of shorter apical setae. However, differently from *Hyloconis*, *Cremastobombycia* possesses a complete transtilla, a sclerotized anellus, and sometimes a well developed juxta. The valva in *Cremastobombycia* is stiff, not flexible as in *Cameraria*, with an enlarged cucullus area covered with short, thick, spinulae-like setae. The female genitalia may be asymmetrical. The ostium bursae in the type species opens at the right side at the posterior margin of segment VII. Segment VIII is short and firmly fused to segment VII. Posterior apophyses with conspicuous triangular appendix at basal 1/3 (*C. solidaginis*). Anterior apophyses arise at the boundary of segment VIII and VII. Ductus bursae strongly melanized along its entire length. The corpus bursae usually is well differetniated from the ductus bursae and usually has one signum. The bulla seminalis may be larger than corpus bursae (*C. solidaginis*). The ductus spermatecae is usually very long, ca. 60 revolutions, loose distally; the bulla spermathecae is sickle-shaped.

Braun (1908) indicated that larvae of *Cremastobombycia* are cylindrical, without prolegs on segment X. However, diagnostic characters of the larva and pupa beside those indicated by Braun (1908) still need to be carefully examined. *Cremastobombycia* feeds on Asteraceae (Braun 1908; De Prins & De Prins 2012), except *C. lantanella*, which feeds on Verbenaceae. *Cremastobombycia* larvae construct tentiform mines on the underside of leaf, except *C. grindeliella* which can sometimes mine both sides of a leaf (Braun 1908). Pupation occurs inside the mine, inside a suspended, spindle-shaped white silken cocoon, sometimes ornamented with longitudinal ridges (Braun 1908).

Diagnosis of Afrotropical *Cremastobombycia*. Afrotropical *Cremastobombycia* species show differences in wing venation and male genital characters from the Neartic congenerics (see 'examined additional type specimens

used for generic diagnosis'). However, based on the shared similarities of the hindwing venation, forewing pattern, and genital morphology we assign the two Afrotropical species, *C. kipepeo* and *C. morogorene* to *Cremastobombycia*. A third Afrotropical species, belonging to *Cremastobombycia*, *C. lantanella* Busck, 1910 was mentioned as a probable invasive pest species to South Africa by Baars & Neser (1999). However, no specimens belonging to this species were detected. Baars & Neser might have confused *Cameraria lantanella* with the another African gracillariid, *Aristaea onychota* (Meyrick, 1908), which has a very similar wing pattern and also feeds on *Lantana*. The two Afrotropical *Cremastobombycia* species are very distinctive in external and internal morphological features.

Head: Vertex not tufted, long piliform scales roughly tufted on occiput, mostly projecting forwards between antennae; frons smooth, shiny white; eyes big. Antenna ca. as long as forewing, smooth scaled, filiform; scape short thickened, bearing pecten of different length. Proboscis developed, naked, of medium length, ca. 2× longer than labial palpus. Maxillary palpus small, rudimentary. Labial palpus moderate, porrect, filiform, drooping, straight.

Thorax: Forewing ground colour ferruginous-ochreous with white and black or only black markings; white markings are margined apically. Descaled forewing lanceolate, slender, and pointed. Afrotropical *Cremastobombycia* differs from the type species, *C. solidaginis*, in that forewing is broader and shorter: maximum width/length ratio in *C. solidaginis* is 0.17, maximum width/length ratio in *C. kipepeo* is 0.26; and in *C. morogorene* it is 0.19. Forewing ventation of *C. kipepeo* and *C. morogorene* has 8 veins, apical part with 5 veins R_3, R_4, R_5, M_1, Cu_1; M is single, differently from *C. solidaginis*, where M_1 is stalked with M_2, and apical part in *C. solidaginis* with 6 veins; the cell between R_4 and R_5 open in *C. kipepeo*, closed by a very slender rudimentary vein in *C. morogorene*, Cu_1 separate, CuP indistinct (fold) over entire length, 1A strong, separate. Hindwing lanceolate, maximum width / hind wing length 0.16, venation reduced to 5 veins as in *C. solidaginis*: Sc very short terminating near base of costa, Rs very long, running nearly to apex of hindwing, M branched to M_1 and M_2, basal 2/3 of M_1 indistinct, parallel to Rs, Cu_1 strong, ends slightly beyond 1/2 of dorsum; A_1 vestigial. Frenulum in male—a single stout bristle, frenula in female—2 tightly appressed bristles, retinaculum—a small fold on Sc. Legs slender, with darker rings; epiphysis on foreleg absent, mesothoracic tibia bears a pair of spurs; hind tibia thickened, with long fine loose hairs, long medial and short apical spurs, hind tarsus smooth, slender and ca. 1.5× longer than tibia.
Abdomen. The anterior boundary of abdomen opening sclerotized; S2 apodemes of median length, ending just before the opening, slender, with broader bases, slender distally. Sternum VIII in adult males well developed, flap-like, extended, tapering caudally, with gently rounded apex.

Male genitalia. Tegumen rather long, with a pair long and many short (*C. kipepeo*) or 5 pairs of equal length (*C. morogorene*) apical setae. Valvae symmetrical, long, straight, with enlarged cucullus area or apical part of valva. Apex of valva is densely setose (*C. kipepeo*) or setose only on ventral and caudal margins of sacculus (*C. morogorene*). Transtilla complete, juxta small. Anellus tubular in *C. kipepeo*. Vinculum slender and can be apically bipartite (C. *morogorene*). Aedoeagus thick, sclerotized in *C. kipepeo* and slender with enlarged coecum in *C. morogorene*; vesica either with cornuti (*C. morogorene*) or a barb-shaped appendage (*C. kipepeo*).

Female genitalia. Papillae analles flat caudally, fused, with sclerotized outer rim. Segment VIII short, weakly sclerotized. Posterior apophyses without enlarged bases, slender; anterior apophyses initiate at middle of segment VIII, slender, shorter than posterior apophyses. Ostium bursae opens at the posterior margin of segment VII at depth of sclerotized with dentate margin posterior extention of segment VII (*C. kipepeo*). Sterigma very strongly developed and sclerotized, can nearly cover entire sternum VII. Ductus bursae long, rather broad. Corpus bursae oval, mainly as a smooth enlargement of ductus bursae, with one-two signa area, of which one round plate is crossed by sclerotized signum (two short narrow rods, situated opposite each other in *C. kipepeo*); corpus bursae with 2 short spikes (*C. kipepeo*).

Biology. No biological data on Afrotropical *Cremastobombycia* is available. In the Nearctic region, larvae in this genus feed on Asteraceae. They produce a tentiform mine on the underside of the leaf (Braun 1908; Busck 1910; De Prins & De Prins 2005). Pupation occurs inside the mine, inside a suspended, spindle-shaped, white, silken cocoon (Braun 1908).

Distribution. Afrotropical *Cremastobombycia* occur in East Africa, coastal forest and/or savannah.

Relationships to other genera. *Cremastobombycia* + *Phyllonorycter* is strongly supported by the eight gene molecular dataset (BP = 100%; PP = 1.0). Although weaker, this clade is sister to *Cameraria* (BP = 70%; PP = 1.0; Fig. 4). See the section on *Phyllonorycter* for details on shared morphological features.

Species examined. ***Cremastobombycia amoena*** **(Frey & Boll, 1878)** [synonym of *C. ambrosiaeella* (Chambers, 1871)]

Lectotype ♀, designated here, [1] (round label ringed with red colour) 'Type'; [2] (handwritten in black Indian ink on a green label) '*L. Amoena* / Fr. & Boll / Dallas'; [3] (handwritten in black Indian ink) 'Frey coll. / (printed) Walsingham / Collection / 1910-427'; [4] (handwritten in black Indian ink) 'Type'; [5] (printed) 'Type', in BMNH: drawer Mi 10020.

Note: In De Prins & De Prins (2005: 162) type material was mentioned as "not stated". A specimen labelled "Type" was found in the BMNH: drawer Mi 10020.

Cremastobombycia actinomeridis **(Frey & Boll, 1878)** (synonym of C. *ignota* (Frey & Boll, 1873)

Lectotype ♀, here designated, [1] (round label ringed with red colour) 'Type'; [2] (handwritten in black Indian ink on a yellow label) '*L. Actinomeridis* / Frey & Boll / Dallas'; [3] (handwritten in black Indian ink) 'Frey coll. / (printed) Walsingham / Collection / 1910-427.'; [4] (printed) 'Type', in BMNH: drawer Mi 10020.

Note: In De Prins & De Prins (2005: 163) the type material was mentioned as "not stated".

Cremastobombycia bostonica **(Frey & Boll, 1878)** (synonym of C. *ignota* (Frey & Boll, 1873)

Holotype ♂ [1] (round label ringed with red colour) 'Type'; [2] (handwritten in black Indian ink on a pink label) '*L. Bostonica* / Frey & Boll / Boston - Cambridge'; [3] (handwritten in black Indian ink) 'Frey coll. / (printed) Walsingham / Collection / 1910-427.'; [4] (handwritten in black Indian ink) 'Type'; [5] (printed) 'Type', in BMNH: drawer Mi 10020.

Note: In De Prins & De Prins (2005: 162) the depository of the type was not mentioned.

Cremastobombycia elephantopodella **(Frey & Boll, 1878)** (synonym of C. *ignota* (Frey & Boll, 1873)

Lectotype ♂, here designated, [1] (round label ringed with red colour) 'Type'; [2] (handwritten in black Indian ink on a yellow label) '*L. Elephantopodella* / Frey & Boll / Dallas'; [3] (handwritten in black Indian ink) 'Frey coll. / (printed) Walsingham / Collection / 1910-427.'; [4] (printed) 'Type', in BMNH: drawer Mi 10020.

Note: In De Prins & De Prins (2005: 163) the type material was mentioned as "Not stated".

Cremastobombycia grindeliella **(Walsingham, 1891)**

Holotype ♂, [1] (round label ringed with red colour) 'Type '; [2] (handwritten in black Indian ink)'Alameda Co. / CALIFORNIA / Sup. *Grindelia* / *robusta* ex / Riley x.1886 / 32540' [3] (printed) Walsingham / Collection / 1910-427.; [3] (handwritten in black Indian ink) '*LITHOCOLLETIS* / *GRINDELIELLA* Wlsm. / Ins. Life iii.327, 329, No. / 48 (1891) / TYPE ♂ descr.', in BMNH: drawer Mi 10020.

Cremastombycia ignota **(Frey & Boll, 1873)**

Holotype ♀ [1] (round label ringed with red colour) 'Type'; ; [2] (handwritten in black Indian ink on a pink label) '*L. Ignota* / Frey & Boll / Boston - Cambridge'; [3] (handwritten in black Indian ink) 'Frey coll. / (printed) Walsingham / Collection / 1910-427.'; [4] (handwritten in black Indian ink) 'Type'; [5]] (printed) 'Type', in BMNH: drawer Mi 10020.

Note: In De Prins & De Prins (2005: 162) the gender of the holotype was not mentioned.

Cremastobombycia solidaginis **(Frey & Boll, 1876)**

Holotype ♀, [1] (round label ringed with red colour) 'Type'; [2] (handwritten in black Indian ink) 'Dallas / TEXAS / Boll'; [3] (handwritten in black Indian ink) 'Frey coll. / (printed) Walsingham / Collection / 1900-427.'; [4] (printed) 'B.M. ♀ / Genitalia slide / No (handwritten in black Indian ink) 6109'; [5] (handwritten in black Indian ink) '*L. solidaginis* / F & B / Dallas'; [6] (printed) 'Type', in BMNH: drawer Mi10020.

Note: In De Prins & De Prins (2005: 163) the gender of the type specimen was not stated.

Key to the species of the Afrotropical *Cremastobombycia* based on external characters

1. Forewing with blackish-fuscous markings only (Fig. 114). . . . . .61. *kipepeo*
– Forewing with white and black markings (Fig. 115) . . . . . 62. *morogorene*

Key to the species of the Afrotropical *Cremastobombycia* based on male genitalia

1. Valva slender straight, cucullus part enlarged, terminating with a short ventral projection. Aedoeagus placed in thick tubular-shaped anellus, vesica with large barb-like and small papilla-like projection on apex (Figs 278, 279). . . . . .61. *kipepeo*

– Valva median with significantly dilated cucullus, somewhat trapezoidal with rounded dorso-apical angle, and half rounded ventroapical angle; half oval seal follows the subapical margin of valva in cucullus area. Aedoeagus narrow tubular, slender, vesica narrow with two long cornuti forking at apex (Figs 280, 282) . . . . . 62. *morogorene*

61. *Cremastobombycia kipepeo* De Prins, new species

(Figs 18, 114, 278, 279, 352, 412, 437)

Diagnosis. Black markings crossing the forewing separates this species from the other Afrotropical Lithocolletinae having fuscous markings: in *C. hexalobina*, the second fascia is Y-shaped, in the *Phyllonorycter melanosparta* group, it is angulated and the central fascia is situated between two short, well edged, oblique strigulae. The male genitalia of *C. kipepeo* can superficially be confused with the genitalia of *P. agassizi* due to the similar shape of the valvae. However, the presence of a pair of long setae and some short setae on the apex of tegumen are similar as in *C. solidaginis* which strongly supports the placement of *C. kipepeo* into *Cremastobombycia*.

Holotype: ♂, [1] '**Kenya** / Arabuko Sokoke Forest / 5 km W Gede, 50 m / 03°16'S 039°59'E / 18.iii.2004 / leg. J. & W. De Prins'; [2] 'Gen. Prep. 3646♂ / De Prins'; [3] 'MRAC/KMMA / 00389'; specimen ID: [4] 'RMCA ENT 000003285'; [5] 'DNA voucher / CLV15207', in INRA; [6] 'Holotype ♂ / *Cremastobombycia / kipepeo /* De Prins, 2012', in RMCA.

Paratype: 1 ♀ (including 1♀ genitalia preparation). **Kenya:** 1♀, Arabuko Sokoke Forest, 10.5 km W Gede, 80 m, 03°16'S 039°58'E, 02.iv.2004, leg. J. & W. De Prins, gen. prep. De Prins 3647♀ (MRAC/KMMA 00390), wing venation prep. De Prins 3770♀ (MRAC/KMMA 00494), specimen ID: RMCA ENT 000003280, in RMCA, DNA voucher CLV14707 in INRA.

Description. *Adult* (Fig. 114). Forewing length: 1.76 mm.

Head: Vertex tufted latero-posteriorly and appressed anteriorly; pale ochreous, piliform tufts with golden lustre placed medially over vertex and directed laterally; smooth, appressed, pale with whitish shading, slender, piliform scales on anterior part of vertex, directed anteriorly, and reaching beyond antennal bases; a bunch of tufted intermixed, pale ochreous, piliform scales present over posterior part of occiput, projected radially; frons smooth, white, shiny with golden ochreous shade bordering vertex and slight brown shading bordering palpi, slender piliform scales with golden bases on dorsal margin of frons, central part of frons with silvery white shine and ventral part contains a few slender, piliform scales with brown apices. Labial palpus as long as eye, straight, slender with sharp apex, directed downwards, pale beige unicoloured along all palpomeres, without special dark markings; maxillary palpus small and slender with sharp apex, of same colour as labial palpus; haustellum short slightly yellowish darker than palpi. Antenna slightly shorter than forewing, consisting of 34 flagellomeres, underside pale ochreous, upperside with pale ochreous basal half and ferruginous apical half, terminal 1/5 of antenna light fuscous; pedicel pale ochreous basaly with ferruginous brown apical third; scape ochreous, with dark white white 6–8 pecten as long as scape in male and shorter in female.

Thorax: Ochreous with irroration of small round scales of darker ochreous shading; tegulae of same colour as thorax with irroration of darker ochreous scales, but uniformly ochreous also at anterior margin. Forewing ground colour light ochreous with irroration of darker shading; black markings on forewing lacking distinctly shaped strigulae or fasciae, as follows: a couple large black scales on costa bordering tegulae, first short costal strigula at 1/8 of forewing, not reaching midline of forewing, without strictly shaped margins, disordelly running from costa towards dorsum; second costal strigula at 1/4, twice broader than first costal strigula with broaden terminal part, reaching midline of forewing; slender fascia following second costal strigula and extending across forewing as one irregular row of black scales at 1/4 of forewing; second fascia at middle of forewing, broader than first fascia, third costal strigula possess a shape of irregular patch, just reaches midline of forewing, touches second fascia with its basal edge; third fascia at 3/4 of forewing, curved, without shaped edges, with broader costal part; which unites with broad termen area, irregularly irrorated with black scales along termen; a few black tipped scales at tornus, however not forming a clearly expressed fringe line, black or dark brown tipped scales terminate forewing; fringe golden, short on costal subapical and apical area, darker yellowish along termen and long, with slight grey shading and golden lustre along subapical dorsal margin. Hindwings pale beige with golden shine; fringe of slightly darker shading, very long. Fore femur ochreous, spotted with numerous darker ochreous scales, fore tibia ochreous with dark brown base and brown fuscous apical band; tarsomere I pale ochreous with fuscous subapex, tarsomere II pale ochreous with fuscous apices, tarsomere III pale beige subbasaly to 1/3 and fuscous apically, tarsomere IV dirty

white with fuscous base, tarsomere V pale fuscous. Mid-femur pale ochreous, mid-tibia pale ochreous with 3 brownish, fuscous patches: basal, median and largest, dotted, apical patch consisting of numerous dark brown scales; tibial spurs pale beige with a couple of black-tipped scales; tarsomere I pale beige with fuscous subapex, tarsomere II pale beige with fuscous apex, tarsomere III fuscous at basal half and dirty white at apical half, tarsomere IV dirty white, tarsomere V pale fuscous. Hind tibia ochreous, dotted with a few fuscous scales apically, tarsomere I beige with fuscous subapex, tarsomeres II–III pale beige with fuscous median patch, tarsomere IV pale beige and terminal tarsomere fuscous.

Abdomen: Dorsally ochreous, fuscous brown; tergites I–III ochreous grey with shine, tergite IV–VII dark grey, tergite VIII, elongate and narrow, beige; sternum VIII of male large, trapezoid.

Male genitalia (Figs 278, 279). Tegumen long (532 µm in holotype) almost as long as valva, narrow, arms very narrow, stronger sclerotized basally, not joining, apical half of tegumen very weakly sclerotized; apex terminates with a small bulb covered with numerous tiny short microtrichiae (visible at enlargement 400×) and a pair of long slender setae, ca. 77 µm long (visible at 200×). Valvae symmetrical, long (ca. 570 µm), narrow, straight; cucullus part enlarged, terminating with a short ventral projection; ventral surface of apical half of valva covered with numerous long slender hair-like setae, more abundant at ventral margin of valva, cucullus sector covered with spaced small round tubercules and shotrt stiff setae. Vinculum very strongly sclerotized, narrow U-shaped with short slender, elongate saccus projecting cephalad. Transtilla not perceptible. Anellus tube-shaped, heavily sclerotized, nearly extending to apex of aedoeagus, terminating with sclerotization with angulate cornutus at terminal part. Aedoeagus long (610 µm in holotype), almost as long as valva, tapering towards vesica; vesica with a large barb-like and a small papilla-like projection on apex.

Female genitalia (Fig. 352). Papillae anales caudally compressed, flat, basal bar narrow, well sclerotized, oval shaped, asymmetric, left ventro-lateral side with rounded process minutely serated; long setae distributed mainly along sclerotized band, caudal part of papillae anales is almost setae free. Posterior apophyses of moderate length (307 µm), without clearly broadened basal parts, slender, straight, but dilating at apices, reaching middle of segment VII, apices blunt. Segment VIII very short and weakly sclerotized. Anterior apophyses initiate at junction of segments VIII and VII, without basal plate or any other sclerotization, narrow, slightly curved, running to middle of segment VII, dilating at middle part and with bent hook-like apices. Ostium bursae located at posterior part of segment VII, slightly oval with sclerotized smooth margins gently transmitting to very heavily sclerotized, cylindrical antrum with narrower posterior part and broader anterior part. A very large, slerotized, sterigmatic armature covers almost entire sternum VII. Ductus bursae long, broad but weakly sclerotized except posterior part between segment VII and VI which is broad and melanized, posteriad this latter part ductus bursae becomes narrow weakly sclerotized, then again broadening and smoothly confluents to corpus bursae leaving no clear boundaries between ductus and corpus bursae. Corpus bursae oval, only slightly membranous with two signa areas: anterior area a round plate, with two slerotized signa, shaped as very narrow sclerotized stripes laying along equator of signum plate but at a distance from each other; second signum area located at caudal part of corpus bursae, it is only slightly more melanized than wall of corpus bursae, caudal signum area without sclerotized signum; two sclerotized signa spikes present on ductus bursae: one larger at centrum of corpus bursae between two signa areas and one smaller at anterior part of corpus bursae. Bulla spermathecae as large as signum area on corpus bursae (ca. 5021 µm²), oval, located posterior ductus bursae, ductus spermathecae about 1.4 mm long, forming 16 coils of smaller diameter at posterior part, with coil diameter gradually enlarging anterad.

Etymology. The name of this species is derived from “kipepeo” the common name meaning “moth, butterfly” in Swahili. This species-group name is regarded as a noun in nominative case.

Variation. There can be slight variation in size and colour of forewing. Female (paratype) is smaller and lighter in ground colour shading .

Habitat. East African coastal forest (Fig. 437).

Host plant(s). Unknown.

Flight period. The adults have been recorded from late March to early April.

Distribution. (Fig. 412). Known only from the type locality in East Kenya.

62. *Cremastobombycia morogorene* De Prins, new species
(Figs 19, 115, 280–282, 413)

Diagnosis. Wing pattern and coloration of hindlegs of *C. morogorene* resemble *Cameraria hexalobina*, but the male genitalia of these two species clearly differ. Specifically, they differ in the shape of valvae, vinculum, and sclerotization of anellus. Male genitalia with multisetose apex of tegumen and the bipartite vinculum consisting of two lateral long branches, separate *C. morogorene* from the rest of Afrotropical Lithocolletinae.

Note: a similar biforked apically vinculum is found in *Cameraria trizosterata* Kumata, 1993 and *C. barlowi* Kumata, 1993 and in a less biforked degree in *C. fasciata* Kumata, 1993. All three latter species are distributed in Western Malaysia.

Holotype: ♂, [1] **Tanzania** / Morogoro Distr.[ict] & / Town, 550–600 m / 30.viii.1992 / leg. L. Aarvik; specimen ID: [2] 'RMCA ENT 000006148'; [3] Gen. Prep. 3501♂ / De Prins; [4] 'MRAC/KMMA / 00657'; wing venation prep. [5] 'De Prins 3793♂'; [6] 'MRAC/KMMA / 00667'; [7] 'Holotype ♂ / *Cremastobombycia* / *morogorene* / De Prins, 2012', in RMCA.

Description. *Adult* (Fig. 115). Forewing length: 2.25 mm.

Head: Vertex tufted with reddish-ochreous scales with a suffusion of a few white shorter scales posteriorly; frons smooth, shiny white with a slight bronze shading on fronto-clypeus near palpi. Maxillary palpus very small, slightly porrect, white. Labial palpus white, drooping, first palpomere with a few small, dark brown scales latero-ventrally, terminal palpomere sharp caudally, directed downwards. Haustellum developed. Antenna slightly shorter than forewing, flagellum mainly fuscous with slightly ringed, narrow, light ochreous bands dorsally, each flagellomere with dark fuscous apical 3/4 and light ochreous base; ventrally flagellum ochreous; scape reddish ochreous posteriorly with infusion of pale ochreous shading anteriorly, 4–5 dark brown scales present on scape dorsally, scape with 6–8 light ochreous pecten, of different length; pedicel as rest of flagellomeres, only slightly larger.

Thorax: Reddish ochreous; tegulae uniformly reddish-ochreous. Forewing ground colour reddish ochreous; white/blackish fuscous markings consisting of two transverse fasciae, two costal strigulae, one dorsal strigula and marked blackish-fuscous area along termen; basal streak short, narrow white stripe slightly oblique towards apex with a couple of black scales; first fascia at 1/4, as a narrow, multiple curved, slightly oblique towards apex white band, richly edged apically with black scales as a narrow edging band from midline of forewing to costa, as a broad edging band, twice broader than white band, from dorsal margin to midline of forewing; second fascia at middle of forewing consisting of narrow white line parallel to first fascia but slightly broader, and richly edged with several rows of black scales apically; black edging of second fascia extending towards apex just above midline of forewing, uniting with rich black irroration at apical 1/4 of forewing; first costal strigula short, narrow, irregular stripe-shaped, apically edged with a spot of blackish scales, second costal strigula almost indispensable at apex, first dorsal strigula situated opposite first costal strigula, without regular shape, hardly visible, termen area richly covered with blackish scales; fringe line at tornus short ochreous fuscous with blackish-tipped scales, along dorsal margin pale fuscous. Hindwing greyish with long fuscous fringe, slightly darker shaded than hindwing. Fore femur and fore tibia dark fuscous, tarsomere I fuscous with a few white piliform scales basally, tarsomere II fuscous ventrally with white spot dorsally, tarsomeres III–IV dark fuscous, terminal tarsomere ochreous; mid-femur dirty white with dark fuscous patches basally and subapically, mid-tibia dirty white with large blackish fuscous patches basally, medially and apically, tibial spurs greyish with white apices without sharp transition borders, tarsomere I white with fuscous subapex, tarsomere II white with fuscous apex, tarsomere III blackish fuscous, tarsomeres IV white and tarsomere V pale fuscous; hind femur greyish, hind tibia grey with whitish ochreous apex, medial spurs fuscous with ochreous apices, apical spurs light ochreous with a couple of fuscous scales subapically, tarsomere I–II white with fuscous base and apex, tarsomere III with fuscous basal 2/3, white apically, tarsomeres IV white, tarsomere V greyish.

Abdomen: Dark fuscous dorsally. Genital segments ochreous brownish. Sternum VIII of male middle size broad, tapering with rounded apex.

Male genitalia (Figs 280–282). Tegumen long (ca. 760 µm), narrow, tapering towards tip bearing about 10 slender setae of median length and several microsetae. Valvae symmetrical, ca. 640 µm long, ventral margin almost straight with a light curve resulting to small dent in middee, dorsal margin slightly concave and cucullus area significantly dilated, somewhat trapezoidal with rounded dorso-apical angle, followed by almost straight apical

margin and slightly projected lateroventally half rounded ventroapical angle; half oval seal following subapical margin of valva in cucullus area; dorsal margin of cucullus is covered with short stiff, setae; ventral margin of valva is setae free except small rounded setose island on small bult postmedially; about 9 long slender, setae randomly distributed on ventral surface of basal part of valva. Vinculum strongly sclerotized, widened laterally, biforked apically, each branch long, slender and somewhat knobbed apically; caudolateral part of vinculum tightly confluent to base of sacculus, basolateralparts of vinculum weakly joint by narrow junction; saccus very narrow, without apical projection, medianpart separated from vinculum; transtilla very narrow, weakly sclerotized, hardly touching caudolateral parts of vinculum. Aedoeagus ca. 915 µm long, narrow, tubular, slender, slightly down curved, tapering towards vesica, coecum anteriorly enlarged, bulbous, vesica narrow, with two long (ca. 222 µm), very slender, confluent cornuti forked at apex of vesica.

Female genitalia. Unknown.

Etymology. The species name refers to the name of the type locality Morogoro in Tanzania**.**

Habitat. Savannah vegetation with agricultural farms.

Host plant(s). Unknown.

Flight period. Adults have been collected in late August.

Distribution. (Fig. 413). Recorded only from the type locality in Tanzania.

Porphyrosela Braun, 1908

Porphyrosela Braun 1908: 272 (key), 348. Type species: *Lithocolletis desmodiella* Clemens, 1859, by monotypy. *Porphyrosela* was established to denote a subgenus of *Lithocolletis* Hübner, 1825.

Historic account. Braun (1908) established *Porphyrosela* as a subgenus of *Phyllonorycter* based on four characters: i) forewing somewhat acuminate; ii) absence of vein R_3 in forewing; iii) scape of antenna without pecten; iv) hind tibia without appressed hairs. In the same publication Braun assigned *Lithocolletis desmodiella* Clemens, 1859 to *Porphyrosela*, which remains the only Nearctic species belonging to this genus. Busck (1909) confirmed the subgeneric status of *Porphyrosela* and considered it closely related to *Cremastobombycia* and *Phyllonorycter.* These three taxa showed a "cylindrical" type of larvae, common to many present-day Lithocolletinae and according to Busck (1909: 100) "are worthy of subgeneric rank...but to erect subgenera for two of the subdivisions [*Porphyrosela* and *Cremastobombycia,* note JDP] of the one main branch and then include the other main branch [*Cameraria*, note JDP] in the third subdivision [*Phyllonorycter*, note JDP] is obviously unscientific".Therefore, Busck (1909) only recogized two genera, 1) *Phyllonorycter* Hübner (including species currently in *Porphyrosela*, *Phyllonorycter* and *Cremastobombycia*) and 2) *Cameraria* Chapman. Braun (1909) followed his division of lithocolletine species into two main branches "cylindrical larva" and "flat larva", regarded the *Porphyrosela* group closely related to the *Phyllonorycter* group, but differently from Busck (1909) placed *Cremastobombycia* at the base of both branches. Subsequently, Braun (1914: 150) combined her larval morphological data with wing pattern data of Lithocolletinae, and concluded that *Porphyrosela* is derived from *Phyllonorycter*, but "*Cremastobombycia* (in its modern form) and the "flat-larval group"[*Cameraria*, note JDP] originated at a somewhat later period than the typical *Lithocolletis* [*Phyllonorycter,* note JDP]". The taxonomic status of *Porphyrosela* remained an item for discussions for microlepidopterists. Differently from *Cremastobombycia*, which was treated at generic level by Meyrick (1912b), *desmodiella* was treated by Meyrick in the same publication as a species of the group C of *Lithocolletis*. But DeGryse (1916), in a publication on larval hypermetamorphism, recognized *Porhyrosela* as a separate genus. Ely (1918) also treated *Porphyrosela* as a separate genus based on wing venation and listed the same diagnostic characters which were presented in the original description of Braun (1908), which was followed by most subsequent workers (e.g., McDunnough 1939; Bourquin 1951; Clarke 1953). However, Fletcher (1929) still considered *Porphyrosela* as a subgenus of *Lithocolletis*. Vári (1961), in his seminal treatment of Afrotropical Lithocolletidae added and corrected the diagnostic characters of *Porphyrosela* because some of the characters were erroneous. For instance, he noted that the scape of *Porphyrosela* has a pecten with a few hairs, that four apical veins are most probably present in the forewing, that the hindwing is narrower than in *Phyllonorycter*, and that Rs and M_1 are coincident at their base and very weakly sclerotized. Furthermore, Vári (1961) noted the simple diagnostic difference between *Porphyrosela*

and *Phyllonorycter*, that the anterior apophyses are absent in *Porphyrosela*, but present in *Phyllonorycter*. Vári (1961, 1963) added the descriptions of two Afrotropical *Porphyrosela* species to the two species then recognized in the genus. Kumata (1993) confirmed and broadened the definition of *Porphyrosela* by noting that *Porphyrosela* in Asia have a hairy pecten on the scape, tufted upperside of hind tibia, and veins R_3, R_4 and R_5 in the forewing. Kumata (1993) also noted that veins in the hindwing are very weakly sclerotized, and that three pairs of sensillae represent the veins Cu_1, M_1 and M_2 which might serve as a diagnostic character separating it from *Phyllonorycter*. Kumata (1993) added another diagnostic character found in the male genitalia: the tegumen of *Porphyrosela* has a pair of apical setae, which easily separates this genus from *Phyllonorycter*, which lacks apical setae. Kumata transferred *aglaozona* Meyrick, 1882, *dismochrysa* Lower, 1897 [misspelled as *desmochrysa*, note JDP], *dorinda* Meyrick, 1912, *neodoxa* Meyrick, 1916 and *hardenbergiella* Wise, 1957 from *Phyllonorycter* to *Porphyrosela*, described *alternata* Kumata, 1993, augmenting the list of *Porphyrosela* species to ten. Publications that followed mainly catalogued the known *Porphyrosela* species and contained additional biological and distribution data (Biezanko *et al*. 1978; Inoue *et al.* 1982; Brower 1984; Grehan *et al.* 1995; Covell 1999; Sugi 2000; Dall'Asta *et al*. 2001, Vári *et al*. 2002; De Prins & De Prins 2005; Bai *et al*. 2009), or data on parasitic Hymenoptera attacking *Porphyrosela* (Yoshimoto 1977; Maier 1988; Kamijo 1991). Kumata (1993, 1995) provided a much detailed redescription of *Porphyrosela dorinda* (Meyrick, 1912). The preimaginal stages of the genus, based on the detail examination of larval and pupal characters of *Porphyrosela minuta* Clarke, 1953 were studied by Bentancourt & Scatoni (2007).

Porphyrosela occurs in all biogeographical regions except Antarctica, although the genus included only 10 species (De Prins & De Prins 2012). In the Palaearctic region, there are two recognized species (*P. alternata* Kumata, 1993 and *P. dorinda* (Meyrick, 1912)), in the Nearctic region there is one (*P. desmodiella* Clemens, 1859), in the Neotropical region there are two (*P. desmodiella* Clemens, 1859 and *P. minuta* Clarke, 1953), in the Oriental region there are three (*P. alternata* Kumata, 1993, *P. dorinda* (Meyrick, 1912) and *P. neodoxa* (Meyrick, 1916)), and in the Australian region there are three (*P. aglaozona* (Meyrick, 1882), *P. dismochrysa* (Lower, 1897), and *P. hardenbergiella* (Wise, 1957). The Afrotropical region was represented by two *Porphyrosela* species: *P. homotropha* Vári, 1963 and *P. teramni* Vári, 1961. Herebelow, we present two more Afrotropical *Porphyrosela* species augmenting the number of *Porphyrosela* species in the Afrotropical region to four.

TABLE 5. *Porphyrosela* species and their biogeographical regions. Twelve species are currently recognized in the world.

	Region					
Species	Afrotropical	Australian	Nearctic	Neotropical	Oriental	Palaearctic
P. aglaozona (Meyrick, 1882)		×				
P. alternata Kumata, 1993					×	×
P. desmodiella Clemens, 1859			×	×		
P. desmodivora De Prins, n. sp.	×					
P. dismochrysa (Lower, 1897)		×				
P. dorinda (Meyrick, 1912)					×	×
P. gautengi De Prins, n. sp.	×					
P. hardenbergiella (Wise, 1957)		×				
P. homotropha Vári, 1963	×					
P. minuta Clarke, 1953				×		
P. neodoxa (Meyrick, 1916)					×	
P. teramni Vári, 1961	×					
Total species diversity by region	4	3	1	2	3	2

Diagnosis. The genus *Porphyrosela* contains some of the smallest moths in Lepidoptera (Kumata, 1993), with ca. 4.5–4.7 mm wingspan. *Porphyrosela* superficially resembles *Phyllonorycter* by wing pattern and venation. The ground forewing colour of many *Porphyrosela* species is orange ferruginous with metallic highlights marked with

broad white rounded or strigulate spots surrounded by a narrow black border. Veins are weakly developed. The forewing can contain 4 or 5 apical veins, depending whether R_3 and R_4 are rudimentary or developed. In hindwing, Rs is very long like in *Phyllonorycter* and M_1 can be branched just beyond the middle and extend almost to subtornum M_1 and defined M_2 (Kumata 1993). The presence of M_1 and M_2 on hindwing might assist in separating *Porphyrosela* from similar *Phyllonorycter* species (Kumata 1993). M_2 is also present in *Protolithocolletis* and *Cremastobombycia*, but these genera possess six (in *Cremastobombycia*, except the Afrotropical taxa) or seven (*Protolithocolletis*) apical forewing veins. Afrotropical *Cremastobombycia* differs from *Porphyrosela* by having more than 2 pairs of apical setae on tegumen in male genitalia and the origin of apophyses anteriores at segment VIII in female genitalia. *Porphyrosela* also differs from *Phyllonorycter* by possessing a pair of apical setae on tegumen in male genitalia; in *Phyllonorycter* such setae are lacking from the apex of the tegumen (Kumata 1993). The female genitalia of *Porphyrosela* differ from those of *Phyllonorycter* and other Lithocolletinae by having a reduced eighth abdominal segment without anterior apophyses (Vári 1961; Kumata 1993). Anterior apophyses that extend from segment VIII in female genitalia are absent in the *Phyllonorycter melanosparta* group. However, in the latter species group the sterigmatic appendages located in segment VII are probably homologous with the anterior apophyses. The larva has been studied in only one species, *P. minuta* Clarke, 1953, by Bentancourt & Scatoni (2007). *Porphyrosela* species possess three flat, legless, sap feeding, early instars and two cylindrical, tissue feeding, later instars with developed legs, prolegs and chewing mouthparts. Chaetotaxy of the last fifth instar of *Porphyrosela* is unique within the Lithocolletinae, seta SD2 from the prothorax and the SV group on three thoracic segments are absent (Bentacourt & Scatoni 2007). In most of other gracillariid genera, the SV group is present on thoracic segments (Davis 1987). The pupa of *Porphyrosela* is slender and subcylindrical with a well developed cephalic process. Apices of the antennae and metathoracic legs coincide at the same length (Bentancourt & Scatoni 2007), whereas in *Phyllonorycter* the antennal appendages are shorter than the thoracic legs and in *Cameraria* the antennal appendages are longer than the thoracic legs (De Prins *et al*. 2003). The abdominal segments of *Porphyrosela* pupa have abundant spinulas and rounded spiracles, whereas the other pattern is present also in the remaining Lithocolletinae genera (De Prins *et al*. 2003; Bentancourt & Scatoni 2007). The cremaster is reduced (Betancourt & Scatoni 2007), whereas in *Phyllonorycter* it is present and in *Cameraria* it is absent (De Prins *et al*. 2003). Larvae of *Porphyrosela* feed primarily on Fabaceae (De Prins & De Prins 2005; 2011), and the majority of species build underside mines, but *P. minuta* constructs an upperside blotch mine. Unlike most other Lithocolletinae genera, *Porphyrosela* is usually gregarious with two or more larvae (up to six) in each mine (Vári 1961; Maier & Davis 1989; Wessels 2010). The duration of larval development, for *P. minuta*, lasts 8–9 days (Bourquin 1951; Bentancourt & Scatoni 2007). Pupation takes place inside the mine in a chamber on the epidermis of leaf that is constructed by the larva at the end of its development (Bourquin 1951). The pupa remains free inside the mine and does not make a cocoon; the exuvium is partially exposed after the adult emerges. For *P. minuta*, pupation lasts only 4–5 days (Bentancourt & Scatoni 2007).

Diagnosis of Afrotropical *Porphyrosela*. Interspecific differences of *Porphyrosela* are most readily detectable based on wing pattern. Afrotropical *Porphyrosela* show no differences in wing venation from the Palaearctic species *P. dorinda* and *P. alternata* (Kumata 1993: pl. V, figs C & D). Male and female genitalia of the Afrotropical species show only very minor differences providing insufficient diagnostic characters for species identification.

Head: Vertex plate tightly joint with frontoclypeus, vertex and occiput tufted with erected fuscous-ochreous long piliform scales; frons covered with appressed smooth scales, with strong metallic gloss; eyes medium sized, slightly smaller than eyes of *Phyllonorycter*, ocular index ca. 0.5, interocular index ca. 0.7. Antenna ca. as long as forewing, smooth scaled, apical flegellomeres might be pure white (*P. teramni*) filiform; scape short thickened, bearing a few hair-like pecten or without pecten. Proboscis developed, naked, slightly shorter than proboscis in *Phyllonorycter*, ca. 2.3× longer than labial palpus. Maxillary palpus small, rudimental, bi-segmented, apical maxillary palpomere almost globular. Labial palpus moderate, porrect, filiform, drooping, with ratio of segments from base 1.1 : 1: 1.3.

Thorax: Forewing background colour ochreous with silvery white markings; fringe long, particularly near tornus and dorsum, reaching width of wing in forewing and ca. 4–5× width of wing in hindwing. Descaled forewing lanceolate, slender, and pointed. Venation with 8 veins, apical part with weak 5 veins R_3, R_4, R_5, M_1, Cu_1; M_1 and Cu_1 separate, CuP indistinct (fold) over entire length, 1A separate; Sc strong and short. Veins R3 and R4 might be rudimentary, very slender and indistinct; cell closed. Hindwing lanceolate, narrow, maximum width/hind wing length is 0.1, venation reduced to 5 veins: Sc very short terminating near base of costa, Rs very long, running

almost to apex of hindwing, M_1 double branched to $M_1$and M_2, both branches running close and almost parallel to each other, basal 2/3 of M_1 indistinct, parallel to Rs, distal parts of M_1 and M_2 run along dorsal margin, Cu_1 strong, ends slightly before 1/2 of dorsum; A_1 vestigial. Frenulum in male—a single stout bristle, frenula in female—2 tightly appressed bristles. Retinaculum in male a tiny fold on Sc. Legs slender, without rings; hind tibia thickened with a few aprressed hairs, with long medial spurs slightly longer tha apical spurs, hind tarsus smooth with darker and brighter shading but not evidently ringed, slender, ca. 0.6× length of tibia.

Abdomen. Anterior margin of abdomen opening narrowly sclerotized and significantly broader towards S_2, the sclerotized margination of abdomen opening well connected on T_2 and unconnected on S_2; S_2 apodemes of rather long, ending beyond the opening, slender, bent in midden, with slightly enlarged bases, slender distally, a pair of tiny spicules present on each abdominal sternum sublatero-anteriorly. Sternum VIII in adult males small, flap-like, extended, more or less rounded caudally.

Male genitalia. Tegumen rather long, conical or subconical, blunt apically with a pair of apical or subapical setae; tuba analis slightly protruding or indistinct. Valvae symmetrical, about as long as tegumen, slender, bar-shaped, weakly arched at subapex, round apically with fine scattered setae. Transtilla is complete, narrow. Anellus well developed, tubular, without sclerotized juxta. Vinculum narrow, with short or medium length saccus. Aedoeagus nearly as long as valva, tubular, tapering beyond middle towards apex, one side of vesica heavily but narrowly sclerotized (*P. teramni*) or bearing cornutus (*P. gautengi*).

Female genitalia. Papillae analles short, narrowed dorsally and ventrally; posterior apophyses long, running to middle or beyond middle of segment VII, straight, slender basal region can be slightly widened in *P. homotropha*. Segment VIII reduced, shortened; anterior apophyses absent. Ostium bursae opens near caudal margin of segment VII; sterigma absent. Ductus bursae is weakly scerotized, without antrum; corpus bursae not distinct, without signum.

Relationships to other genera. The phylogenetic position of *Porphyrosela* remains unclear, as species in this genus have not been sequenced. Species in *Porphyrosela* are rather uniform morphologically both externally and internally, suggesting that the genus may be a monophyletic assemblage of similar species. Most diagnostic characters are found in the forewing pattern, such as the number and shape of patches and strigulae. The genitalia do not show evident and significant interspecific differences. Valvae of *Porphyrosela* are rod-like, sparsely setose with rounded or slightly obtusely angulated apex, vinculum in males more or less subriangular or slightly different shape with short sacccus. The differences are even less conspicuous in female genitalia, such as minute differences in the shape and length of posterior apophyses. Most *Porphyrosela* species are oligophagous and feed on closely related host plants.

Biology. The mine is oblong, transparent, and tentiform, on the underside (abaxial) leaf surface (*P. teramni*) or it is constructed on the upperside (adaxial) of the leaf (*P. homotropha*); mine strongly contracted; no folds (*P. teramni*) or several folds (*P. homotropha*) visible; larvae gregarious in mine (*P. homotropha*, *P. teramni*); frass in one or two clusters; pupation without cocoon; pupa protrudes the mine before adult emerges (Vári 1961). Afrotropical species, like all other *Porphyrosela* species, feed on Fabaceae.

Distribution. Afrotropical *Porphyrosela* occurs in Cameroon, Ethiopia, South Africa and Zimbabwe.

Specimens examined: *Porphyrosela desmodiella* (Clemens, 1859):

♀, [1] (handwritten in black Indian ink)‘UNITED STATES / inf. *Desmodium* / *viscidiflorum* vii-viii / Clemens Coll / Mus. Am. Ent. Soc. / Philadelphia 1872 / 36050’, [2] (printed) ‘Walsingham / Collection. / 1910-427’; [3] (handwritten in black Indian ink) ‘*Lithocolletis* / *desmodiella* ♀ / Clms / HOMO-TYPE Clms’, in BMNH: drawer Mi 10019.

Key to the species of the Afrotropical *Porphyrosela* based on external characters and host plants

1. Antennal tips white, four costal strigulae on forewing 2
– Antennal tips of the same colour as remaining part of flagellum, three costal strigulae on forewing 3
2. Ground colour of forewing equally unicolous ochreous; larvae feed on *Teramnus* spp. and *Vigna* spp. [Fabaceae] (Figs 120–122) . . . . . 66. *teramni*
– Ground colour of forewing speckled with blackish scales; larvae feed on *Glycine max* (L.) Merr. and *Vigna* sp. [Fabaceae] (Figs 118, 119). . . . . 65. *homotropha*

3. Ground colour of forewing equally unicolous ochreous; larvae feed on *Vigna luteola* (Jacq.) Benth [Fabaceae] (Fig. 117) . . . . . 64. *gautengi*
– Ground colour of forewing with dense irroration of brownish scales; larvae feed on *Desmodium adscendens* (Sw.) DC. [Fabaceae] (Fig. 116). . . . . 63. *desmodivora*

Key to the species of the Afrotropical *Porphyrosela* based on male genitalia*

1. Tubular anellus shorter than aedoeagus, tegumen about as long as valva 2
– Tubular anellus as long as aedoeagus enclosing it entirely, tegumen slightly longer than valva (Figs 287–291) . . . . 66. *teramni*
2. Valva bar-shaped with rounded apex; aedoeagus broad, basally bearing sclerotized cornutus, apex of vesica with sharp barb (Figs 283, 284) . . . . . 64. *gautengi*
– Valva bar-shaped, slightly dilated apically, with somewhat angulated, but not round apex; aedoeagus straight, with narrow tip, distally open, cornuti absent (Figs 285, 286) . . . . . 65. *homotropha*

* male genitalia of *P. desmodivora* unknown.

63. *Porphyrosela desmodivora* De Prins, new species
(Figs 116, 414)

Diagnosis. Although the available specimens of *P. desmodivora* do not possess intact genitalia, the wing pattern and natural history data provide enough characters to diagnose this new species. The forewing pattern of *P. desmodivora* differs from that of *P. homotropha* by the more brownish ground colour**.** *Porphyrosela desmodivora* is speckled with brownish, dark grey, rectangular scales. The size of strigulae is also different: in *P. desmodivora* the third costal and dorsal strigulae are small, smaller than first costal and dorsal strigulae, dirty white and largely indistinct. In *P. homotropha* these two strigulae are the largest strigulae, bright white and bold, and very distinct. Both *P. gautengi* and *P. desmodivora* have three costal strigulae on the forewing, but *P. desmodivora* differs from *P. gautengi* by its ground colour: *P. desmodivora* has a dense irroration of brown scales, whereas *P. gautengi* is unicolorous ochreous. The coloration of head and legs is also different between those two species (see description below). None of the Afrotropical species of *Porphyrosela*, except *P. desmodivora*, feeds on *Desmodium*.

Note: Four species of *Porphyrosela* feed on *Desmodium* plants worldwide: the Australasian *Porphyrosela aglaozona* (Meyrick, 1882), the Palaearctic and Oriental *P. alternata* Kumata, 1993, the New World *P. desmodiella* (Clemens, 1859), and the Oriental *P. neodoxa* (Meyrick, 1916) (De Prins & De Prins 2005, 2006).

Porphyrosela desmodivora significantly differs from *P. desmodiella*, because the latter possesses two tranverse fasciae (10 specimens of *P. desmodiella*, belonging to the collection of Lord Walsingham and deposited in the collection of BMNH, drawer Mi 10019; see also Braun 1908: pl. XXIV, figs 14–15). It also differs from *P. aglaozona* and *P. neodoxa* by forewing pattern. In *P. aglaozona* the forewing has four costal and three dorsal strigulae, in *P. neodoxa* three costal and two dorsal strigulae whereas in *P. desmodivora* three costal and three dorsal strigulae are present on the forewing (Meyrick 1916; Wessels 2010). *Porphyrosela desmodivora* resembles *P. alternata*, but differs from it by ground colour and by the pattern of the apical part of forewing. Additional characters that are diagnostic include: in *P. alternata* i) strigulae are large semi-round or round shaped; ii) strigulae are approximately of equal size; iii) the gaps between strigulae are approximately as large as the diameter of strigulae; iv) the first dorsal strigula is large and bold. In *P. desmodivora* i) the strigulae are long rectangular shaped; ii) strigulae have more than 2× difference in size; iii) the gaps between strigulae are 3× and larger than the width of strigula; iv) the first dorsal strigula in *P. desmodivora* is small, hardly visible. The above mentioned characters are summarized in tables 6 and 7.

Holotype: ♂, [1] 'Kamerun **[Cameroon]** / Ekona / 20.iv.1938 / [leg.] Buhr S. G.; [2] 'Mine an [on] / *Desmodium* / *adscendens* / 8.52'; [3] 'Glas [preparation] No 61'; [4] 'Einige Kleinschmetterlinge aus oberseitigen Platzminen (M.) / an *Desmodium adscendens* (Papilion.) / Ekona / 20.iv.1938' [printed in red on a slender long white piece of paper, folded and pinned under the specimen]; [5] 'Holotype ♂ / *Porphyrosela* / *desmodivora* / De Prins, 2012', in ZMHB.

Paratype: 1 ♂ (abdomen damaged). 1♂: Kamerun [**Cameroon**], Ekona, 20.iv.1938, [leg.] Buhr S. G; mine an [on] *Desmodium adscendens*, 8.52, in ZMHB.

TABLE 6. Comparison of external morphological characters of *Porphyrosela* species feeding on *Desmodium*.

Character	Species				
	aglaozona	***alternata***	***desmodiella***	***desmodivora***	***neodoxa***
white markings on forewing	four costal and three dorsal strigulae	three costal and three dorsal strigulae	two tranverse fasciae, two costal and one dorsal strigulae	three costal and three dorsal strigulae	three costal and two dorsal strigulae
ground colour of forewing	shining ochreous orange	orange brownish with a metallic lustre	ferruginous brown, ruby tinted	speckled with brownish, dark grey, scales	shining coppery orange
base of costa of forewing	base of forewing conspicuously black	triangular black spot present	black spot absent	black spot absent	black spot absent

TABLE 7. Comparison of forewing pattern between *P. alternata* and *P. desmodivora*.

alternata	***desmodivora***
strigulae are large semi-round or round shaped	strigulae are long rectangular shaped
strigulae are approximately of equal size	strigulae more than 2× difference in size
gaps between costal strigulae are approximately as large as the diameter of strigulae	gaps between costal strigulae are 3× and larger than the width of strigula
the first dorsal strigula is large and bold	the first dorsal strigula is small, hardly visible

Description. *Adult* (Fig. 116). Forewing length: 1.15–1.45 mm.

Head: Vertex tufted with short ochreous piliform scales, frons smooth, metally shiny, mainly from long narrow piliform scales, but bearing a few pale, less shiny, broader almost rounded appressed scales on vertex-frons boundary projecting ventrally. Labial palpus as long as diameter of eye, drooping, directed downwards, pale baige, basal palpomere light brown, a very slender line of tiny brown dots running along front side of two basal palpomeres. Haustellum short, pale beige. Antenna slightly shorter than forewing, consisting of 27–28 flagellomeres, basal part of antenna light brown, midden part pale and gradually getting darker brownish towards apex, apical flagellomeres brown; pedicel slightly longer than following flagellomere, brownish beige; scape shorter and thicker than pedicel, dorsally loosely covered with appressed, short, brownish, piliform scales, with 5–6 short stiff brownish hair-like pecten.

Thorax: Uniformly brownish, same basic colour as forewings; tegulae concolourous with thorax. Forewing ground colour greyish ochreous, speckled with brownish, dark grey rectangular dots with three costal and three dorsal dirty white strigulae, first costal strigula at 1/3 of forewing, large dirty white patch, reaching midline of forewing, irregularly rounded shaped, edged roundly with with blackish brown small rectangular scales irregularly surrounding first costal strigula; second costal strigulae twice smaller than first costal strigula, slightly beyond middle of forewing, dirty white, semcircular, edged on both sides by elongate recrangular brownish black scales; third costal strigula is smaller than first costal strigula, but slightly larger than second costal strigula, situated near apex, shiny white, irregular spot-shaped, without distinctive edging; first dorsal strigula small, at 1/4, semicircular, situated just basally of first costal strigula, dirty white, hardly visible, edged with blackish brown scales, except on dorsum, second dorsal strigula at 1/2 of dorsum, situated basally of second costal strigula, narrow, rectangular, just not reaching midline of forewing, irregularly edged from all sides except dorsum, third dorsal strigula situated in middle of gap between second and third costal strigulae, basally tornus, irregularly elongate, with apical part extending beyond midline of forewing, insignificantly edged on both sides with irregular row of blackish brown fuscous scales, apical scales longer, brightly ochreous and dark brown tipped, forming an inconspicuous fringe short line; fringe short pale greyish at apex and termen, gradually getting longer and becoming pale greyish with slight ochreous golden shade at tornus. Hindwing brownish ochreous, fringe of same colour as hindwing. Fore

femur fuscous with metallic shine, fore tibia and tarsus, except tarsomere III, pale grey with metallic shine, tarsomere III and apex of tarsus dark brownish grey; mid-femur fuscous grey with brownish shadowing, mid-tibia pale grey with a weak metallic shine, tibial spurs dirty white with metallic shine, tarsus dirty white with strong metallic shine possessing a slight bronze shading towards apex of tarsus, on tarsomeres III–V, a few dark grey tiny piliform scales present on subbasal, middle, and apex of mid-trasomere I; hind femur ochreous fuscous with metallic shine, hind tibia shiny ochreous irrorated with blackish brown scales with dark grey erected hairs, pale grey patch at subbase and ochreous bronze apex of hind tibia, median spurs short, ca. 1/3 of hind tibial length, white with slight bronze sading at base, apical spurs short, white; hind tarsus dark ochreous fuscous with slight lighter shading at apical tarsomeres.

Abdomen: Dark brownish grey. Descaled sternum VIII of male small, rounded apically.

Male genitalia (damaged). Tegumen subconical, rounded apically, strongly sclerotized; basal arms of tegumen short, narrow, strongly sclerotized, curved, dilating from each with smooth anastomosis into median suture of tegumen, crossing dorsal side of tegumen.

Female genitalia. Unknown.

Etymology. The specific epithet combines the generic name of the host plant and the Latin word *vorare*, meaning 'greedily eating', referring to the ability of the larva to consume its host leaf quickly.

Habitat. Unknown.

Host plant(s). Fabaceae: *Desmodium adscendens* (Sw.) DC.

Flight period. Adults were collected in late April.

Distribution (Fig. 414). Recorded only from the type locality in West Cameroon.

64. *Porphyrosela gautengi* De Prins, new species

(Figs 117, 283, 284, 353, 415)

Diagnosis. *Porphyrosela gautengi*, n. sp., is similar to *P. teramni* but it can easily be distinguished from the latter by forewing pattern and colour of the terminal segments of the antennal flagellum. The forewing of *P. teramni* has 4 costal strigulae, whereas that of *P. gautengi* has 3; apical 6–7 flagellomeres of the antenna in *P. teramni* are pure white, wheras the tips of the antennae of *P. gautengi* are not distinguishable from the remaining flagellomeres and are pale grey. The male genitalia of the new species resemble those of *P. teramni* but differ from the latter by the following characters: i) in *P. teramni* the tegumen is long and acuminating towards the apex; in *P. gautengi* it is significantly shorter with a rounded apex; ii) in *P. teramni* the valva is ventrally emarginated, whereas in *P. gautengi* the apex of the valva is gently rounded; iii) the main body of the aedoeagus is truncate and slightly narrowed apically in *P. gautengi*, whereas the main body of the aedoeagus in *P. teramni* has a narrow subapical constriction; and iv) the vesica in *P. teramni* is bulbed and rounded, whereas the aedoeagus in *P. gautengi* is broad basally with a sclerotized cornutus, and the vesica has a sharp barb.

Holotype: ♂, [**South Africa**]: [1] 'Jozini Dam / Lebombo M[oun]t[ain]s. Nat.[ure] [Reserve] / 18.i.1965'; specimen ID: [2] 'RMCA ENT 000004797'; [3] 'Holotype ♂ / *Porphyrosela / gautengi* / De Prins, 2012', in RMCA.

Paratypes: 28♂ and 51♀ (including 1♂ and 1♀ genitalia preparations), 1 specimen. [**South Africa**]: 10♂, 16♀, Pretoria, Willow Glen, 14.ii.1984, 15.ii.1984, 16.ii.1984, 13.ii.1984, 02.ii.1988, 26.ii.1988, 23.ii.1988, 29.i.1990, 30.i.1990, 31.i.1990, Febr.[uary] 1990, 01.ii.1990, 02.ii.1990, [leg.] L.Vári, Ac[quisition]. no. 3929, 4023, 4031, 4054, G.[enitalia] De Prins 3506♂ (TMSA 14606), in TMSA. 14♂, 27♀, Pretoria, 20.iv.1950, 05.ii.1957, 03.iii.1960, 26.ii.1971, 01.iii.1971, 02.iii.1971, 03.iii.1971, 05.iii.1971, 06.iii.1971, 07.iii.1971, [leg.] L.Vári, Ac.[quisition] no. 209, 2222, 1992, 3086, 3334, G.[enitalia] 7784♂, 7785♀, in TMSA. 2♀, 1 specimen, same locality data, 22.xi.1948, 19.i.1949, 14.ii.1949, [leg.] L. Vári, Ac.[quisition] no. 54, 87, 122, PT, *Porphyrosela teramni* Vári, PARATYPE No 6504, 6509, 6516', in TMSA. 4♂, 4♀, Jozini Dam, Lebombo M[oun]t[ain]s., Nat.[ure] Reserve], 18.i.1965, 20.i.1965, 25.i.1965, Ac.[quisition] no. 2766, in TMSA. 1♀, same locality data, 20.i.1965, gen. prep. De Prins 3741♀ (MRAC/KMMA 00449), specimen ID: RMCA ENT 000004796, in RMCA. 1♀, Loskopdam, 23.xi.1971, [leg.] L. Vári, Ac.[quisition] no. 3174, in TMSA.

Description. *Adult* (Fig. 117). Forewing length: 1.90–2.07 mm.

Head: Vertex tufted with dark fuscous-brown, piliform scales, frons smooth, dark grey, with strong metallic shine, consisting of strongly appressed, long, piliform scales, projecting ventrally. Maxillary palpus tiny, porrect, grey. Labial palpus as long as diameter of eye, drooping, first palpomere grey with brownish shading, second palpomere grey, same shading as frons but lacking metallic gloss, terminal palpomere dark grey with sharply pointed apex, directed downwards. Haustellum short, strongly curved, greyish beige. Antenna slightly shorter than forewing, consisting of 30–32 flagellomeres, dark grey dorsally, gradually paler from mid-length to apex, grey with light brown shading ventrally; pedicel slightly larger than following flagellomere, dark grey; scape with appressed dark grey, bronzy, shiny, piliform scales loosely covering pale grey basal colour, with three short, stiff, pale grey pecten.

Thorax: Grey with strong metallic gloss; tegula as thorax. Forewing ground colour golden ochreous with three slight oblique towards apex, silvery white costal strigulae and three gradually enlarging towards tornus dorsal strigulae; costal strigulae large, rectangular shaped, almost reaching midline of forewing, first and second costal strigulae equal sized, third costal strigula largest, all three costal strigulae irregularly edged with blackish fuscous scales; first costal strigula situated at 1/3 of forewing, second costal strigula at 2/3 of forewing, and third strigula occupying apex of forewing; first dorsal strigula small, at 1/4, half round shaped, edged with blackish fuscous scales, except dorsum, second at 1/2 of dorsum, narrow, rectangular, just not reaching midline forewing, irregularly edged from all sides except dorsum, third dorsal strigula just before tornus, triangular shaped, with apical part extending beyond midline of forewing, edged on both sides with irregular row of blackish scales, termen and apical area suffused with brownish fuscous scales; fringe line not conspicuous, but longer dark brown scales stretching along termen, fringe short, whitish at apex and termen, gradually getting longer and becoming pale ochreous at tornus. Hindwing light fuscous with slight ochreous shade, fringe long, dense, pale grey, gradually getting shorter towards apex, obtaining slight golden shine at apex. Fore femur pale grey with bronze metallic shine, fore tibia and tarsus pale grey; mid-femur and tibia grey with bronze metallic shine, spurs pale grey as mid-tibia, mid-tarsomeres I–III pale grey, terminal tarsomeres dark grey; hind femur pale grey with strong metallic gloss, base of femur with slight bronze shine, hind tibia pale grey with two large bronze copper patches: basal triangular patch of medium size and large irregular patch extending from middle to apex of hind tibia, median spurs very long slightly shorter than tibia, metallic grey at basal 2/3 of length and pale grey with silver gloss at apical 1/3, apical spurs short, about 3× shorter than medial spurs, dirty pale grey at basal and apical parts and slightly darker grey at median part; hind tarsus dark grey with light bronze shade at apical half.

Abdomen: Dark grey dorsally, except first two segments which are pale grey with metallic gloss, ventrally whitish grey with metallic gloss, a bronze patch on 6–7 sterna, genital strerna dark grey. Sternum VIII of male very small, rounded apically.

Male genitalia (Figs 283, 284). Tegumen subconical, slightly longer than valva, broadly rounded apically, sparsely squamose dorsally, with a pair of stiff long setae; basal part arms of tegumen narrow strongly sclerotized running parallel to each other with smooth anastomosis into median part of tegumen; two narrow sclerotized seams run parallel each other at apical 1/2 of tegumen to gently broadly rounded apex; sclerotized tegumenal ‘cap’ covering apical third of tegumen. Valvae symmetrical, slightly shorter than tegumen, narrow, bar shaped with slight dilation at apical part and gently rounded apices, almost straight with light inclination medially, ventral surfice of valva with sparsely distributed round tubecules bearing fine setae. Vinculum narrow, subtriangular with apical saccus very short and blunt caudally. Transtilla complete, narrow in whole length, without laterocephalic lobes. Aedoeagus slightly shorter than valva, thickly sclerotized, tubular, broad basally bearing long heavily sclerotized cornutus, tapering apically to truncate sclerotized subapex, vesica narrow, weakly sclerotized, with sharp barb at apex. Anellus long, weakly membranous, tubular, shorter than aedoeagus.

Female genitalia (Fig. 353). Papillae anales short, flattened, almost rectangular shaped, connected with each other laterally, rather short, ca. 40 µm, tubular, and setose with long, slender setae, more dense apically. Posterior apophyses long (280 µm), slightly thickened in basal 1/4, apical parts slender along entire length, straight and parallel to each other, with sharp apices, entering anterior middle of segment VII. Segment VIII of moderate length, weakly sclerotized, wrinkled, anterior margin sinuate and fused with posterior margin of segment VII. Anterior apophyses absent. Segment VII moderate sized, slightly enlarged towards anterior margin, ca. 300 µm long, well sclerotized, with sinuate posterior margin, covered with numerous tubercules, concave ventrally. Ostium bursae opening at middle of concave posterior margin of segment VII, broadly dilating posteriorly without surrounded sterigma. Initial part of ductus bursae melanized, somewhat triangular,

anatomosing to tubular part. Ductus and corpus bursae without clear distinct separation. Structure of ductus bursae + corpus bursae long, ca. 750 µm, weakly sclerotized; corpus bursae formed by terminal elongated part of ductus bursae, without signum. Ductus spermathecae narrow, sclerotized, of medium length (ca. 160 µm), enlarged anteriorly, gently sinuate, but without revolutions; vesica large, irregular rounded, with annulated seam crossing medially.

Etymology. The specific epithet is derived from the name of the South African province Gauteng, where the type locality is located.

Habitat. Secondary forest.

Host plant(s). Fabaceae: *Vigna luteola* (Jacq.) Benth. In note 4054 written by Vári on 25 January 1990 (manuscript notebook of Vári), it is stated that he collected in "Pretoria (Willow Glen) *Porphyrosela teramni* Vári on *Vigna luteola* (Jacq.) Benth. [*P. teramni*]". We have identified those specimens as *P. gautengi*.

Mine. On upperside of leaf (Vári, manuscript note).

Flight period. Adults have been collected from late November to mid-April.

Distribution (Fig. 415). Recorded only from South Africa.

65. *Porphyrosela homotropha* Vári, 1963

(Figs 119, 285, 286, 354, 417)

Porphyrosela homotropha—Vári (1963: 11–12; pl. 1, fig. 6; figs 10, 11, 19), Dall'Asta *et al*. (2001: 35), De Prins & De Prins (2005: 368).

Diagnosis. *Porphyrosela homotropha* is most similar to *P. teramni* and *P. gautengi*. It can be distinguished from *P. teramni* by the brighter ochreous-yellow forewing ground colour and presence of irroration of black scales. It differs from *P. gautengi* by the presence of 4 costal strigulae and white tips of antenna. The male genitalia of *P. homotropha* resemble those of *P. gautengi* and *P. teramni* but differ from the former by the shape of the apical region of valva, shape of aedoeagus and the size of annellus. The valva of *P. homotropha* is slightly dilated apically, with slight angulation, but not round apex. In *P. gautengi* the apex of valva is rounded and in *P. teramni* valva is slightly concave ventrally with gently emarginated subapex and blunt apex. Aedoeagus in *P. homotropha* straight, with narrow tip, distally open, cornuti absent; aedoeagus in *P. teramni* thickly sclerotized, tubular, gently tapering apically beyond middle, with narrow constriction at subvesica, vesica sclerotized, bulbed at apex, with one side heavily but narrowly sclerotized, with short barb, top bearing 6–8 tiny sharp spinules; aedoeagus in *P. gautengi* broad basally tapering apically to truncate sclerotized subapex, bearing long heavily sclerotized cornutus, vesica narrow, with sharp barb at apex. Anellus in *P. gautengi* and *P. homotropha* shorter than aedoeagus; anellus in *P. teramni* as long as aedoeagus. Female genitalia are less distinctive: posterior apophyses in *P. homotropha* reach the middle of segment VII, whereas in *P. teramni* they are longer and reach the anterior 1/3 of segment VIII. *Porphyrosela homotropha* feeds on *Glycine max* and *Vigna* sp., which differ from the hosts of *P. gautengi* and *P. teramni*.

Note: The specimen collected in 1996 at Lake Tara (Ethiopia) shows very minor differences in size and position of strigulae compared with the only available type specimen of *P. homotropha (*see *Note* below*)*. Unfortunately, both the female paratype and the specimen from Lake Tara are worn, thus limiting our observations of their wing pattern. Differences in genitalia can vary between individuals but are minor. Because the Lake Tara specimen 1) was collected not far from the type locality of *P. homotropha*; 2) largely resembles the external appearance of *P. homotropha* (especially in the coloration of terminal segments of the antennal flagellum, number of strigulae, position of strigulae); 3) have internal morphological characters (female genitalia) that are indistinguishable from *P. homotropha*, we regard this specimen as *P. homotropha*.

Material examined. *Holotype:* ♂, [1] '**Aethiopien** [**Ethiopia**] Addis Ababa [Addis Abeba]'; [2] 'Little Akaki / River, 2300 m / 3.xi.–6.xii.1959 / E[rich]. M[artin]. Hering / 6531' [3] 'Mine an [on] *Glycine javanica*', in ZMHB [not found, not examined].

Paratypes: 2♀ [of which 1♀ collected on 5.xii.1959 is examined]. **Ethiopia:** 1♀, Addis Ababa; Little Akaki River, 2300 m, 3.xi.–6.xii.1959, [leg.] E. M. Hering 6531; Mine an [on] *Glycine javanica*, in ZMHB [not found, not examined]. 1♀, Addis Ababa; Little Akaki River, 2300 m, 5.xii.1959, [leg.] E. M. Hering 6531'; mine an [on] *Glycine javanica*, *Porphyrosela homotropha* Vári PARATYPE No 4786, in TMSA [examined].

Additional material: 1♀ (including 1♀ genitalia preparation). **Ethiopia**: 1♀, Athiopien [Ethiopia], 11–16.i.1996, Tana See [Lake], Bahir Dar, 1600 m, leg. Mey & Ebert, gen. prep. De Prins 3541♀, in ZMHB.

Note: In the original description, Vári did not state where the types were deposited. He wrote "Little Akaki River, 3.xi.–6.xii.1959, breeding nr. 6531, ♂-holotype, ♀-allotype and 1♀ paratype; the paratype is in the collection of the TMSA" (Vári 1963: 12). It was presumed that the holotype and the ♀ paratype (collected on 3.xi.1959) were deposited in the collection of the ZMHB. However, from the correspondence with Wolfram Mey (ZMHB) and personal communication with L. Vári (TMSA) it became clear that these two types probably were lost while E. M. Hering traveled from Africa to Germany, carrying both specimens. To be sure that the holotype of *P. homotropha* is absent, we meticulously searched for it during our visit at the ZMHB in September 2007. Unfortunately, we could not locate these two types, and conclude that the genitalia slides made from these specimens are also lost. Therefore, we believe that the only name-bearing type specimen of this species remains the female paratype deposited in TMSA.

Since no *Porphyrosela homotropha* name-bearing type specimen can be found, in accordance with the provisions of Art. 75.1 of the ICZN we designate here the female paratype specimen as the *Neotype* bearing the following labels: [1] 'Aethiopien [Ethiopia]: / Addis Ababa [Addis Abeba]'; [2] 'Little Akaki / River, 2300 m / 5.xii.1959 / E. M. Hering / 6531'; [3] 'Mine an [on] *Glycine javanica*', [4] '*Porphyrosela* / *homotropha* Vári / PARATYPE No 4786', deposited in TMSA.

Redescription. *Adult* (Fig. 119). Forewing length: 1.45 mm.

Head: Vertex tufted with black, piliform scales. Labial palpus small, drooping, dark grey with slight metallic shine. Antenna slightly shorter than forewing, flagellomeres blackish dorsally, terminal eight flagellomeres white.
Thorax: Dark grey with metallic gloss; tegulae as thorax. Forewing ground colour yellow ochreous, shiny, irrorated with black scales between first and second dorsal strigulae basally, apically and in termen area; all strigulae snow-white strongly shiny; 4 obligue costal strigulae at 1/4, 1/2, 2/3, and 5/6, costal strigulae rather large elongate, reaching midline of forewing, edged on both sides with black scales; 3 dorsal strigulae enpanding towards tornum, first dorsal strigula absent in paratype deposited in TMSA; second dorsal strigula is situated midway between first and second costal strigulae, third dorsal strigula just beyond third costal strigula; on left wing second dorsal strigula connected to second costal strigula to form a somewhat oblique band, on right wing second dorsal strigula clearly separated from second costal strigula; third dorsal strigula is 2× larger than second dorsal strigula; fringe line inconspicuous, but black scales present at apex, fringe rather long dark grey, gradually becoming longer towards tornum and dorsum. Hindwing dark grey, fringe long, dense, concolourous with hind wing. Legs dark grey shiny, foretibia is faintly whitish apically, tarsomere I of fore and mid-leg faintly whitish at their tips; hind tibia just distally from medial spurs brownish, tarsus brownish except tip of tarsomere I dirty white.

Abdomen: Blackish grey dorsally, shiny, ventrally paler with silvery shine. Sternum VIII of male small, rounded apically.

Male genitalia (Figs 285, 286, following Vári 1963: pl. 1, fig. 10). Tegumen subconical, slightly longer than valva, broadly rounded apically, sparsely squamose dorsally, with a pair of stiff, long setae. Valvae symmetrical, slightly shorter than tegumen, narrow, bar-shaped, slightly dilated apically with rough, somewhat dentate apices, slightly bent medially, ventral surface of valva covered with sparsely distributed, fine spines. Vinculum very narrow, with very short saccus, blunt caudally. Aedoeagus shorter than valva, straight, with narrow distally open vesica, cornuti absent. Anellus weakly membranous, tubular, shorter than aedoeagus.

Female genitalia (Fig. 354, following Vári 1963: pl. 1, fig. 11). Papillae anales short, flattened, setose with long slender dense setae ca. 68 µm long, mostly apically. Posterior apophyses long (ca. 230 µm), slightly thickened in basal 1/4, apical parts slender along entire length, straight and parallel to each other, with sharp apices, entering anterior middle of segment VII. Segment VIII of mid-length, weakly sclerotized, well connected with segment VII. Anterior apophyses absent. Segment VII ca. 380 µm long, slightly enlarged towards anterior margin. Ostium bursae opening at posterior part of segment VII, anteriad of junction of segment VII and VIII; sterigma simple, without membranized structures. Ductus and corpus bursae weakly sclerotized, ca. 380 µm long (ductus+corpus); signum absent. Ductus spermathecae without convolutions, gently curving, ca. 190 µm long, bulla spermathecae small and well sclerotized, oval-shaped.

Habitat. Unknown.

Host plant(s). Fabaceae: *Glycine max* (L.) Merr. (=*Glycine javanica* L.) (Vári 1963: 12, *Vigna* sp. (Vári 1961: 225, Dall'Asta *et al*. 2001: 34, De Prins & De Prins 2005: 368).

Mine. On upperside of leaf, thick and protruding, leaf very contorted; at the underside greenish marmored, at the last stage becoming completely transparent; in most cases caterpillars live gregariously in mine.

Flight period. Adults have been collected from November–January.

Distribution (Fig. 416). Recorded only from Ethiopia (Vári 1963).

66. *Porphyrosela teramni* Vári, 1961

(Figs 10, 20, 120–122, 287–291, 355, 417)

Porphyrosela teramni—Vári (1961: 224–225; pl. 15, fig. 4; pl. 65, fig. 12; pl. 105, fig. 7), Vári & Kroon (1986: 86, 138, 157), Kroon (1999: 74, 118, 152), Dall'Asta *et al*. (2001: 35), Vári *et al*. (2002: 26), De Prins & De Prins (2005: 369).

Diagnosis. *Porphyrosela teramni* is similar to *P. gautengi;* for differences see diagnosis of *P. gautengi*.

Material examined. *Holotype:* ♂, [1] [**South Africa**]: 'Pretoria / 22.xi.1948 / [leg.] L.Vári / Ac.[quisition] no. 54'. [2] 'HT'; [3] 'G[enitalia]. / 6923'; [4] '*Porphyrosela / teramni* Vári / ♂ HOLOTYPE No 6497', in TMSA.

Paratypes: 3♂ and 7♀ (including 1♂ and 3♀ genitalia preparations), 15 specimens. [**South Africa**]: 1♀, Pretoria, 22.xi.1948, [leg.] L.Vári, Ac.[quisition] no. 54; AT; G.[enitalia] 7132; *Porphyrosela teramni* Vári ♀ ALLOTYPE No 6498, in TMSA. 3♂, 6♀, 15 specimens: Pretoria, 19.xi.1948, 22.xi.1948, 24.xi.1948, 19.i.1949, 14.ii.1949, 15.ii.1949, 15.iv.1950, 02.ii.1951, 06.ii.1952, 13.ii.1952, [leg.] L.Vári, Ac.[quisition] no. 54, 87, 122, 210, 318, 444; PT; G.[enitalia] 7131♂, 7132♀, 6924♀, 7673♀, wing venation 2271; *Porphyrosela teramni* Vári PARATYPE No 6499, 6500, 6501, 6502, 6503, 6505, 6506, 6507, 6508, 6510, 6511, 6512, 6513, 6514, 6515, 6517, 6518, 6519, 6520, 6521, 6522, 6523', in TMSA. 1♂, Pretoria, 15.ii.1949, [leg.] L. Vári, Ac.[quisition] no. 122 and 1♀, Pretoria, 13.ii.1952, [leg.] L. Vári, Ac.[quisition] no. 444, both in ZMHB.

Note: 2♀ paratypes and 1 paratype specimen: 1♀, Pretoria, 22.xi.1948, [leg.] L. Vári, Ac.[quisition] no. 54; *Porphyrosela teramni* Vári PARATYPE No 6504. 1♀ Pretoria, 14.ii.1949, [leg.] L. Vári, Ac.[quisition] no. 122; *Porphyrosela teramni* Vári PARATYPE No 6516. 1 specimen, Pretoria, 19.i.1949, [leg.] L. Vári, Ac.[quisition] no. 87; *Porphyrosela teramni* Vári PARATYPE No 6509 belong to *Porphyrosela gautengi*, new species.

Additional material: 2♂ and 4♀ (including 2♂ and 4♀ genitalia preparations) and 45 specimens. **South Africa**: 1♂, 2♀, 12 specimens, Oribi Gorge, 09.iv.1954, 11.iv.1954, 12.iv.1954, 17.iv.1954, 20.iv.1954, [leg.] L.Vári, Ac.[quisition] no. 1218, G.[enitalia] 7674♀, 7890♂, 7891♀, wing venation 3233, in TMSA. 14 specimens, Mtunzini, 15.xii.1953, 18.xii.1953, L.Vári, Ac.[quisition] no. 998, in TMSA. 3 specimens, Jozini Dam, Lebombo Mts., 21.xii.1961, Ac.[quisition] no. 2398, in TMSA. 1♀ and 3 specimens, Glenmore, Port Edward, 12.v.1971, [leg.] L. Vári, G.[enitalia] De Prins 3543♀ (TMSA 14608), Ac.[quisition] no. 3124, in TMSA. 1♂ and 1♀, same locality data, gen. prep. De Prins 3739♂, 3740♀ (MRAC/KMMA 00432, 00433), descaled head prep. (MRAC/KMMA 00433), wing venation prep. De Prins 3792♀ (MRAC/KMMA 00434), specimen IDs: RMCA ENT 000004794–000004795, in RMCA. 9 specimens, Illovo Beach 09.xi.1984, 11.xi.1984, 12.xi.1984, [leg.] L. Vári, Ac.[quisition] no. 3936, in TMSA. 3 specimens, Durban, [date not stated], [leg.] E. L. Clark, in TMSA. **Zimbabwe**: 1 specimen, Vumba, 14.iii.1964, [leg.] L. Vári, Ac.[quisition] no. 2680, in TMSA.

Redescription. *Adult* (Figs 120–122). Forewing length: 2.09–2.18 mm.

Head: Anterior part of vertex bronze, posterior part of vertex and occiput tufted with fuscous ochreous intermixed with grey piliform scales with slight bronze shading, of medium length; tufted bunch of piliform scales divided medially, more dense laterad, close to antennae, projecting anterior upwards upwards, short piliform scales, projecting laterally on posterior part of occiput; frons smooth, greyish with a very gew dark tipped scales and with very strong metallic gloss. Maxillary palpus tiny, porrect, greyish. Labial palpus as long as diameter of eye, greyish, drooping, terminal palpomere with sharply pointed apex, directed downwards. Haustellum short, strongly curved, pale beige. Antenna as long as forewing, consisting of 33–34 flagellomeres, basal and median flagellomeres brownish fuscous dorsally, paler ventrally, apical 8 flagellomeres pure white; pedicel slightly larger than following flagellomere, rectangular form, brownish fuscous; scape covered appressed dark fuscous piliform scales dorsally and brownish ochreous ventrally, pecten absent.

Thorax: Greyish with strong metallic gloss; tegulae as thorax. Forewing ground colour golden ochreous with four slight oblique, silvery white costal strigulae and three gradually enlarging towards tornus dorsal strigulae; first and fourth costal strigulae are slightly larger than second and third costal strigulae; first costal strigula at 1/3 of forewing, oblique towards apex, rectangular shaped, irregularly edged around with 2–3 rows of

fuscous scales; second costal strigula at middle of forewing, parallel to first costal strilgula, slightly narrower than first costal strigula, edged on both sides with irregular row of fuscous scales; third costal strigula at 3/4 of forewing, triangular shaped, oblique towards tornus, slightly smaller than second strigula, edged on both sides by a row of black fuscous scales; fourth costal strigula in apical area, shiny white, relatively large triangular shaped, directed straight downwards, reaching just midline of termen; 3 dorsal strigulae gradually enlarging towards tornus; 1dorsal strigula at 1/4, situated slightly basad first costal strigula, very small, half rounded, edged around except on dorsum with a row of brownish fuscous scales; second dorsal strigula short rod or triangular shaped, ending just before midline of forewing, slightly oblique towards apex, situated just basad second costal strigula, edged with 1–2 rows of brownish fuscous scales, third dorsal strigula, rectangular shaped, reaching midline of forewing, follows just after third costal strigula, edged on both sides with irregular row of brownish fuscous scales, termen and apical area bordering fourth costal strigula and third dorsal strigula suffused with brownish fuscous scales; fringe short pale greyish at apex, gradually getting longer and darker to dark grey at tornus and dorsum. Hindwing light fuscous, fringe long, dense, gradually shortening towards apex and slightly of darker shading than hindwing. Fore femur brownish fuscous, fore tibia brownish fuscous with beige subapical patch, tarsomeres I dark beige, other tarsomeres brownish fuscous, terminal tarsomere with beige tip; mid-femur and mid-tibia fuscous, mid-tibia with appressed scales, tibial spurs fuscous, tarsus fuscous with terminal tarsomere metallic greyish white; hind femur dark grey with metallic gloss, hind tibia fuscous at base, metallic dirty white at subbase and reddish ochreous with long, loose, dark grey, piliform scales from beyond middle of hind tibia to nearly apex, apex white, medial spurs very long, slightly shorter than tibia, greyish metallic with intermixed reddish ochreous, small patches at subbase, fuscous at median part and whitish at apex, apical spurs short, about 3× shorter than medial spurs, dirty pale greyish with white apices; tarsus fuscous with pale grey with weak metallic glossy apex, tarsomeres I–II dark fuscous with metallic apices, tarsomeres III pale fuscous with metallic gloss, tarsomeres IV pale grey with pale fuscous apex, tarsomere V pale grey with weak metallic gloss.

Abdomen: Fuscous grey dorsally, paler grey with metallic gloss ventrally. Sternum VIII of male very small, visible at 100× enlargement, as large as 108 µm, half rounded, with well sclerotized lateral sides, covered with tiny, sparse tubercules.

Male genitalia (Figs 287–291). Tegumen conical, rather long (ca. 300 µm), acuminate apically, sparsely squamose dorsally, with a pair of fine long setae, ca. 50 µm long; tuba analis densely covered with spinules on ventral surface; arms of tegumen narrow, strongly sclerotized, running parallel to each other with smooth anastomosis into median part of tegumen. Valvae symmetrical, 1/4 shorter than tegumen, narrow, bar-shaped, slightly arched upwards and slightly constricted medially, slightly concave ventrally with gently emarginated subapex and blunt apex, ventral surface of valva scattered with sparsely distributed, round tubecules bearing fine setae. Vinculum narrow, subtriangular with apical saccus very short and sharp caudally. Transtilla complete, narrow in whole length, without latero-cephalic lobes. Aedoeagus slightly shorter than valva, ca. 236 µm long, thickly sclerotized, tubular, gently tapering apically beyond middle, with narrow constriction at subvesica, vesica sclerotized, bulbed at apex, with one side heavily but narrow sclerous. Anellus long, membranous, tubular, as long as aedoeagus, with tiny spinules at apical part.

Female genitalia (Fig. 355). Papillae anales short, narrowed dorsally and ventrally, touching each other with dorsal caudal parts forming a triangle with smoothly rounded apex and rough, thick, lateral sides, tubulosae, spinulosae and setose with long setae of 50–70 µm, more dense baso-laterally. Posterior apophyses long, ca. 340 µm lonbg, slender throughout, slightly arched, parallel to each other, with sharp apices, entering anterior 1/3 of segment VII. Segment VIII short, strongly sclerotized, wrinkled, anterior margin sinoid and tightly fused with posterior margin of segment VII. Anterior apophyses absent. Segment VII long (470 µm), trapezoidal, well sclerotized, with sinuate posterior margin, concave ventrally. Ostium bursae opening at middle of concave posterior margin of segment VII, without surrounded sterigma. Structure of ductus bursae+corpus bursae long (ca. 0.9 mm), weakly sclerotized; without distinction between ductus bursae and corpus bursae; corpus bursae formed by terminal elongate portion of ductus bursae, without signum. Ductus spermathecae narrow, sclerotized, of medium length, less long than half length of segment VII, enlarged anteriorly, gently curving, without revolutions; vesica small, indistinguisble from caudal part of ductus spermathecae.

Habitat. Secondary forest.

Host plant(s). Fabaceae:

TABLE 8. Host plants of Lithocolletinae mines recorded from herbarium samples.

Host plant	Date	Country	Details	comments on insect sample
Dombeya kefaensis	29.xi.1995	Ethiopia	7°18' N 36°54'E, 2200m Kefa Region, 51 km S of Jimma, Alt. 2200m	larva
Dombeya rotundifolia	29.vii.1952	Zimbabwe		head of larva
Dombeya torrida	22.xii.1837	Ethiopia		larva
Dombeya wittei	13.vii.1967	Zambia	Kitwe	larva
Grewia picta (=*aldabrensis*)	21.ii.1968	Aldabra	South Island	pupa
Grewia picta (=*aldabrensis*)	21.ii.1968	Aldabra	South Island	pupa
Grewia picta (=*aldabrensis*)	21.ii.1968	Aldabra	South Island	pupa
Grewia picta (=*aldabrensis*)	15.ii.1968	Aldabra	Isle Michel	2 pieces of pupal remnants
Grewia picta (=*aldabrensis*)	15.ii.1968	Aldabra	Isle Michel	remnant of larva
Grewia picta (=*aldabrensis*)	15.ii.1968	Aldabra	Isle Michel	larval head
Grewia picta (=*aldabrensis*)	15.ii.1968	Aldabra	Isle Michel	parasite
Grewia picta (=*aldabrensis*)	15.ii.1968	Aldabra	Isle Michel	complete larva
Grewia picta (=*aldabrensis*)	15.ii.1968	Aldabra	Isle Michel	head of larva
Grewia aldabrensis	15.ii.1968	Aldabra	Isle Michel	head of larva
Grewia picta (=*aldabrensis*)	15.ii.1968	Aldabra	Isle Michel	head of larva or parasite
Grewia picta (=*aldabrensis*)	15.ii.1968	Aldabra	Isle Michel	pupa of parasite
Grewia ferruginea	02.x.1967	Ethiopia		remnant of larva + cocoon of parasite
Grewia pinnatifida	15.ix.1953	DR Congo		mine
Grewia praecox	20.iii.1952	Zambia	Lusaka	Pupa at the moment of eclosion
Grewia similis	1962	Tanzania	Kondora District, Salanga Hill	small second instar larva
Grewia tenax	21.ix.1977	Niger	30 km NW d'Agades Kori Szezil. Alt. 520 m	pupa of parasite
Grewia tenax	21.ix.1977	Niger	30 km NW d'Agades Kori Szezil. Alt. 520 m	remnants of probably parasitic pupa
Grewia tenax	21.ix.1977	Niger	30 km NW d'Agades Kori Szezil. Alt. 520 m	remnants of probably parasitic pupa
Grewia tenax	21.ix.1977	Niger	30 km NW d'Agades Kori Szezil. Alt. 520 m	pressed larva
Hexalobus crispiflorus	08.iii.1995	Ghana	07°55'N 02°04'W Brong-Ahato, 300m	complete larva
Hexalobus crispiflorus	08.iii.1995	Ghana	07°55'N 02°04'W Brong-Ahato, 300m	larva of parasite

..... continued on the next page

TABLE 8. (Continued)

Host plant	Date	Country	Details	comments on insect sample
Hexalobus crispiflorus	08.iii.1995	Ghana	07°55'N 02°04'W Brong-Ahato, 300m	larva squashed together with plant epidermis
Hexalobus crispiflorus	08.iii.1995	Ghana	07°55'N 02°04'W Brong-Ahato, 300m	empty pupation camera + remnants of pupa
Hexalobus crispiflorus	08.ii.1923	R.C.A.	Oubangi-Chari A. E. F.	larva
Hexalobus crispiflorus	08.ii.1923	R.C.A.	Oubangi-Chari, A. E. F.	larva
Hexalobus crispiflorus	08.ii.1923	R.C. A.	Oubangi-Chari A. E. F.	last instar larva
Hexalobus crispiflorus	08.ii.1923	R.C.A.	Oubangi-Chari A. E. F.	empty mine + remnants of larva
Hexalobus crispiflorus	08.ii.1923	R.C.A.	Oubangi-Chari A. E. F.	empty mine + remnants of parasitic pupa
Hexalobus crispiflorus	20.ii.1921	R.C.A.		last instar larva
Hexalobus crispiflorus	20.ii.1921	R.C.A.		young larva
Hexalobus crispiflorus	??viii.1932	DR Congo	Lualaba, Nyongwe (Maniema)	last instar larva
Hexalobus crispiflorus	??viii.1932	DR Congo	Lualaba, Nyongwe (Maniema)	remnants of larva
Hexalobus crispiflorus	??viii.1932	DR Congo	Lualaba, Nyongwe (Maniema)	complete larva
Pavonia columella	07.viii.1942	Mozambique	Massingire, Serra da Morumbala	head of larva
Rhynchosia luteola var. verdickii	17.iv.1954	Zimbabwe	Northern Rhodesia, Chingola	head of larva

Teramnus sp., *Vigna* sp. (Vári 1961: 225, De Prins & De Prins 2005: 369). In note 2680 written by Vári on 12 March 1964 (manuscript notebook of Vári), it is stated that he collected in "Vumba 1 mine of *Porphyrosela teramni* on *Vigna* plant. The moth emerged 14.iii.1964 [*P. teramni*]". In note 3124A written by Vári on 08 May 1971, (manuscript notebook of Vári) it is stated that he collected in "Glenmore a few mines of *Porphyrosela teramni* Vári on *Vigna* (=3122) plant. The first moth emerged 13.v.1971 [*P. teramni*]". In note 3936 written by Vári on 02 November 1984, (manuscript notebook of Vári) it is stated that he collected in "Illovo Beach a few mines of *Porphyrosela teramni* Vári on *Vigna* plant. The first moth emerged 09.xi.1984 [*P. teramni*]".

T. labialis (L. f.) Spreng, Vári 1961: 225, Kroon 1999: 74, 118; Dall'Asta *et al*. 2001: 35; De Prins & De Prins 2005: 369). In notes 0087, 0122, 0210 written by Vári on 03 January 1949, 06 November 1949, 10 April 1950 (manuscript notebook of Vári) it is stated that he collected in "Pretoria several mines (=54) of *Lithocolletis* on *Teramnus labialis* (=54). The first moth emerged 04.i.1949, 14.xi.1949, 15.iv.1950 [*P. teramni* [types]]", In notes 0318, 0337, 0444 written by Vári on 23 January 1951, 02 June 1951, and 02 February 1952 (manuscript notebook of Vári) it is stated that he collected in "Pretoria (own garden) some mines (=54) of *Lithocolletis* on *Teramnus labialis* (=54). The first moth emerged 02.ii.1951, and 06.ii.1952 [*P. teramni* [types]]".

Vigna luteola (Jacq.) Benth. (Vári 1961: 225, Kroon 1999: 74, 119; Dall'Asta *et al*. 2001: 35, De Prins & De Prins 2005: 369). In note 0998 written by Vári on 01 December 1953, (manuscript notebook of Vári) it is stated that he collected in "Mtunzini some mines of *Lithocolletis* on *Vigna* cf. *luteola* (=688). The first moth emerged 09.iv.1953 [*P. teramni*]". In note 4054 written by Vári on 25 January 1990, (manuscript notebook of Vári) it is stated that he collected in "Pretoria (Willow Glen) *Porphyrosela teramni* Vári on *Vigna luteola* (Jacq.) Benth. [*P. teramni*]".

In note 1218 written by Vári on 30 March 1954 (manuscript notebook of Vári) it is stated that he collected at "Oribi Gorge some mines of *Lithocolletis* on unidentified plant. The first moth emerged 09.iv.1954 [*P. teramni*]". In note 2398 written by Vári on 15 December 1961 (manuscript notebook of Vári) it is stated that he collected in "Jozini Dam 3 mines of *Lithocolletis* on unidentified Leguminosae plant. The first moth emerged 21.xii.1961 [*P. teramni*]".

Remarks. The species identification of the moths as *P. teramni* is stated by Vári himself.

Mine. An underside mine, tentiform, transparant, arbitrarily in disc, whitish on underside, no distinct folds visible, but mine strongly contracted. Fine black frass in one or two clusters; pupation without cocoon; pupa protrudes through lower epidermis before adult emerges; often more than one larva, up to six larvae found in one mine (Vári 1961: 225, De Prins & De Prins 2005: 369).

Flight period. Adults have been collected from early November to mid-May.

Distribution (Fig. 417). Recorded from South Africa (Vári 1961: 225) and Zimbabwe (**new record**).

Acknowledgments

This revision is dedicated to the lasting memory of Lajos Vári (Pretoria, South Africa), commemorating the 50th anniversary of his monumental work on African Lithocolletidae (Vári 1961). To our great sadness, Lajos Vári deceased in April 2011 and did not see this work finished. Jurate & Willy De Prins are deeply indebted to Lajos for his guidance, inspiration, correspondence, support, and sharing of specimens (Fig. 446).

We are also grateful to Martin Krüger, Barbara Dombrowski (TMSA, South Africa), Kevin Tuck (BMNH, UK), Leif Aarvik (NHMO, Norway), Ole Karsholt (ZMUC, Denmark), Wolfram Mey (ZMHB, Germany), and Joel Minet (MNHN, France) for access to their institutional collections. Jurate & Willy De Prins cordially thank Barbara Dombrowski for her hospitality during their long term study visits in Pretoria and for providing the opportunity to consult the unpublished collecting diaries of L. Vári. David Agassiz (Weston-super-Mare, UK) and Leif Aarvik (NHMO, Norway) are thanked very much for generously providing some very valuable specimens from their recent collecting acquisitions in East Africa. The authors are grateful to the administrators of biodiversity affairs for their kind assistance in arranging permits and providing access to several African natural biotopes: Wanja Kinuthia (NMK, Kenya); Koen Maes (Kenya, Cameroon); Eric Vingerhoedt and Gael Vande weghe (Rwanda); Laurent Nsenga and Bruno Perodeau (Democratic Republic of the Congo); and Amon Maerere, Maulid Mwatawala, and Gration Rwegasira (Tanzania). AYK thanks Charles Mitter (UM-SI, USA) for allowing him to participate in an expedition to study Afrotropical Lithocolletinae in the Democratic Republic of the Congo in 2007 (Fig. 447). We are also obliged to our field companions (the late Ernest Obanda, Ugo Dall'Asta, Knud Larsen, Frans Desmet, Jos Dils, Mavrik Vingerhoedt, Gration Rwegasira, Kire Kiraba and Donath Fungu) for making our collecting trips in Africa pleasant and unforgettable. David Lees (BMNH, UK) is cordially thanked for his kind efforts to collect additional specimens of *P. madagascariensis* in Antananarivo and for his very useful comments on the distribution patterns of monotrysian and ditrysian moths in Madagascar and the Mascarene islands. Carlos Lopez-Vaamonde (INRA, France) and Rodolphe Rougerie (CCDB, Canada) are gratefully acknowledged for their kind efforts to DNA barcode the Afrotropical Lithocolletinae and the extensive correspondence on this issue. Carlos is also acknowledged for collecting *Phyllonorycter dombeyae* mines in KwaZulu-Natal (South Africa) during his attendance of the International Congress of Entomology in 2008 and for organizing the fast transport of *Phyllonorycter ruizivorus* mines from Reunion to Belgium. Lei Xiao (FSMC, USA) sequenced some of the lithocolletine specimens included in the molecular component of this study. Eberhard Fischer (Koblenz, Germany), Peter Stoffelen (Meise, Belgium) and staff members of East African Herbarium are thanked for assisting in identification of African plants.

Sarra Ben Aissa (Paris, France) and John Coutsis (Athens, Greece) were very helpful in explaining the etymology of *Phyllonorycter jabalshamsi* and *P. grewiaephilos*. We wish to thank Eliane De Coninck (RMCA, Belgium) who assisted with SEM images of *P. grewiaephilos*. Stéphane Hanot (RMCA, Belgium) kindly digitized some slides of biotopes. Christian Guillermet (Antibes, France) is thanked for his warm and inspiring correspondence with JDP on microlepidoptera from Reunion island and kind donation of his book. Justin Gerlach (CUMZ, UK) kindly presented for our studies the only specimen of *Neolithocolletis pentadesma* collected in the Seychelles.

The line drawings of genitalia presented in this publication are by Willy De Prins (Leefdaal, Belgium). We very much thank Donald Davis (Washington, USA) for his continued support and guidance. Issei Ohshima (Hokkaido, Japan) and Paolo Triberti (Verona, Italy) are gratefully acknowledged for their helpful comments while preparing the manuscript. Virginijus Sruoga (Vilnius, Lithuania) and Sergey Sinev (St. Peterburg, Russia) are thanked for some final editorial suggestions.

This study would not have been possible without the financial support of the Belgian Science Policy Office (contract MO/37/022). The first author expresses her sincere gratitude.

References

Aarvik, L., Berggren, K. & Hansen, L.O. (2000) *Catalogus Lepidopterorum Norvegiae*. Lepidopterologisk Arbeidsgruppe Zoologisk Museum, Universitetet i Oslo Norsk Institutt for Skogforskning, Oslo, 192 pp.

Augustin, S. Guichard, S. Svatoš & Gilbert, M. (2004) Monitoring the regional spread of the invasive leafminer *Cameraria ohridella* Deschka and Dimic (Lepidoptera: Gracillariidae) by damage assesssment and pheromone traps. *Environmental Entomology*, 33, 1584–1592.

Bai, H.Y., Li, H.H. & Kendrick, R.C. (2009) Microlepidoptera of Hong Kong: Checklist of Gracillariidae (Lepidoptera: Gracillarioideae). *SHILAP, Revista de Lepidopterologia*, 37, 495–509.

Baars, J.-R. & Neser, S. (1999) Past and present initiatives on the biological control of *Lantana camara* (Verbenaceae) in South Africa. *In*: Olckers, T. & Hill, M. P. (Eds.), Biological control of weeds in South Africa (1990–1998). *African Entomology Memoir*, 1, 21–33.

Baryshnikova, S.V. (2002) Types of the gracillariid moth species-group taxa in the collection of the Zoological Institute, Russian Academy of Sciences (St. Petersburg). *Entomologicheskoe Obozrenie*, 81, 197–214.

Bazinet, A.L. & Cummings, M.P. (2009). The Lattice Project: a Grid research and production environment combining multiple Grid computing models. *In*: Weber, W. H. W. (Ed.) *Distributed & Grid Computing - Science Made Transparent for Everyone Principles, Applications and Supporting Communities Tectum.* Marburg, pp. 2–13.

Bengtsson, B.Å. & Johansson, R. (2011) *Encyclepedia of the Swedish flora and fauna. Lepidoptera: Roeslerstammiidae–Lyonetiidae*. ArtDatabanken, Sveriges lantbruksuniversiteit, Uppsala, 494 pp.

Bentancourt, C.M. & Scatoni, I.B. (2007) Morphology and biology of *Porphyrosela minuta* Clarke 1953 (Lepidoptera: Gracillariidae, Lithocolletinae) in Uruguay. *Neotropical Entomology*, 36, 514–519.

Bertrand, Y., Pleijel, F. & Rouse, G.W. (2006) Taxonomic surrogacy in biodiversity assessments, and the meaning of Linnaean ranks. *Systematics and Biodiversity*, 4, 149–159.

Bethoux, O. (2007) Propositions for a character-state-based biological taxonomy. *Zoologica Scripta*, 36, 409–416.

Biezanko, C. M., Ruffinelli, A. & Link, D. (1978) *Catalogue of Lepidoptera of the Republic of Uruguay.* Centro de Ciencias Rurais, 84 pp.

Bland, K.P. (1980) Nigerian Gracillariidae. *Journal of the Lepidopterists' Society*, 34, 25–35.

Bland, K.P. (2010) Name-bearing types of Lepidoptera (Insecta), excluding Rhopalocera, in the National Museums of Scotland, Edinburgh. *Zootaxa*, 2394, 1–22.

Bouché, P.F. (1834) *Naturgeschichte der Insekten, besonders in Hinsicht ihrer ersten Zustände als Larven und Puppen*. Der Nicolaischen Buchhandlung, Berlin, 216 pp, 10 pls.

Bourquin, F. (1951) Cuatro notas sobre metamorfosis de Microlepidópteros. I. "*Aristotelia perplexa*" Clarke II. "*Parastega hemisigna*" Clarke III. "*Porphyrosella* sp." IV." *Darlia praetexta*" Clarke. *Acta Zoologica Lilloana*, 12, 509–518, 4 pls.

Bourquin, F. (1962) Microlépidopteros nuevos con sus biologías. *Revista de la Sociedad Entomologica Argentina*, 23 (1960), 31–46.

Bradley, J.D. (1966) Some changes in the nomenclature of British Lepidoptera. Part 4. Microlepidoptera. *Entomologist's Gazette*, 17, 213–235.

Bradley, J.D., Jacobs, S.N.A. & Tremewan, W.G. (1969) A key to the British and French species of *Phyllonorycter* Hübner (*Lithocolletis* Hübner) (Lep. Gracillariidae). *Entomologist's Gazette*, 20, 3–33.

Braun, A.F. (1908) Revision of the North American species of the genus *Lithocolletis* Hübner. *Transactions of the American Entomological Society*, 34, 269–357, xx–xxiv pls.

Braun, A.F. (1909) Phylogeny of the Lithocolletid group. *Canadian Entomologist*, 41, 419–423.

Braun, A.F. (1914) Evolution of the color pattern in the microlepidopterous genus *Lithocolletis*. *Journal of the Academy of Natural Sciences, Philadelphia*, 16, 103–168, iii–iv pls.
Braun, A.F. (1916) Notes on *Lithocolletis* with descriptions of new species (Lep.). *Entomological News*, 27, 82–84.
Braun, A.F. (1923) The Chambers specimens of Tineina in the collection of the American Entomological Society. *Transactions of the American Entomological Society*, 49, 347–358.
Braun, A.F. (1929) A new genus and species in the Gracillariidae (Microlepidoptera). *Canadian Entomologist*, 61, 38–39.
Broughton, S. (2000) Review and evaluation of *Lantana* biocontrol programs. *Biological Control*, 17, 272–286.
Brower, A.E. (1984) A List of the Lepidoptera of Maine, Part 2: The Microlepidoptera, Section 2; Cosmopterigidae through Hepialidae. *Technical Bulletin of the Maine Agricultural Experiment Station*, 114, i–x, 1–70.
Bruand, T. (1851) Catalogue du Doubs. (Suite.) Tinéides. *Mémoires de la Société libre d'Emulation de Doubs*, 1849, 23–68.
Bruand, T. (1852) Lépidoptères recueillis en 1851. A ajouter au Catalogue du Doubs. *Mémoires de la Société libre d'Emulation de Doubs*, 1851, 139–140.
Bultman, T.L. & Faeth, S.H. (1985) Patterns of intra- and interspecific association of leaf-mining insects on three oak hosts species. *Ecological Entomology*, 10, 121–129.
Bultman, T.L. & Faeth, S.H. (1986a) Experimental evidence for intraspecific competition in a lepidopteran leaf miner. *Ecology*, 67, 442–448.
Bultman, T.L. & Faeth, S.H. (1986b) Leaf size selection by leaf-mining insects on *Quercus emoryi* (Fagaceae). *Oikos*, 46, 311–316.
Bultman, T.L. & Faeth, S.H. (1986c) Selective oviposition by a leaf miner in response to temporal variation in abscission. *Oecologia*, 69, 117–120.
Bultman, T.L. & Faeth, S.H. (1987) Impact of irrigation and experimental drought stress on leaf-mining insects of Emory oak. *Oikos*, 48, 5–10.
Bultman, T.L. & Faeth, S.H. (1988) Abundance and mortality of leaf miners on artificially shaded Emory oak. *Ecological Entomology*, 13, 131–142.
Busck, A. (1900) New species of moths of the superfamily Tineina from Florida. *Proceedings of the United States National Museum*, 23, 225–254, pl. 1.
Busck, A. (1909) Notes on Microlepidoptera, with descriptions of new North American species. *Proceedings of the Entomological Society of Washington*, 11, 87–103.
Busck, A. (1910) New Central-American Microlepidoptera introduced into the Hawaiian islands. *Proceedings of the Entomological Society of Washington*, 12, 132–135.
Chambers, V.T. (1871) Micro-Lepidoptera. *Canadian Entomologist* 3(3–12), 54–58, 84–88, 108–112, 127–130, 146–149, 161–166, 182–185, 205–209, 221–224.
Chapman, T.A. (1902) The classification of *Gracilaria* [sic] and allied genera. *Entomologist, an Illustrated Journal of British Entomology*, 35, 81–88, 138–142, 159–164.
Cho, S., Zwick, A., Regier, J.C., Mitter, C., Cummings, M.P., Yao, J., Du, Z., Zhao, H., Kawahara, A.Y., Weller, S., Davis, D. R., Baixeras, J., Brown, J.W., Parr, C. (2011) Can deliberately incomplete gene sample augmentation improve a phylogeny estimate for the advanced moths and butterflies (Hexapoda: Lepidoptera)? *Systematic Biol*ogy, 60, 782–796.
Clarke, J.F.G. (1953) A new *Porphyrosela* from Argentina (Gracillariidae; Lepidoptera). *Acta Zoologica Lilloana*, 13, 69–70.
Clemens, B. (1859) Contribution to American Lepidopterology. - No. 2. *Proceedings of the Academy of Natural Sciences of Philadelphia* (1859), 317–328.
Covell, C.V., Jr. (1999) The butterflies and moths (Lepidoptera) of Kentucky: an annotated checklist. Kentucky State Nature Preserves Comission Scientific and Technical Series, 6, i–liv, 1–220.
Cummings, M.P. & Huskamp, J.C. (2005) Grid computing. *EDUCAUSE Review*, 40, 116–117.
Curtis, J. (1829) *British Entomology; being illustrations and descriptions of the genera of insects found in Great Britain and Ireland: containing coloured figures from nature of the most rare and beautiful species, and in many instances of the plants upon which they are found*. London, folio 284.
Dall'Asta, U., De Prins, J. & De Prins, W. (2001) Preliminary checklist of Gracillariidae of the Afrotropical Region. *Zoölogische Documentatie, Koninklijk Museum voor Midden-Afrika*, Tervuren, België, 25, 48 pp.
Davis, D.R. (1987) Micropterigidae, Eriocraniidae, Acanthopteroctetidae, Nepticulidae, Opostegidae, Tischeriidae, Heliozelidae, Adelidae, Incurvariidae, Prodoxidae, Tineidae, Psychidae, Ochsenheimeriidae, Lyonetiidae, Gracillariidae. In: Stehr, F. W. (Ed.) *Immature insects*. Kendall / Hunt Publ. Co., Dubuque, Iowa, 341–378, 456, 459–460 pp.
Davis, D.R. & De Prins, J. (2011) Systematics and biology of the new genus *Macrosaccus* with descriptions of two new species (Lepidoptera, Gracillariidae). *ZooKeys*, 98, 29–82.
Davis, D.R. & Deschka, G. (2001) Biology and systematics of the North American *Phyllonorycter* leafminers on Salicaceae, with a synoptic catalog of the Palearctic species (Lepidoptera: Gracillariidae). *Smithsonian Contributions to Zoology,* 614, 1–89.
Davis, D.R. & Robinson, G.S. (1998) The Tineoidea and Gracillarioidea. *In*: Kristensen, N. P. (Ed.), *Lepidoptera, moths and butterflies. Volume 1: Evolution, systematics, and biogeography. Handbook of Zoology IV (35)*. Walter de Gruyter, Berlin, New York, pp. 91–117.
Davis, D.R. & Wagner, D.L. (2011) Biology and systematics of the New World *Phyllocnistis* Zeller leafminers of the avocado genus *Persea* (Lepidoptera, Gracillariidae). *ZooKeys*, 97, 39–73.

de Graaf, H.W. (1853) Nederlandsche schubvleugelige insekten [Lepidoptera]. *In*: Herklots, J. A. *Bouwstoffen voor eene fauna van Nederland. Eerste deel*. E. J. Brill, Leiden, 57 pp.
de Graaf, H.W. & Snellen, P.C.T. (1866) Microlepidoptera in Nederland waargenomen. *In*: Herklots, J. A. *Bouwstoffen voor eene Fauna van Nederland 3*. E. J. Brill, Leiden, pp. 234–317.
DeGryse, J.J. (1916) The hypermetamorphism of the lepidopterous sapfeeders. *Proceedings of the Entomological Society of Washington*, 18, 164–168.
De Prins, J. & De Prins, W. (2007) Two new *Phyllonorycter* species (Lepidoptera: Gracillariidae) from West Africa. *Acta Zoologica Academiae Scientiarium Hungaricae*, 53 (Suppl.1), 47–60.
De Prins, J. & De Prins, W. (2006–2012) *Global taxonomic database of Gracillariidae*. Royal Museum for Central Africa & Belgian Biodiversity Platform. Available from http://www.gracillariidae.net/ (accessed 24 October, 2011).
De Prins, J. & Mozūraitis, R. (2006) A new species of *Phyllonorycter* (Lepidoptera: Gracillariidae) from Kenya discovered by using the sex attractant Z8-tetradecen-1yl acetate. *Zootaxa*, 1124, 55–68.
De Prins, J. & Sruoga, V. (2012) A review of the taxonomic history and biodiversity of the genus Urodeta (Lepidoptera: Elachistidae: Elachistinae), with description of new species. *Zootaxa*, 3488, 41–62.
De Prins, J., De Prins, W. & Dall'Asta, U. (2002) The karyotype of *Cameraria ohridella* (Lepidoptera: Gracillariidae). *Phegea*, 30, 5–10.
De Prins, J., De Prins, W. & De Coninck, E. (2003) The pupal morphology of *Cameraria ohridella* compared with that of the genus *Phyllonorycter* (Lepidoptera: Gracillariidae). *Journal of Pest Science*, 76, 145–150.
De Prins, J., Mozūraitis, R., Lopez-Vaamonde, C. & Rougerie, R. (2009) Sex attractant, distribution and DNA barcodes for the Afrotropical leaf-mining moth *Phyllonorycter melanosparta* (Lepidoptera: Gracillariidae). *Zootaxa*, 2281, 53–67.
De Prins, W. & De Prins, J. (2005) *Gracillariidae (Lepidoptera)*. *In*: Landry, B. (Ed.), *World catalogue of insects. Volume 6*. Apollo Books, Stenstrup, 502 pp.
Deschka, G. (1968) Zwei neue paläarktische *Lithocolletis*-Arten. (Vorläufige Beschreibungen). *Zeitschrift der Wiener Entomologischen Gesellschaft*, 78 (1967), 84–85.
Deschka, G. & Dimić, N. (1986) *Cameraria ohridella* sp. n. (Lep., Lithocolletidae) aus Mazedonien, Jugoslawien. *Acta Entomologica Jugoslavica*, 22, 11–23.
Douglas, J.W. (1853) Contribution towards the Natural History of British Microlepidoptera. *Transactions of the Entomological Society of London, N. S.*, 2(4), 119–124, pls. 13, 14.
Drummond, A.J., Ashton, B., Buxton, S., Cheung M, Cooper, A., Duran, C., Field, M., Heled, J., Kearse, M., Markowitz, S, Moir, R., Stones-Havas, S., Sturrock, S., Thierer, T. & Wilson, A. (2010) Geneious v5.5. Available from http://www.geneious.com (accessed 20 March 2012).
Duponchel, P.A.J. (1838–1840) *In*: Godart, J.-B., *Histoire naturelle des Lépidoptères ou Papillons de France. Tome 11. Nocturnes. Tome huitième*. Méquignon-Marvis, Libraire-Éditeur, Paris, 720 pp, 287–314 pls.
Duponchel, P.A.J. (1842–1845) *In*: Godart, J.-B., *Histoire naturelle des Lépidoptères ou Papillons de France. Nocturnes. Supplément aux tome quatrième et suivants*. Méquignon-Marvis, Libraire-Éditeur, Paris, 554 pp, 51–90 pls.
Dyar, H.G. (1903) A list of the North American Lepidoptera and key to the literature of this order of insects. *Bulletin of the United States National Museum*, 52 (1902), i–xix, 1–723.
Ely, C.R. (1918) A revision of the North-American Gracilariidae [sic] from the standpoint of venation. *Proceedings of the Entomological Society of Washington*, 19B (1917), 29–77.
Emmet, A.M. (1991) *The scientific names of the British Lepidoptera. Their history and meaning*. Harley Books, Colchester, 288 pp.
Emmet, A.M., Watkinson, I.A. & Wilson, M.R. (1985) Gracillariidae. *In*: Heath, J. & Emmet, A. M. (Eds.), *The moths and butterflies of Great Britain and Ireland. Volume 2. Cossidae-Heliodinidae*. Harley Books, Colchester, Essex, pp. 294–362.
Ermolaev, V.P. (1979) On the study of mining moths, family Gracillariidae (Lepidoptera) from the south of the Far East. *In*: Ler, P. A. (Ed.), *Terrestrial arthropods of the Far East*. Akademija Nauk SSSR, Vladivostok, pp. 23–27.
Ermolaev, V.P. (1986) New and little known species of leafblotch miners (Lepidoptera, Gracillariidae) from the south of Primorye Territory. *Entomologicheskoe Obozrenie*, 65, 741–752.
Fabricius, J.C. (1781) *Species insectorum exhibentes eorum differentias specificas, synonyma autorum, loca natalia, metamorphosin adiectis observationibus, descriptionibus. Tom II*. Impensis Carol. Ernest, Bohnii, Hamburgi et Kilonii, 517 pp.
Faeth, S.H. (1990a) Structural damage to oak leaves alters natural enemy attack on a leafminer. *Entomologia Experimentalis et Applicata*, 57, 57–63.
Faeth, S.H. (1990b) Aggregation of a leafminer, *Cameraria* sp. nov. (Davis): consequences and causes. *Journal of Animal Ecology*, 59, 569–586.
Faeth, S.H. (1991a) Effect of oak leaf size on abundance, dispersion, and survival of the leafminer *Cameraria* sp. (Lepidoptera: Gracillariidae). *Environmental Entomology*, 20, 196–204.
Faeth, S.H. (1991b) Novel aspects of host tree resistance to leafminers. *United States Forest Service General Technical Report*, 153, 219–239.
Fitch, A. (1859) Report on the noxious, beneficial and other insects of the State of New York. Fifth Report. *Transactions of the New York State Agricultural Society* 18 (1858), 781–854, 9 figs. Also separately published with different pagination and with an index to parts 3–5, New York, 74 pp.

Fletcher, T.B. (1929) A list of the generic names used for Microlepidoptera. *Memoirs of the Department of Agriculture in India. Entomological Series*, 11, 1–244.
Fontes, E.M.G., Habeck, D.H. & Slansky, F. (1994) Phytophagous insects associated with goldenrods (*Solidago* spp.) in Gainesville, Florida. *Florida Entomologist*, 77, 209–221.
Forbes, W.T.M. (1923) The Lepidoptera of New York and neighbouring states. Part I. Primitive forms, Microlepidoptera, Pyraloids, Bombyces. *Memoirs of Cornell University Agricultural Experiment Station*, 68, 1–729.
Francke, W., Franke, S., Bergmann, J., Tolasch, T., Subchev, M., Mircheva, A., Toshova, T., Svatos, A., Kalinova, B., Karpati, Z., Szocs, G. & Toth, M. (2002) Female sex pheromone of *Cameraria ohridella* Desch. and Dim. (Lepidoptera: Gracillariidae): Structure confirmation, synthesis and biological activity of (8E, 10Z)-8, 10-tetradecadienal and some analogues. *Zeitschrift für Naturforschung* C, 57, 739–752.
Frey, H. (1856) *Die Tineen and Pterophoren der Schweiz*. Meyer und Zeller, Zürich, 430 pp.
Frey, H. (1880) *Die Lepidopteren der Schweiz*. Verlag von Wilhelm Engelmann, Leipzig, 454 pp.
Frey, H. & Boll, J. (1873) Nordamerikanische Tineen. *Entomologische Zeitung, Stettin*, 34, 201–224.
Frey, H. & Boll, J. (1876) Einige Tineen aus Texas. *Entomologische Zeitung, Stettin*, 37, 209–228.
Frey, H. & Boll, J. (1878) Tineen aus Texas. *Entomologische Zeitung, Stettin*, 39, 249–279.
Frisch, J. L. (1721) *Beschreibung von allerley Insecten in Teutsch-Land : nebst nützlichen Anmerckungen und nöthigen Abbildungen von diesem kriechenden und fliegenden inländischen Gewürme : zur Bestätigung und Fortsetzung der gründlichen Entdeckung : so einige von der Natur dieser Creaturen herausgegeben : und zur Ergänzung und Verbesserung der andern. Dritter Theil*. Verlag Christoph Gottlieb Nicolai, Berlin, pp. (i)–(vi) [unnumbered], 1–39, 3 pls.
Gerlach, J. & Matyot, P. (2006) *Lepidoptera of the Seychelles islands*. Backhuys Publishers, Leiden, 130 pp., 32 pls.
Ghesquière, J. (1940) Lépidoptères Microlépidoptères (première partie). *Annales du Musée du Congo belge, Zoologie [3, Arthropodes] section 2, Catalogues raisonnés de la Faune entomologique du Congo belge*, Sér. III(II) 7(1), 1–120, i–v pls.
Glaser, L. (1863) *Der neue Borkhausen oder hessisch-rheinische Falterfauna. Beschreibendes Verzeichniss in der in Hessen und den angrenzenden Ländern vorhandenen Gross- und Kleinfalter*. Verlag der G. Jonghaus'schen Hoftuchhandlung, Darmstadt, 546 pp.
Grehan, J.R., Parker, B.L., Nielsen, G.R., Miller, D.H., Hedbor, J.D., Sabourin, M. & Griggs, M.S. (1995) Moths and butterflies of Vermont (Lepidoptera). A faunal checklist. Agricultural Experiment Station, University of Vermont. *Vermont Miscellaeous Publication*, 116, i–xi, 1–95.
Guillermet, C. (2011). *Les Hétérocères, ou paillons de nuit, de l'île de La Réunion*. Parc National de La Réunion et Association N. D. P., 556 pp., 13 pls.
Hampson, G.F. (1918) Some small families of the Lepidoptera which are not included in the key to the families in the Catalogue of Lepidoptera Phalaeanae, a list of the families and subfamilies of the Lepidoptera with their types and a key to the families. *Novitates Zoologicae*, 25, 366–394.
Handfield, L. (1997) Liste des Lépidoptères du Québec et du Labrador. Fabreries, 7(Supplément), 1–155.
Heinemann, H. & Wocke, M.F. (1877) *Die Schmetterlinge Deutschlands und der Schweiz. Part 2. Volume 3*. C. A. Schwetschke & Sohn, Braunschweig, pp. 1–102, 376–826.
Hennig, W. (1965) Phylogenetic Systematics. *Annual Review of Entomology*, 10, 97–116.
Hennig, W (1966) *Phylogenetic Systematics*. University of Illinois Press, Urbana, xiii+263 pp.
Hering, E.M. (1951) *Biology of the leafminers*. Dr. W. Junk, The Hague, 420 pp.
Hernandez-Lopez, A., Rougerie, R., Tomov, R., Kenis, M., Grabenwegen, G., Augustin, S., Roques, A. & Lopez-Vaamonde, C. (2009) Host tracking, cryptic adaptation? A barcode study of a parasitoid of the horse chesnut leafminer. *Abstracts Volume of the Third International Barcode of Life Conference, 7–12 November 2009, Mexico City*, pp. 65.
Herrich-Schäffer, G.A.W. (1855) *Systematische Bearbeitung der Schmetterlinge von Europa zugleich als Text, Revision und Supplement zu Jakob Hübner's Sammlung europäischer Schmetterlinge. 5. Die Schaben und Federmotten*. Regensburg, 394 pp.
Heyden, C. (1843) [no title]. *Amtlicher Bericht der Versammlung der Naturforscher Mainz* 20, 208.
Heydenreich, G.H. (1851) *Lepidopterorum Europaeorum Catalogus Methodicus. Systematisches Verzeichniss der Europaeischen Schmetterlinge*. Julius Klinkhardt, Leipzig, 130 pp.
Hinckley, A.D. (1971) Infestation of irradiated white oaks by the solitary oak leafminer *Cameraria hamadryadella* (Lepidoptera: Gracillariidae). *Annals of the Entomological Society of America*, 64, 1094–1098.
Hinckley, A.D. (1972) Comparative ecology of two leafminers on white oak. *Environmental Entomology* 1, 358–361.
Hoare, R.J.B. (2000) A new genus of primitive Nepticulidae (Lepidoptera) from eastern Australia, with a revised diagnosis of nepticulid subfamilies. *Zoological Journal of the Linnean Society*, 128, 289–317.
Hübner, J. (1796–1838) *Sammlung europäischer Schmetterlinge. Achte Horde. Tineae Die Schaben; nach der Natur geordnet, beschrieben und vorgestellt*. J. Hübner Verlag, Augsburg. 78 pp., 71 pls.
Hübner, J. (1816–1826) *Verzeichniss bekannter Schmettlinge* [sic]. J. Hübner Verlag, Augsburg, 431 pp, 72 pls.
Hübner, J. (1822) *Systematisches-alphabetisches Verzeichniss aller bisher bey den Fürbildungen zur Sammlung europäischer Schmetterlinge angegebenen Gattungsbennungen; mit Vorbemerkung auch augsburgischer Gattungen*. J. Hübner Verlag, Augsburg, iv+81 pp.
Ikeda, E. (1995) Revision of the Japanese species of Chrysocharis (Hymenoptera, Eulophidae), 1. *Japanese Journal of Entomology*, 63, 261–274.

Inoue, H., Sugi, S., Kuroko, H., Moriuti, S. & Kawabe, A. (1982*) Moths of Japan*. Volume 1. Text. Volume 2. Plates and synonymic catalogue. Kodansha, Tokyo, 966 pp. (vol. 1), 552 pp (vol. 2).

International Commission on Zoological Nomenclature (1926) Opinions rendered by the International Commission on Zoological Nomenclature. Opinion 97. Did Hübner's Tentamen, 1806, create monotypic genera? *Smithsonian miscellaneous Collections*, 73(4), 19–30.

International Commission on Zoological Nomenclature (1999) *International Code of Zoological Nomenclature. Fourth Edition*. The International Trust for Zoological Nomenclature, London, 306 pp.

Johne, B., Schuetz, S. & Füldner, K. (2005) Hinweise zur Morphologie und Entwicklung der Kastanienminiermotte *Cameraria ohridella* Deschka & Dimic (Lepidoptera: Gracillariidae) im südlichem Niedersachsen (NW-Deutschland). *Philippia*, 12, 137–146.

Kaila, L., Mutanen, M. & Nyman, T. (2011) Phylogeny of the mega-diverse Gelechioidea (Lepidoptera): adaptations and determinants of success. *Molecular Phylogenetics and Evolution*, 61, 801–809.

Kalinová, B., Svatos, A., Kindl, J., Hovorka, O., Hrdy, I., Kuldova, J. & Hoskovec, M. (2003) Sex pheromone of horse-chestnut leafminer *Cameraria ohridella* and its use in a pheromone-based monitoring system. *Journal of Chemical Ecology*, 29, 387–404.

Kamijo, K. (1990) Five new species of Achrysocharoides (Hymenoptera, Eulophidae) associated with Leguminosae in Japan. *Japanese Journal of Entomology*, 58, 293–302.

Kamijo, K. (1991) Revision of North American *Achrysocharoides* (Hymenoptera: Eulophidae). *Akitu*, N. S., 124, 1–34.

Kawahara, A.Y. & Rubinoff, D. (2012) Three new species of fancy case caterpillars from threatened forests of Hawaii (Lepidoptera, Cosmopterigidae, *Hyposmocoma*). *ZooKeys*, 170, 1–20.

Kawahara, A.Y., Mignault, A. A., Regier, J. C., Kitching, I. J., Mitter, C. (2009) Phylogeny and biogeography of hawkmoths (Lepidoptera: Sphingidae): evidence from five nuclear genes. *PLoS ONE* 4(5), e5719.

Kawahara, A.Y., Nishida, K. & Davis, D.R. (2009) Systematics, host plants, and life histories of three new *Phyllocnistis* species from the central highlands of Costa Rica (Lepidoptera, Gracillariidae, Phyllocnistinae). *ZooKeys*, 27, 7–30.

Kawahara, A.Y. Sohn, J.C., De Prins, J., Cho, S. (2010) Five species of Gracillariidae (Lepidoptera) new to Korea. *Entomological Research*, 40, 131–135.

Kawahara, A.Y., Ohshima, I., Kawakita, A., Regier, J.C., Mitter, C., Cummings, M.P., Davis, D.R., Wagner, D. L., De Prins, J. & Lopez-Vaamonde, C. (2011) Increased gene sampling strengthens support for higher-level groups within leaf-mining moths and relatives (Lepidoptera: Gracillariidae). *BMC Evolutionary Biology*, 11, 182.

Kindl, J., Kalinová, B., Freise, J. F., Heitland, W., Augustin, S., Guichard, S., Avtzis, N. & Svatos, A. (2002) Monitoring the population dynamics of the horse chestnut leafminer *Cameraria ohridella* with a synthetic pheromone in Europe. *Plant Protection Science*, 38, 131–138.

Klots, A.B. (1970) Lepidoptera. *In*: Tuxen, S. L. (Ed.), *Taxonomist's glossary of genitalia in insects. (Second revised and enlarged edition)*. Munksgaard, Copenhagen, pp. 115–130.

Kovács, Z., Stauffer, Ch. & Lakatos, F. (2000) A vadgesztenyelevél-aknázómoly (*Cameraria ohridella* Deschka et Dimic 1986, Lep. Lithocolletidae) Európai elterjedésének genetikai vizsgálata. *Növényvédelem*, 36, 288–290.

Kristensen, N.P. (2003) Skeleton and muscles: adults. *In*: Kristensen, N. P. (Ed.), *Lepidoptera, moths and butterflies. Volume 2: Morphology, physiology, and development. Handbook of Zoology IV (36)*. Walter de Gruyter, Berlin, New York, pp. 39–131.

Kroon, D.M. (1999) *Lepidoptera of Southern Africa: host-plants and other associations*. Sasolburg Litho (Pty) Ltd., 160 1–48 pp.

Kumata, T. (1959) Redescriptions of the species of the genus Lithocolletis described by Prof. Dr. S. Matsumura (Lepidoptera, Gracillariidae). Insecta Matsumurana, 22, 71–81.

Kumata, T. (1961) Descriptions of a new genus and a new species of Gracillariidae from Japan (Lepidoptera). *Insecta Matsumurana*, 24(1), 52–56.

Kumata, T. (1963) Taxonomic studies on the Lithocolletinae of Japan (Lepidoptera: Gracillariidae) Parts I–III. *Insecta Matsumurana*, 25(2), 53–90 [part I]; 26(1), 1–48 [part II]; 26(2), 69–88, pls. 1–8 [part III].

Kumata, T. (1967) New or little-known species of the genus *Lithocolletis* occurring in Japan (Lepidoptera: Gracillariidae). *Insecta Matsumurana*, 29(2), 59–72.

Kumata, T. (1973) On the genus *Phyllonorycter* or *Lithocolletis* from Central Nepal, with descriptions of twelve new species - notes on Gracillariidae (Lepidoptera) of Nepal, I. *Insecta Matsumurana, N. S.*, 1, 1–45, 4 pls.

Kumata, T. (1982) A revision of the *nipponicella* complex of the genus *Phyllonorycter*, with description of a new species (Lepidoptera, Gracillariidae). Tyô to Ga, 33, 70–86.

Kumata, T. (1993) A contribution to the knowledge of the Malaysian Lithocolletinae (Gracillariidae, Lepidoptera), with a revision of Indian *Cameraria* associated with Leguminosae. *Insecta Matsumurana, N. S.*, 48, 1–85.

Kumata, T. (1995) Some species of the subfamily Lithocolletinae (Gracillariidae, Lepidoptera) collected in the Philippines. *Insecta Matsumurana, N. S.*, 52, 105–131.

Kuroko, H. & Lewvanich, A. (1983) Some lepidopterous insect pests attacking economically important plants in Thailand. *Bulletin of the University of Ōsaka Prefecture. Series B Agriculture and Biology*, 35, 1–9.

Kuznetzov, V.I. (1978) New species of Microlepidoptera (Gracillariidae, Alucitidae, Pyralidae) from Middle Asia. *In*: New species of insects from Central Asia and Kazakhstan. *Trudy Zoologicheskogo Instituta, Akademija Nauk SSSR*, 71,

110–119.
Kuznetzov, V.I. (1979a) A review of the genera of Gracillariidae (Lepidoptera) of the Palaearctic fauna. *Entomologicheskoe Obozrenie*, 58, 835–856.
Kuznetzov, V.I. (1979b) New subgenera and species of moths (Lepidoptera, Gelechiidae, Gracillariidae) from Siberia and the Far East. *In*: New species of insects from Siberia and the Far East. *Trudy Zoologicheskogo Instituta, Akademija Nauk SSSR*, 81, 87–102.
Kuznetzov, V.I. (1979c) New miner-moths (Lepidoptera, Gracillariidae) from the Asiatic part of the USSR. *In*: New species if insects from the Asiatic part of the USSR. *Trudy Zoologicheskogo Instituta, Akademija Nauk SSSR*, 88, 77–84.
Kuznetzov, V.I. (1981) Fam. Gracillariidae (Lithocolletiidae)—leaf blotch miners. *In*: Medvedev, G. S. (Ed.), *A guide to the insects of the European part of the USSR. Lepidoptera. Vol. 4. Lepidoptera. Part 2*. Nauka, Leningrad, pp 149–311.
Kuznetzov, V.I. & Baryshnikova, S. V. (1998) Brief catalogue of the mining moths of the fam. Gracillariidae (Lepidoptera) of Russia and adjacent countries. *Trudy Zoologicheskogo Instituta, Rossijskaya Akademija Nauk*, 274, 1–60.
Kuznetzov, V.I. & Baryshnikova, S.V. (2001) Review of Palaearctic genera of the gracillariid moths (Lepidoptera, Gracillariidae), with description of a new subfamily Ornixolinae Kuznetzov et Baryshnikova, subfam. n. *Entomologicheskoe Obozrenie*, 80, 96–120.
Kuznetzov, V.I. & Baryshnikova, S.V. (2004) Evolutionary-morphological approach to the systematics of leafminers of the genus *Phyllonorycter* Hbn. (Lepidoptera, Gracillariidae) with account of species feeding specialization. *Entomologicheskoe Obozrenie*, 83: 625–639.
Lakatos, F., Kovacs, Z., Stauffer, C., Kenis, M., Tomov, R. & Davis, D.R. (2003) The genetic background of three introduced leaf miner moth species - *Parectopa robiniella* Clemens 1863, *Phyllonorycter robiniella* Clemens 1859 and *Cameraria ohridella* Deschka et Dimic 1986. *Proceedings: IUFRO Kanazawa 2003 "Forest Population Dynamics and Host Influences"*, 67–71.
Landry, J.-F. & Wagner, D.L. (1995) Taxonomic review of apple-feeding species of *Phyllonorycter* Hübner (Lepidoptera, Gracillariidae) in North America. *Proceedings of the Entomological Society of Washington*, 97, 603–625.
Laštůvka, A. & Laštůvka, Z. (2006) The European *Phyllonorycter* species feeding on the plants of the tribe Genisteae (Fabaceae), with descriptions of twelve new species (Lepidoptera: Gracillariidae). *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis*, 54, 65–83.
Laurin, M. (2005) The advantages of phylogenetic nomenclature over Linnean nomenclature. In: Minelli, A., Ortalli, G. & Sanga, G. (Eds.), *Animal Names, Vol. 1*. Instituto Veneto di Scienze, Lettere ed Arti, Venice, pp. 67–97.
Laurin, M. (2010) The subjective nature of Linnaean categories and its impact in evolutionary biology and biodiversity studies. *Contributions to Zoology*, 79, 131–146.
Lees, D.C., Lopez-Vaamonde, C. & Augustin, S. (2011) *Cameraria ohridella* Deschka & Dimić 1986. *Encyclopedia of Life*. Available from http://www.eol.org/pages/306084 (accessed 24 February, 2011).
Le Marchand, S. (1936) Clé ou table analytique pour la détermination des espèces françaises de *Lithocolletis* (Famille des Gracilariidae [sic]). *L'Amateur de Papillons*, 8, 83–118.
Liblikas, I., Mozūraitis, R., Santangello, E.M., Noreika, R. & Borg-Karlson, A.-K. (2009) Syntheses, characterizations, and biological activities of tetradeca-4,8-dien-1-yl acetates as sex attractants of leaf -mining moth of the genus *Phyllonorycter* (Lepidoptera: Gracillariidae). *Chemistry & Biodiversity*, 6, 1388–1403.
Lienig, F. (1846) Lepidopterische Fauna von Lievland und Curland. *Isis, oder enzyklopädische Zeitung von Oken*, (1846) (3–4), 175–302.
Linnaeus, C. (1758) *Systema Naturae per Regna Tria Naturae, secundum Classes, Ordines, Genera, Species, cum characteribus, differentiis, synonymis, Iocis. Tomus 1. Editio Decima, Reformata*. Laurentii Salvii, Holmiae, 4+824 pp.
Lopez-Vaamonde, C., Godfray, H.C.J. & Cook, J.M. (2003) Evolutionary dynamics of host-plant use in a genus of leaf-mining moths. *Evolution*, 57, 1804–1821.
Lopez-Vaamonde, C., Wikström, N., Labandeira, C., Godfray, C.J., Goodman, S.J. & Cook, J.M. (2006) Fossil-calibrated molecular phylogenies reveal that leaf-mining moths radiated millions of years after thier host plants. *Journal of Evolutionary Biology*, 19, 1314–1326.
Lopez-Vaamonde, C., Agassiz, D., Augustin, S., De Prins, J., De Prins, W., Gomboc, S., Ivinskis, P., Karsholt, O., Koutroumpas, A., Koutroumpa, F., Lastuvka, Z., Marabuto, E., Olivella, E., Przybylowicz, L., Roques, A., Ryrholm, N., Šefrova, H., Sima, P., Sims, I., Sinev, S., Skulev, B., Tomov, R., Zilli, A. & Lees, D. (2010) Lepidoptera. Chapter 11. In: Roques, A, Kenis, M., Lees, D. Lopez-Vaamonde, C., Rabitsch, W., Rasplus, J.-Y., and Roy, D. B. (Eds) *Alien terrestrial arthropods of Europe.* BioRisk 4, Special Issue. Pensoft, 603–668 pp.
Lower, O.B. (1897) Descriptions of new species of Australian Lepidoptera, with notes on synonymy. *Proceedings of the Linnean Society of New South Wales*, 22, 10–32.
Maier, C.T. (1988) Gracillariid hosts of *Sympiesis marylandensis* (Hymenoptera: Eulophidae) in New England. *Annals of the Entomological Society of America*, 81, 728–732.
Maier, C.T. & Davis, D.R. (1989) Southern New England host and distributional records of Lithocolletinae Gracillariidae (Lepidoptera), with comparison of host specificity in temporate regions. *Miscellaneous Publications of the Entomological Society of America*, 70, i–v, 1–23.
Manceau, M., Domingues, V.S., Linnen, C.R., Rosenblum, E.B. & Hoekstra, H.E. (2010) Convergence in pigmentation at mutiple levels: mutations, genes and function. *Philosophical Transactions of the Royal Society, Biological Sciences*, 365,

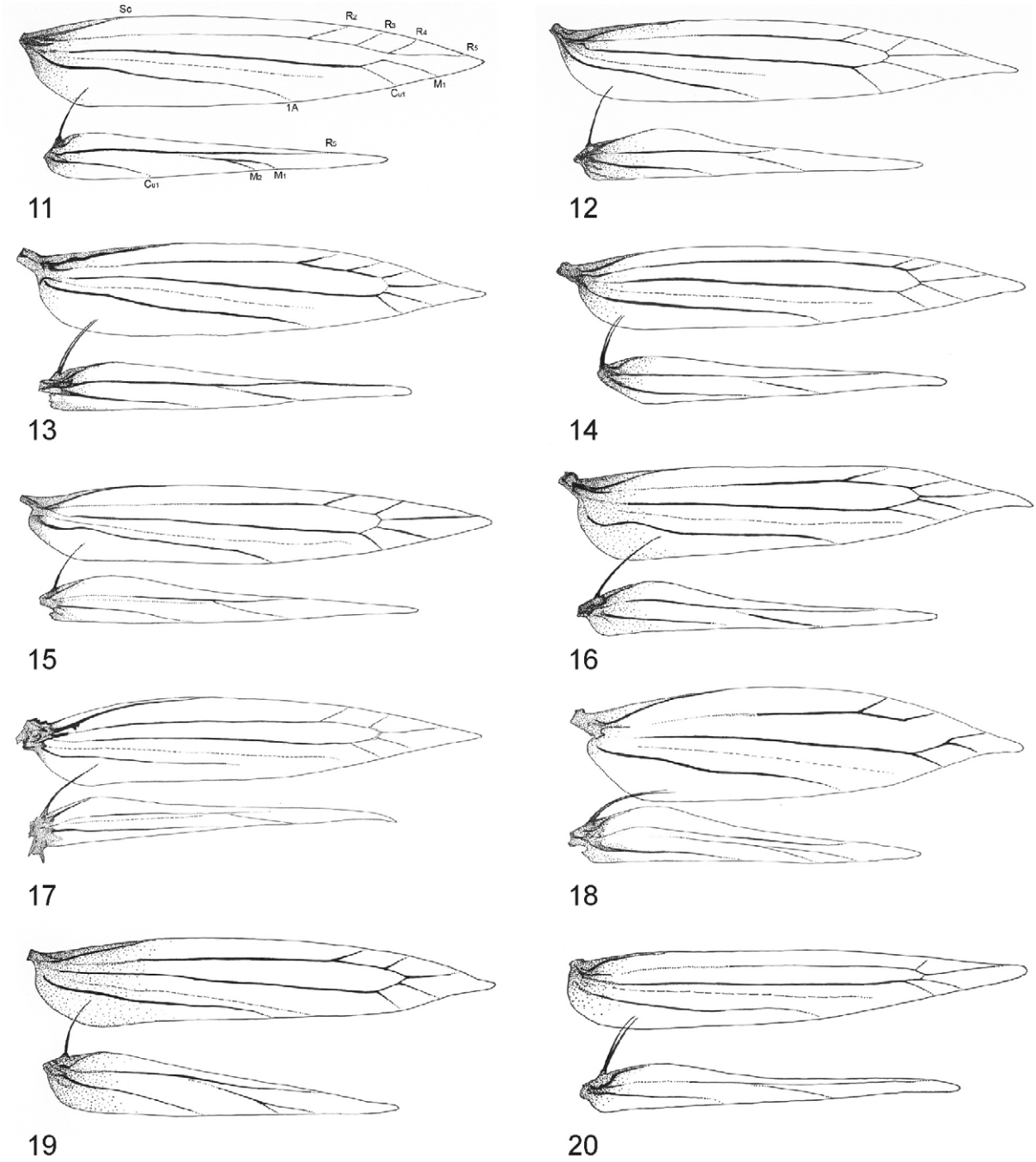
2439–2450.
Martiré, D. & Rochat, J. (2008) *Les papillons de La Réunion et leurs chenilles*. Publications scientifiques du museum, 496 pp.
Masters, J.C. (2007) Taking phylogenetics beyond pattern analysis: can models of genome dynamics guide predictions about homoplasy in morphological and behavioural data sets? *Journal of Human Evolution*, 52, 522–535.
Mayr, E. (1942) *Systematics and the origin of species from the viewpoint of a zoologist*. Columbia University Press, New York, 334 pp.
McDunnough, J.H. (1939) Check list of the Lepidoptera of Canada and the United States of America. Part 2. Microlepidoptera. *Memoirs of the Southern California Academy of Sciences*, 2, 1–171.
McGraw-Hill Science and Technology dictionary (2011) Available from http://www.answers.com/topic/homotype#ixzz1FvPtQNdk (accessed 07 March, 2011)
Meusemann, K., von Reumont, B.M., Simon, S., Roeding, F., Strauss, S., Kueck, P., Ebersberger, I., Walzl, M., Pass, G., Breuers, S., Achter, V., von Haeseler, A., Burmester, T., Hadrys, H., Waegele, J. W. & Misof, B. (2010) A phylogenomic approach to resolve the arthropod Tree of Life. *Molecular Biology and Evolution*, 27, 2451–2464.
Mey, W. (2004) Introduction: Research on Lepidoptera of the Brandberg in Namibia (Insecta, Lepidoptera). *Esperiana Memoir*, 1, 7–26.
Meyrick, E. (1882) Descriptions of Australian Microlepidoptera. vii. Revisional. *Proceedings of the Linnean Society of New South Wales*, 7, 148–202.
Meyrick, E. (1891) A fortnight in Algeria, with descriptions of new Lepidoptera. *Entomologist's Monthly Magazine*, 27 (second ser vol. 2), 9–13, 55–62.
Meyrick, E. (1895) *A handbook of British Lepidoptera*. Macmillan and Co, London and New York, vi+843 pp.
Meyrick, E. (1908) Descriptions of African Micro-Lepidoptera. *Proceedings of the Zoological Society of London*, 47, 716–756.
Meyrick, E. (1911) Descriptions of Transvaal Micro-Lepidoptera. II. *Annals of the Transvaal Museum*, 2, 218–240.
Meyrick, E. (1912a) *Exotic Microlepidoptera*, Marlborough, 1(1), 1–32.
Meyrick, E. (1912b) Lepidoptera Heterocera (Tineae). Fam. Gracilariadae. In: Wytsman, P. (ed.): Genera Insectorum. Fascicule 128. V. Verteneuil & L. Desmet, Imprimeurs-Éditeurs, 36 pp., pl. 1.
Meyrick, E. (1916) *Exotic Microlepidoptera*, Marlborough, 1(20), 609–640.
Meyrick, E. (1919) *Exotic Microlepidoptera*, Marlborough, 2(8), 225–256.
Meyrick, E. (1921) Descriptions of South African Micro-Lepidoptera. *Annals of the Transvaal Museum*, 8(2), 49–148.
Meyrick, E. (1927) *A revised handbook of British Lepidoptera*. E. W. Classey ltd., London, 914 pp.
Meyrick, E. (1936) *Exotic Microlepidoptera*, Marlborough, 5(1–2), 1–64.
Minelli, A. (2000) the ranks and the names of species and higher taxa, or a dangerous inertia of the language of natural history. In: Ghiselin, M. T. & Leviton, A. E. (Eds.), *Cultures and Institutions of Natural History: Essays in the History and Philosophy of Sciences*. California Academy of Sciences, San Francisco, pp. 339–351.
Mircheva, A. & Subchev, M. (2002) Investigations on the diurnal and seasonal flight of the horse chestnut leaf miner, *Cameraria ohridella* Deschka et Dimic, 1986 (Lepidoptera: Gracillariidae) by sex pheromone traps. *Acta Entomologica Bulgarica*, 8, 10–15.
Mircheva, A. & Subchev, M. (2003) Seasonal monitoring of *Cameraria ohridella* Deschka et Dimic (Lep., Gracillariidae) by pheromone traps in Bulgaria. *Acta Entomologica Bulgarica*, 9, 30–34.
Mosher, E. (1916) A classification of the Lepidoptera based on characters of the pupa. *Bulletin of the Illinois State Laboratory of Natural History*, 12, 1–158.
Munro, H.K. (1957) *Sphenella* and some allied genera (Trypetidae, Diptera). *Journal of the entomological Society of South Africa*, 20, 15.
Mutanen, M., Wahlberg, N. & Kaila, L. (2010) Comprehensive gene and taxon coverage elucidates radiation patterns in moths and butterflies. *Proceedings of the Royal Society, series B Biological Sciences*, 277, 2839–2848.
Needham, J.G., Frost, S.W. & Tothill, B.H. (1928) *Leaf-mining insects*. The Williams and Wilkins Co., Baltimore, viii+351 pp.
Nicelli, G. (1851) Bericht über Arten der Gattung *Lithocolletis* nebst bechreibung einiger in Zellers Monographie unerwaehnter Arten dieser Gattung. *Entomologische Zeitung, Stettin*, 12(2), 34–51.
Noreika, R. (1994) Two new species of *Phyllonorycter* Hübner, 1822 from the Far East area (Lepidoptera: Gracillariidae). *Phegea*, 22, 105–113.
Noreika, R. (1997) Gracillariidae. *In*: Ler, P. A. (Ed.), Key to the insects of Russian Far East. Vol. V. Trichoptera and Lepidoptera. Part 1. Dal'nauka, Vladivostok, pp. 373–429.
Noreika, R. & Puplesis, R. (1992) Salicaceae feeding Gracillariidae (Lepidoptera) of Central Asia. *Tijdschrift voor Entomologie*, 135, 27–41.
Nye, I.W.B. & Fletcher, D.S. (1991) *The generic names of moths of the World. Volume 6. Microlepidoptera*. Natural History Museum Publications, London, xxix+368 pp.
Opler, P.A. (1971) Seven new lepidopterous leaf-miners associated with *Quercus agrifolia* (Heliozelidae, Gracilariidae [sic]). *Journal of the Lepidopterists' Society*, 25, 194–211, 7 pls.
Opler, P.A. (1974) *Biology, ecology, and host specificity of Microlepidoptera associated with Quercus agrifolia (Fagaceae)*. University of California Press, 83 pp, 7 pls.
Opler, P.A. & Davis D.R. (1981) The leafmining moths of the genus *Cameraria* associated with Fagaceae in California (Lepidoptera: Gracillariidae). *Smithsonian Contributions to Zoology*, 333, i–iii, 1–58.

Palmer, W. A. & Pullen, K.R. (1995) The phytophagous arthropods associated with *Lantana camara, L. hirsuta, L. urticifolia* and *L. urticoides* (Verbenaceae) in North America. *Biological Control*, 5, 54–72.
Parenti, U. (2000) *A Guide to the Microlepidoptera of Europe*. Museo Regionale di Scienze Naturali, Torino, 426 pp., 156 pls.
Park, K. T. (1983) Microlepidoptera of Korea. *Insecta Koreana*, ser. 3, 1–189, pls. 1–2.
Patočka, J. (1980) Die Raupen und Puppen der Eichenschmetterlinge Mitteleuropas. *Monographien zur angewandten Entomologie*, 23, 1–188.
Paulian, R. & Viette, P. (1955) Essai d'un catalogue biologique des Lépidoptères Hétérocères de Tananarive. *Mémoires de l'Institut scientifique de Madagascar*, Sér. E, 6, 141–281, 8 pls.
Péré, C., Augustin, S., Turling, T.C.J. & Kenis, M. (2010) The invasive alien leaf miner *Cameraria ohridella* and the native tree *Acer pseudoplatanus*: a fatal attraction? *Agricultural and Forest Entomology*, 12, 151–159.
Perny, B. (1997) Erste Ergebnisse populationsgenetischer Untersuchungen von *Cameraria ohridella*. *Forstschutz Aktuell*, 21, 13–15.
Powell, J.A. & Opler, P.A. (2009) *Moths of Western North America*. University of California Press, xiii+369 pp.
Puplesiene, J. & Noreika, R. (1993) A brief karyological review of the Gracillariidae (Lepidoptera). *Phegea*, 21, 55–63.
Puplesis, R. & Diškus, A. (2005). Checklist of African Tischeriidae (Insecta: Lepidoptera) with a redescription of the formely neglected *Tischeria urticilolella* from Equatorial Africa. *Zoological Science*, 22, 1051–1055.
Raspotnig, G., Schicho, R., Stabentheiner, E., Magnes, C. & Stelzl, M. (2003) Morphology of female sex pheromone gland in the horse chestnut leafminer *Cameraria ohridella* (Lep., Gracillariidae). *Journal of Applied Entomology*, 127, 121–126.
Regier, J.C., Zwick, A., Cummings, M.P., Kawahara, A.Y., Cho, S., Weller, S., Roe, A., Baixeras, J., Brown, J. W., Parr, C., Davis, D.R., Epstein, M., Hallwachs, W., Hausmann, A., Janzen, D.H., Kitching, I.J., Solis, M.A., Yen, S.-H., Bazinet, A. L. and Mitter, C. (2009) Toward reconstructing the evolution of advanced moths and butterflies (Lepidoptera: Ditrysia): an initial molecular study. *BMC Evolutionary Biology*, 9, 280.
Robinson, G.S. (1976) The preparation of slides of Lepidoptera genitalia with special reference to the Microlepidoptera. *Entomologist's Gazette*, 27, 127–132.
Robinson, G.S. (2009) *Biology, distribution and diversity of tineid moths*. Southdene Sdn Bhd Kuala Lumpur in association with the Natural History Museum, London, 143 pp.
Robinson, G.S., Ackery, P.R., Kitching, I.J., Beccaloni, G.W. & Hernández, L.M. (2001) *Hostplants of the moth and butterfly caterpillars of the Oriental Region*. The Natural History Museum, London, 744 pp.
Robinson, G.S., Ackery, P.R., Kitching, I.J., Beccaloni G.W. & Hernández, L.M. (2005–2011) HOSTS, *a Database of the World's Lepidopteran Hostplants*. The Natural History Museum, London. Available from http://www.nhm.ac.uk/research-curation/research/projects/hostplants/ (Accessed 24 February, 2011).
Ronquist, F. & Huelsenbeck, J.P. (2003) MrBayes 3: Bayesian phylogenetic inference under mixed models. *Bioinformatics*, 19, 1572–1574.
Rubinoff, D., Cameron, S. & Will, K. (2006) A genomic perspective on the shortcomings of mitochondrial DNA for "Barcoding" Identification. *Journal of Heredity*, 97, 581–594.
Sajap, A.-S., Ling, S.-Y., Wahab, Y.-A., Marsidi, A. (1996) Bionomics of *Neolithocollettis pentadesma* (Meyrick), a leafminer of angsana, *Pterocarpus indicus*. *Malaysian Forester*, 59, 153–163.
Schrank, F.V.P. (1802) *Fauna Boica. Durchgedachte Geschichte der Baiern einheimischen und zahmen Thiere. Zweyter Band*. Johann Wilhelm Krüll, Ingolstadt, viii+412 pp.
Skuhravý, V. (1998) Zur Kenntnis der Blattminen-Motte *Cameraria ohridella* Desch. & Dim. (Lep., Lithocolletidae) an *Aesculus hippocastanum* L. in der Tschechischen Republik. *Anzeiger für Schädlingskunde (und Pflanzenschutz)*, 71, 81–84.
Snellen, P.C.T. (1882) *De vlinders van Nederland. Microlepidoptera, systematisch beschreven, 2 vols*. E. J. Brill, Leiden, xiii+1197 pp.
Stainton, H.T. (1848) A monograph on the British *Argyromiges*. *Zoologist* 6, 2078–2097, 2152–2164, 1–3 pls.
Stainton, H.T. (1850) Notes of captures of Tineidae, with remarks on the specific distinctions of some closely-allied species. *Zoologist*, 8, 2893–2897.
Stainton, H.T. (1854) Lepidoptera: Tineina. *In*: *Insecta Britannica. Vol. 3*. Lovell Reeve, London, 313 pp, 10 pls.
Stainton, H.T. (1857) *The Natural History of the Tineina. Volume II. Containting Lithocolletis. Part I*. John Van Voorst, London, ix+317 pp, 8 pls.
Stainton, H.T. (1859) *A manual of British butterflies and moths. Volume 2*. John van Voorst, London, 217–480 pp.
Stainton, H.T. (1863a) *List of Tineina larvae, figured and described for the natural history of the Tineina*. E. Newman, Bishopsgate, 28 pp.
Stainton, H.T. (1863b) Observations on American Tineina. *Proceedings of the Entomological Society of Philadelphia*, 2, 130–132.
Stainton, H.T. (1863c) On the generic characters afforded by the habits of various leaf-mining Micro-lepidopterous larvae. *Transactions of the Entomological Society of London*, (ser 3) 1, 604–611.
Stainton, H.T. (1867) *The Tineina of Syria and Asia Minor*. John van Voorst, London, 84 pp.
Stamos, D.N. (2003) *The species problem: biological species, ontology and the metaphysics of biology*. Lexington Books, Oxford, 390 pp.
Stephens, J.F. (1834–1835) *Illustrations of British Entomology; or, a Synopsis of Indigenous Insects, containing their generic*

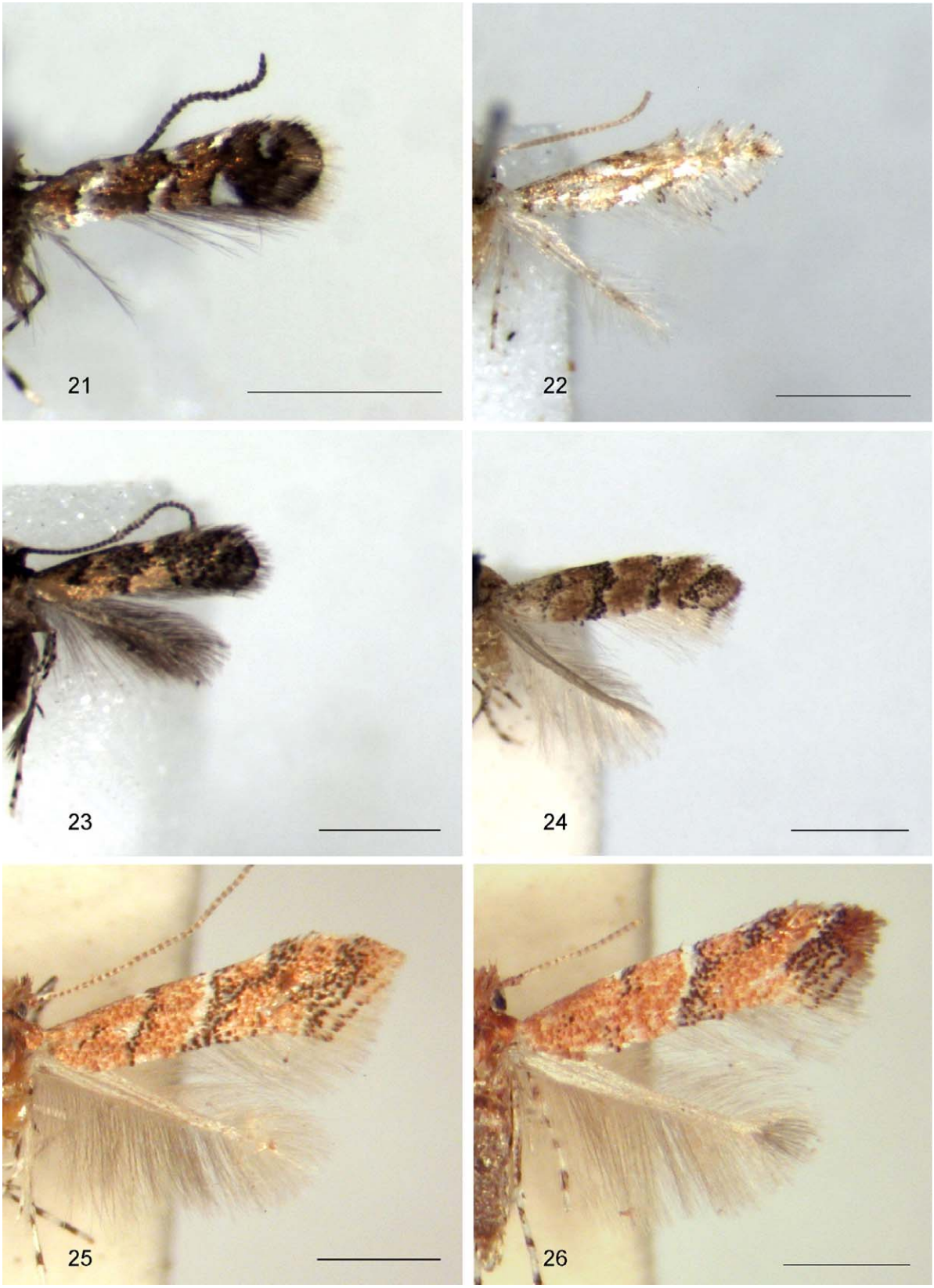
and species distoinctions; with an account of their metamorphoses, times of appearance, localities, food, and economy… Haustellata Part 4. Baldwin & Cradock, London, 1–352 pp. [1834], 353–433 pp. [1835], 33–41 pls.
Sugi, S. (2000) *Post - Moths of Japan. Edition 2. Additions of species and changes in names of Japanese moths*. The Japan Heterocerists' Society, 171 pp.
Svatoš, A., Kalinová, B., Hoskovec, M. Kindl, J., Hovorka, O. & Hrdý, I. (1999) Identification of a new lepidopteran sex-pheromone in picogram quantities using an antennal biodetector - (8E,10Z)-tetradeca-8,10-dienal from *Cameraria ohridella*. *Tetrahedron Letters*, 40, 7011–7014.
Svatoš, A., Kalinová, B., Hoskovec, M., Kindl, J., Hovorka, O. & Hrdý, I. (2001) Identification of *Cameraria ohridella* sex pheromone and its possible use in horse chestnut protection. *IOBC/WPRS Bulletin*, 24, 5–12.
Svatoš, A., Kalinová, B. & Hrdý, I. (2009) *Cameraria ohridella*: 10 years of sex pheromone and kaitomone research. *Journal of Applied Entomology*, 133, 319–327.
Swain, V.M. & Prinsloo, G.L. (1986) A list of phytophagous insects and mites on forest trees and shrubs in South Africa. *Entomology Memoir Department of Agriculture and Water Supply Republic of South Africa*, 66, i–iii, 1–91.
Swammerdam, J. (1737) *Biblia Naturae; sive Historia Insectorum, in classes certas redacta, nec non exemplis, et anatomico variorum animalculorum examine, aeneisque tabulis illustrata*. Tom I. I. Severinus, B. Vander Aa, P. Vander Aa, Leiden. i–54 [unnumbered], 1–362, pls. I–XVI.
Swezey, O.H. (1910) Some new species of Hawaiian Lepidoptera. *Proceedings of the Hawaiian Entomological Society*, 2(3), 103–143, 3 pls.
Swezey, O.H. (1913) Leaf-miners of the Hawaiian Islands. Proceedings of the Hawaiian Entomological Society, 2(5), 221–227.
Swezey, O.H. & Bryan, E.H. (1929) Further notes on the forest insects of Molokai. *Proceedings of the Hawaiian Entomological Society*, 7, 293–314.
Szöcs, G. & Toth, M. (1998) Vigyazat! Almalevél-Aknázómolyok az almalevél-aknùazómoly feromoncsapdában! *Növényvédelem*, 34, 187–189.
Szöcs, G., Karpati, Z., Toth, M. & Francke, W. (2000) About the identification of the synthetic sex-phoromone of horse-chestnut leaf miner (*Cameraria ohridella*). *Növényvédelem*, 36, 429–430.
Szöcs, G., Otvos, I.S., Schiller, A.J., Bergmann, J. & Francke, W. (2006) *Cameraria gaultheriella* and *C. lobatiella* attracted in Canada to (E, Z)-8, 10 tetradecadienal, the sex pheromone of the European *C. ohridella*. *Canadian Entomologist*, 138, 263–268.
The Plant List. A working list of all plant species (2012). Royal Botanic Gardens, Kew and Missouri Botanical Garden (accessed 16 April 2012).
Treitschke, F. (1833) *Die Schmetterlinge von Europa*. Ernst Fleischer, Leipzig, 9(2), 294 pp.
Triberti, P. (2004) Gracillariidae (Lepidoptera, Gracillarioidea). *In*: Mey, W. (Ed.): The Lepidoptera of the Brandberg Massif in Namibia. Part 1. *Esperiana Memoir. Lepidoptera Africana*, 1, pp. 75–89.
Triberti, P. (2007) The *Phyllonorycter* species from Palaearctic Region feeding on Rosaceae (Lepidoptera, Gracillariidae). *Bollettino del Museo Civico di Storia Naturale di Verona*, 31, 147–221.
TROPICOS (2011) Missouri Botanical Garden. Available from http://www.tropicos.org/ (accessed 25 February, 2012).
Urban, A.J., Simelane, D.O., Retief, E., Heystek, F., Williams, H.E. & Madire, L.G. (2011) The invasive '*Lantana camara* L.' hybrid complex (Verbenaceae): a review of research into its identity and biological control in South Africa. *African Entomology*, 19, 315–348.
Valade, R., Kenis, M., Hernandez-Lopez, A., Augustin, S., Mari Mena, N., Magnoux, E., Rougerie, R., Lakatos, F., Roques, A. & Lopez-Vaamonde, C. (2009) Mitochondrial and microsatellite DNA markers reveal a Balkan origin for the highly invasive hores-chestnut leaf miner *Cameraria ohridella* (Lepidoptera, Gracillariidae). *Molecular Ecology*, 18, 3458–3470.
Vane-Wright, R.I. (2003) Evidence and identity in butterfly systematics. *In*: Boggs, C. L. Watt, W. B. & Ehrlich, P. R. (Eds.), *Butterflies: ecology and evolution taking flight*. University of Chicago Press, Chicago, pp. 477–513.
Vane-Wright, R.I. (2007) Linnaeus' butterflies. *The Linnean Special Issue* 7, 59–74.
van Nieukerken, E.J. & De Prins, J. (2007) A new *Cameraria* on Annonaceae in Vietnam and the genus in the Afrotropical region. *Abstracts of 1fifth European Congress of Lepidopterology*, 8–12 September 2007, Erkner, [no pagination].
van Nieukerken, E.J., Kaila, L., Kitching, I.J., Kristensen, N.P., Lees, D.C., Minet, J., Mitter, C., Mutanen, M., Regier, J. C., Simonsen, T.J., Wahlberg, N., Yen, S.-H., Zahiri, R., Adamski, D., Baixeras, J., Bartsch, D., Bengtsson, B. Å., Brown, J. W., Rae Bucheli, S., Davis, D. R., De Prins, J., De Prins, W., Epstein, M. E., Gentili-Poole, P., Gielis, C., Hättenschwiler, P., Hausmann, A., Holloway, J. D., Kallies, A., Karsholt, O., Kawahara, A. Y., Koster, S.(J.C.), Kozlov, M. V., Lafontaine, J. D., Lamas, G., Landry, J.-F., Lee, S., Nuss, M., Park, K.-T., Penz, C., Rota, J., Schintlmeister, A., Schmidt, B. C., Sohn, J.-C., Solis, M. A., Tarmann, G. M., Warren, A. D., Weller, S., Yakovlev, R. V., Zolotuhin, V. V. & Zwick, A. (2011) Order Lepidoptera Linnaeus, 1758. *In*: Zhang, Z.-Q. (Ed.) Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness. *Zootaxa*, 3148, 212–221.
Vári, L. (1961) South African Lepidoptera. Vol. I. Lithocolletidae. *Transvaal Museum Memoir*, 12, 238 pp. 112 pls.
Vári, L. (1963) Neue afrikanische Microlepidoptera. *Deutsche Entomologische Zeitschrift*, N. F., 20, 1–12, 1 pl.
Vári, L. & Kroon, D. (1986) *Southern African Lepidoptera. A series of cross-referenced indices*. Lepidopterists Society of Southern Africa and the Transvaal Museum, Pretoria, 198 pp.
Vári, L., Kroon, D.M. & Krüger, M. (2002) *Classification and checklist of the species of Lepidoptera recorded in Southern Africa*. Simple Solutions, Chatswood, xxi+385 pp.

Viette, P. (1949) Description de trois Microlépidoptères malgaches. *Mémoires de l'Institut scientifique de Madagascar*, Sér. A, 3(2), 171–176.
Viette, P. (1951) Notes sur quelques Lépidoptères malgaches. *Mémoires de l'Institut scientifique de Madagascar*, Sér A, 5(1), 131–138.
Viette, P. (1990) A provisional check-list of the Lepidoptera Heterocera of Madagascar. Liste récapitulative des Lépidoptéres Hétérocères de Madagascar. *Faune de Madagascar*, Supplement, 1–263.
Walker, F. (1864) *List of the specimens of Lepidopterous insects in the collection of the British Museum. Part 29. Tineites*. Order of the trustees, London, 1096 pp.
Walker, F. (1875) Lepidoptera. *In*: Melliss, J. C. (Ed.) *St. Helena: a physical, historical, and topographical description of the island, including its geology, fauna, flora, and meteorology.* L. Reeve & Co., Covent Garden, London, pp. 180–193.
Walsingham, Lord (Thomas de Grey) (1891) Steps towards a revision of Chambers' index with notes and descriptions of new species. *Insect Life*, 3, 325–329.
Walsingham, Lord (Thomas de Grey) (1894) Catalogue of the Pterophoridae, Tortricidae, and Tineidae of the Madeira Islands, with notes and descriptions of new species. *Transactions of the Entomological Society of London*, 1894, 535–555.
Walsingham, Lord (Thomas de Grey) (1901) Spanish Micro-Lepidoptera. *Entomologist's Monthly Magazine*, 12(37), ser. 2, 233–239.
Walsingham, Lord (Thomas de Grey) (1908) Microlepidoptera of Tenerife. *Proceedings of the Zoological Society of London*, 1907, 911–1034, 51–53 pls.
Walsingham, Lord (Thomas de Grey) (1914) Lepidoptera Heterocera (continued). *Biologia centrali-americana, Lepidoptera-Heterocera*, 4(1909–1915), 225–392.
Watkinson, I. A. (1985) Gracillariidae. Lithocolletinae. *In*: Heath, J. & Emmet, A. M. (Eds), *The moths and butterflies of Great Britain and Ireland. Volume 2. Cossidae-Heliodinidae*. Harley Books, Colchester, Essex, 294–362, pls 11–13.
Wessels, J. (2010) Soybean leafminer. Queensland government, primary industries and fisheries. Available from http://www.dpi.qld.gov.au/26_13759.htm (accessed 27 February, 2011).
Whitebread, S.E. (1990) *Phyllonorycter robiniella* (Clemens, 1859) in Europe (Lepidoptera, Gracillariidae). *Nota lepidopterologica*, 12 (1989), 344–353.
Wilgenbusch, J.C., Warren, D.L. & Swofford, D.L. (2004) *AWTY: A system for graphical exploration of MCMC convergence in Bayesian phylogenetic inference*. Available at http://ceb.csit.fsu.edu/awty (accessed 20 March, 2012).
Will, K. & Rubinoff, D. (2004) Myth of the molecule: DNA barcodes for species cannot replace morphology for identification and classification. *Cladistics*, 20, 47–55.
Wilson, R.A. (1999) *Species: new interdisciplinary essays*. MIT Press, Cambridge, 325 pp.
Wise, K.A.J. (1957) A new species of *Lithocolletis* (Lepidoptera: Gracillariidae) from New Zealand. *Proceedings of the Royal Entomological Society of London (Series B, Taxonomy)*, 26, 26–28, 1 pl.
Wocke, M.F. (1848) Geschwänzte Arten. Ungeschwänzte Arten. *Jahrbuch Schlesischen Gesellschaft*, 106–107.
Wocke, M.F. (1861) II. Microlepidoptera. *In*: Staudinger, O. & Wocke, M. F. *Catalog der Lepidopteren Europa's und der angrenzenden Länder*. O. Staudinger, und in der Königl. Hofbuchhandlung von Hermann Burdach, Dresden, 192 pp.
Yoshimoto, C.M. (1977) The North American species of the genus *Achrysocharoides* (Hymenoptera: Eulophidae). *Canadian Entomologist*, 109, 907–930.
Zahiri, R., Holloway, J.D., Kitching, I.J., Lafontaine, J.D., Mutanen, M. & Wahlberg, N. (2012) Molecular phylogenetics of Erebidae (Lepidoptera, Noctuoidea). *Systematic Entomology*, 37, 102–124.
Zapata, F. & Jimenez, I. (2012) Species delimitation: inferring gaps in morphology and across geography. *Systematic Biology*, 61, 179–194.
Zeller, P.C. (1839) Versuch einer naturgemässen Eintheilung der Schaben. *Isis, oder enzyklopädische Zeitung von Oken*, 3, 167–220.
Zeller, P.C. (1846) Die Arten der Blattminierergattung *Lithocolletis*. *Linnaea Entomologica*, 1, 166–261, pl. I.
Zeller, P.C. (1847) Die Gracilarien. *Linnaea Entomologica*, 2, 303–383, 585–586, pl. II.
Zeller, P.C. (1848) Die Gattungen der mit Augendeckeln versehenen blattminirenden Schaben. *Linnaea Entomologica*, 3, 248–344, 57 figs.
Zeller, P.C. (1875) Beiträge zur Kenntniss der nordamericanischen Nachtfalter, besonders der Microlepidopteren. Dritte Abtheilung. *Verhandlungen der zoologisch-botanischen Gesellschaft in Wien*, 25, 205–360, 8–10 pls.
Zetterstedt, J.W. (1838–1840) *Insecta Lapponica*. Lipsiae [Leipzig], vi+1140 pp.
Zimmerman, E.C. (1978) Superfamily Gracillarioidea (Stainton). *Insects of Hawaii*, 9, pp. 644–719.
Zwickl, D.J. (2006) *Genetic algorithm approaches for the phylogenetic analysis of large biological sequence datasets under the maximum likelihood criterion*. Ph.D. dissertation, The University of Texas at Austin.

FIGURES 5–10. Adult head morphology of the Afrotropical Lithocolletinae genera. 5, *Neolithocolletis nsengai*, descaled head prep. MRAC/KMMA 00537. 6, *Cameraria landryi*, descaled head prep. MRAC/KMMA 00529. 7, *Phyllonorycter grewiaecola*, descaled head prep. MRAC/KMMA 00532. 8, *Phyllonorycter hibiscina*, descaled head prep. MRAC/KMMA 00531. 9, *Cremastobombycia solidaginis*, descaled head prep. De Prins 3791. 10, *Porphyrosela teramni*, descaled head prep. MRAC/KMMA 00433.

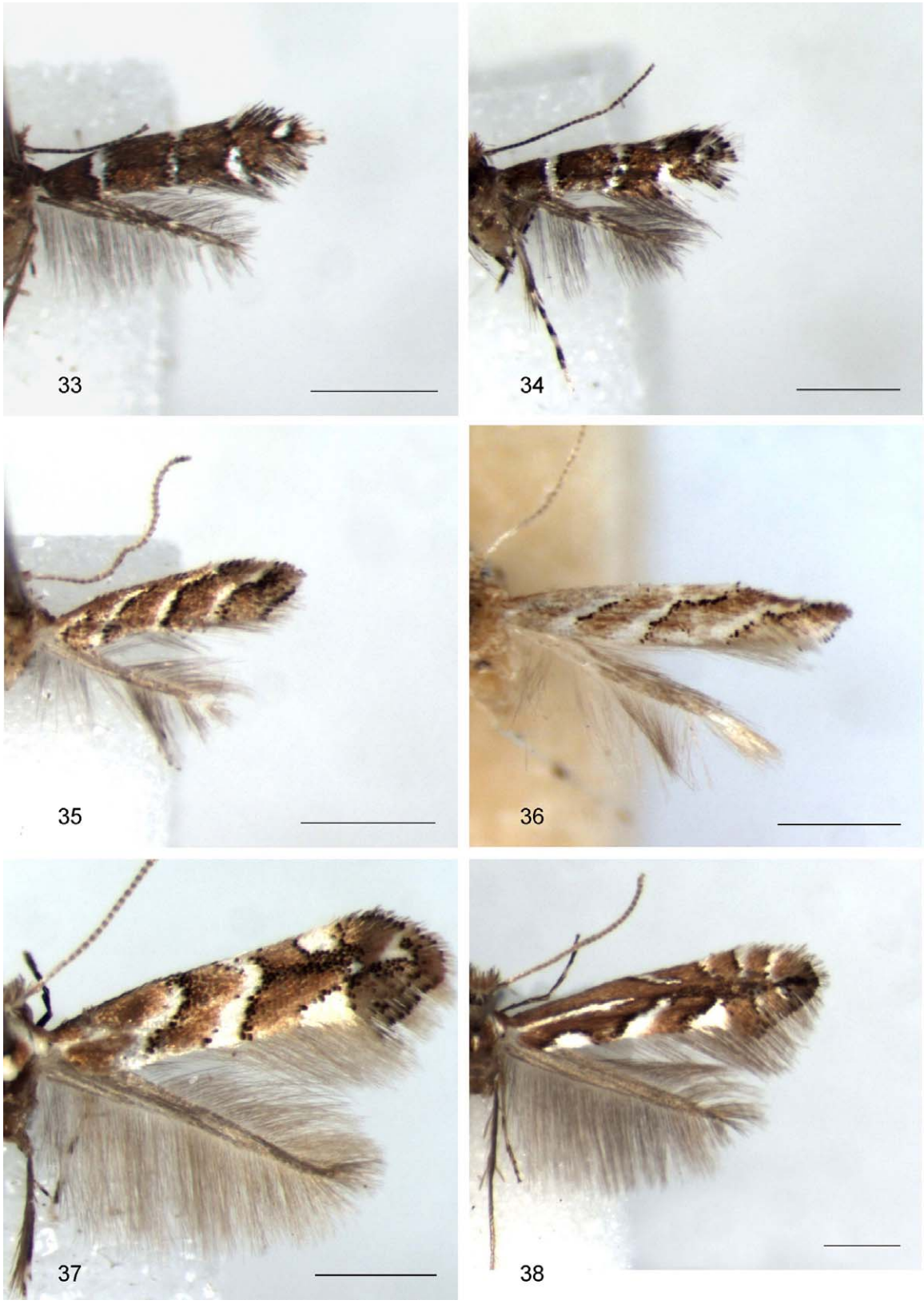


FIGURES 11–20. Wing morphology of the Afrotropical Lithocolletinae genera. 11, *Hyloconis luki*, wing venation prep. MRAC/KMMA 00454. 12, *Neolithocolletis mayumbe*, wing venation prep. MRAC/KMMA 00535. 13, *Neolithocolletis nsengai*, wing venation prep. MRAC/KMMA 00427. 14, *Cameraria perodeaui*, wing venation prep. MRAC/KMMA 00453. 15, *Cameraria torridella*, wing venation prep. MRAC/KMMA 00490. 16, *Phyllonorycter grewiaecola*, wing venation prep. MRAC/KMMA 00528. 17, *Phyllonorycter melanosparta*, wing venation prep. MRAC/KMMA 00497. 18, *Cremastobombycia kipepeo*, wing venation prep. MRAC/KMMA 00494. 19, *Cremastobombycia morogorene*, wing venation prep. MRAC/KMMA 00667. 20, *Porphyrosela teramni*, wing venation prep. MRAC/KMMA 00434.

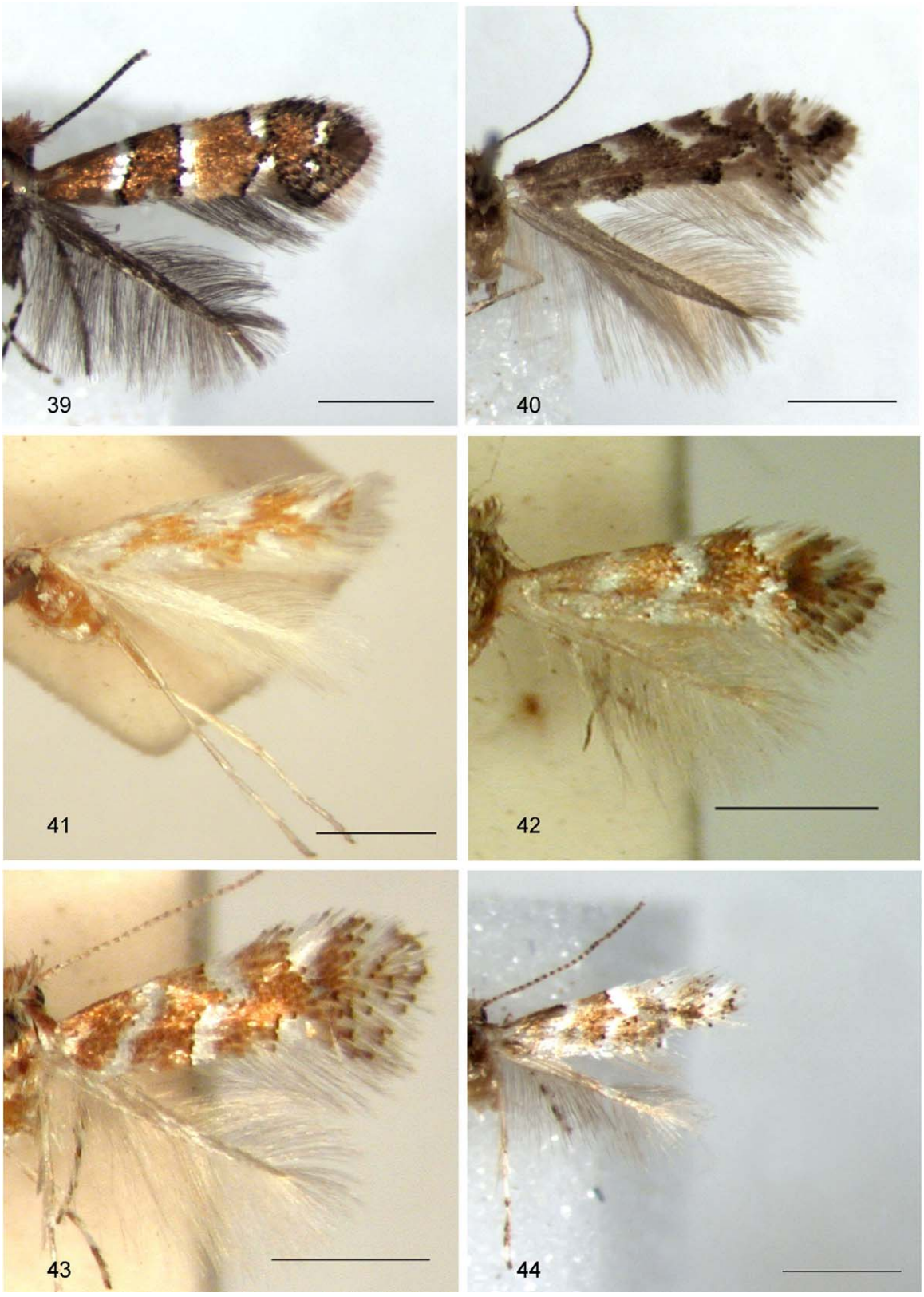


FIGURES 21–26. Adults. Scale bar 1 mm. 21, *Hyloconis luki*, holotype ♂, DRC, Bas-Congo, Luki-Mayumbe NR, 23.v.2007, leg. J. & W. De Prins, specimen ID: RMCA ENT 000004800. 22, *Neolithocolletis mayumbe*, holotype ♂, DRC, Bas-Congo, Luki-Mayumbe NR, 22.iii.2006, leg. J. & W. De Prins, specimen ID: RMCA ENT 000003293. 23, *Neolithocolletis nsengai*, paratype ♀, DRC, Bas-Congo, Luki-Mayumbe NR, 16.v.2007, leg. J. & W. De Prins, specimen ID: RMCA ENT 000004793. 24, *Neolithocolletis pentadesma*, ♀, Seychelles, Fregate island, 4.x.2002, leg. J. Gerlach, in CUMZ. 25, *Cameraria hexalobina*, holotype 6364♂, South Africa, Punda Maria, 12.iv.1952, leg. L. Vári, in TMSA. 26, *Cameraria hexalobina*, paratype 6368♂, South Africa, Punda Maria, 15.iv.1952, leg. L. Vári, in TMSA.

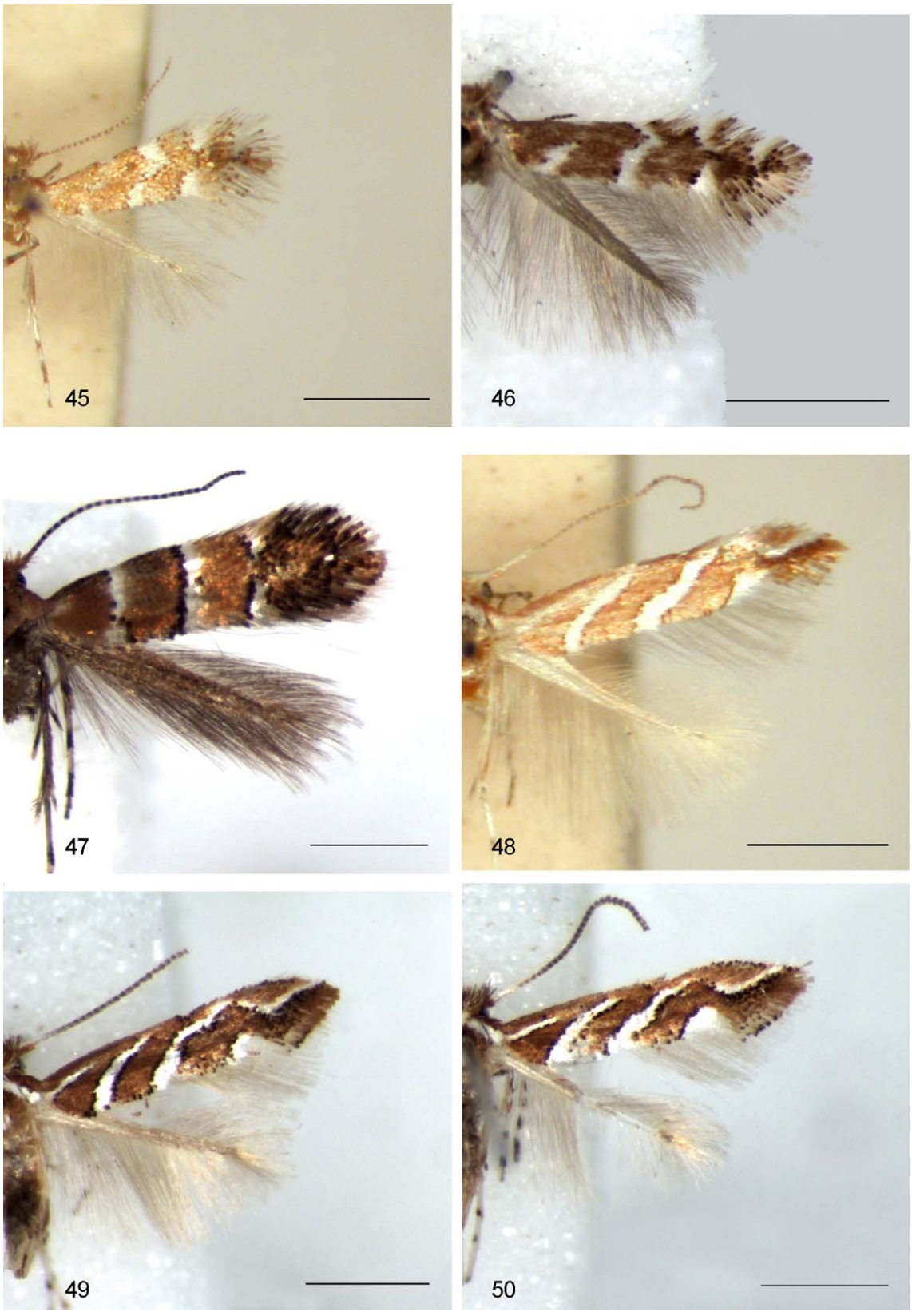
FIGURES 27–32. Adults. Scale bar 1 mm. 27, *Cameraria hexalobina*, ♀, DRC, Bas-Congo, Luki-Mayumbe NR, 05.iv.2006, leg. J. De Prins, specimen ID: RMCA ENT 000003295. 28, *Cameraria fara*, holotype ♀, Cameroon**,** Faro riverside, 27.xi.2003, leg. J. De Prins, specimen ID: RMCA ENT 000003284. 29, *Cameraria landryi*, holotype ♂, DRC, Bas-Congo, Luki-Mayumbe NR, 23.v.2007, leg. J. & W. De Prins, specimen ID: RMCA ENT 000004448. 30, *Cameraria landryi*, paratype ♂, DRC, Bas-Congo, Luki-Mayumbe NR, 16.v.2007, leg. J. & W. De Prins, specimen ID: RMCA ENT 000004450. 31, *Cameraria varii*, holotype ♂, South Africa, Pretoria, 30.x.1968, leg. L. Vári, specimen ID: RMCA ENT 000004276. 32, *Cameraria varii*, paratype ♀, South Africa, Pretoria, 07.xi.1968, leg. L. Vári, specimen ID: RMCA ENT 000004277.



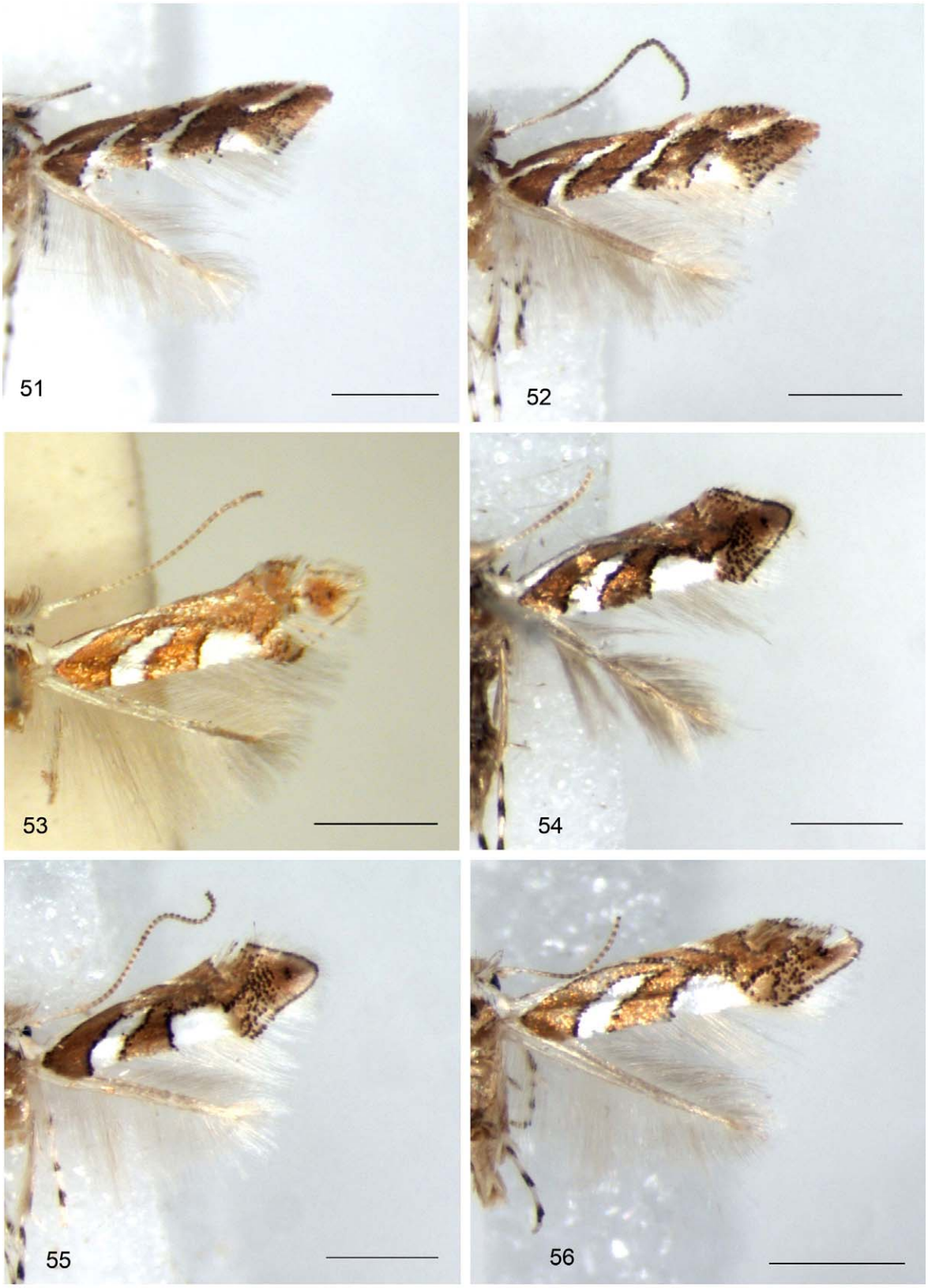
FIGURES 33–38. Adults. Scale bar 1 mm. 33, *Cameraria perodeaui*, holotype ♀, DRC, Bas-Congo, Luki-Mayumbe NR, 16.v.2007, leg. J. & W. De Prins, specimen ID: RMCA ENT 000004799. 34, *Cameraria perodeaui*, paratype ♀, DRC, Bas-Congo, Luki-Mayumbe NR, 23.v.2007, leg. J. & W. De Prins, specimen ID: RMCA ENT 000004798. 35, *Cameraria sokoke*, holotype ♂, Kenya, Arabuko Sokoke Forest, 30.iii.2004, leg. J. De Prins, specimen ID: RMCA ENT 000003275. 36, *Cameraria zaira*, holotype ♂, DRC, Ht. Katanga, Panda, 04.ii.1930, leg. J. Romieux, in MHNG. 37, *Cameraria torridella*, holotype ♂, Kenya, Rift Valley, Turi, 02.xii.1998, leg. D.J.L. Agassiz, specimen ID: RMCA ENT 000003121. 38, *Phyllonorycter achilleus*, holotype ♂, Kenya, Rift Valley, Turi, ex mine 16.x.1999, leg. D.J.L. Agassiz, specimen ID: RMCA ENT 000003125.



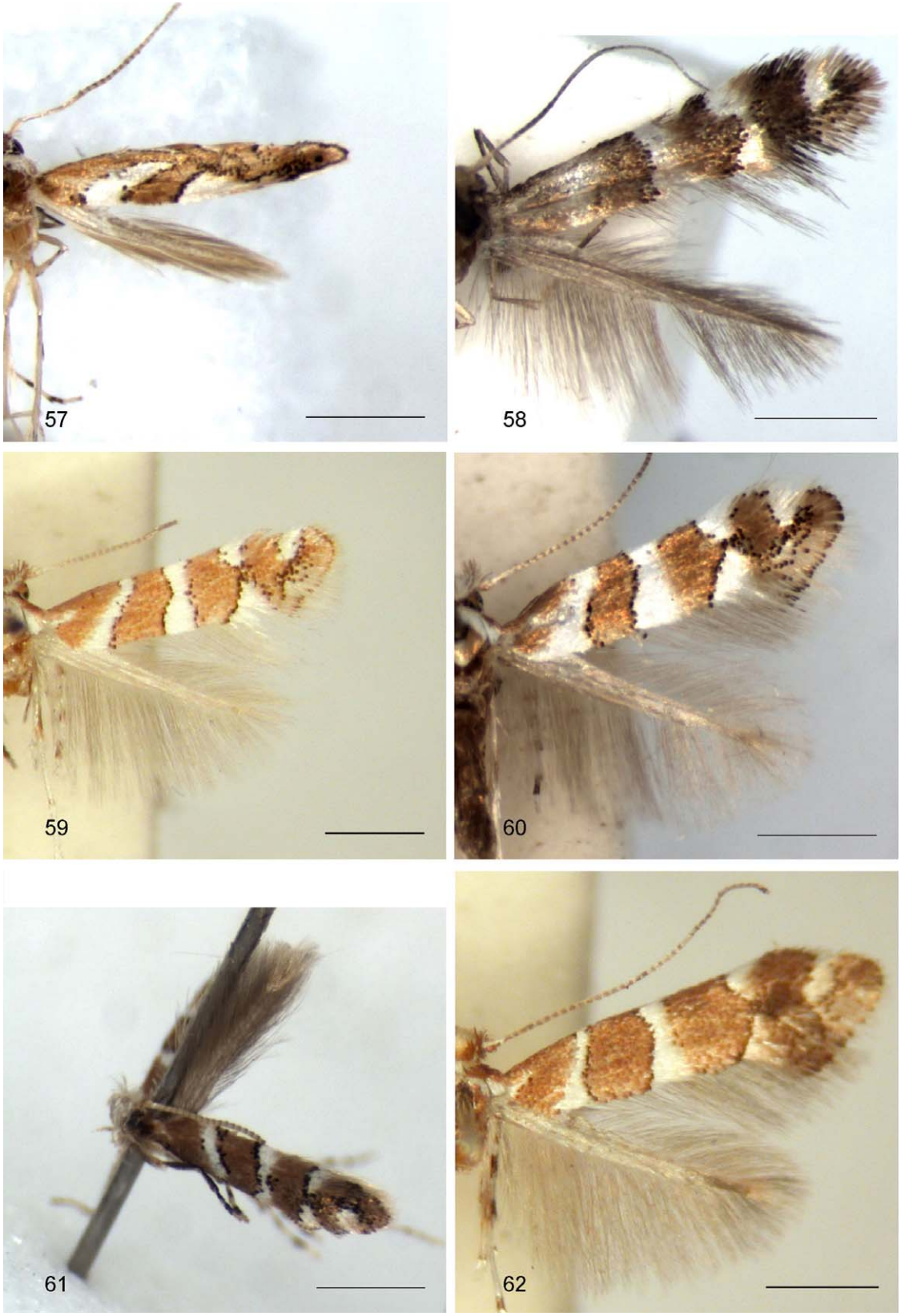
FIGURES 39–44. Adults. Scale bar 1 mm. 39, *Phyllonorycter adderis*, holotype ♂, Rwanda, Nyungwe, mine 03.viii.2008, leg. J. & W. De Prins, specimen ID: RMCA ENT 000005052. 40, *Phyllonorycter agassizi*, holotype ♂, Kenya, Ndoinet, 20.xii.1998, leg. D.J.L. Agassiz, specimen ID: RMCA ENT 000006146. 41, *Phyllonorycter chionopa*, holotype 6496♀, Namibia, Abachaus, ??.x.1944, leg. G. Hobohm, in TMSA. 42, *Phyllonorycter encaeria*, holotype 361♂, South Africa, Pretoria, 08.x.1906, leg. A.J.T. Janse, in TMSA. 43, *Phyllonorycter encaeria*, ♀, South Africa, Pretoria, 20.ix.1951, leg. L. Vári, in TMSA. 44, *Phyllonorycter kazuri*, holotype ♂, Kenya, Tsavo, 12.iv.2002, leg. J. De Prins, specimen ID: RMCA ENT 000003276.



FIGURES 45–50. Adults. Scale bar 1 mm. 45, *Phyllonorycter lantanae*, holotype 6377♀, South Africa, Louis Trichardt, 20.iv.1955, leg. L. Vári, in TMSA. 46, *Phyllonorycter lantanae*, ♀, Kenya, Rift Valley, Gilgil, 26.xi.2005, leg. D.J.L. Agassiz, in BMNH. 47, *Phyllonorycter gato*, holotype ♀, Rwanda, Nyungwe, mine 03.viii.2008, leg. J. & W. De Prins, specimen ID: RMCA ENT 000005151. 48, *Phyllonorycter grewiaecola*, holotype 6370♂, South Africa, Waterpoort, 4.v.1956, leg. L. Vári, in TMSA. 49, *Phyllonorycter grewiaecola*, ♂, Kenya, Tsavo, mine 12.iv.2002, leg. J. De Prins, specimen ID: RMCA ENT 000003003. 50, *Phyllonorycter grewiaecola*, ♂, Kenya, Tsavo, mine 12.iv.2002, leg. J. De Prins, specimen ID: RMCA ENT 000003018.

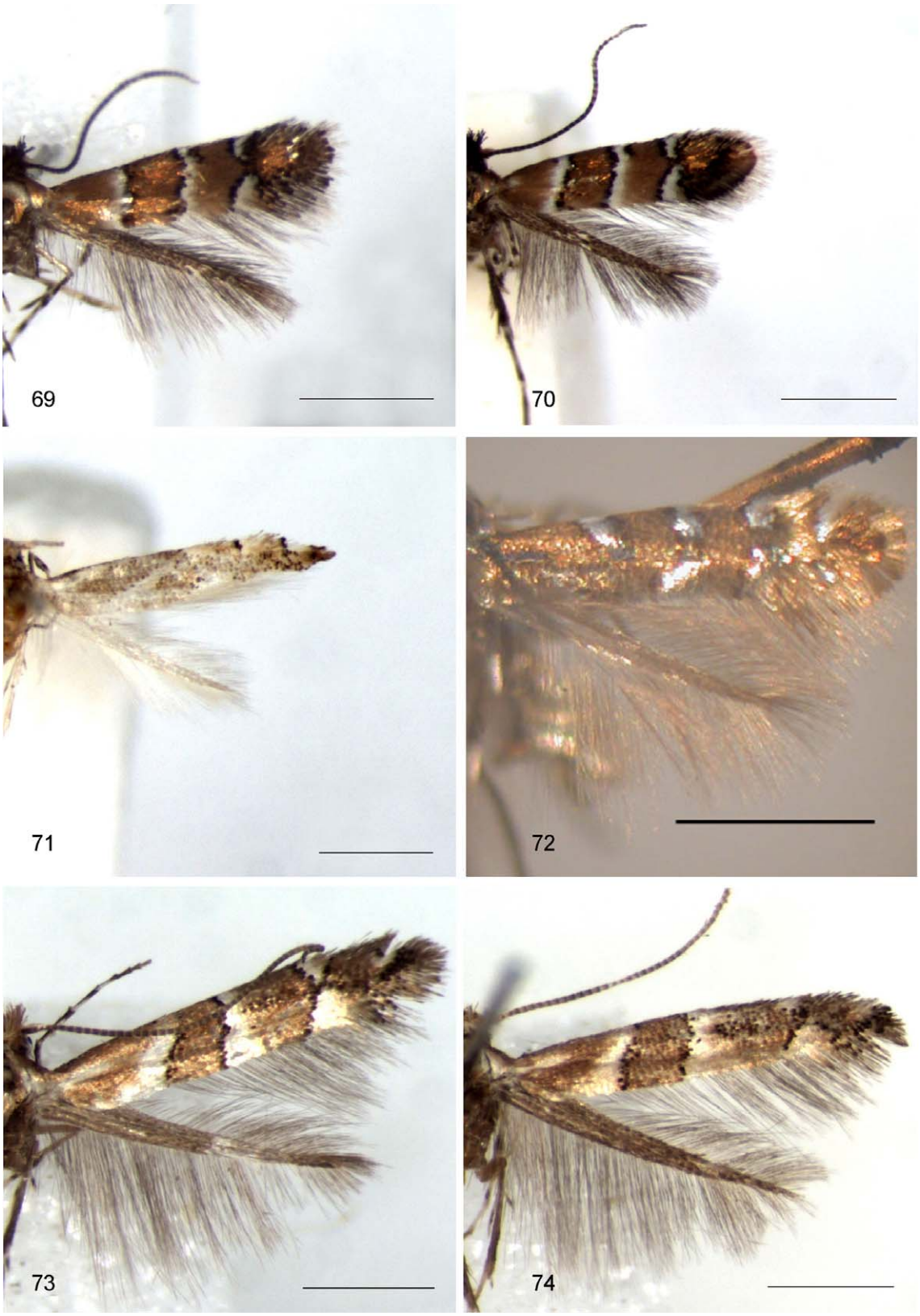


FIGURES 51–56. Adults. Scale bar 1 mm. 51, *Phyllonorycter grewiaephilos*, holotype ♂, Kenya, Tsavo, mine 12.iv.2002, leg. J. De Prins, specimen ID: RMCA ENT 00000307. 52, *Phyllonorycter grewiaephilos*, paratype ♂, Kenya, Tsavo, mine 12.iv.2002, leg. J. De Prins, specimen ID: RMCA ENT 000003076. 53, *Phyllonorycter grewiella*, holotype 6373♂, South Africa, Malelane, 24.iii.1952, leg. A.J.T. Janse & L. Vári, in TMSA. 54, *Phyllonorycter grewiella*, ♂, Kenya, Tsavo, mine 12.iv.2002, leg. J. De Prins, specimen ID: RMCA ENT 000003111. 55, *Phyllonorycter grewiella*, ♀, Kenya, Tsavo, mine 12.iv.2002, leg. J. De Prins, specimen ID: RMCA ENT 000003112. 56, *Phyllonorycter grewiella*, ♀, Namibia, Erongo, 15–16.iii.2005, leg. W. Mey, in ZMHB.



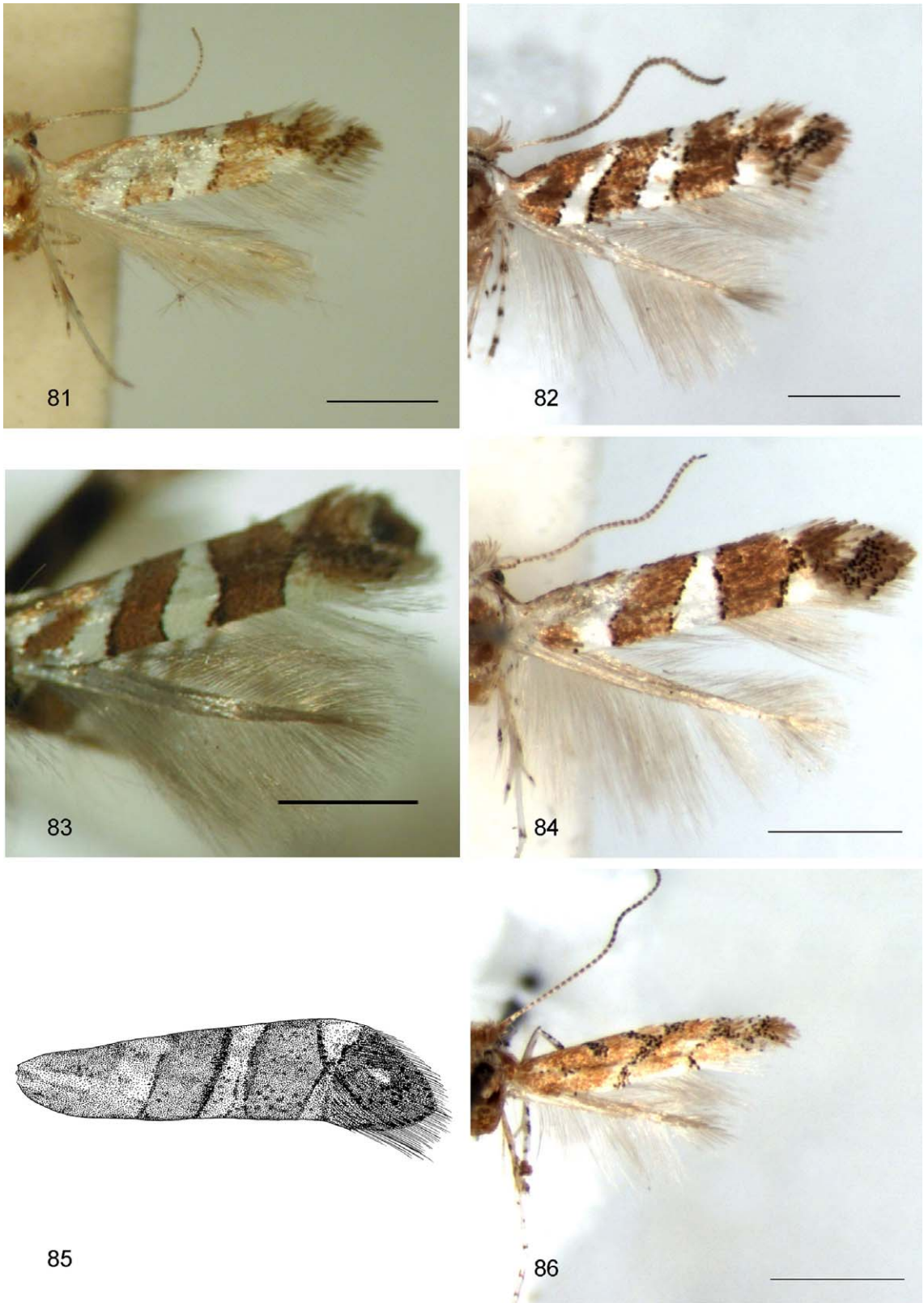
FIGURES 57–62. Adults. Scale bar 1 mm. 57, *Phyllonorycter grewiella*, ♂, Yemen, Ibb, Al Qa'idah, 28.iv.1998, leg. M. Fibiger *et al*., in ZMUC. 58, *Phyllonorycter acutulus*, holotype ♂, Kenya, Aberdares, 12.iv.2000, leg. U. Dall'Asta, specimen ID: RMCA ENT 000004451. 59, *Phyllonorycter brachylaenae*, holotype 6414♂, South Africa, Pretoria, 20.x.1949, leg. L. Vári, in TMSA. 60, *Phyllonorycter brachylaenae*, ♀, South Africa, Pretoria, 18.iii.1955, leg. L. Vári, specimen ID: RMCA ENT 000004114. 61, *Phyllonorycter dombeyae*, holotype ♂, South Africa, KwaZulu-Natal, Hluhluwe-Imfolozi, mine 15.vii.2008, leg. C. Lopez-Vaamonde, specimen ID: RMCA ENT 000005040. 62, *Phyllonorycter hibiscina*, holotype 6403♂, South Africa, Hennops River, 12.ix.1950, leg. L. Vári, in TMSA.

FIGURES 63–68. Adults. Scale bar 1 mm. 63, *Phyllonorycter hibiscina*, paratype 6408♂, South Africa, Hennops River, 15.iii.1955, leg. L. Vári, in TMSA. 64, *Phyllonorycter hibiscina*, ♂, Kenya, Lake Nakuru, mine 11.x.2001, leg. J. De Prins, specimen ID: RMCA ENT 000004032. 65, *Phyllonorycter hibiscina*, ♂, Kenya, Lake Nakuru, mine 11.x.2001, leg. J. De Prins, specimen ID: RMCA ENT 000004033. 66, *Phyllonorycter ipomoellus*, holotype ♀, Rwanda, Nyungwe, mine 31.vii.2008, leg. J. & W. De Prins, specimen ID: RMCA ENT 000005149. 67, *Phyllonorycter ipomoellus*, paratype ♀, Rwanda, Nyungwe, mine 31.vii.2008, leg. J. & W. De Prins, specimen ID: RMCA ENT 000005150. 68, *Phyllonorycter turensis*, holotype ♀, Kenya, Rift Valley, Turi, 26.v.1999, leg. D.J.L. Agassiz, in BMNH.

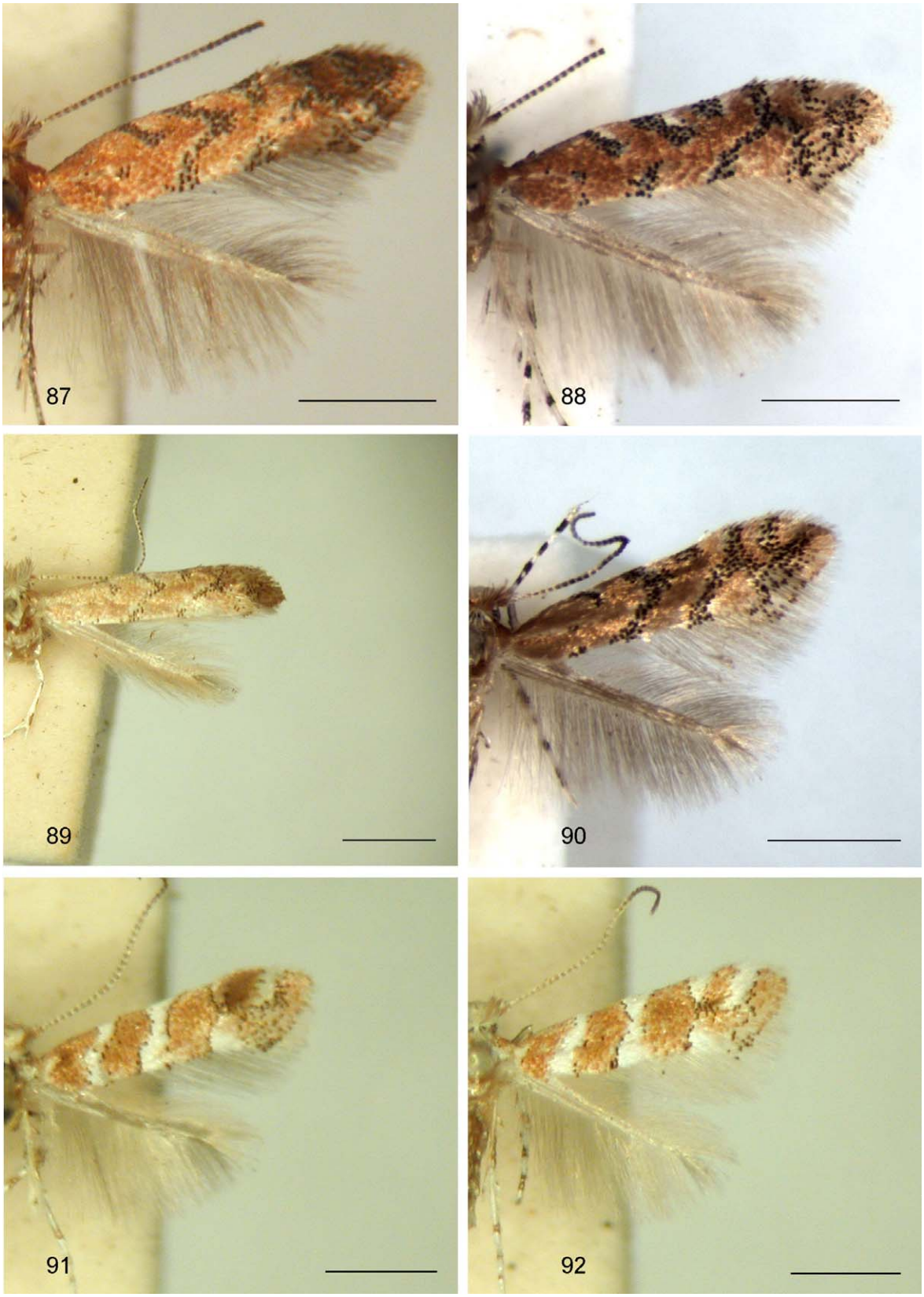


FIGURES 69–74. Adults. Scale bar 1 mm. 69, *Phyllonorycter hibiscola*, holotype ♀, Kenya, Kakamega Forest, mine 28.iii.2003, leg. J. & W. De Prins, specimen ID: RMCA ENT 000003278. 70, *Phyllonorycter hibiscola*, paratype ♀, Kenya, Kakamega Forest, mine 17.iv.2001, leg. J. De Prins, specimen ID: RMCA ENT 000003266. 71, *Phyllonorycter jabalshamsi*, holotype ♂, Oman, Jabal Shams, Al Hamra, 07.i.1993, leg. B. Skule, in ZMUC. 72, *Phyllonorycter lemarchandi*, holotype ♂, Madagascar, Antananarivo, mine 03.i.1949, in MNHN. 73, *Phyllonorycter albertinus*, holotype ♂, Kenya, Rift Valley, Turi, 05.ii.1999, leg. D.J.L. Agassiz, in BMNH. 74, *Phyllonorycter albertinus*, paratype ♂, Kenya, Rift Valley, Turi, 18.i.1999, leg. D.J.L. Agassiz, specimen ID: RMCA ENT 000006147.

FIGURES 75–80. Adults. Scale bar 1 mm. 75, *Phyllonorycter caudasimplex*, holotype ♀, Nigeria, Ile-Ife, 30.xii.1971, leg. J.T.Medler, in BMNH. 76, *Phyllonorycter leucaspis*, paratype ♂, Namibia, Brandberg, 18.iii.2001, leg. W. Mey, specimen ID: RMCA ENT 000004446. 77, *Phyllonorycter ololua*, holotype ♂, Kenya, Nairobi, Ololua Forest, 23.v.1999, leg. B. Bytebier, specimen ID: RMCA ENT 000003274. 78, *Phyllonorycter ruizivorus*, holotype ♂, Reunion, St. Pierre, mine 02.x.1998, leg. S. Quilici, in BMNH. 79, *Phyllonorycter ruizivorus*, paratype ♂, Reunion, Le Port, mine 28.viii.2009, leg. J. Rochat, specimen ID: RMCA ENT 000005299. 80, *Phyllonorycter trochetellus*, holotype ♂, Mauritius, mine ??iv.2004, leg. C. Müller, in BMNH.

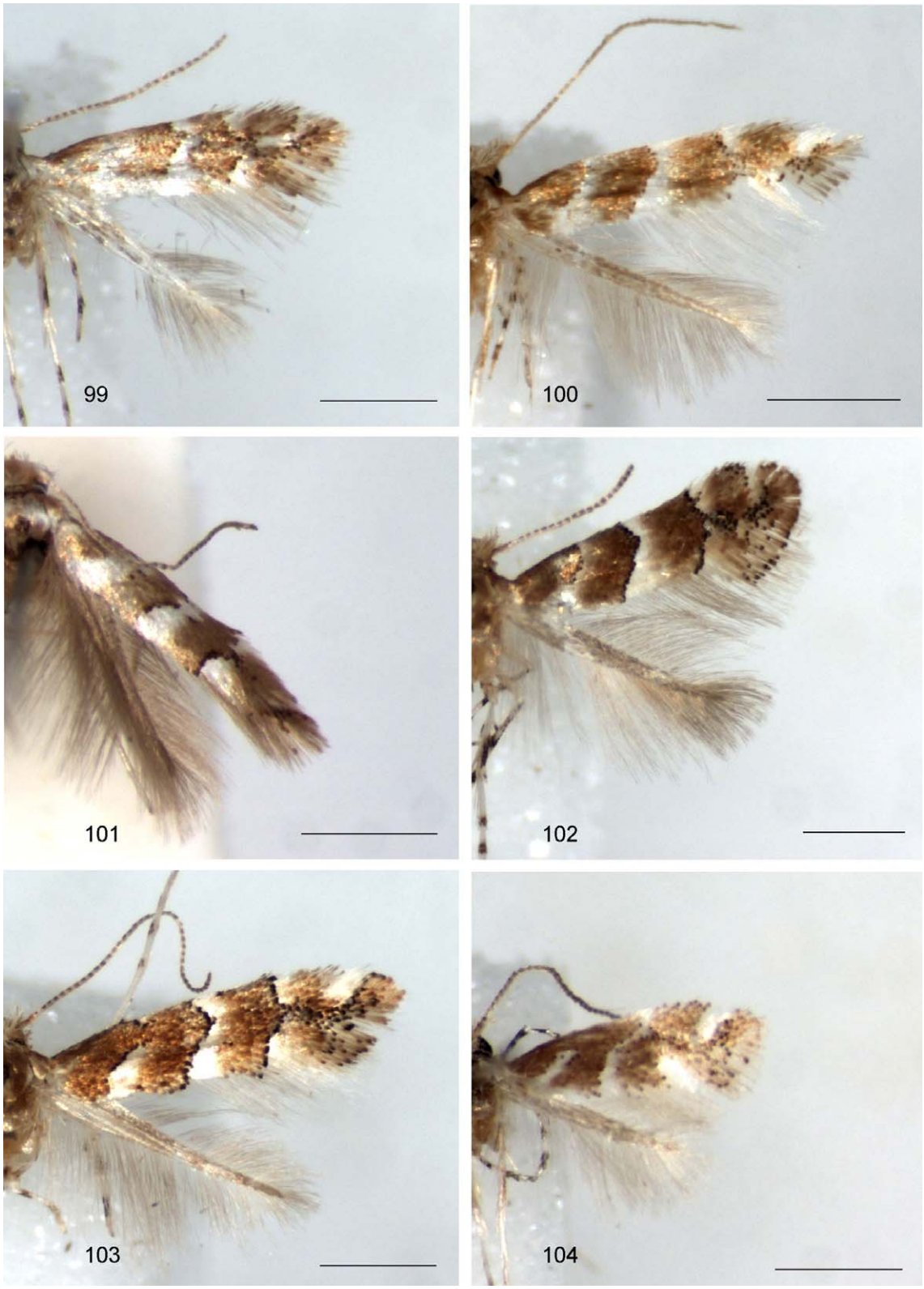


FIGURES 81–86. Adults. Scale bar 1 mm. 81, *Phyllonorycter didymopa*, holotype 6494♀, South Africa, Tswaing, 16.i.1955, in TMSA. 82, *Phyllonorycter didymopa*, ♀, South Africa, Tswaing, 16.xi.2004, leg. J. & W. De Prins, specimen ID: RMCA ENT 000003287. 83, *Phyllonorycter loxozona*, holotype ♀, Uganda, Busunju, 02.x.1935, leg. H.C. Taylor, in BMNH. 84, *Phyllonorycter loxozona*, ♀, South Africa, Rustenburg, 10–17.xi.1976, leg. Potgieter & Molekane, in TMSA. 85, *Phyllonorycter madagascariensis*, holotype, Antananarivo, leg. R. Paulian. The drawing is made by Willy De Prins after the original description and the drawing of Viette (1949: 175–176, fig. 5). 86, *Phyllonorycter aarviki*, holotype ♀, Tanzania, Morogoro, 25.iii.1992, leg. L. Aarvik, specimen ID: RMCA ENT 000004128.

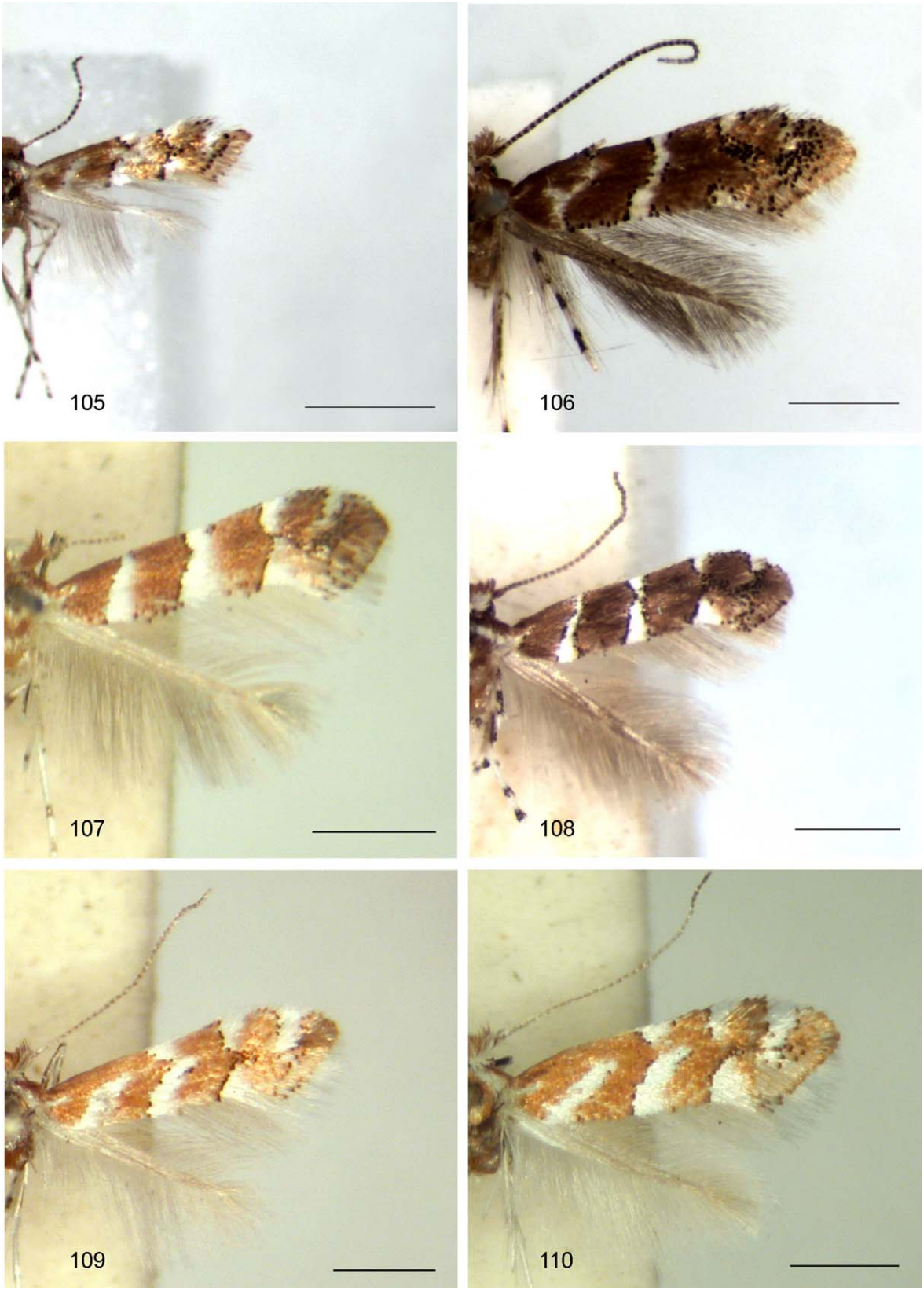


FIGURES 87–92. Adults. Scale bar 1 mm. 87, *Phyllonorycter anchistea*, holotype 6348♂, South Africa, Louis Trichardt, 11.v.1953, leg. L. Vári, in TMSA. 88, *Phyllonorycter anchistea*, ♂, South Africa, Buffelspoortdam, 20.vii.1971, specimen ID: RMCA ENT 000004151. 89, *Phyllonorycter melanosparta*, holotype 360♀, South Africa, Barberton, 31.xii.1910, leg. A.J.T. Janse, in TMSA. 90, *Phyllonorycter melanosparta*, ♀, Kenya, Kakamega Forest, mine 19.iv.2001, leg. J. De Prins, specimen ID: RMCA ENT 000004144. 91, *Phyllonorycter melhaniae*, holotype 6396♂, Zimbabwe, Hot Springs, 29.iv.1956, leg. L. Vári, in TMSA. 92, *Phyllonorycter melhaniae*, paratype 6399♀, Zimbabwe, Hot Springs, 03.v.1956, leg. L. Vári, in TMSA.

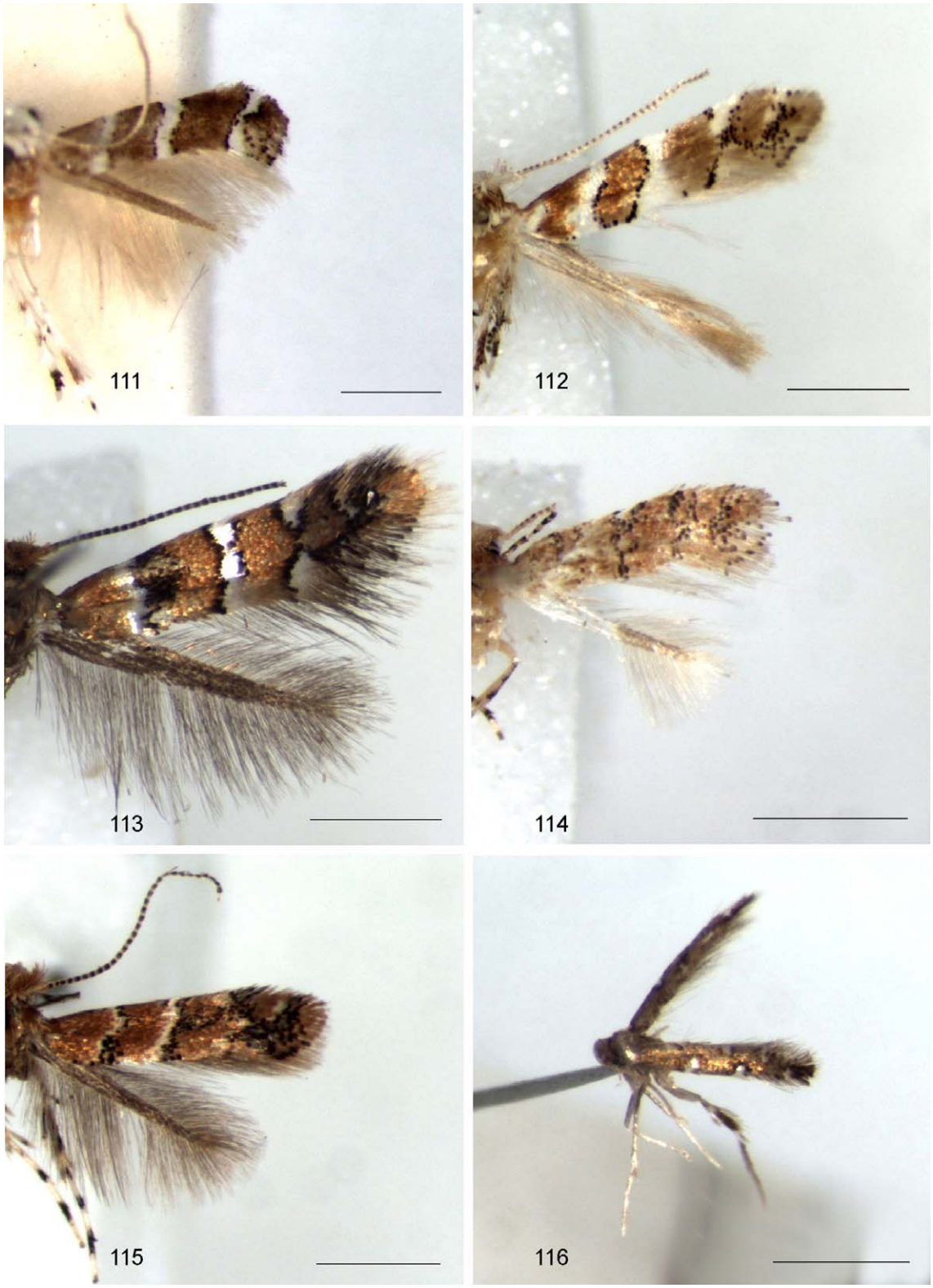
FIGURES 93–98. Adults. Scale bar 1 mm. 93, *Phyllonorycter melhaniae*, ♀, South Africa, Potgietersrus, 26.iv.1968, specimen ID: RMCA ENT 000003361. 94, *Phyllonorycter rongensis*, holotype ♀, Kenya, Rift Valley, Rongai, 06.i. 2000, leg. D.J.L. Agassiz, specimen ID: RMCA ENT 000003269. 95, *Phyllonorycter mida*, holotype ♀, Kenya, Arabuko Sokoke Forest, 27.iii.2004, leg. J. & W. De Prins, specimen ID: RMCA ENT 000003282. 96, *Phyllonorycter mida*, paratype ♀, Yemen, Shabwah, Abdalla Garib Plateau, 02.v.1999, leg. M. Fibiger *et al*., in ZMUC. 97, *Phyllonorycter tsavensis*, holotype ♀, Kenya, Tsavo, 11.iv.2002, leg. J. De Prins, specimen ID: RMCA ENT 000003268. 98, *Phyllonorycter obandai*, paratype ♂, Kenya, Rift Valley, Turi, 27.ii.2000, leg. D.J.L. Agassiz, in BMNH.



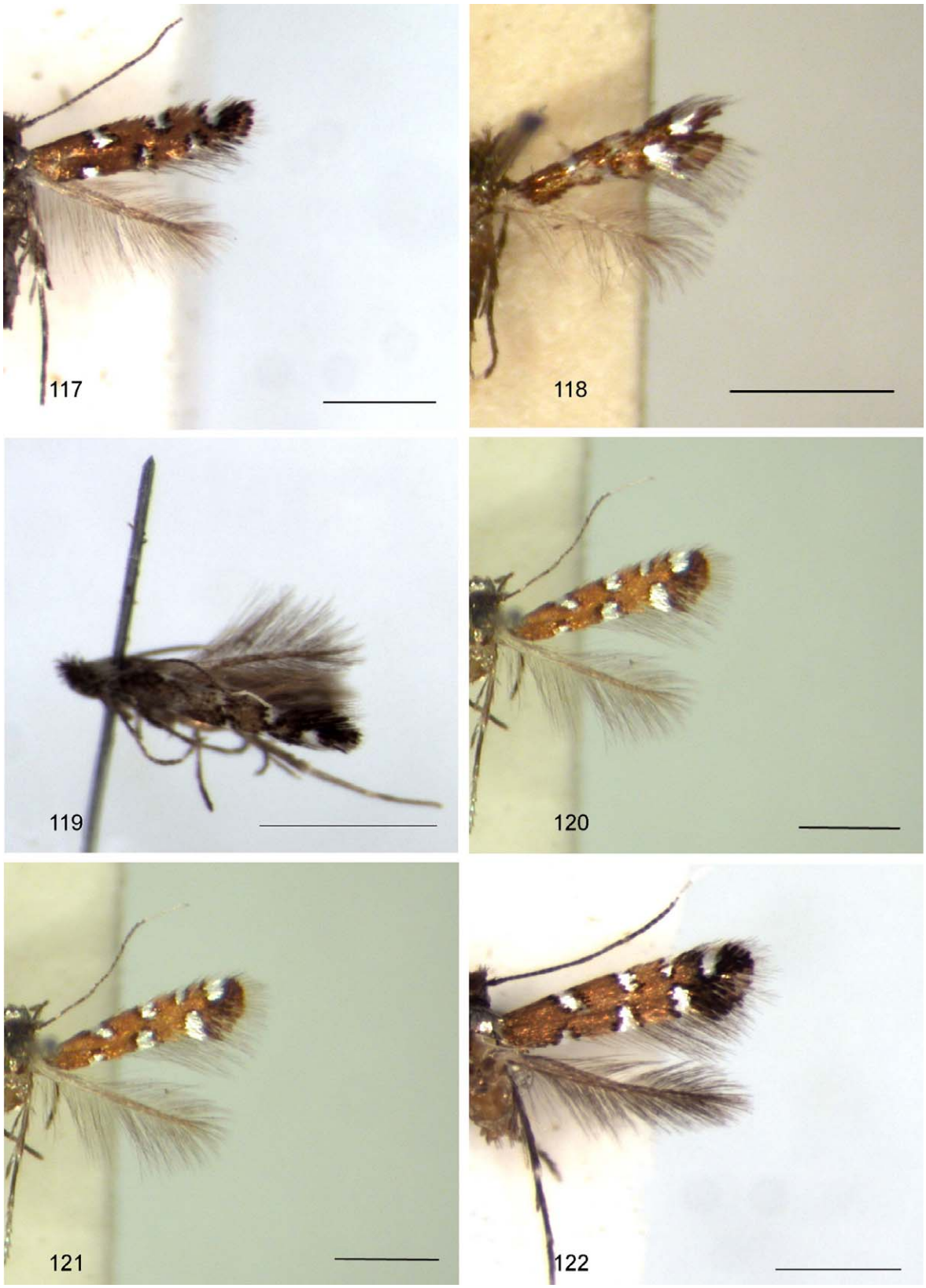
FIGURES 99–104. Adults. Scale bar 1 mm. 99, *Phyllonorycter farensis*, holotype ♂, Cameroon, North Province, Faro riverside, 24.xi.2003, leg. J. De Prins, specimen ID: 000002948. 100, *Phyllonorycter farensis*, paratype ♂, Cameroon, North Province, Faro riverside, 25.xi.2003, leg. J. De Prins, specimen ID: 000002962. 101, *Phyllonorycter fletcheri*, holotype ♂, Uganda**,** Rwenzori Mountains, Ibanda, 12.ix.1952, leg. D.S. Fletcher, in BMNH. 102, *Phyllonorycter gozmanyi*, holotype ♂, Cameroon, North Province, Faro riverside, 29.xi.2003, leg. J. De Prins, specimen ID: 000002959. 103, *Phyllonorycter gozmanyi*, holotype ♂, Cameroon, North Province, Faro riverside, 01.xii.2003, leg. J. De Prins, specimen ID: 000002960. 104, *Phyllonorycter maererei*, holotype ♂, Tanzania, Morogoro, 13.vii.2009, leg. J. & W. De Prins, specimen ID: RMCA ENT 000005330.



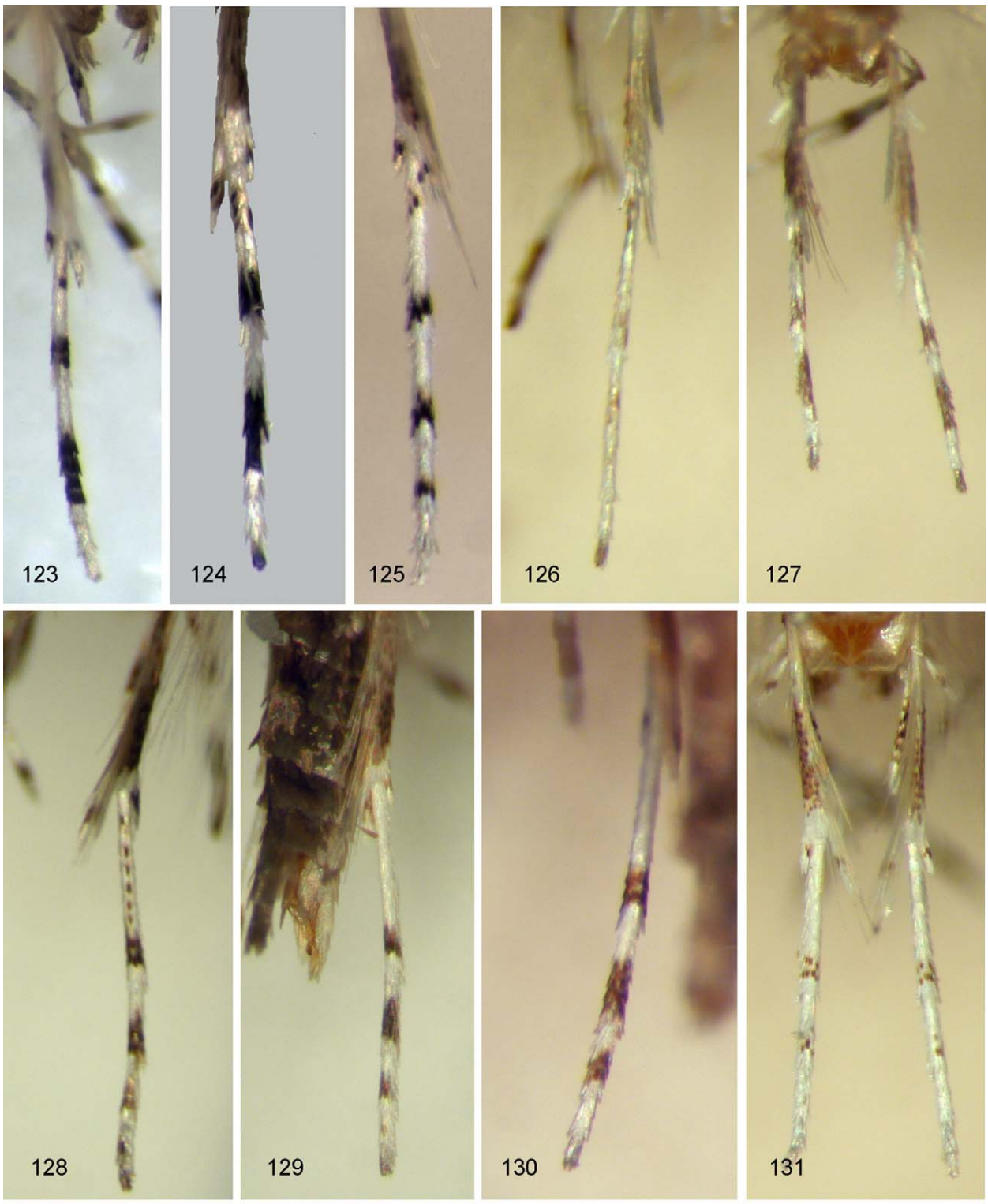
FIGURES 105–110. Adults. Scale bar 1 mm. 105, *Phyllonorycter mwatawalai*, holotype ♀, Tanzania, Morogoro, 14.vii.2009, leg. J. & W. De Prins, specimen ID: RMCA ENT 000005331. 106, *Phyllonorycter ocimellus*, holotype ♂, Kenya, Taita Hills, mine 09.iv.2001, leg. J. & W. De Prins, specimen ID: RMCA ENT 000003353. 107, *Phyllonorycter pavoniae*, holotype 6391♂, South Africa, Chipise, 28.v.1953, leg. L. Vári, in TMSA. 108, *Phyllonorycter pavoniae*, ♂, South Africa, Kruger National Park, Punda Milia, 18–30.v.1975, in TMSA. 109, *Phyllonorycter rhynchosiae*, holotype 6379♂, South Africa, Pretoria, 14.iii.1949, leg. L. Vári, in TMSA. 110, *Phyllonorycter rhynchosiae*, paratype 6390♂, South Africa, Hartebeestpoort, 11.ii.1955, leg. L. Vári, in TMSA.



FIGURES 111–116. Adults. Scale bar 1 mm. 111, *Phyllonorycter ruwenzori*, holotype ♂, Uganda, Rwenzori Mountains, Bundibugyo, 22.viii–3.ix.1952, leg. D.S. Fletcher, in BMNH. 112, *Phyllonorycter silvicola*, holotype ♀, Kenya, Kakamega Forest, 31.iii.2003, leg. J. & W. De Prins, specimen ID: RMCA ENT 000003277. 113, *Phyllonorycter umukarus*, holotype ♀, Rwanda, Nyungwe, mine 28.vii.2008, leg. J. & W. De Prins, specimen ID: RMCA ENT 000005152. 114, *Cremastobombycia kipepeo*, holotype ♂, Kenya, Arabuko Sokoke Forest, 18.iii.2004, leg. J. & W. De Prins, specimen ID: RMCA ENT 000003285. 115, *Cremastobombycia morogorene*, holotype ♂, Tanzania, Morogoro, 30.viii.1992, leg. L. Aarvik, specimen ID: RMCA ENT 000006148. 116, *Porphyrosela desmodivora*, paratype ♂, Cameroon, Ekona, 20.iv.1938, leg. S.G. Buhr, in ZMHB.



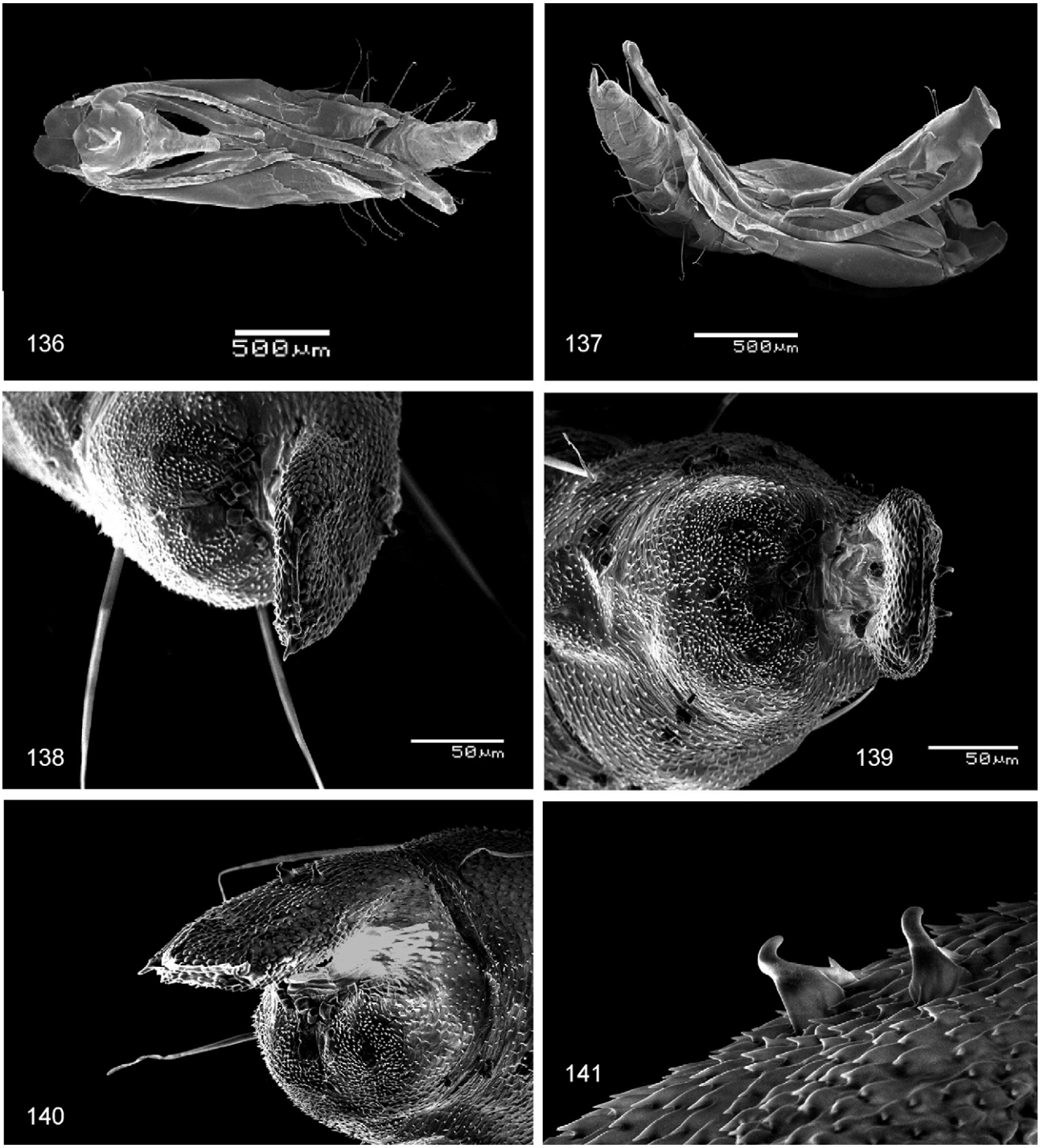
FIGURES 117–122. Adults. Scale bar 1 mm. 117, *Porphyrosela gautengi*, holotype ♂, South Africa, Lebombo Mountains, Jozini Dam, 18.i.1965, specimen ID: RMCA ENT 000004797. 118, *Porphyrosela homotropha*, paratype 4786♀, Ethiopia, Addis Ababa, 5.xii.1959, leg. E.M. Hering, in ZMHB. 119, *Porphyrosela homotropha*, ♀, Ethiopia, Tana Lake, Bahir Dar, 11–16.i.1996, leg. Mey & Ebert, in ZMHB. 120, *Porphyrosela teramni*, holotype 6497♂, South Africa, Pretoria, 22.xi.1948, leg. L. Vári, in TMSA. 121, *Porphyrosela teramni*, paratype 6520, South Africa, Pretoria, 22.xi.1948, leg. L. Vári, in TMSA. 122, *Porphyrosela teramni*, ♂, South Africa, Glenmore, 12.v.1971, specimen ID: RMCA ENT 000004794.



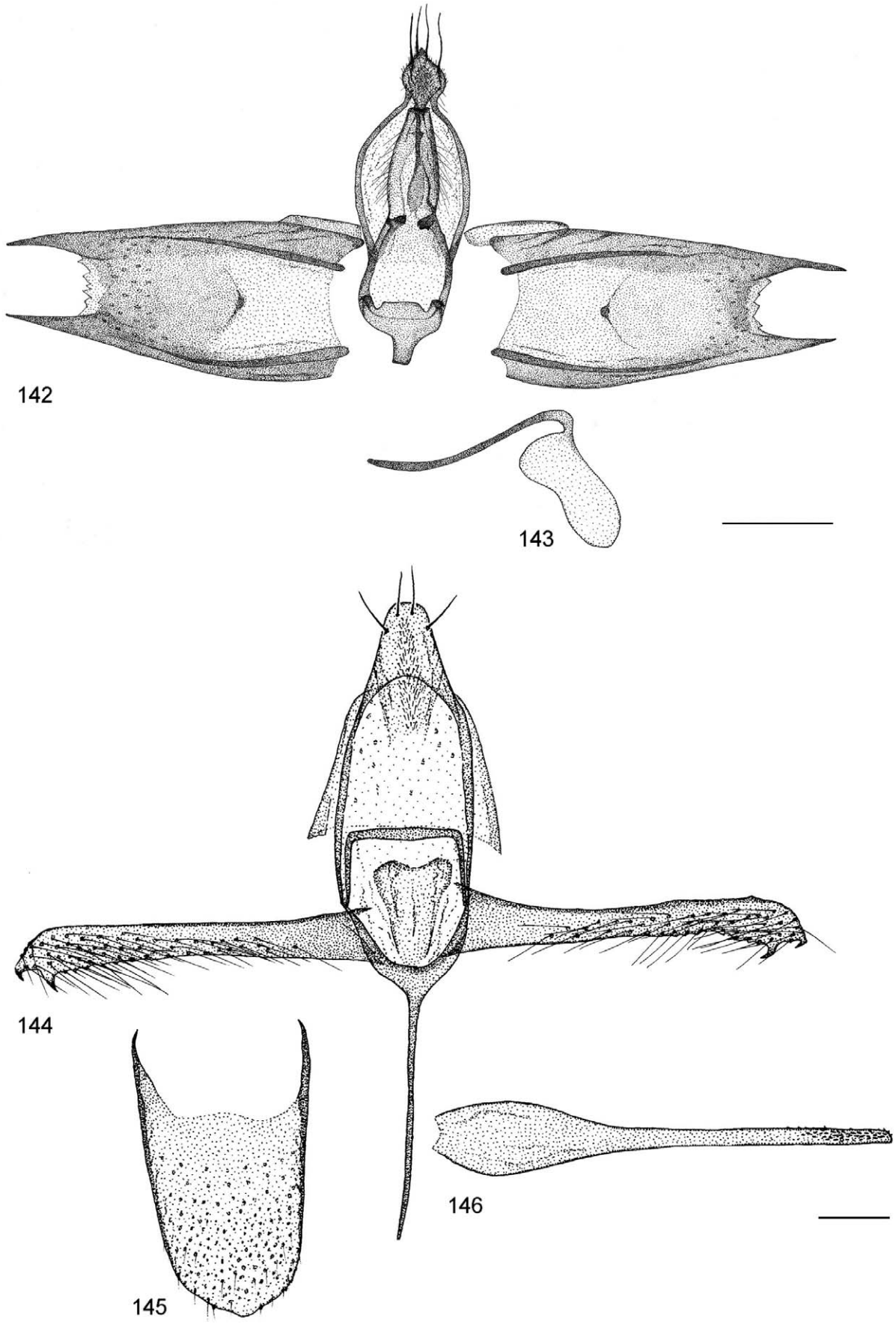
FIGURES 123–131. Diagnostic characters in hind legs between congeneric Afrotropical Lithocolletinae species. 123, *Cameraria fara*, hind tarsus white with a brownish spot subbasally and two blackish rings: narrow medially and broad subapically, tarsomere V white. 124, *Cameraria landryi*, hind tarsus white with two blackish small spots basally and two blackish rings: narrow medially and broad subapically, tarsomere V white with dark fuscous tip. 125, *Cameraria varii*, hind tarsus white with a blackish small spot basally and three blackish rings of median width, tarsomere V white. 126, *Phyllonorycter encaeria*, hind tarsomeres I–III with faint fuscous subapical patches. 127, *Phyllonorycter lantanae*, hind tarsomere I with subbasal and subapical dark fuscous patches, tarsomere II with dark fuscous apical half, tarsomere III with a dark fuscous basal half. 128, *Phyllonorycter anchistea*, hind tarsomere I dotted. 129, *Phyllonorycter melanosparta*, hind tarsomere I not dotted. 130, *Phyllonorycter hibiscina*, hind tarsomere I white with a dark fuscous apex. 131, *Phyllonorycter pavoniae*, hind tarsomere I with a faint subapical ochreous patch.

FIGURES 132–133. Diagnostic characters in frons between two related Afrotropical Lithocolletinae species. 132, *Phyllonorycter melhaniae*, frons shiny white with irrorated dispersed dark brown scales. 133, *Phyllonorycter pavoniae*, frons whitish with a very faint pale ochreous suffusion.

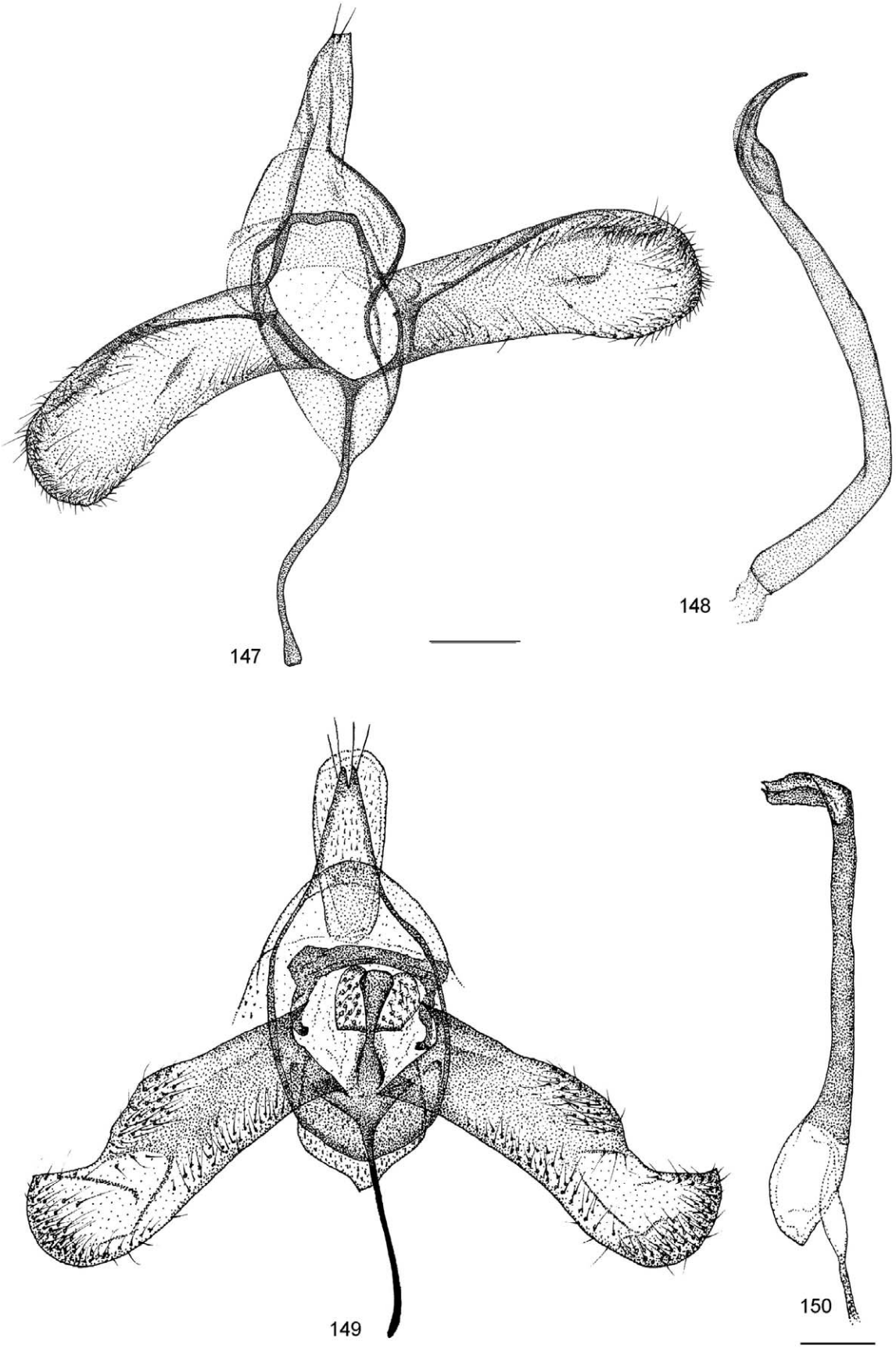
FIGURES 134–135. *"Lithocolletis" aurifascia* Walker 1875, holotype ♂, Saint Helena, leg. Wollaston, in BMNH. 134, adult, habitus. 135, labial palpus long and porrect with a long tuft beneath indicates that *aurifascia* does not belong to Lithocolletinae.



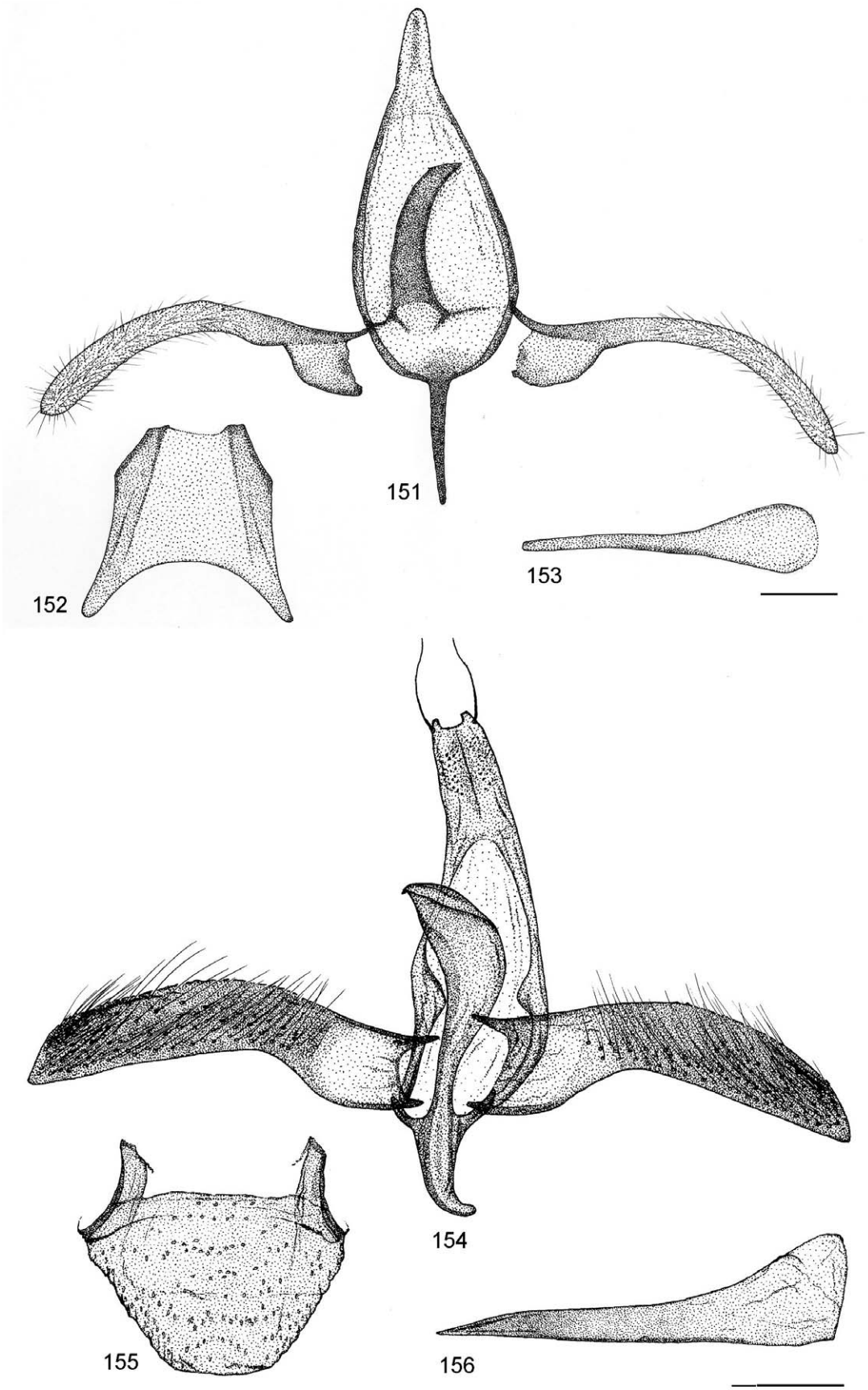
FIGURES 136–141. Exuvium of *Phyllonorycter grewiaephilos*. 136, ventral view. 137, lateral view. 138, terminal segment, caudal view. 139, terminal segment, ventral view. 140, terminal segment, lateral view. 141, small cremaster on terminal segment.



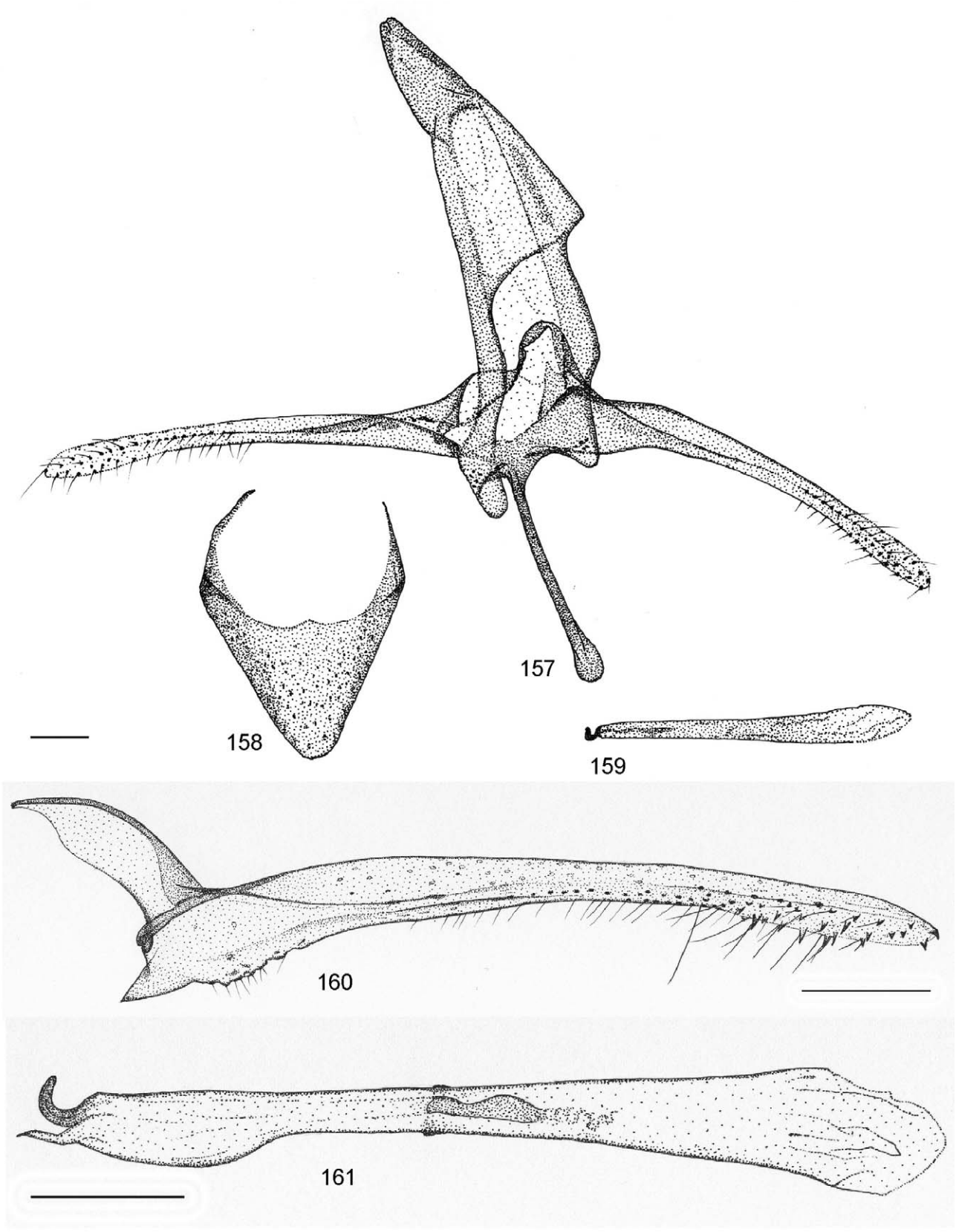
FIGURES 142–146. Male genitalia. Scale bar 100 µm. 142–143, *Hyloconis luki*, holotype, genitalia prep. MRAC/KMMA 00452, in RMCA. 142, ventral view. 143, aedoeagus. 144–146, *Neolithocolletis mayumbe*, holotype, genitalia prep. MRAC/KMMA 00407, in RMCA. 144, ventral view. 145, sternum VIII. 146, aedoeagus.



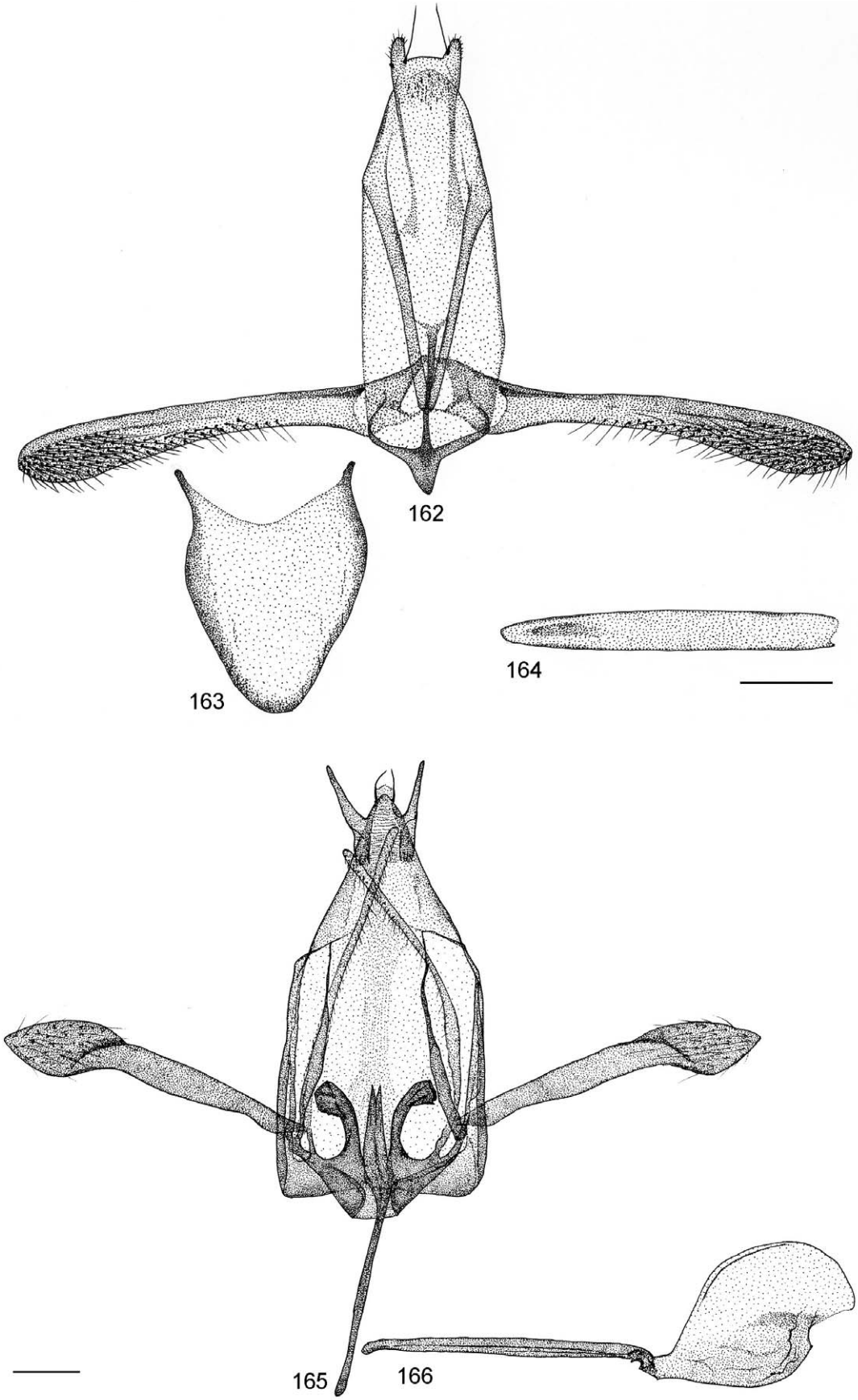
FIGURES 147–150. Male genitalia. Scale bar 100 µm. 147–148, *Neolithocolletis nsengai*, paratype, genitalia prep. MRAC/KMMA 00425, in RMCA. 147, ventral view. 148, aedoeagus. 149–150, *Neolithocolletis pentadesma*, the drawings are made by Willy De Prins after the additional description and the drawing of Kumata (1993: 8–9, fig. 3a–c). 149, ventral view. 150, aedoeagus.



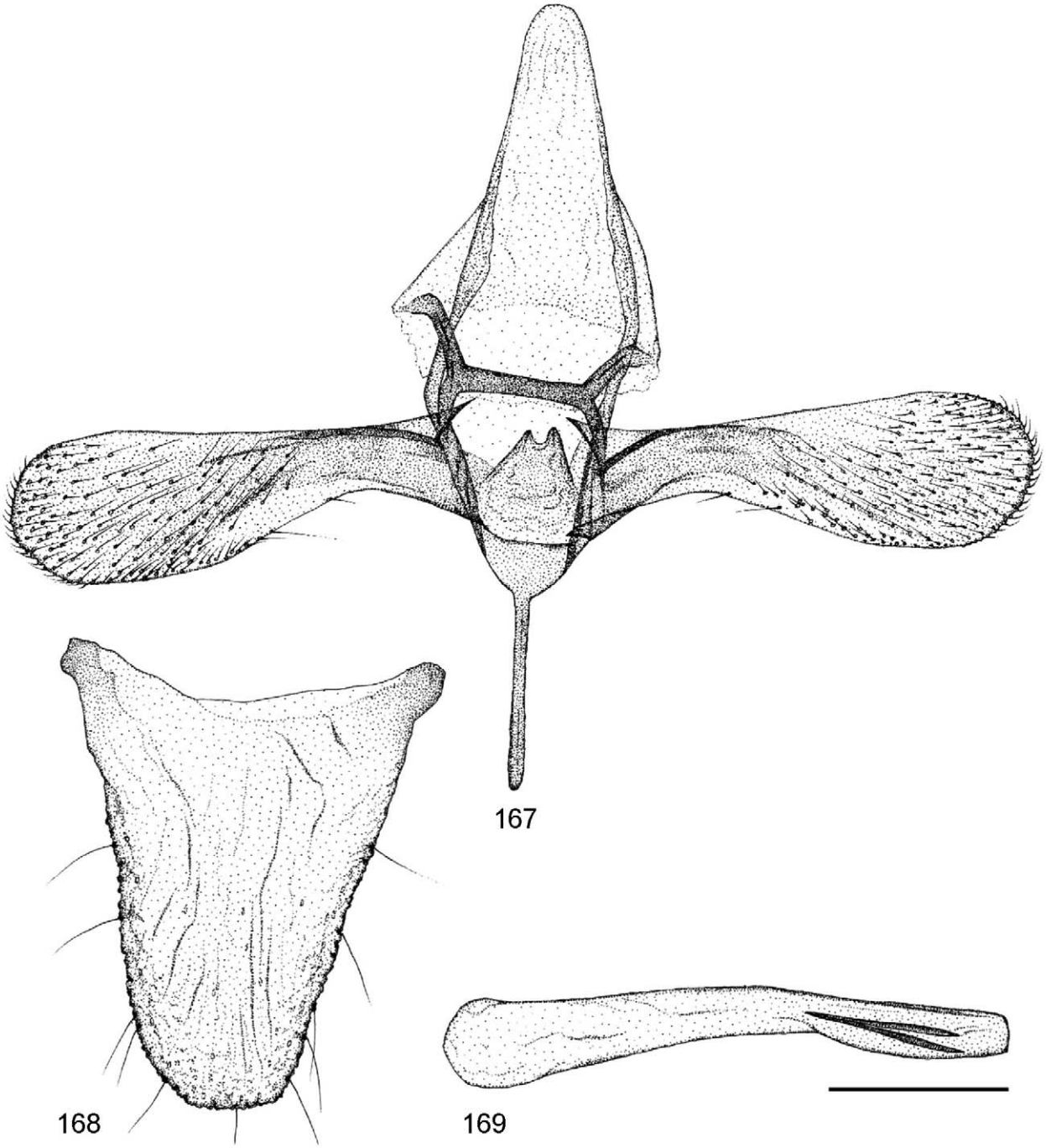
FIGURES 151–156. Male genitalia. Scale bar 100 µm. 151–153, *Cameraria hexalobina*, holotype, the drawing is made by Willy De Prins after the genitalia prep. Vári 6927, in TMSA. 151, ventral view. 152, sternum VIII. 153, aedoeagus. 154–156, *Cameraria landryi*, holotype, genitalia prep. MRAC/KMMA 00417, in RMCA. 154, ventral view. 155, sternum VIII. 156, aedoeagus.



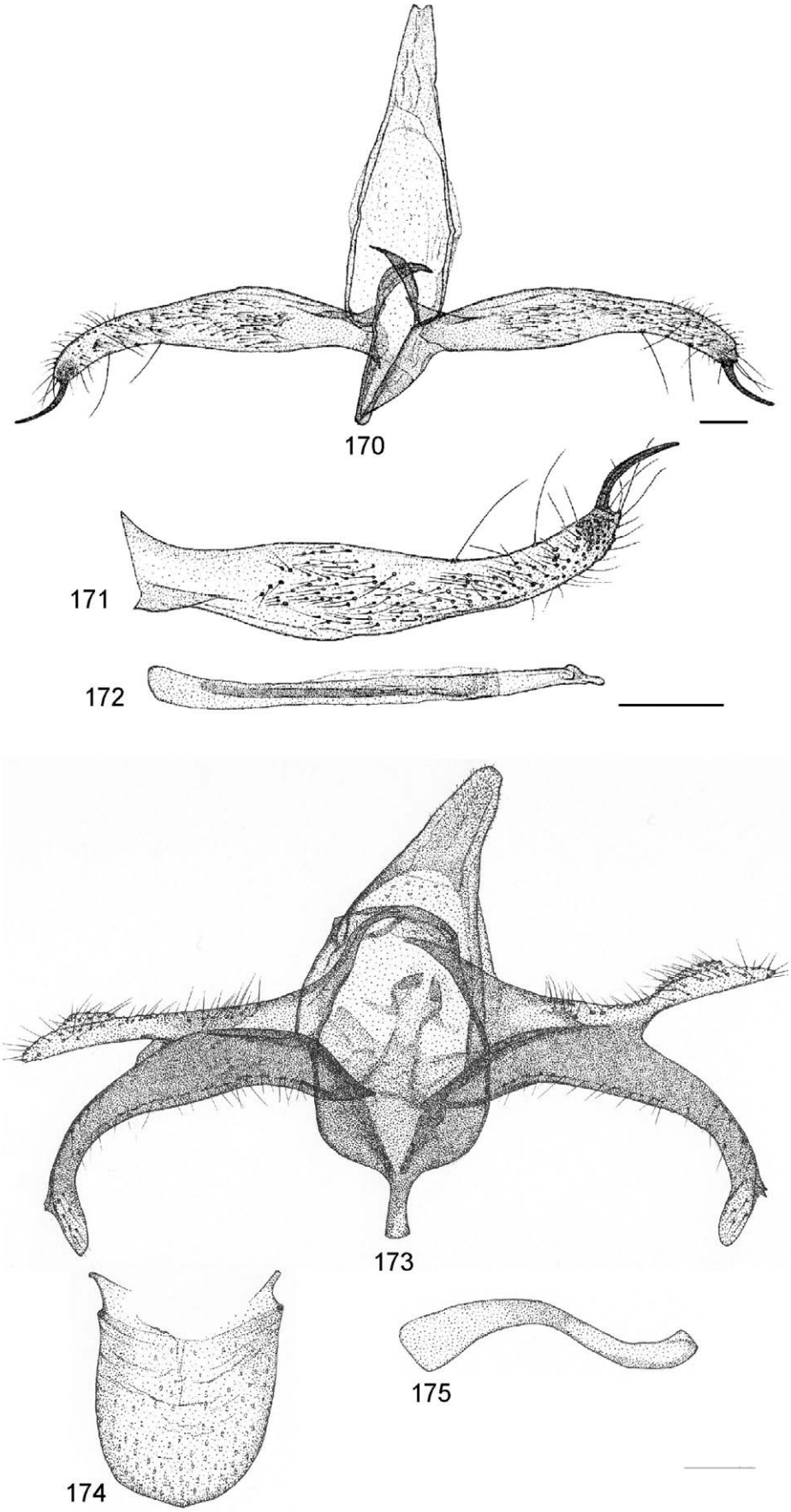
FIGURES 157–161. Male genitalia. Scale bar 100 µm. 157–161, *Cameraria varii*. 157–159, holotype, genitalia prep. MRAC/KMMA 00400, in RMCA. 157, ventral view. 158, sternum VIII. 159, aedoeagus. 160–161, paratype, genitalia prep. De Prins 3494. 160, valva. 161, aedoeagus.



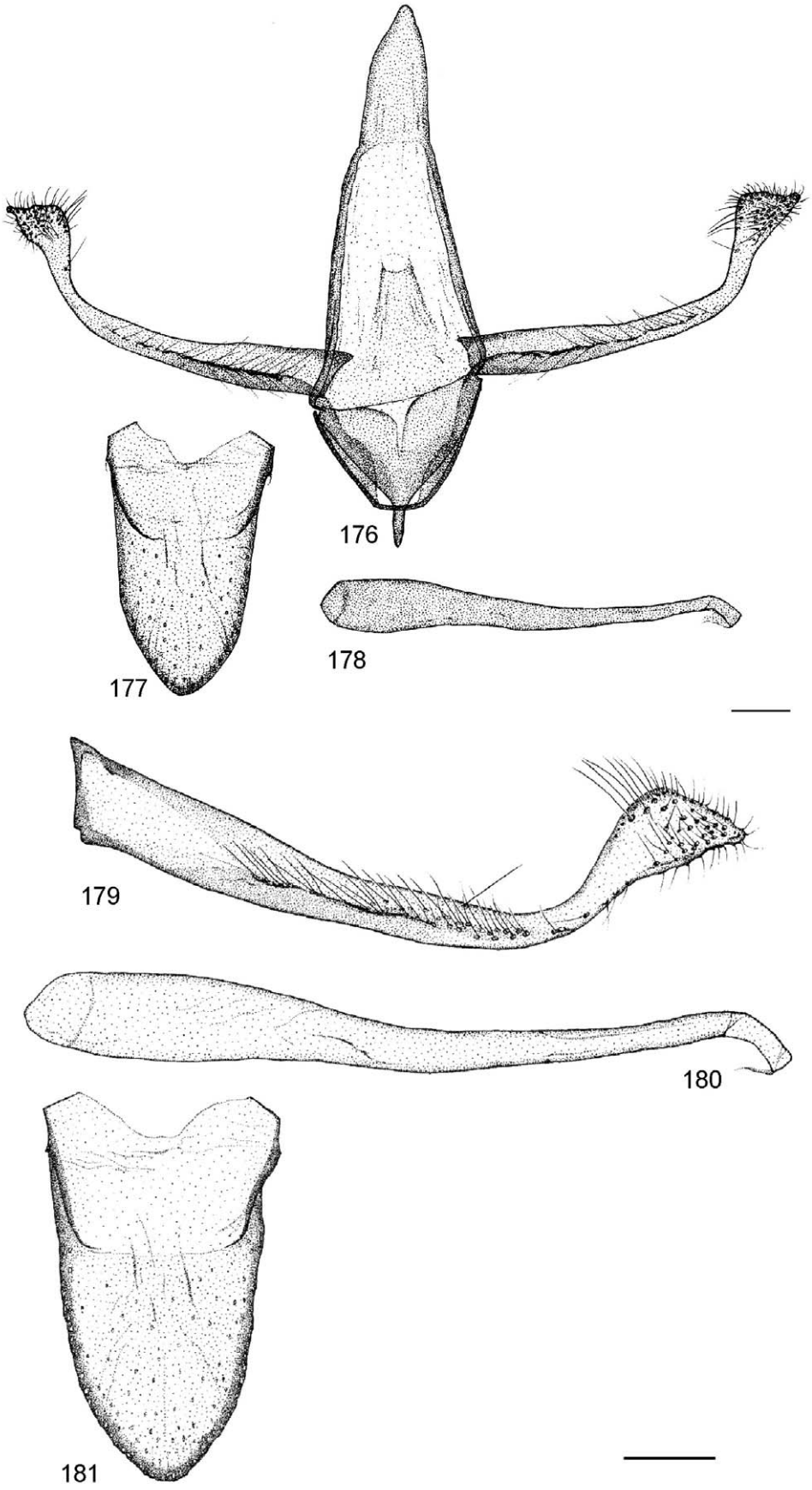
FIGURES 162–166. Male genitalia. Scale bar 100 µm. 162–164, *Cameraria sokoke*, holotype, genitalia prep. MRAC/KMMA 00385, in RMCA. 162, ventral view. 163, sternum VIII. 164, aedoeagus. 165–166, *Cameraria zaira*, holotype, genitalia prep. De Prins 3517, in MHNG. 165, ventral view. 166, aedoeagus.



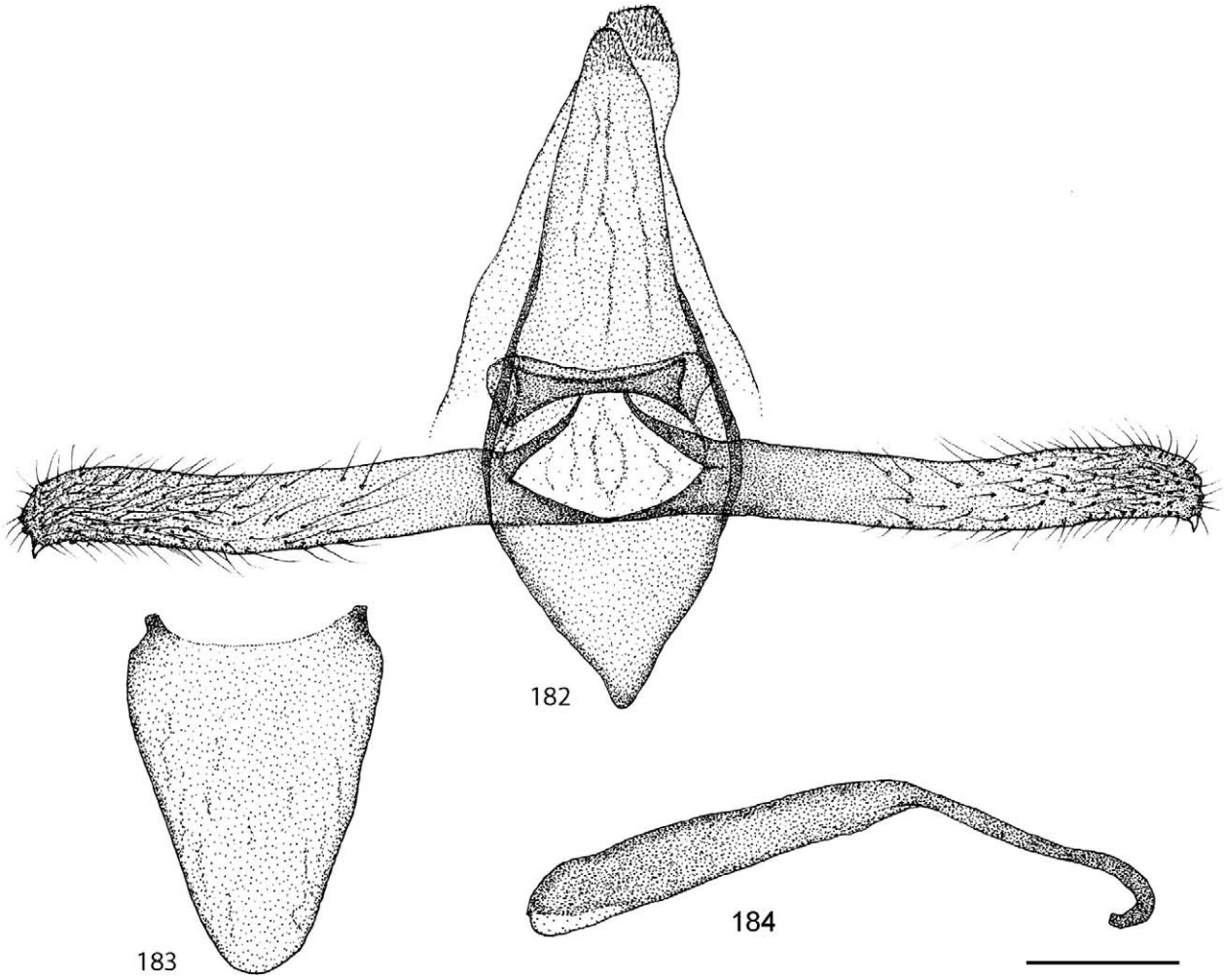
FIGURES 167–169. Male genitalia. Scale bar 100 µm. 167–169, *Cameraria torridella*, holotype, genitalia prep. MRAC/KMMA 00287, in RMCA. 167, ventral view. 168, sternum VIII. 169, aedoeagus.



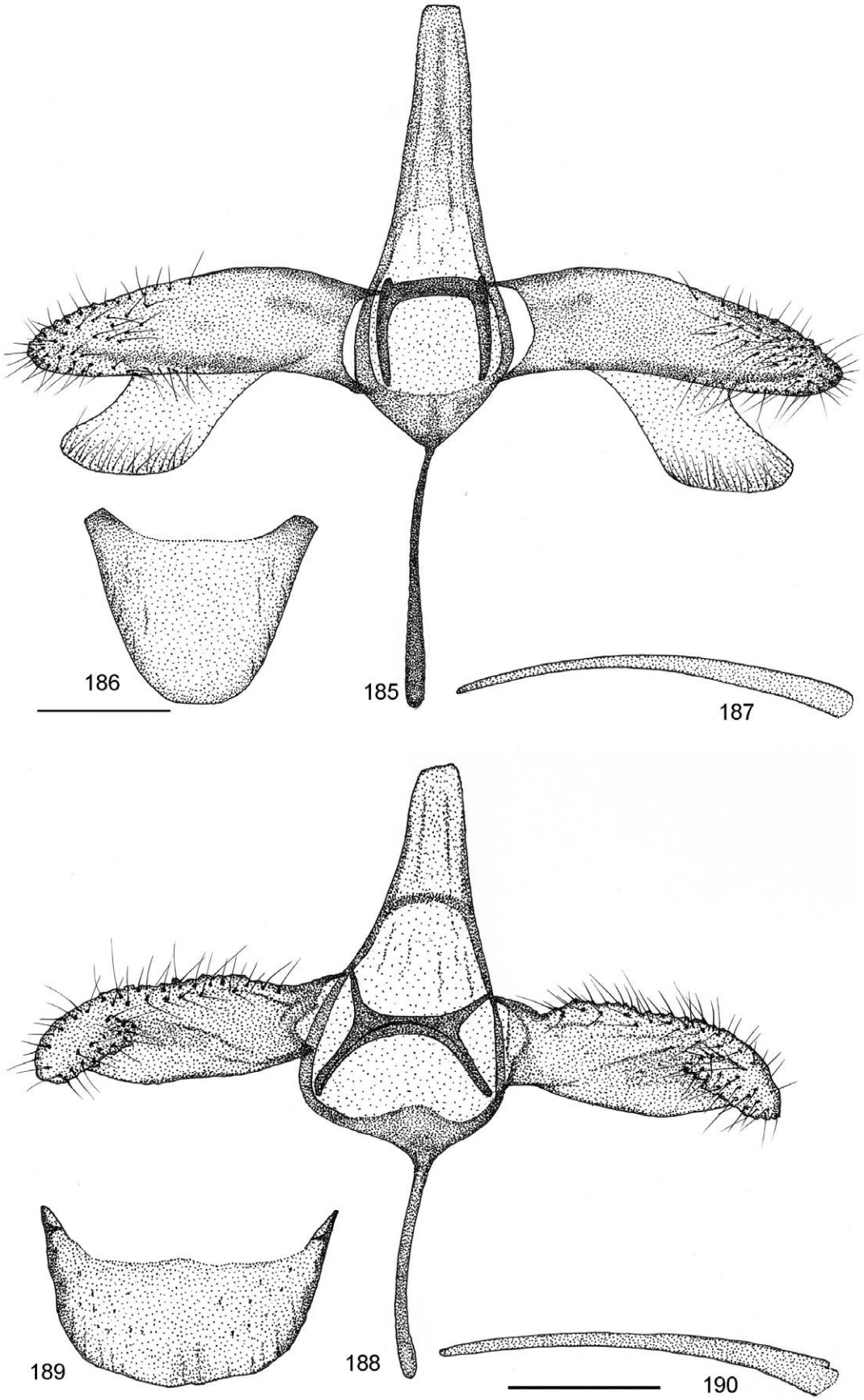
FIGURES 170–175. Male genitalia. Scale bar 100 µm. 170–172, *Phyllonorycter achilleus*, holotype, genitalia prep. MRAC/KMMA 00381, in RMCA. 170, ventral view. 171, valva. 172, aedoeagus. 173–175, *Phyllonorycter adderis*, holotype, genitalia prep. MRAC/KMMA 00462, in RMCA. 173, ventral view. 174, sternum VIII. 175, aedoeagus.



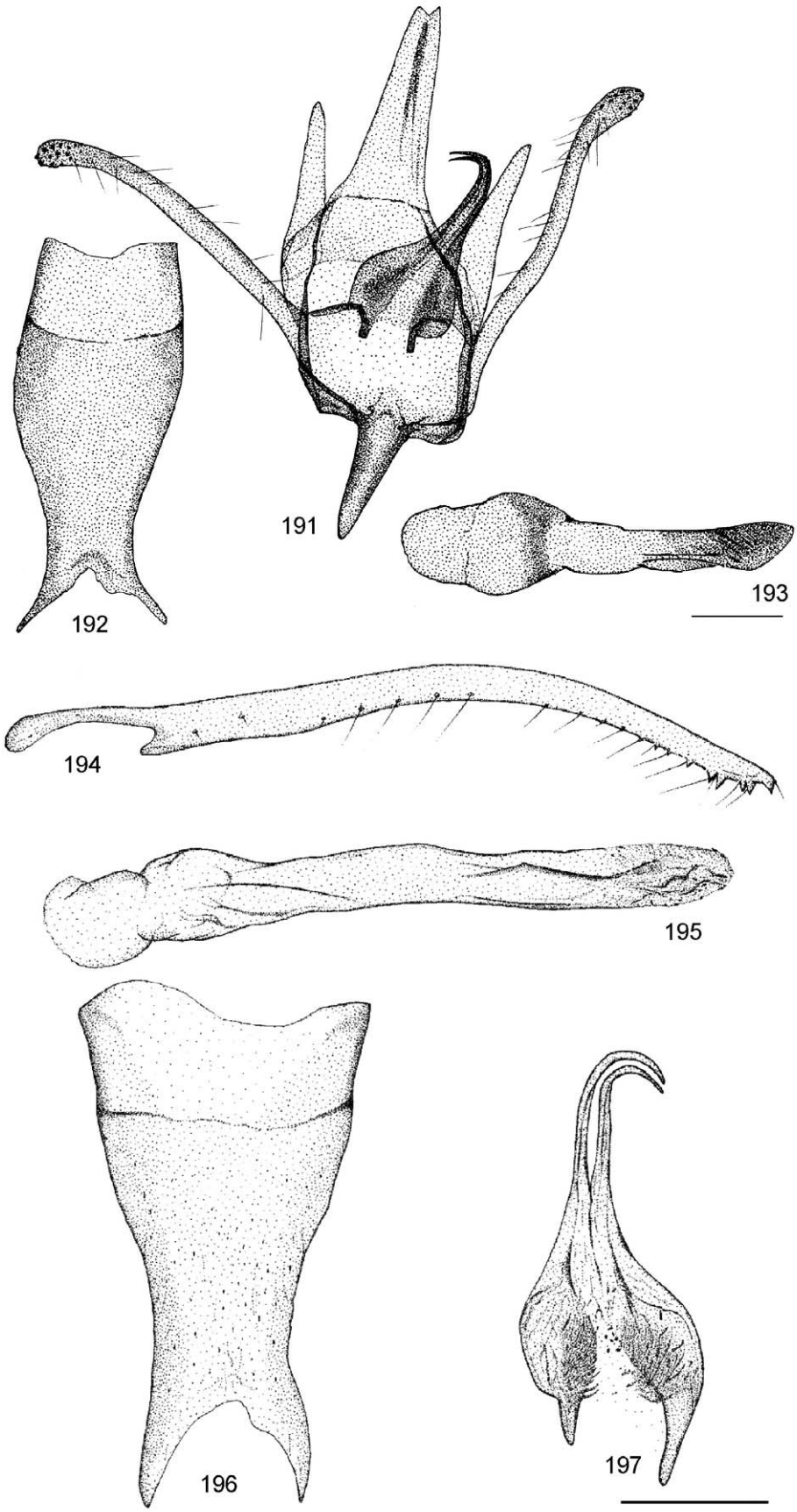
FIGURES 176–181. Male genitalia. Scale bar 100 µm. 176–181, *Phyllonorycter agassizi*, holotype, genitalia prep. MRAC/KMMA 00655, in RMCA. 176, ventral view. 177, sternum VIII. 178, aedoeagus. 179, valva. 180, aedoeagus (enlarged). 181, sternum VIII (enlarged).



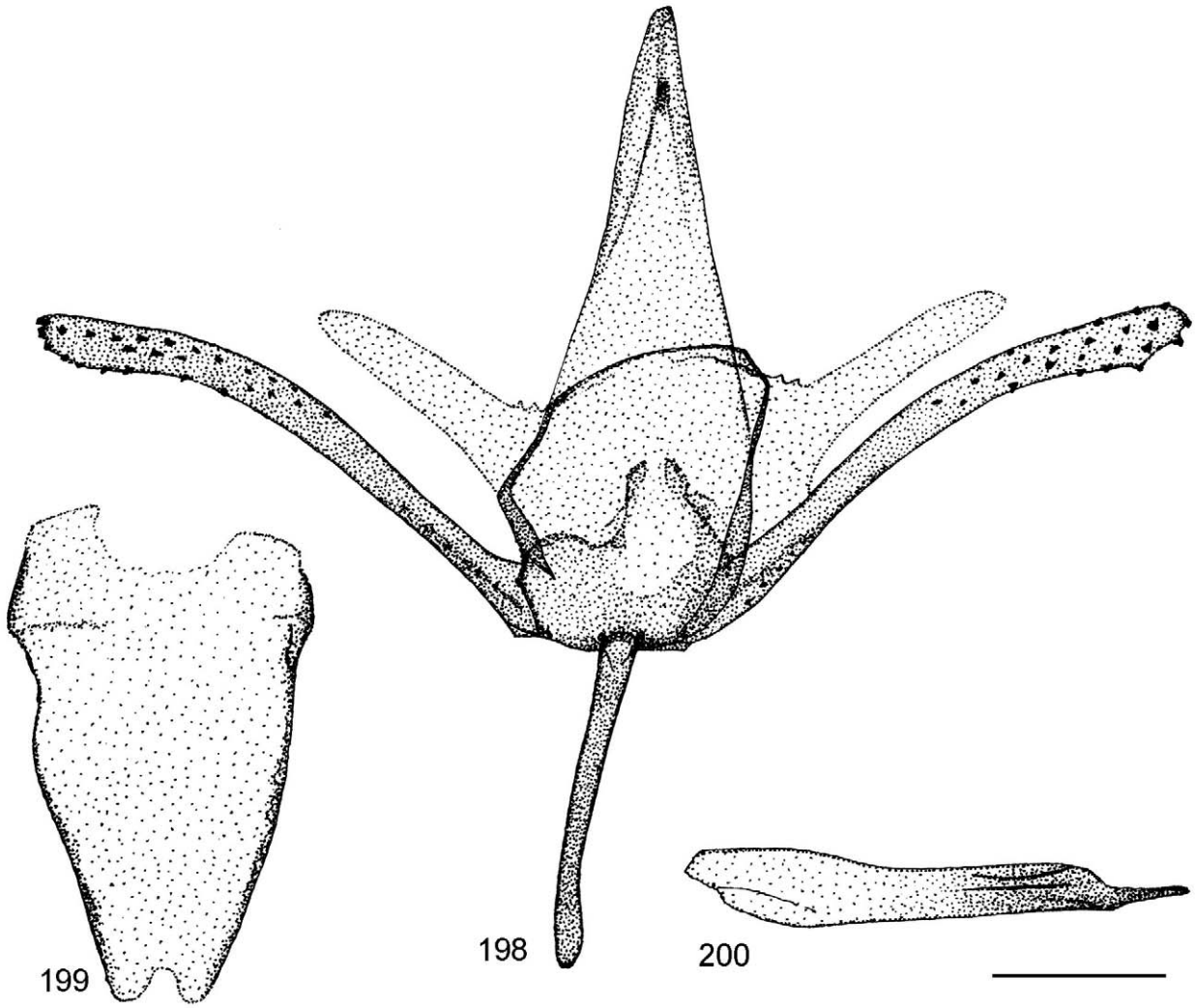
FIGURES 182–184. Male genitalia. Scale bar 100 µm. 182–184, *Phyllonorycter chionopa*, the drawings are made by Willy De Prins after the additional description and the drawing of Triberti (2004: 81; fig. 6: A–C). 182, ventral view. 183, tip of valva. 184, aedoeagus.



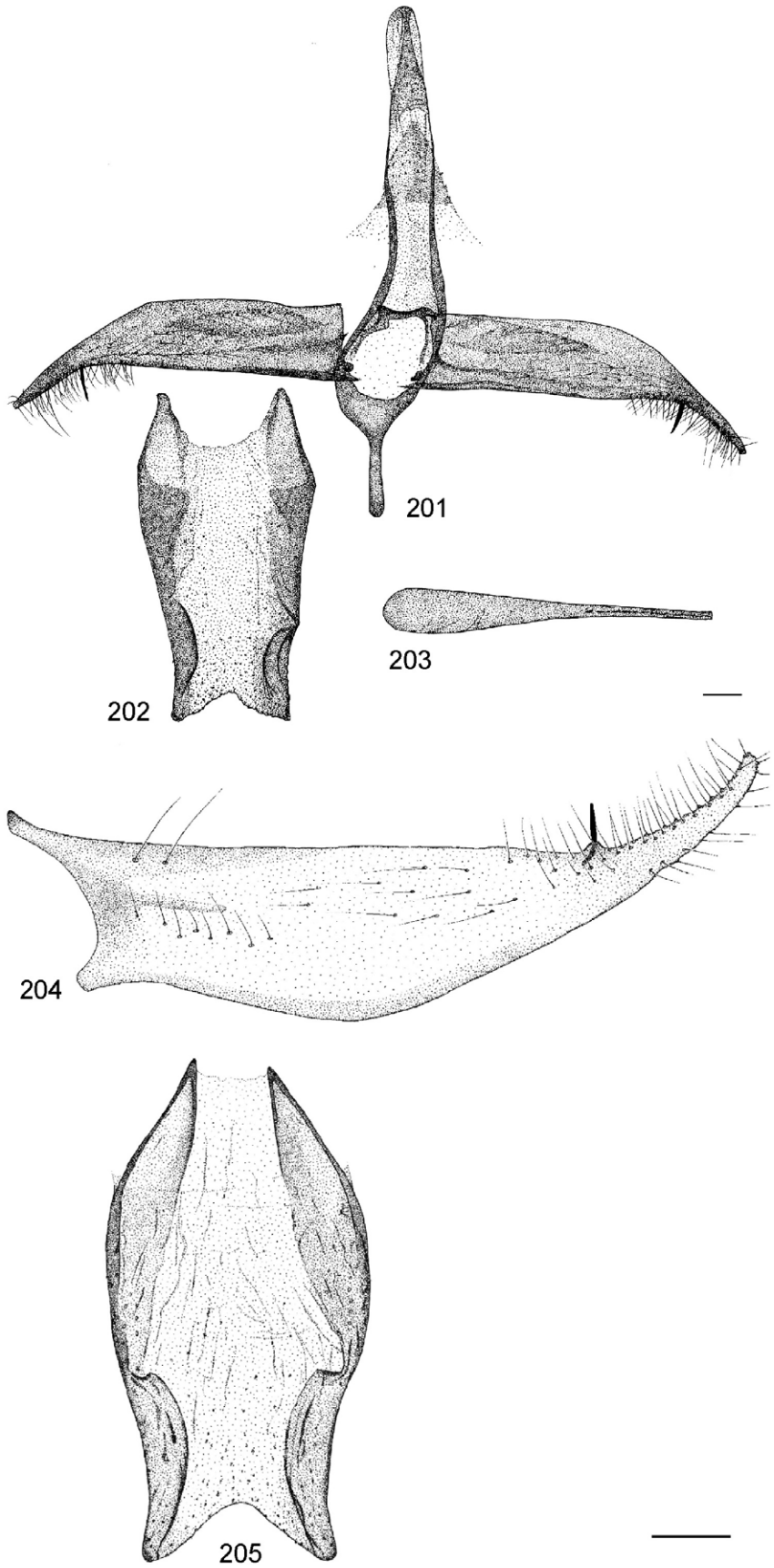
FIGURES 185–190. Male genitalia. Scale bar 100 µm. 185–187, *Phyllonorycter encaeria*, holotype, the drawing is made by Willy De Prins after the genitalia prep. Vári 4156, in TMSA. 185, ventral view. 186, sternum VIII. 187, aedoeagus. 188–190, *Phyllonorycter kazuri*, holotype, genitalia prep. MRAC/KMMA 00348, in RMCA. 188, ventral view. 189, sternum VIII. 190, aedoeagus.



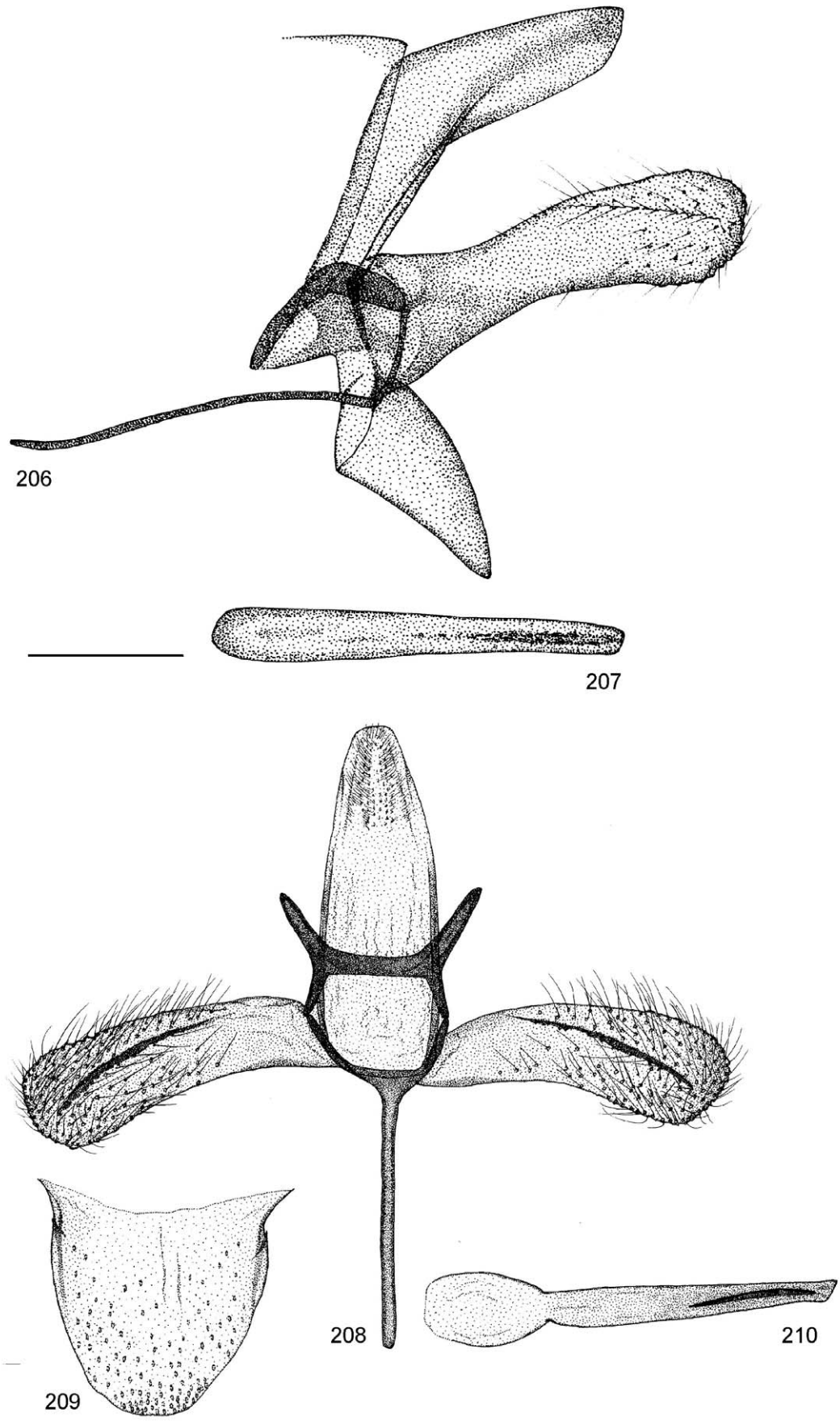
FIGURES 191–197. Male genitalia. Scale bar 100 µm. 191–197, *Phyllonorycter grewiaecola*. 191–193, genitalia prep. MRAC/KMMA 00273, in RMCA. 191, ventral view. 192, sternum VIII. 193, aedoeagus. 194–197, genitalia prep. TMSA 14603, in TMSA. 194, valva. 195, aedoeagus. 196, sternum VIII. 197, fultura superior.



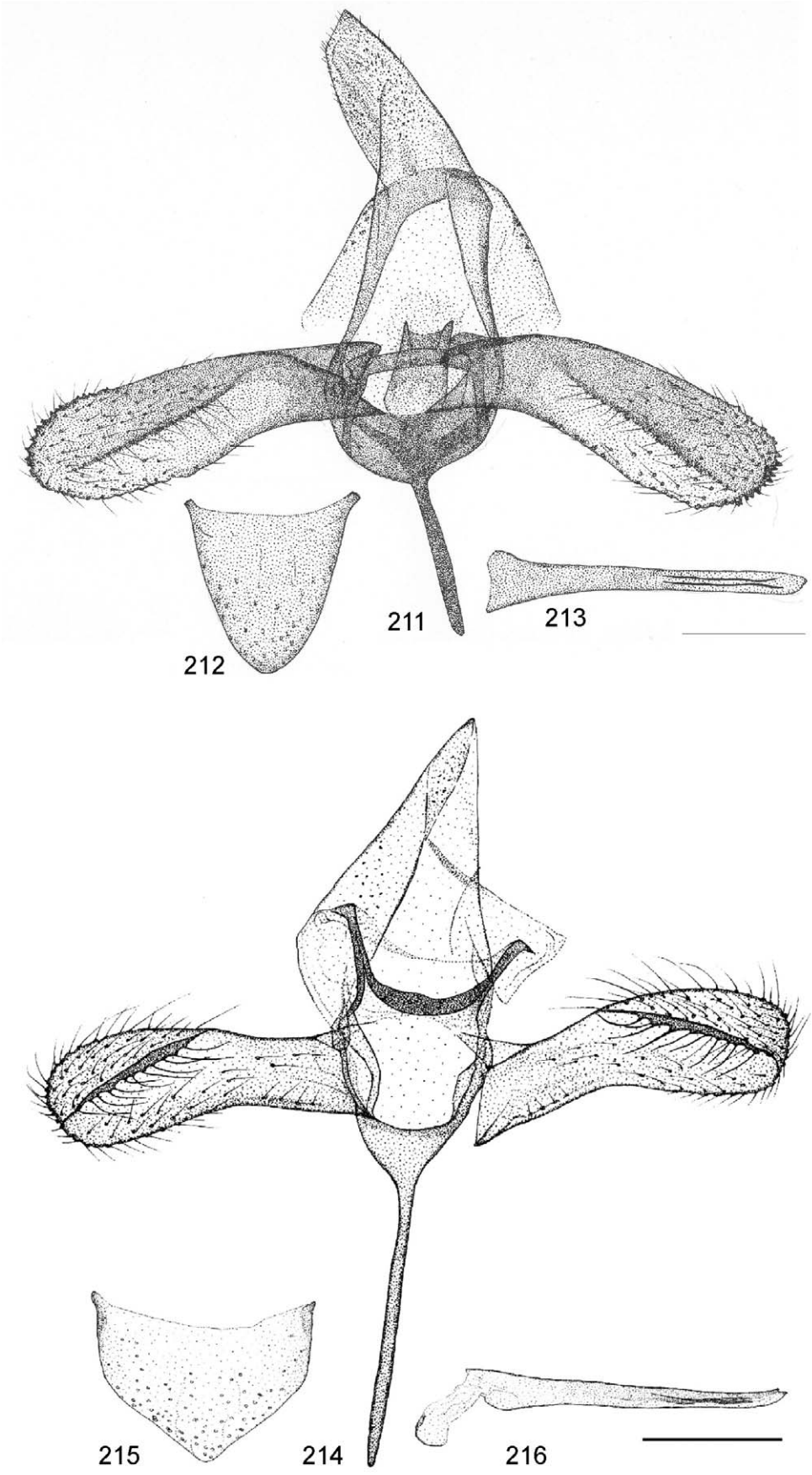
FIGURES 198–200. Male genitalia. Scale bar 100 µm. 198–200, *Phyllonorycter grewiaephilos*, paratype, genitalia prep. MRAC/KMMA 00264, in RMCA. 198, ventral view. 199, sternum VIII. 200, aedoeagus.



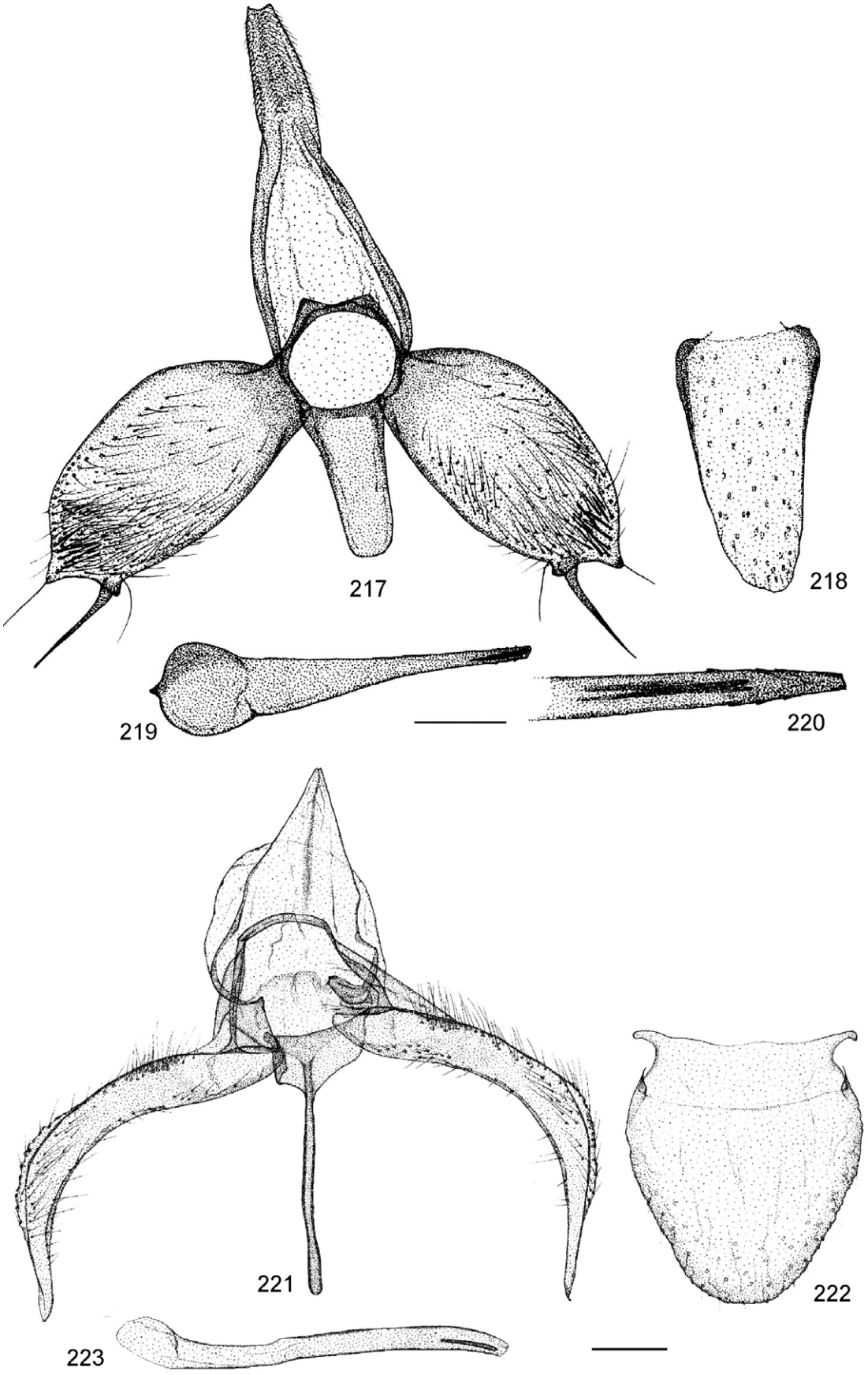
FIGURES 201–205. Male genitalia. Scale bar 100 µm. 201–205, *Phyllonorycter grewiella.* 201–202, holotype, the drawing is made by Willy De Prins after the genitalia prep. Vári 7523, in TMSA. 201, valva. 202, sternum VIII. 203–205, genitalia prep. De Prins 3717, in ZMUC. 203, ventral view. 204, sternum VIII. 205, aedoeagus.



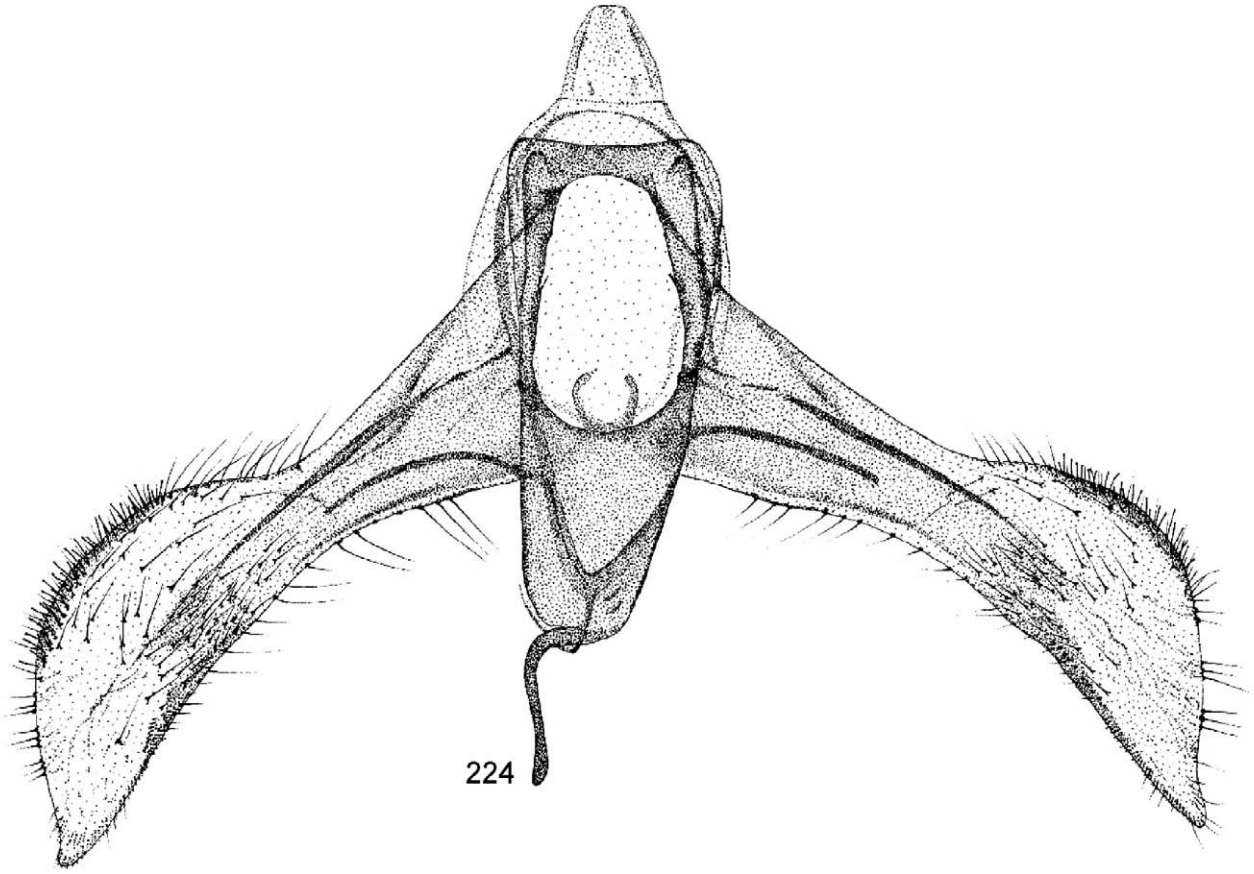
FIGURES 206–210. Male genitalia. Scale bar 100 µm. 206–210, *Phyllonorycter brachylaenae*. 206–207, the drawing is made by Willy De Prins after the genitalia prep. Vári 7523, in TMSA. 206, lateral view. 207, aedoeagus. 208–210, genitalia prep. De Prins 3709, in ZMHB. 208, ventral view. 209, sternum VIII. 210, aedoeagus.

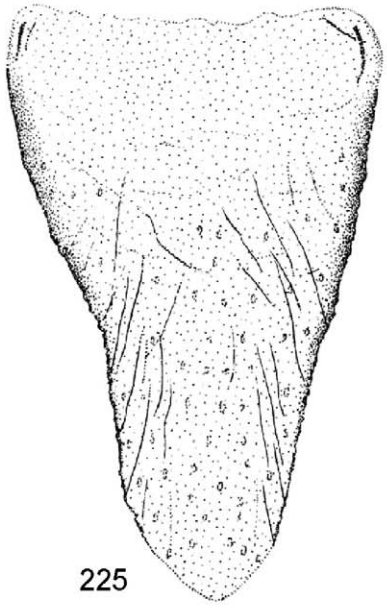


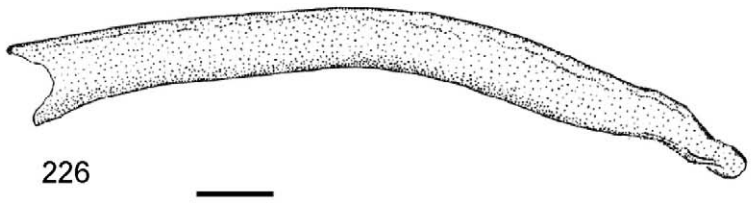
FIGURES 211–216. Male genitalia. Scale bar 100 µm. 211–213, *Phyllonorycter dombeyae*, holotype, genitalia prep. MRAC/KMMA 00458, in RMCA. 211, ventral view. 212, sternum VIII. 213, aedoeagus. 214–216, *Phyllonorycter hibiscina*, genitalia prep. MRAC/KMMA 00360, in RMCA. 214, ventral view. 215, sternum VIII. 216, aedoeagus.



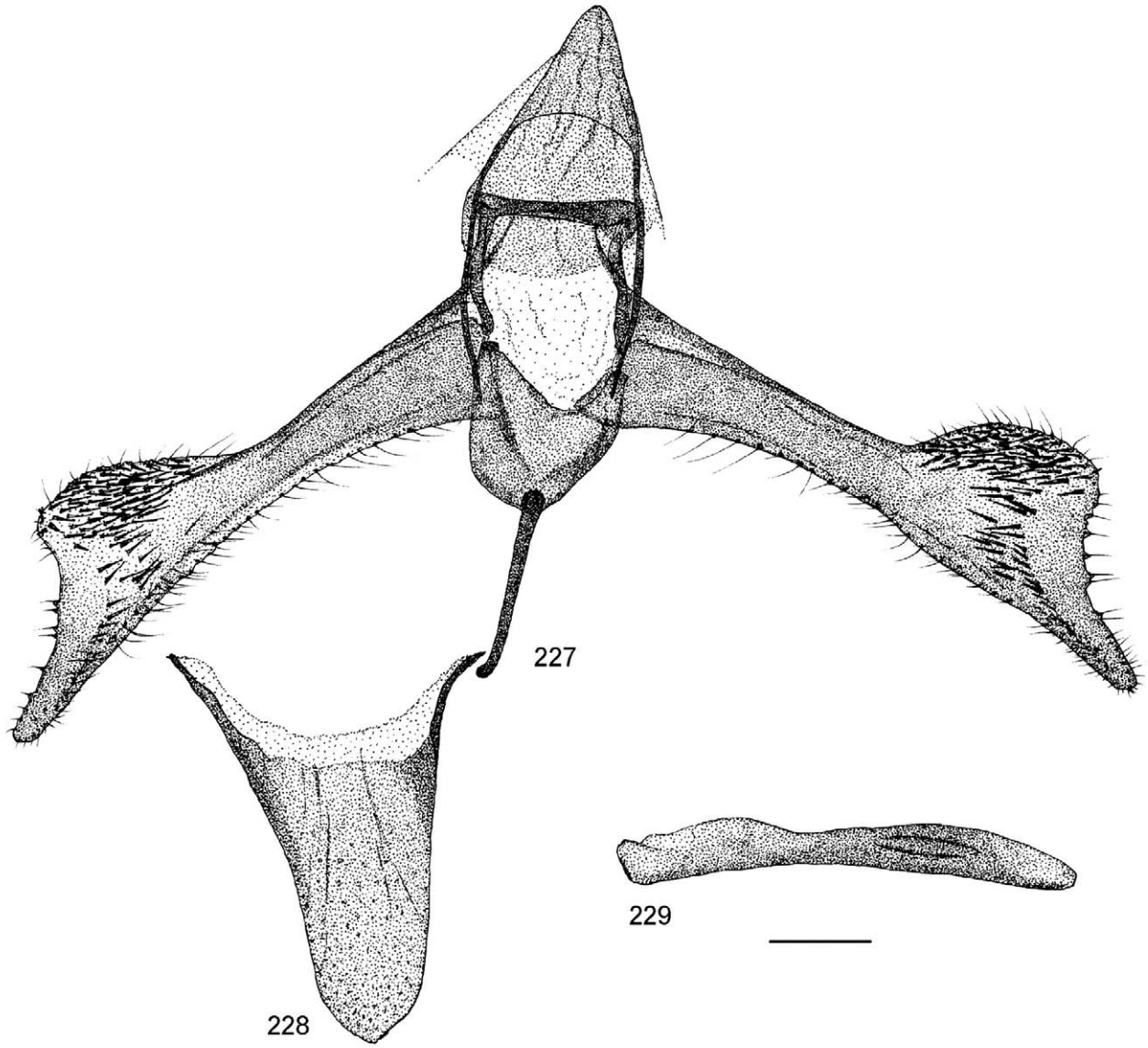
FIGURES 217–223. Male genitalia. Scale bar 100 µm. 217–220, *Phyllonorycter jabalshamsi*, paratype, genitalia prep. MRAC/KMMA 00421, in RMCA. 217, ventral view. 218, sternum VIII. 219, aedoeagus. 220, vesica. 221–223, *Phyllonorycter lemarchandi*, genitalia prep. De Prins 3560, in MNHN. 221, ventral view. 222, sternum VIII. 223, aedoeagus.







FIGURES 224–226. Male genitalia. Scale bar 100 µm. 224–226, *Phyllonorycter albertinus*, holotype, genitalia prep. De Prins 3504, in BMNH. 224, ventral view. 225, sternum VIII. 226, aedoeagus.



FIGURES 227–229. Male genitalia. Scale bar 100 µm. *Phyllonorycter leucaspis*, paratype, genitalia prep. MRAC/KMMA 00424, in RMCA. 227, ventral view. 228, sternum VIII. 229, aedoeagus.

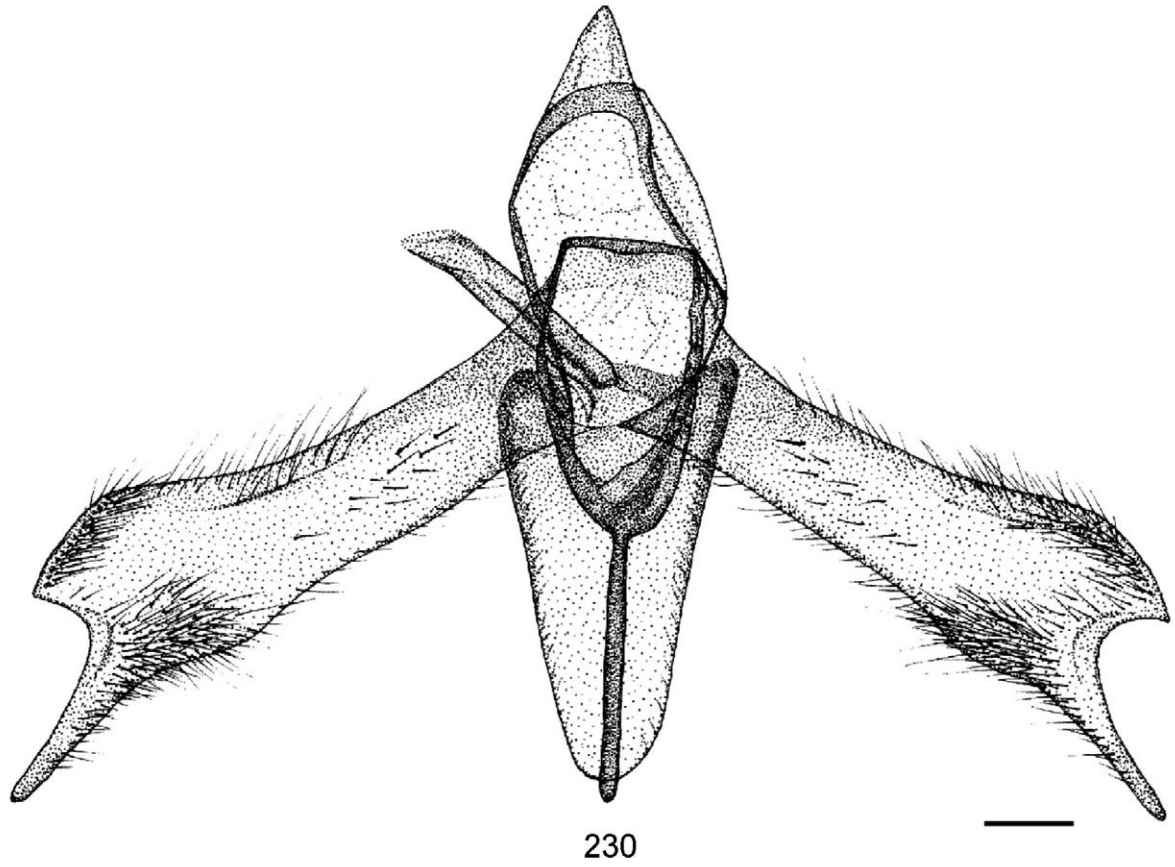
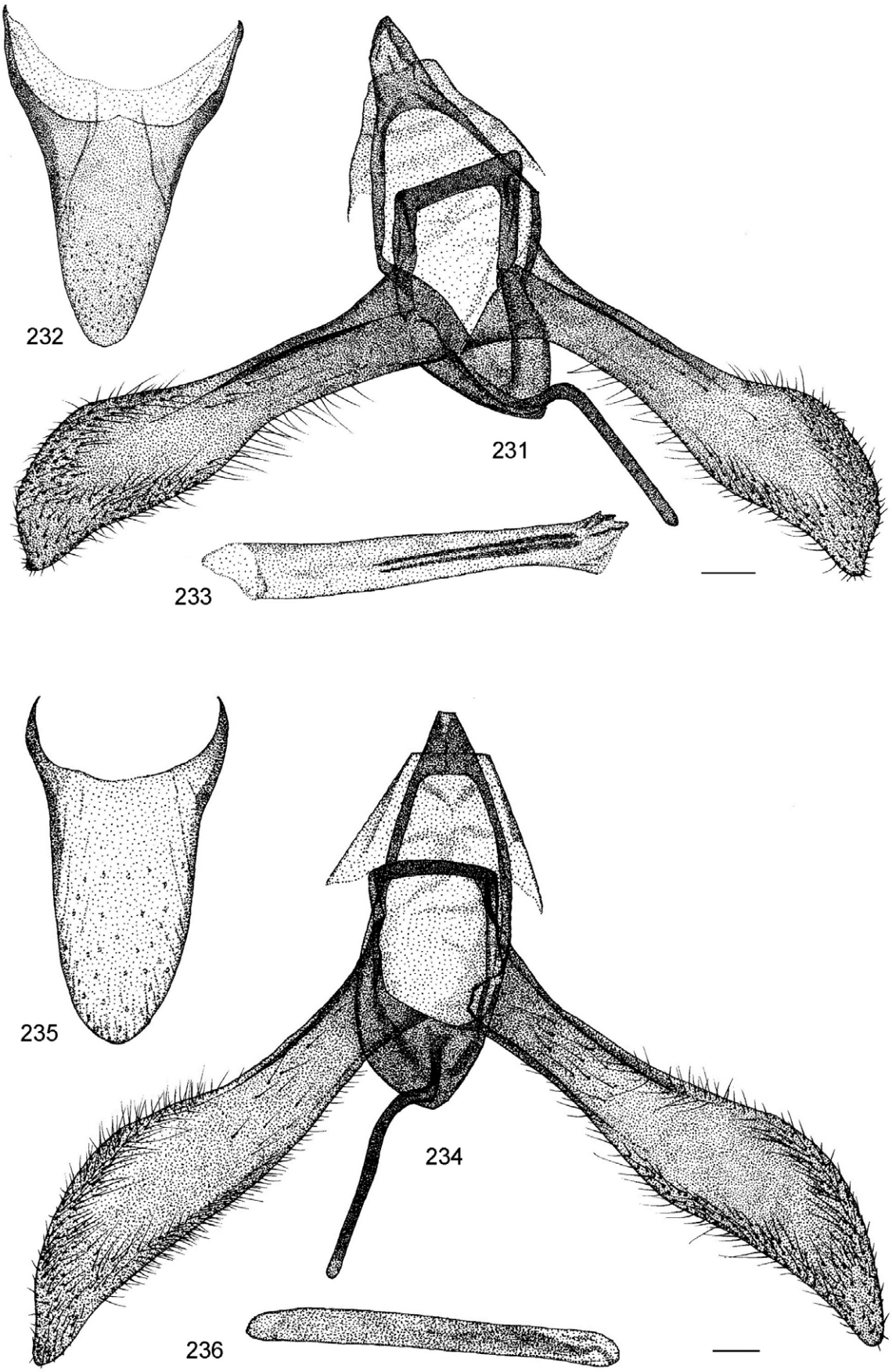
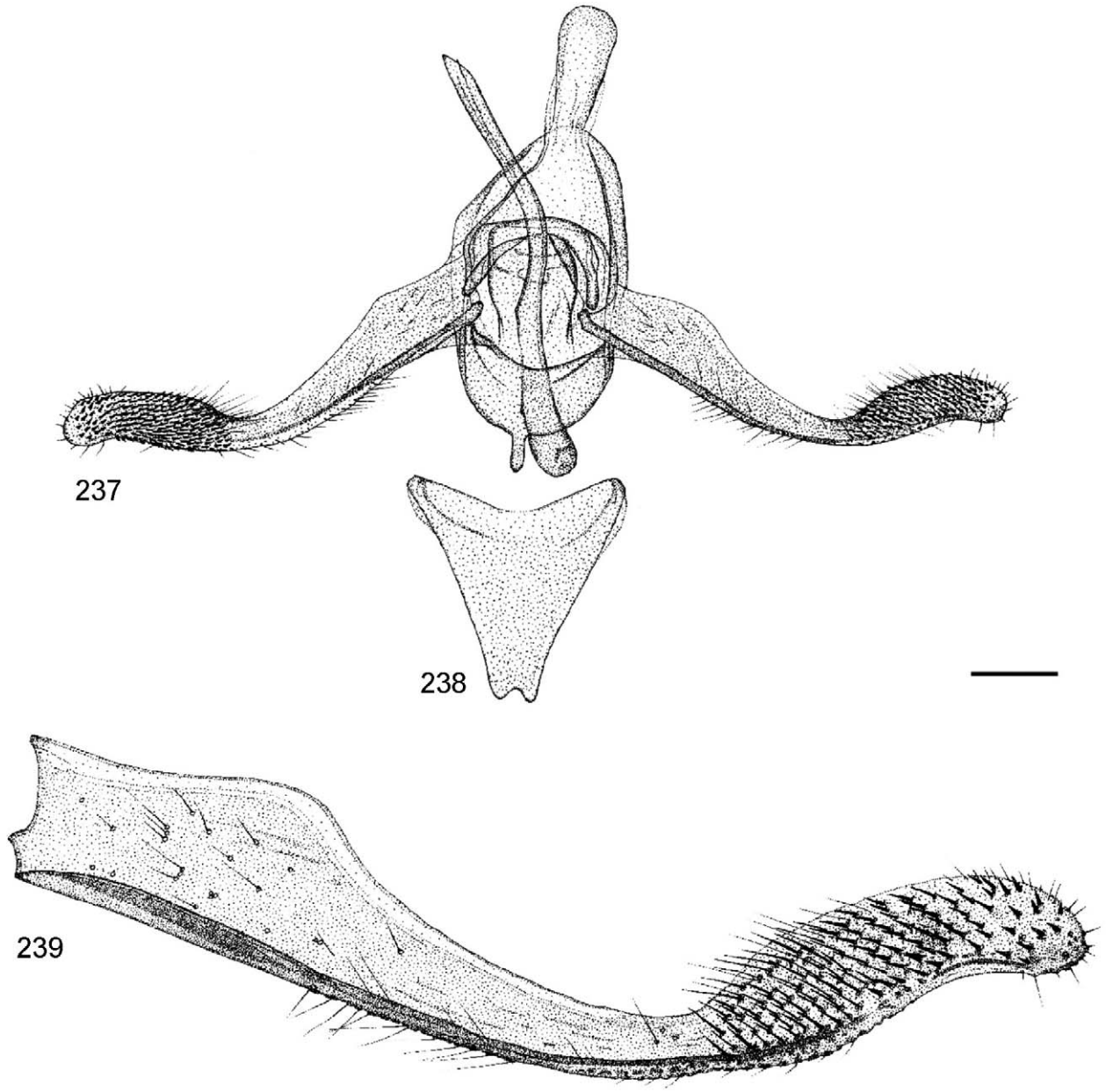


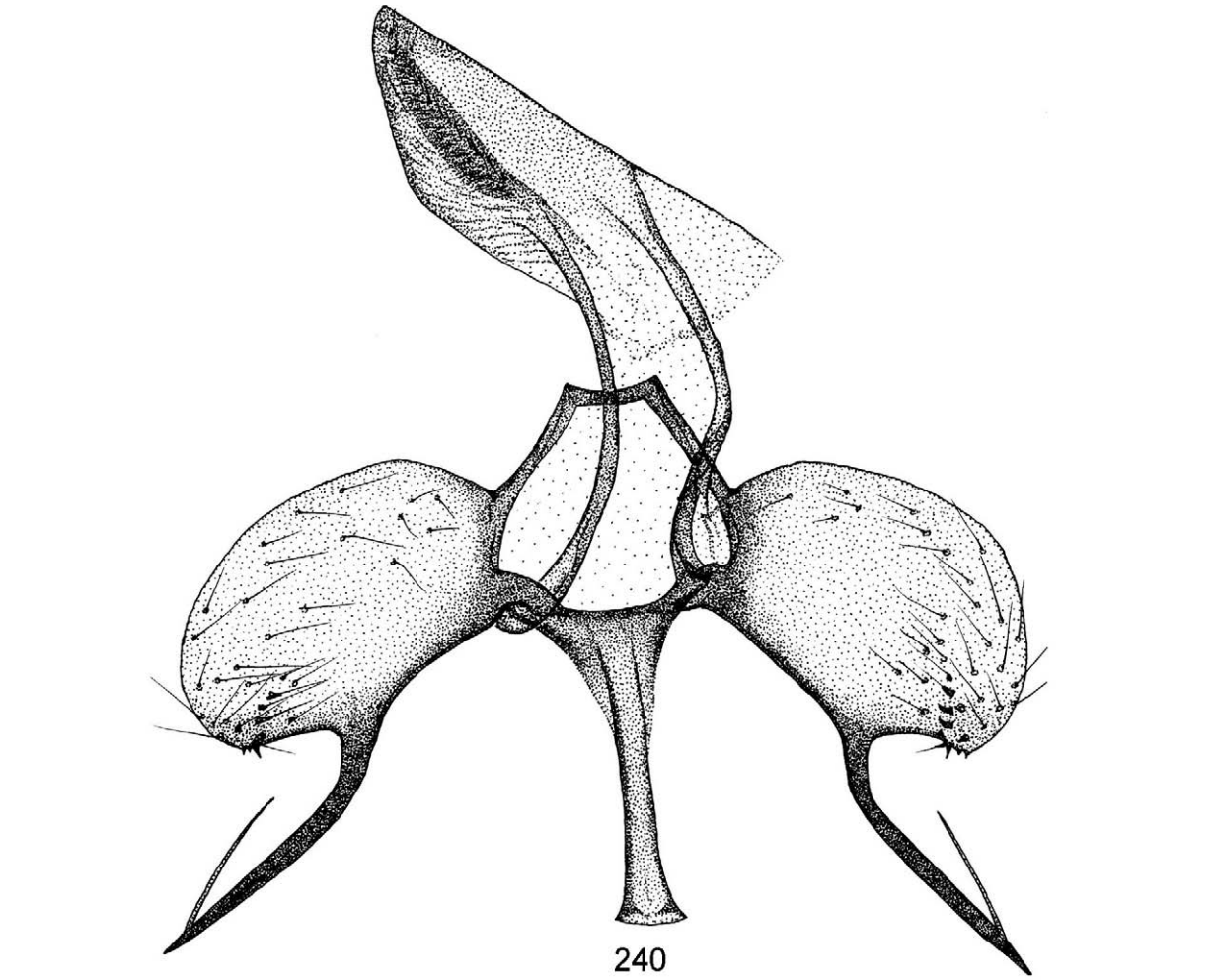
FIGURE 230. Male genitalia. Scale bar 100 µm. 230, *Phyllonorycter ololua*, holotype, genitalia prep. MRAC/KMMA 00369, in RMCA.



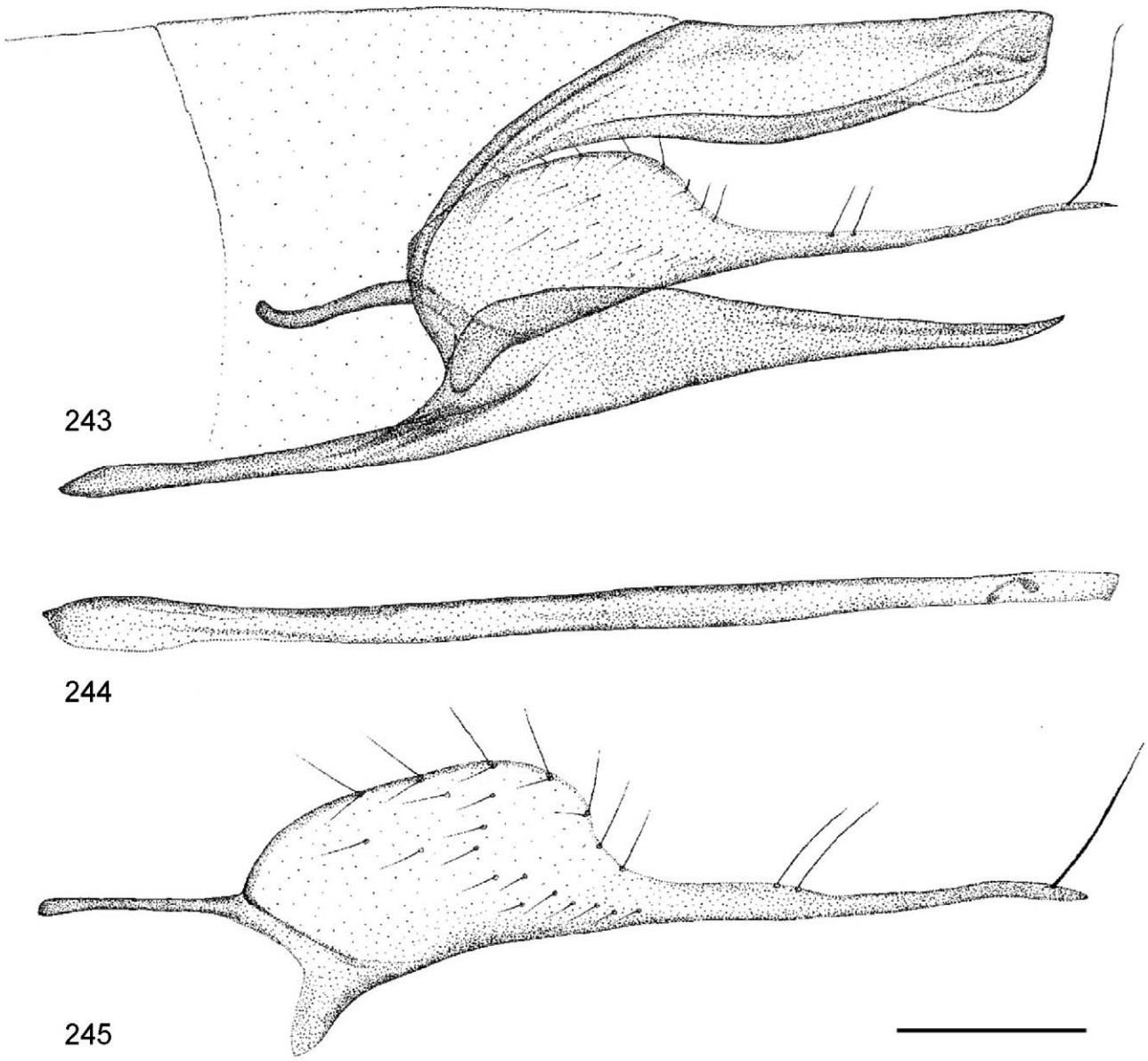
FIGURES 231–236. Male genitalia. Scale bar 100 µm. 231–233, *Phyllonorycter ruizivorus*, holotype, genitalia prep. De Prins 3723, in BMNH. 231, ventral view. 232, sternum VIII. 233, aedoeagus. 234–236, *Phyllonorycter trochetellus*, holotype, genitalia prep. De Prins 3720, in BMNH. 234, ventral view. 235, sternum VIII. 236, aedoeagus.



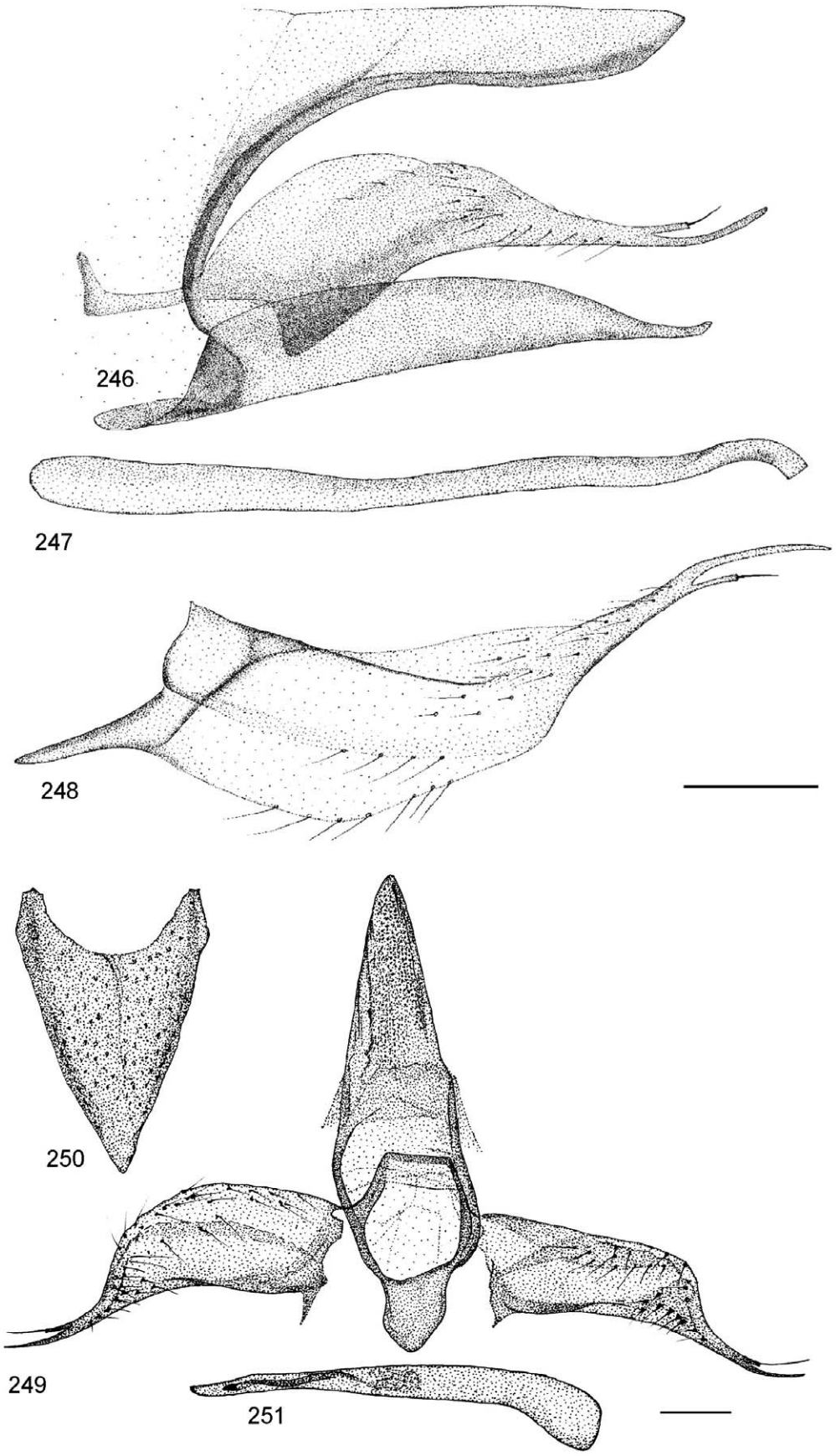
FIGURES 237–239. Male genitalia. Scale bar 100 µm. 237–239, *Phyllonorycter loxozona*, paratype, B.M. genitalia prep. 3924, in BMNH. 237, ventral view. 238, sternum VIII. 239, cucullus.



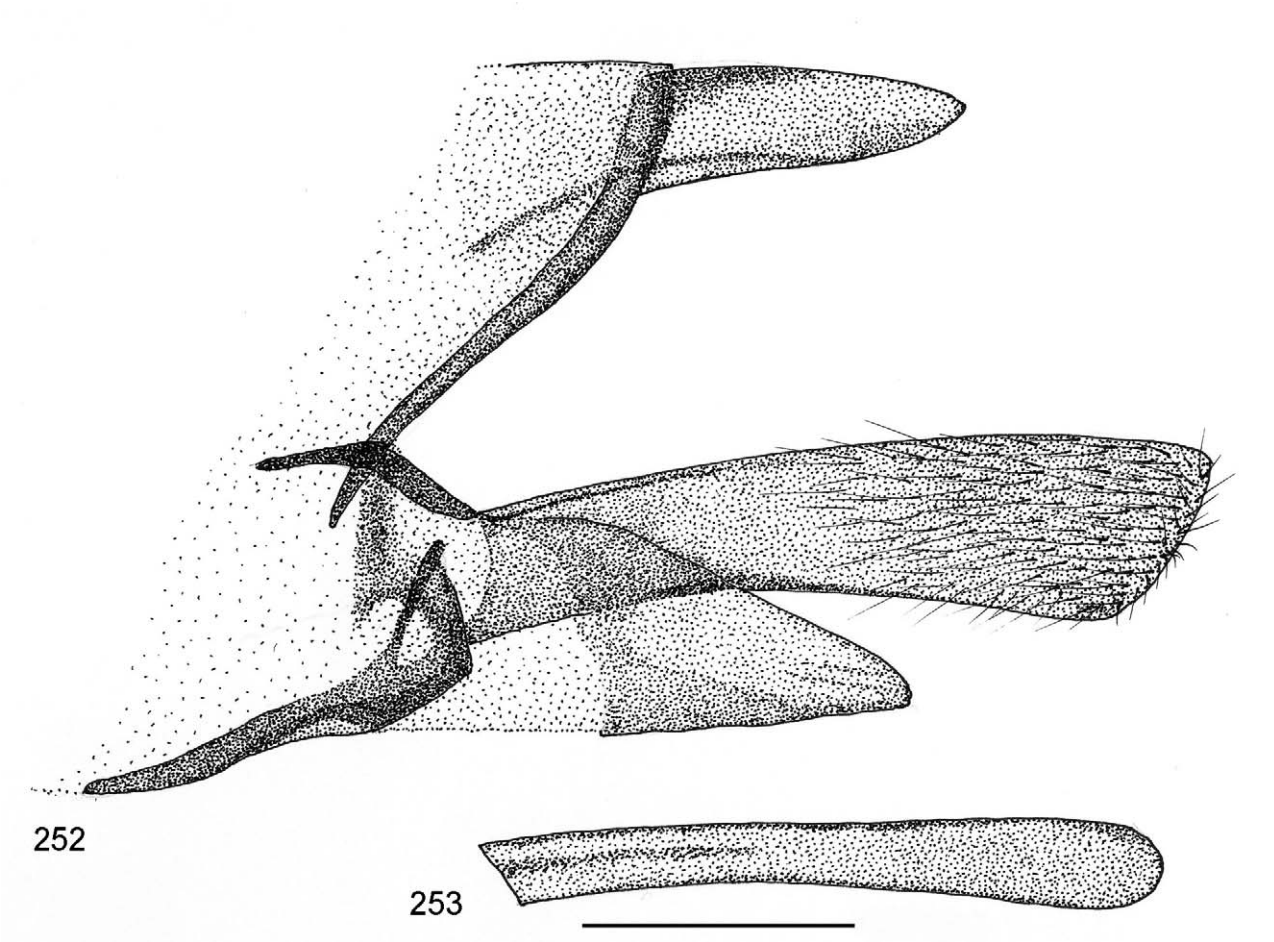
FIGURES 240–242. Male genitalia. Scale bar 100 µm. 240–242, *Phyllonorycter aarviki*, paratype, genitalia prep. MRAC/KMMA 00658, in RMCA. 240, ventral view. 241, sternum VIII. 242, aedoeagus.



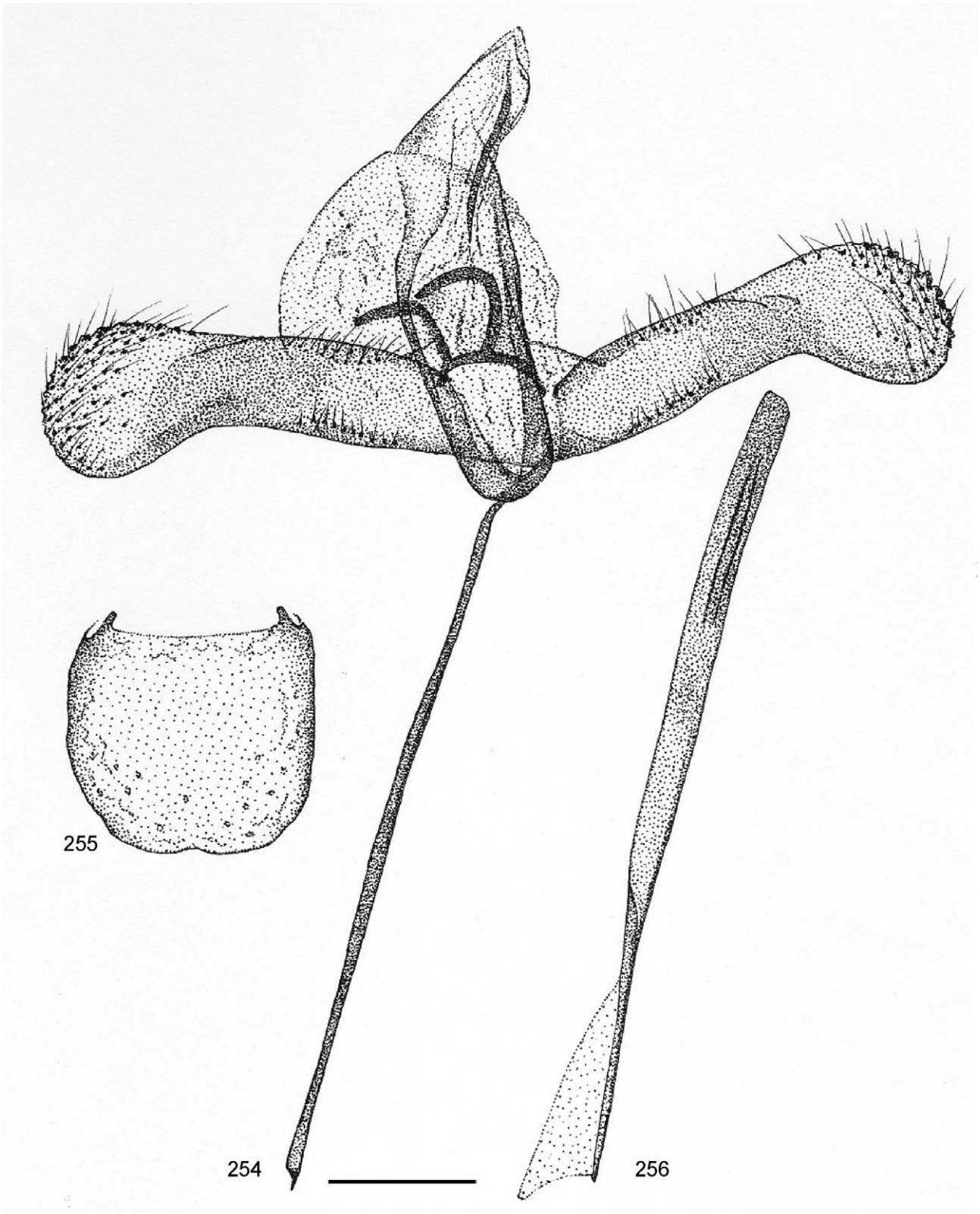
FIGURES 243–245. Male genitalia. Scale bar 100 µm. 243–245, *Phyllonorycter anchistea*, holotype, the drawing is made by Willy De Prins after the genitalia prep. Vári 7138, in TMSA. 243, lateral view. 244, aedoeagus. 245, valva.



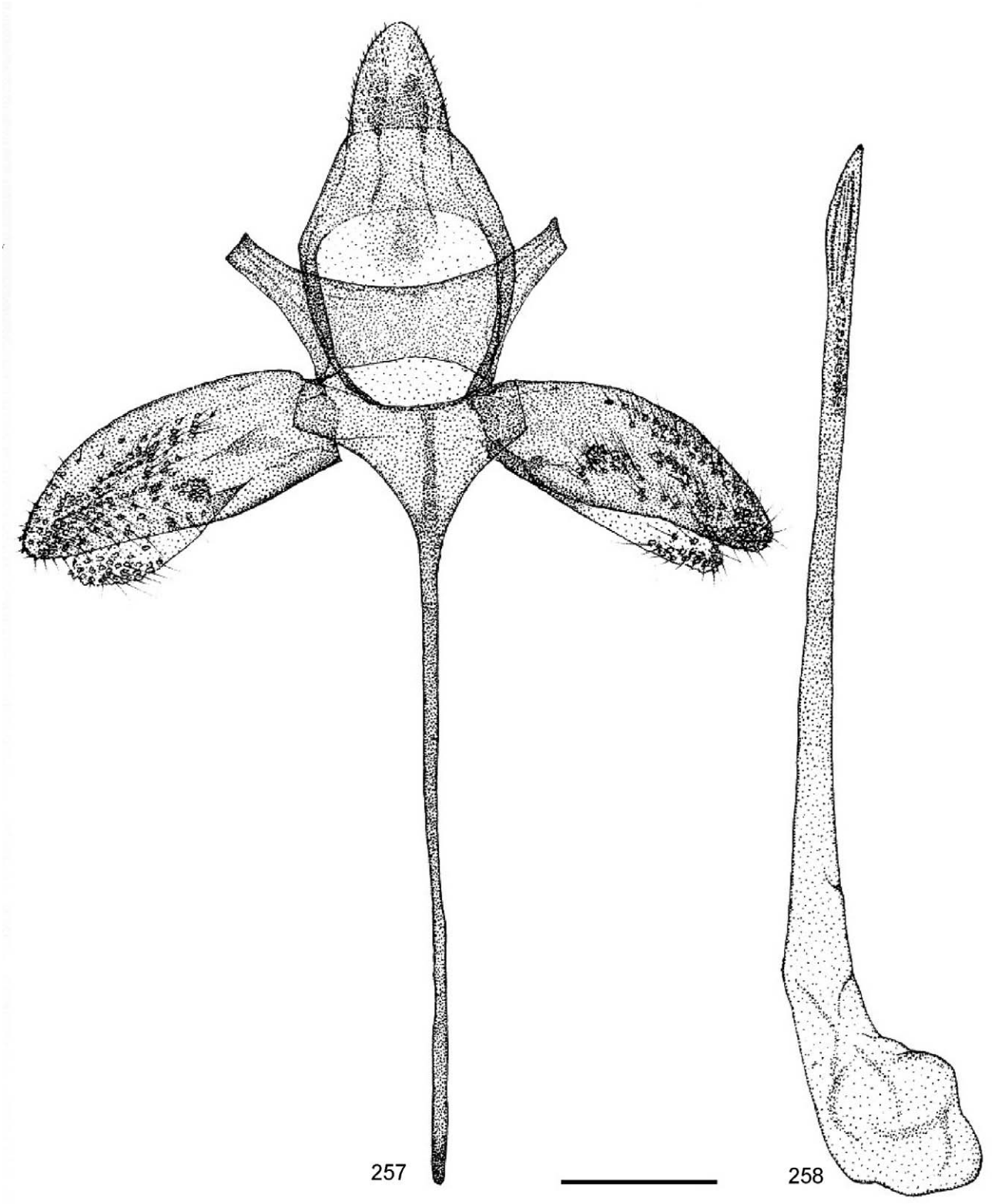
FIGURES 246–251. Male genitalia. Scale bar 100 µm. 246–248, *Phyllonorycter melanosparta*, the drawing is made by Willy De Prins after the genitalia prep. Vári 6925, in TMSA. 246, lateral view. 247, aedoeagus. 248, valva. 249–251, *Phyllonorycter melanosparta*, genitalia prep. MRAC/KMMA 00377, in RMCA. 249, ventral view. 250, sternum VIII. 251, aedoeagus.



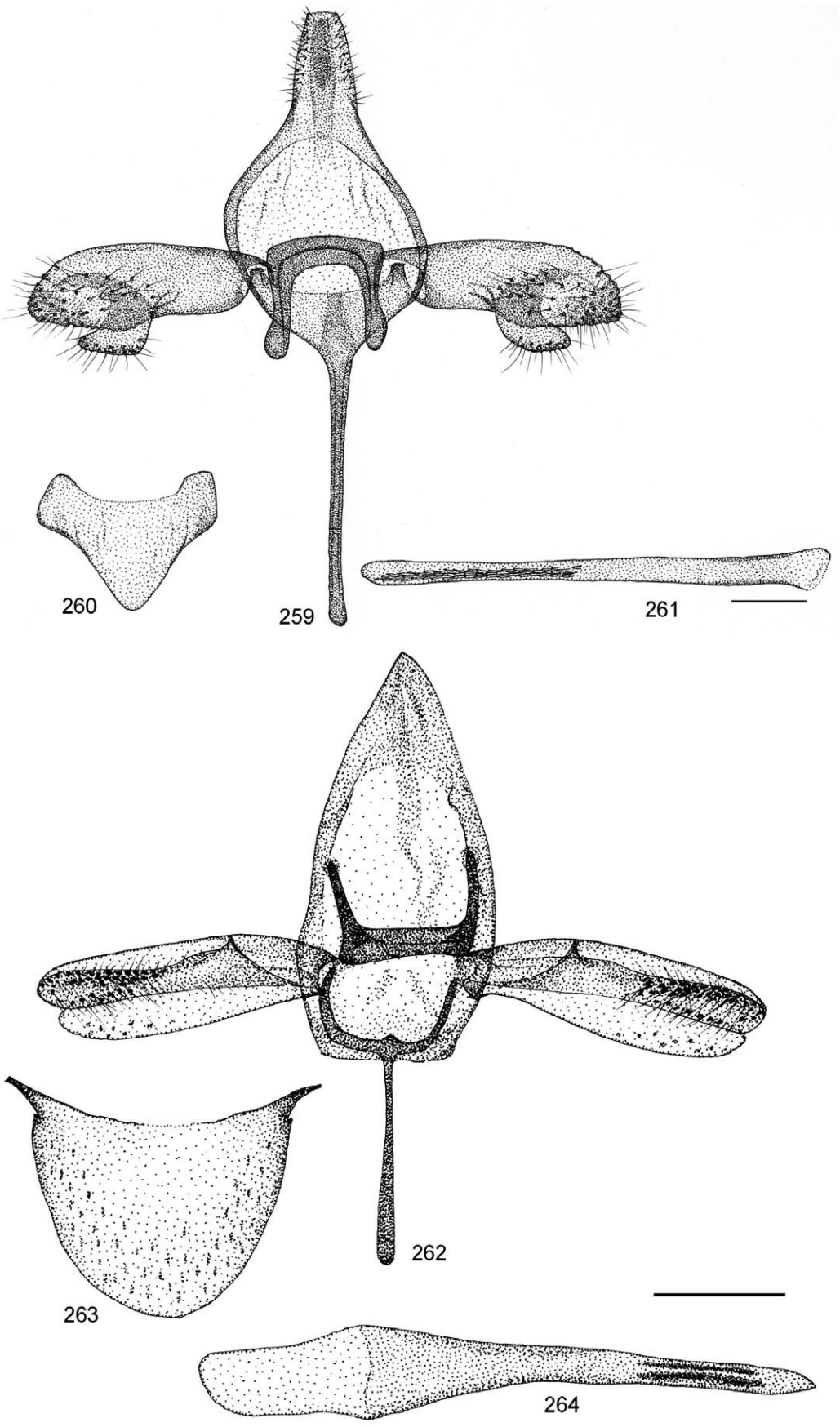
FIGURES 252–253. Male genitalia. Scale bar 100 µm. 252–253, *Phyllonorycter melhaniae*, holotype, the drawing is made by Willy De Prins after the genitalia prep. Vári 7495, in TMSA. 252, lateral view. 253, aedoeagus.



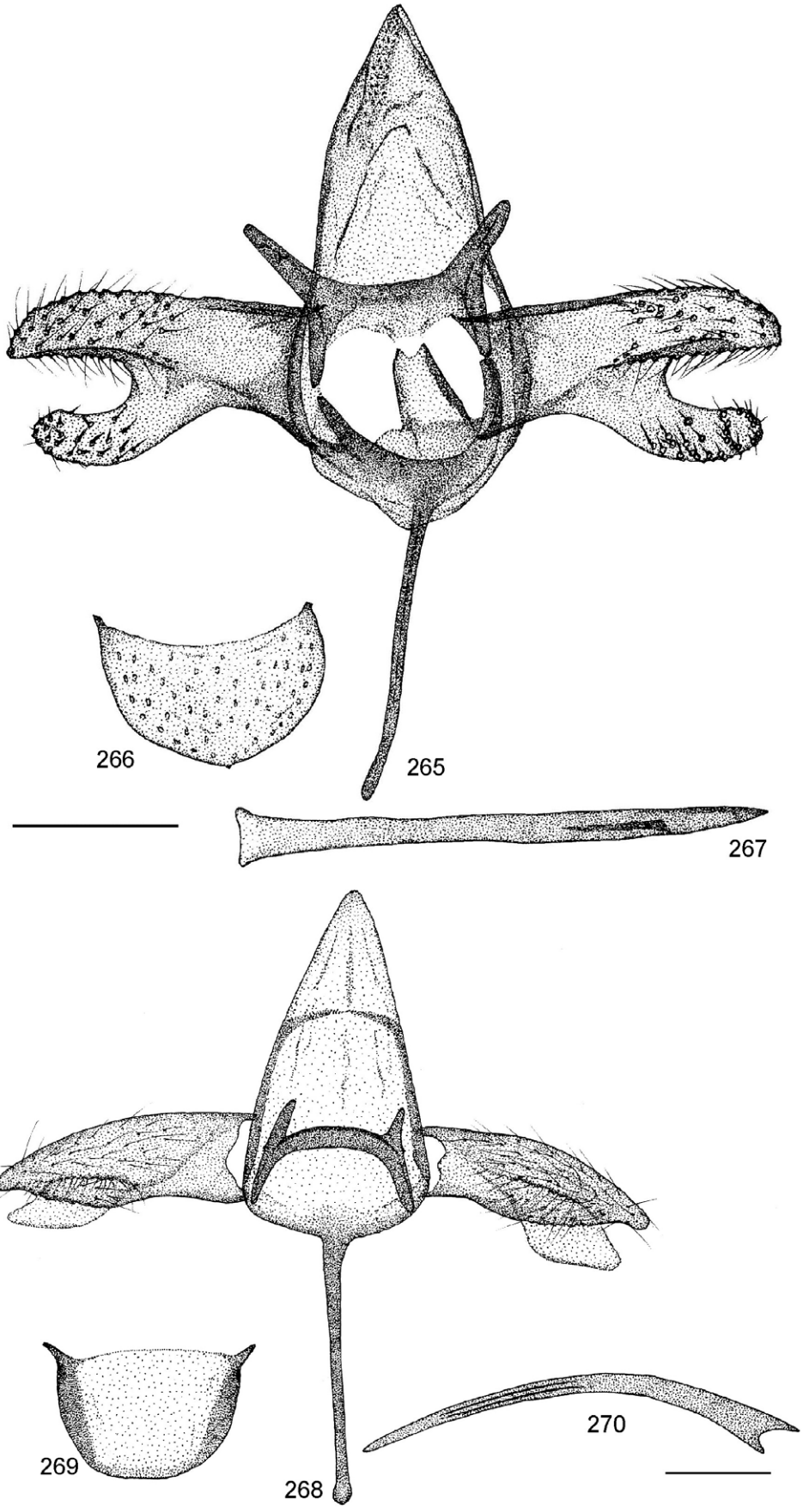
FIGURES 254–256. Male genitalia. Scale bar 100 µm. *Phyllonorycter obandai*, holotype, genitalia prep. MRAC/KMMA 00251, in RMCA. 254, ventral view. 255, sternum VIII. 256, aedoeagus.



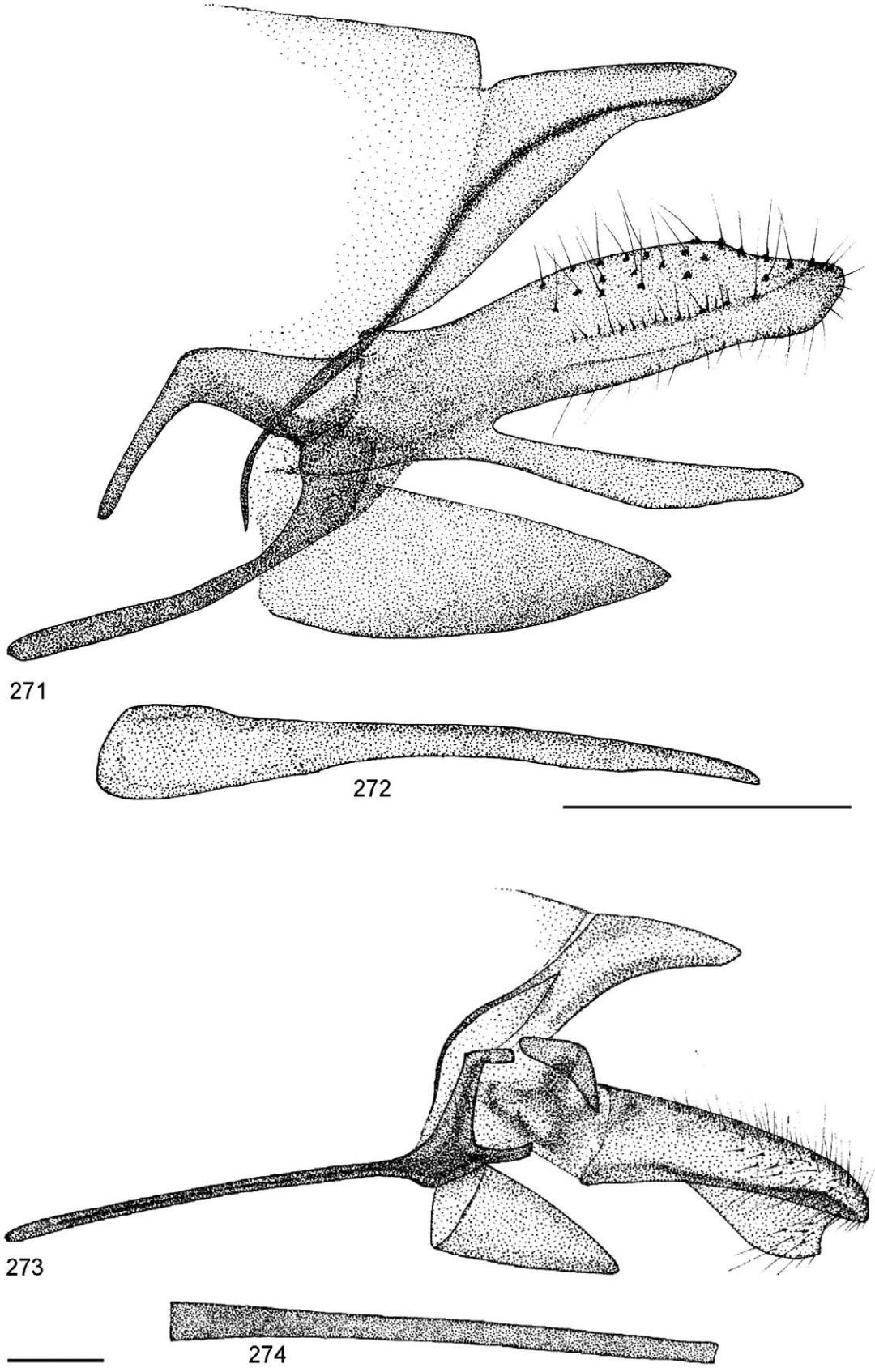
FIGURES 257–258. Male genitalia. Scale bar 100 µm. *Phyllonorycter farensis*, holotype, genitalia prep. MRAC/KMMA 00279, in RMCA. 257, ventral view. 258, aedoeagus.



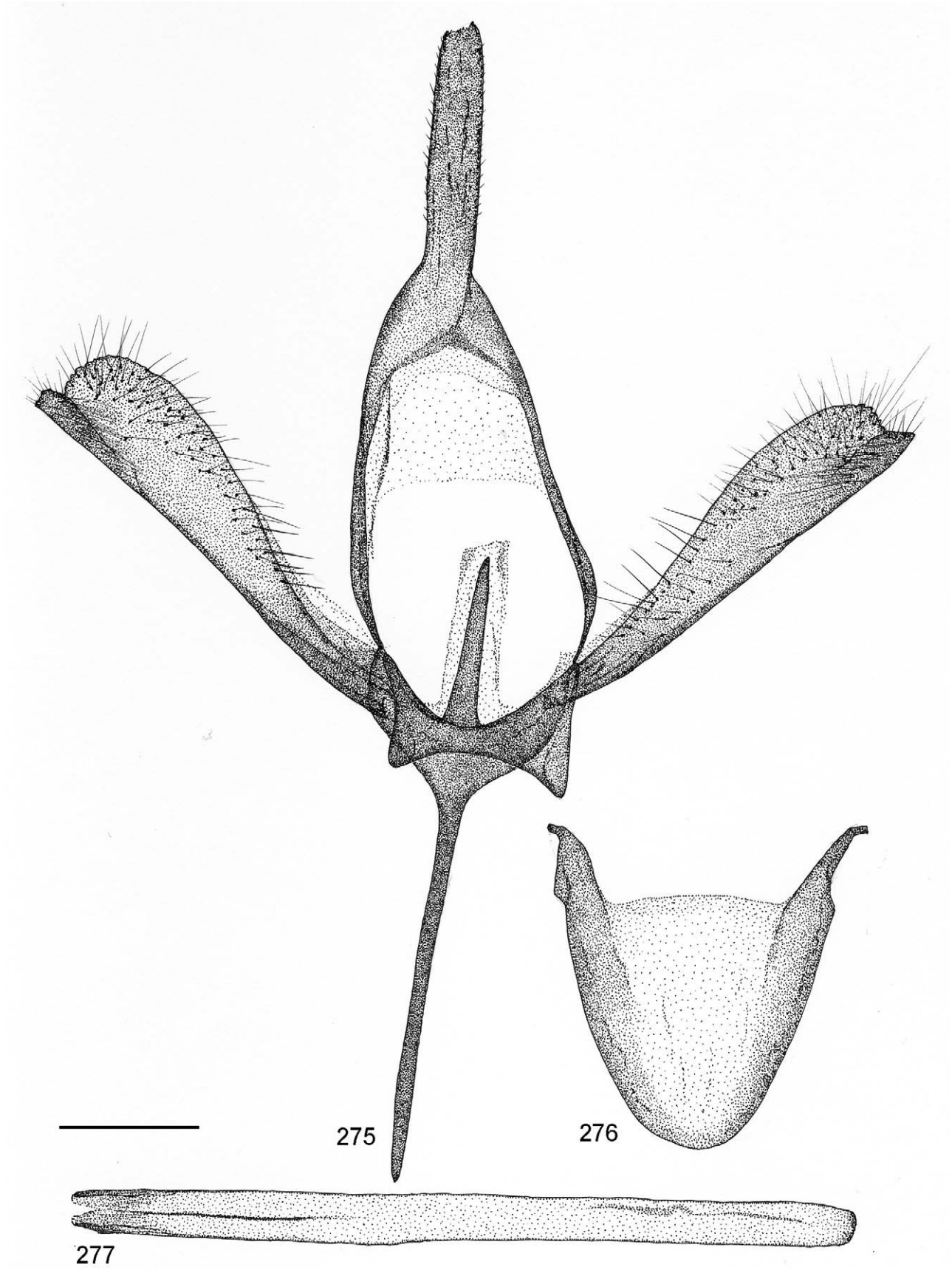
FIGURES 259–264. Male genitalia. Scale bar 100 µm. 259–261, *Phyllonorycter fletcheri*, holotype, genitalia prep. De Prins 3653, in BMNH. 259, ventral view. 260, sternum VIII. 261, aedoeagus. 262–264, *Phyllonorycter gozmanyi*, holotype, genitalia prep. MRAC/KMMA 00278, in RMCA. 262, ventral view. 263, aedoeagus. 264, sternum VIII.



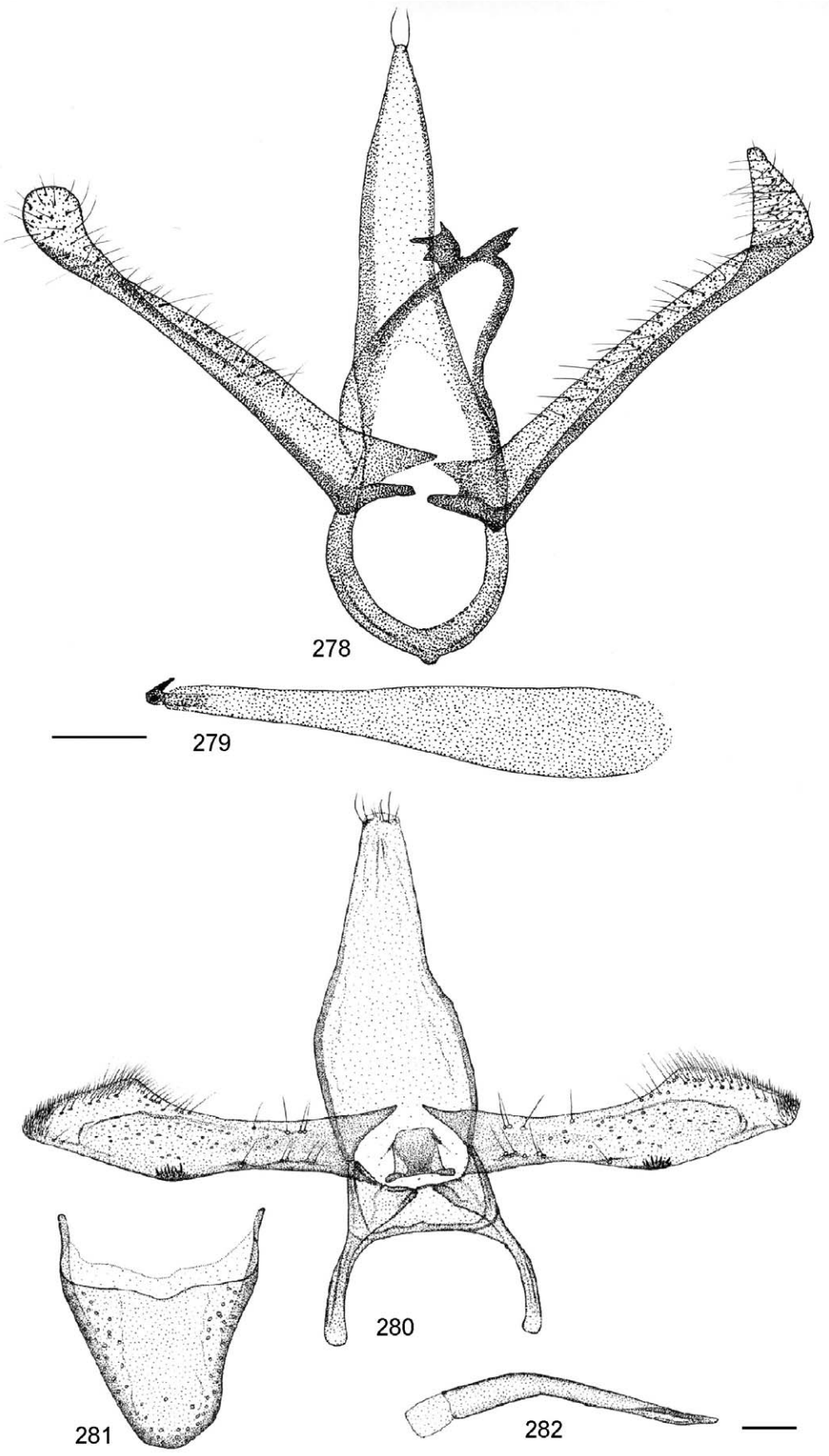
FIGURES 265–270. Male genitalia. Scale bar 100 µm. 265–267, *Phyllonorycter maererei*, paratype, genitalia prep. De Prins 3718, in ZMUC. 265, ventral view. 266, sternum VIII. 267, aedoeagus. 268–270, *Phyllonorycter ocimellus*, paratype, genitalia prep. MRAC/KMMA 00349, in RMCA. 268, ventral view. 269, sternum VIII. 270, aedoeagus.



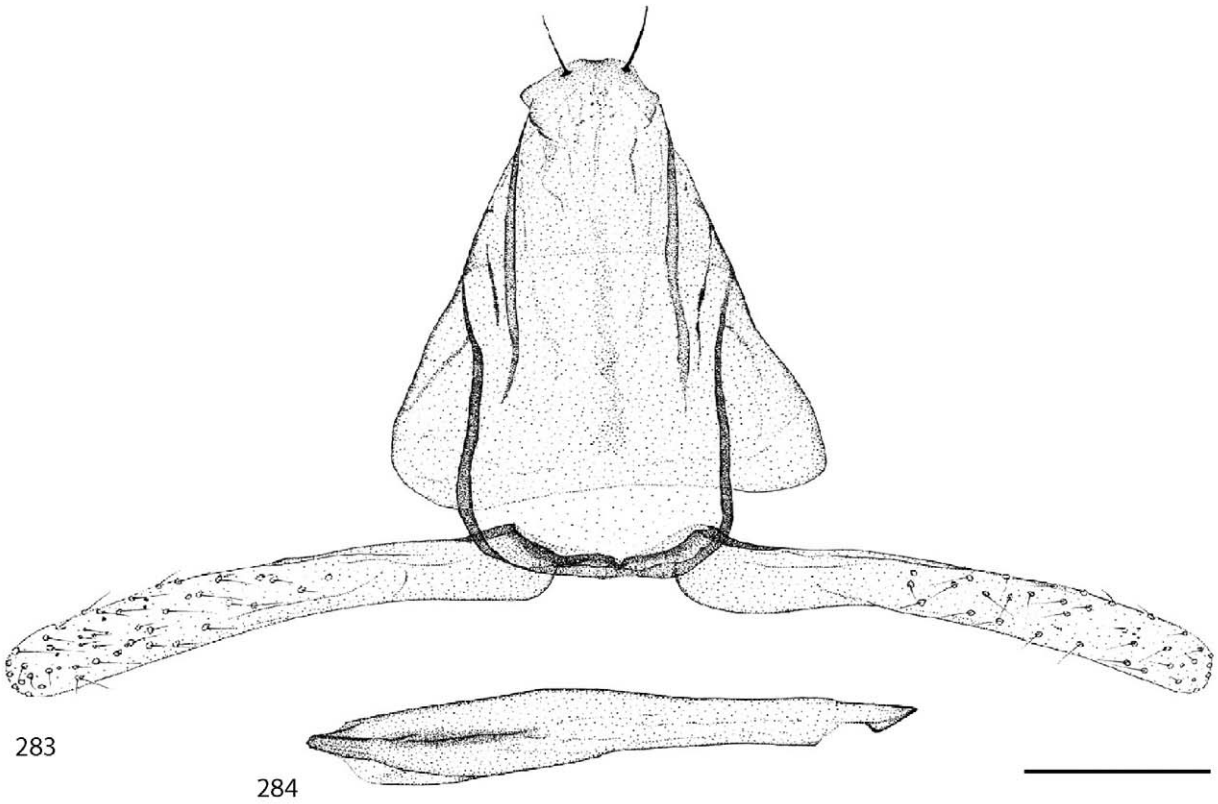
FIGURES 271–274. Male genitalia. Scale bar 100 µm. 271–272, *Phyllonorycter pavoniae*, holotype, the drawing is made by Willy De Prins after the genitalia prep. Vári 7140, in TMSA. 271, lateral view. 272, aedoeagus.273–274, *Phyllonorycter rhynchosiae*, paratype, the drawing is made by Willy De Prins after the genitalia prep. Vári 7498, in TMSA. 273, lateral view. 274, aedoeagus.

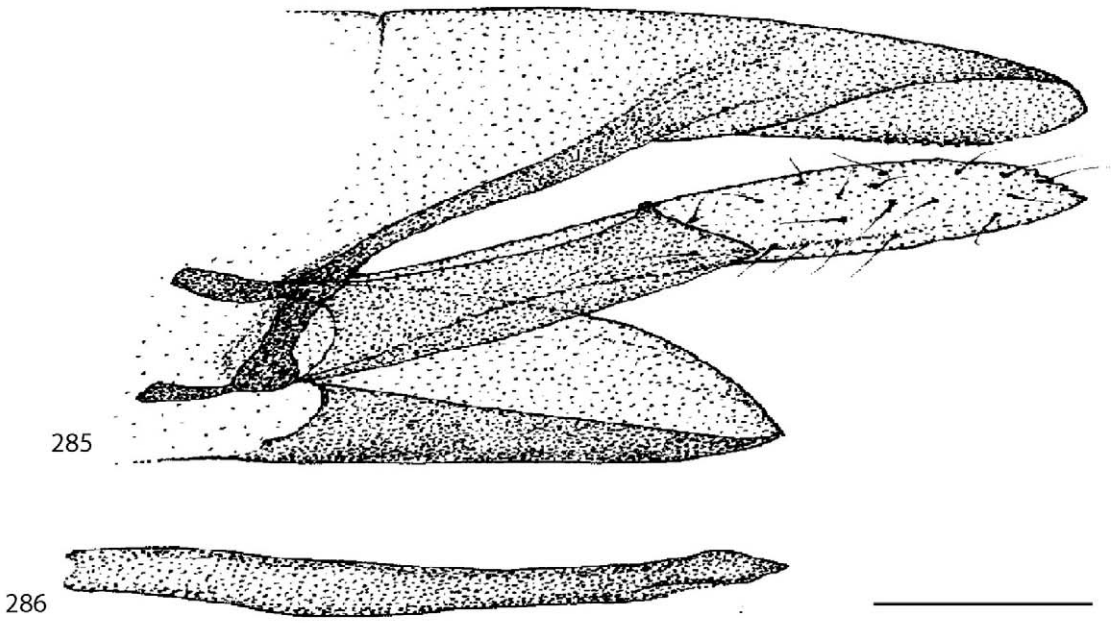


FIGURES 275–277. Male genitalia. Scale bar 100 µm. 275–277, *Phyllonorycter ruwenzori*, holotype, B.M. genitalia prep. 10147, in BMNH. 275, ventral view. 276, sternum VIII. 277, aedoeagus.

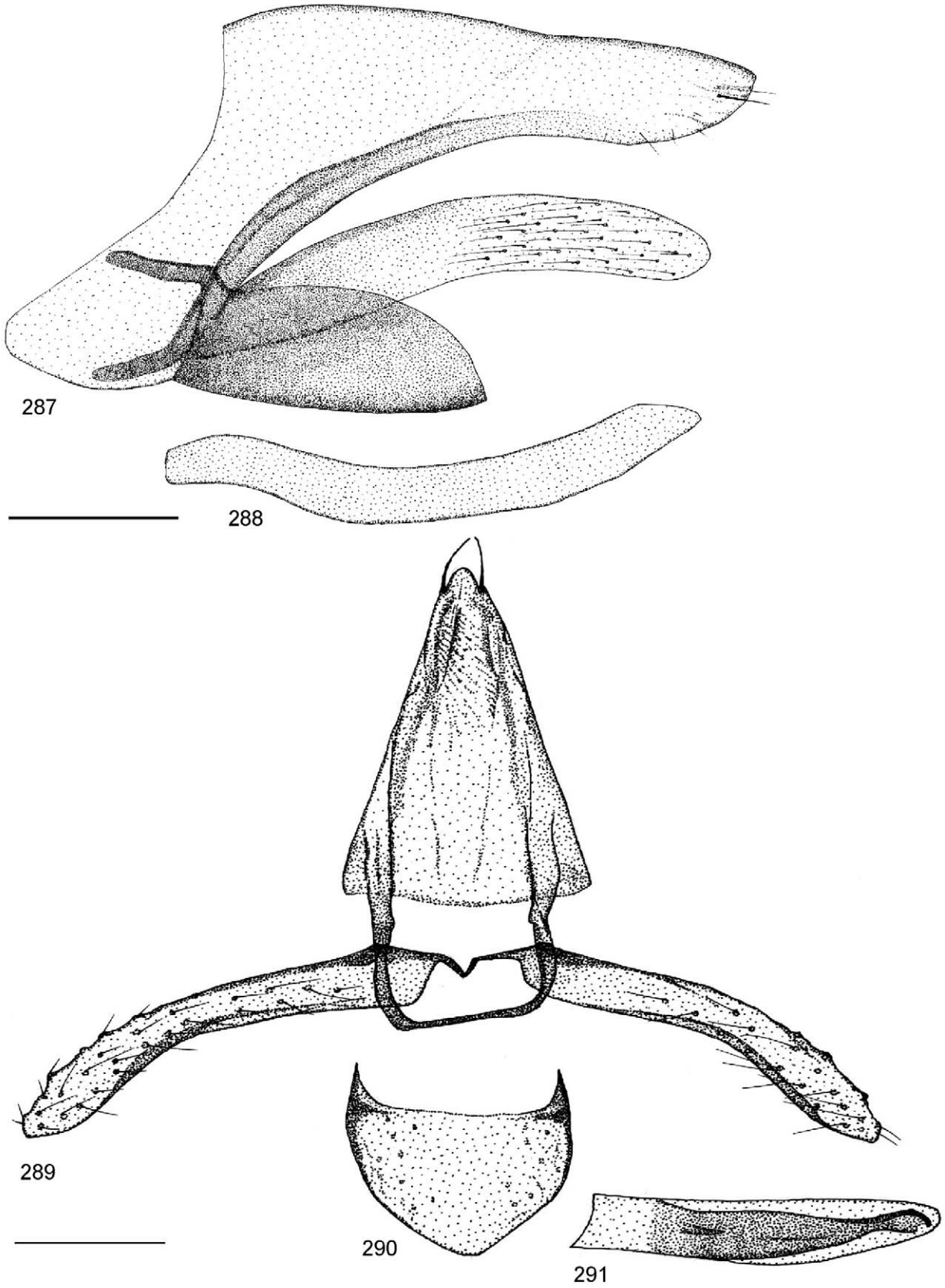


FIGURES 278–282. Male genitalia. Scale bar 100 µm. 278–279, *Cremastobombycia kipepeo*, holotype, genitalia prep. MRAC/KMMA 00389, in RMCA. 278, ventral view. 279, aedoeagus. 280–282, *Cremastobombycia morogorene*, holotype, genitalia prep. MRAC/KMMA 00657, in RMCA. 280, ventral view. 281, sternum VIII. 282, aedoeagus.

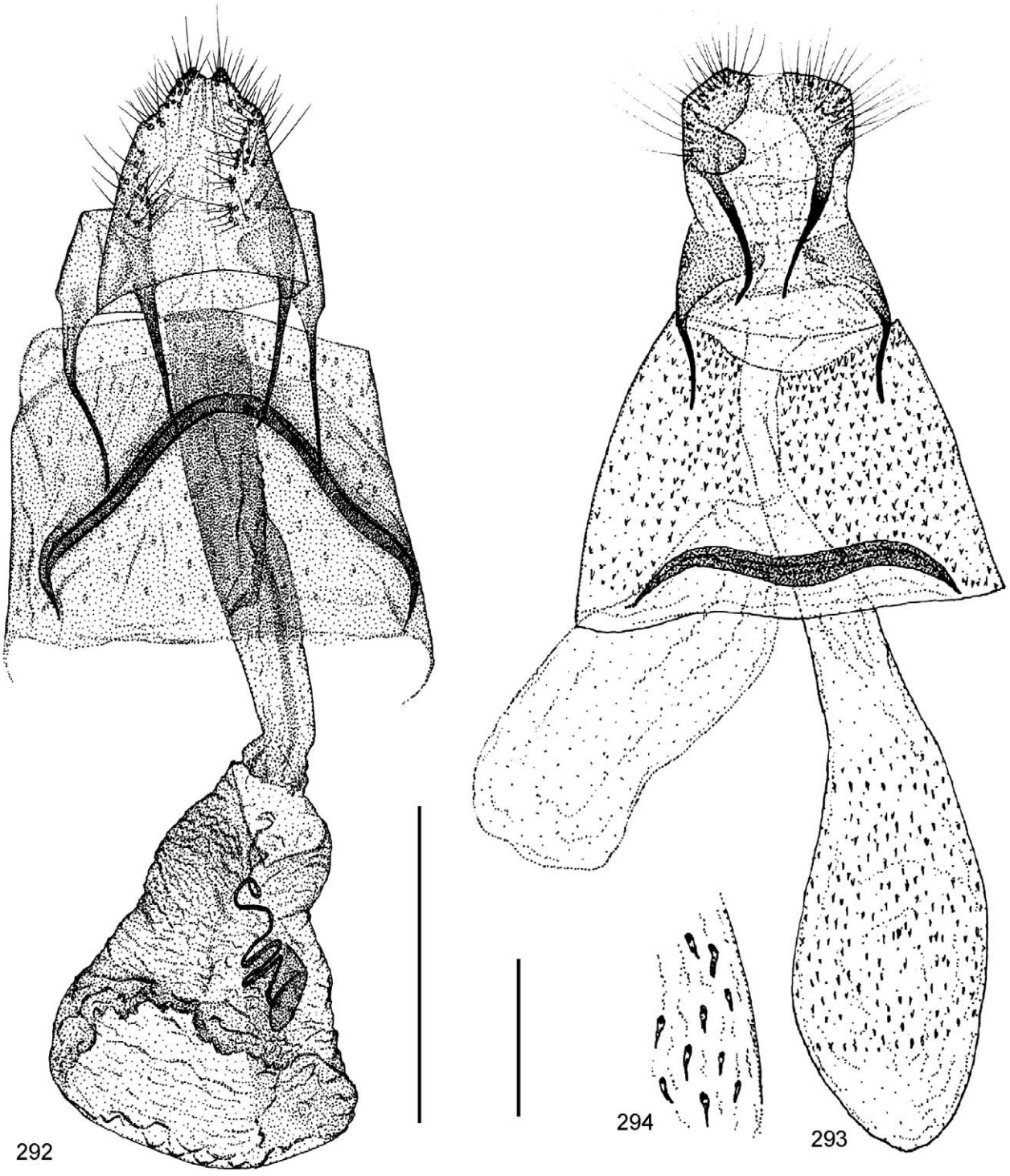




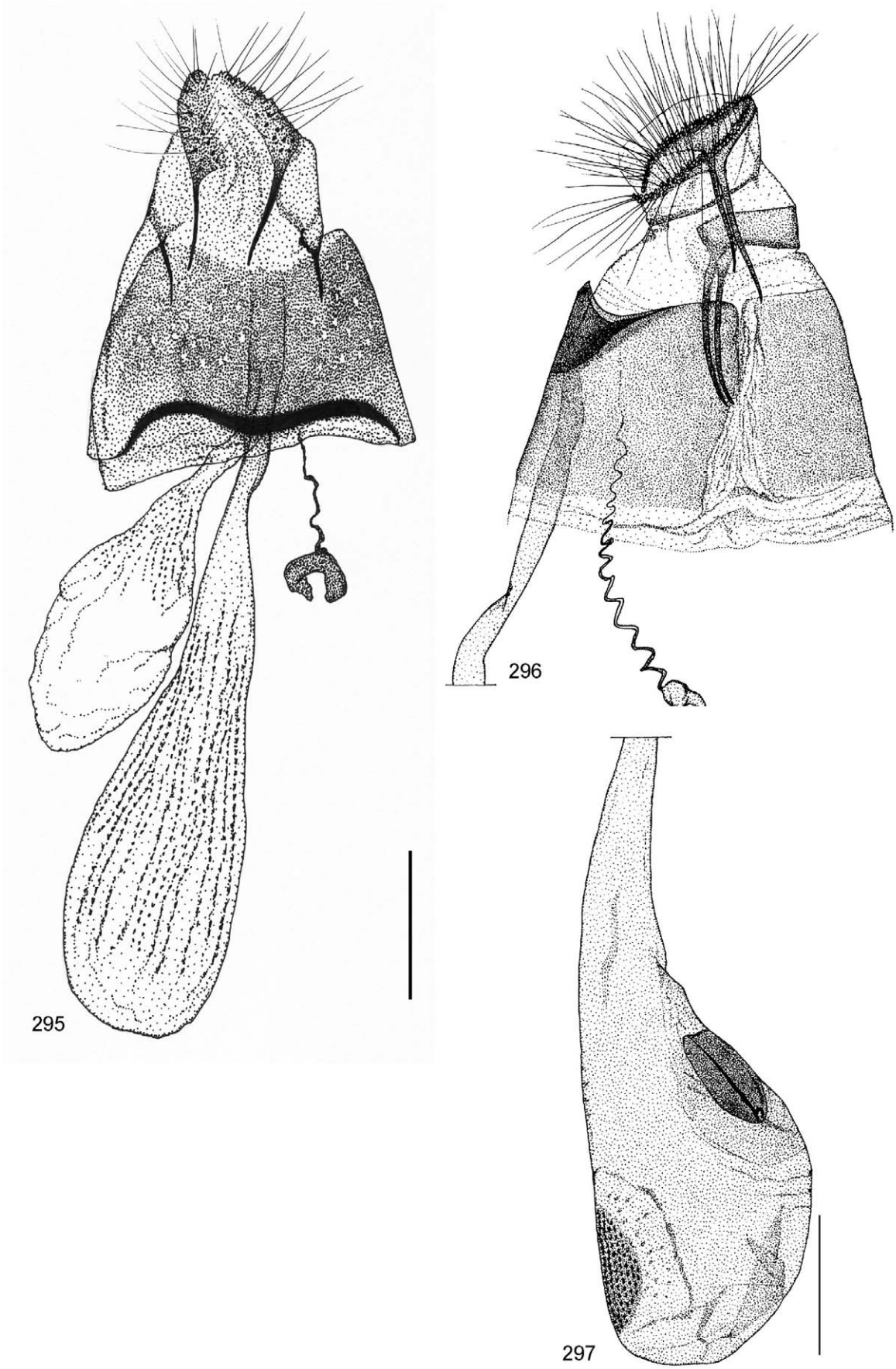
FIGURES 283–286. Male genitalia. Scale bar 100 µm. 283–284, *Porphyrosela gautengi*, paratype, genitalia prep. TMSA 14606, in TMSA. 283, lateral view. 284, aedoeagus. 285–286, *Porphyrosela homotropha*, the drawings are made by Willy De Prins after the original description and the drawing of Vári (1963: 11; fig. 10). 285, lateral view. 286, aedoeagus.



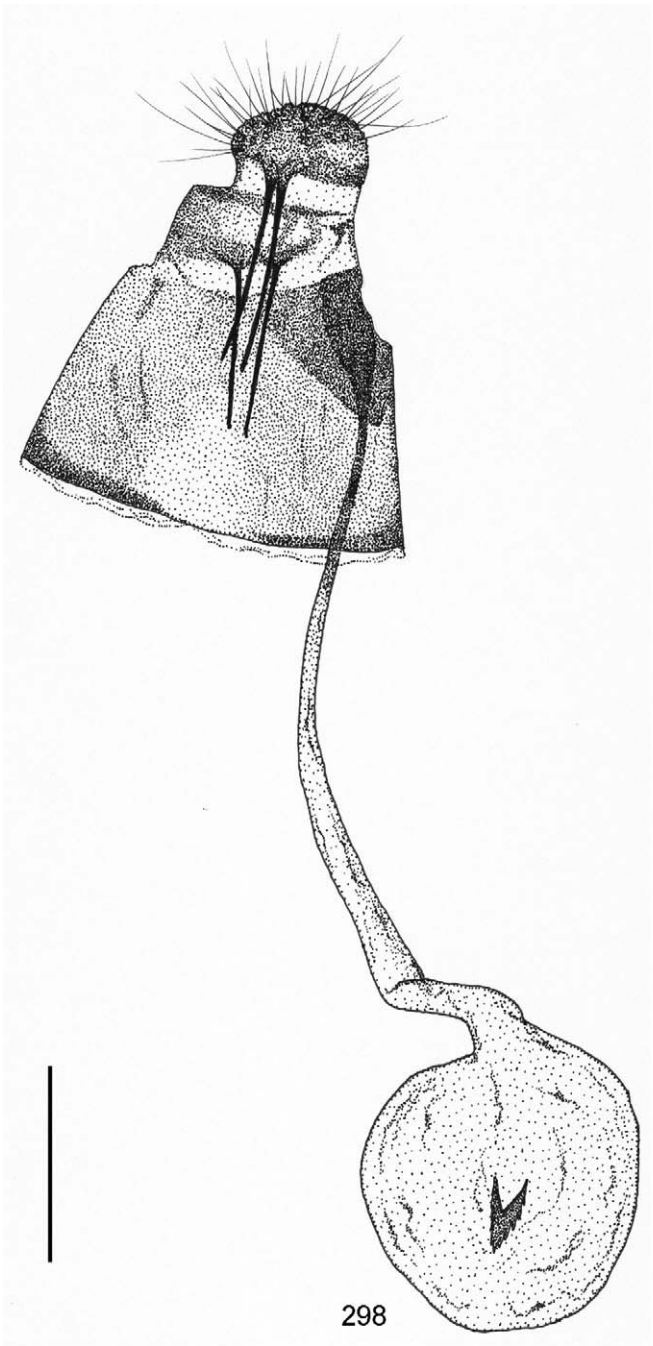
FIGURES 287–291. Male genitalia. Scale bar 100 µm. 287–288, *Porphyrosela teramni*, holotype, the drawing is made by Willy De Prins after the genitalia prep. Vári 6923, in TMSA. 287, lateral view. 288, aedoeagus. 289–291, *Porphyrosela teramni*, genitalia prep. MRAC/KMMA 00432, in RMCA. 289, ventral view. 290, sternum VIII. 291, aedoeagus.

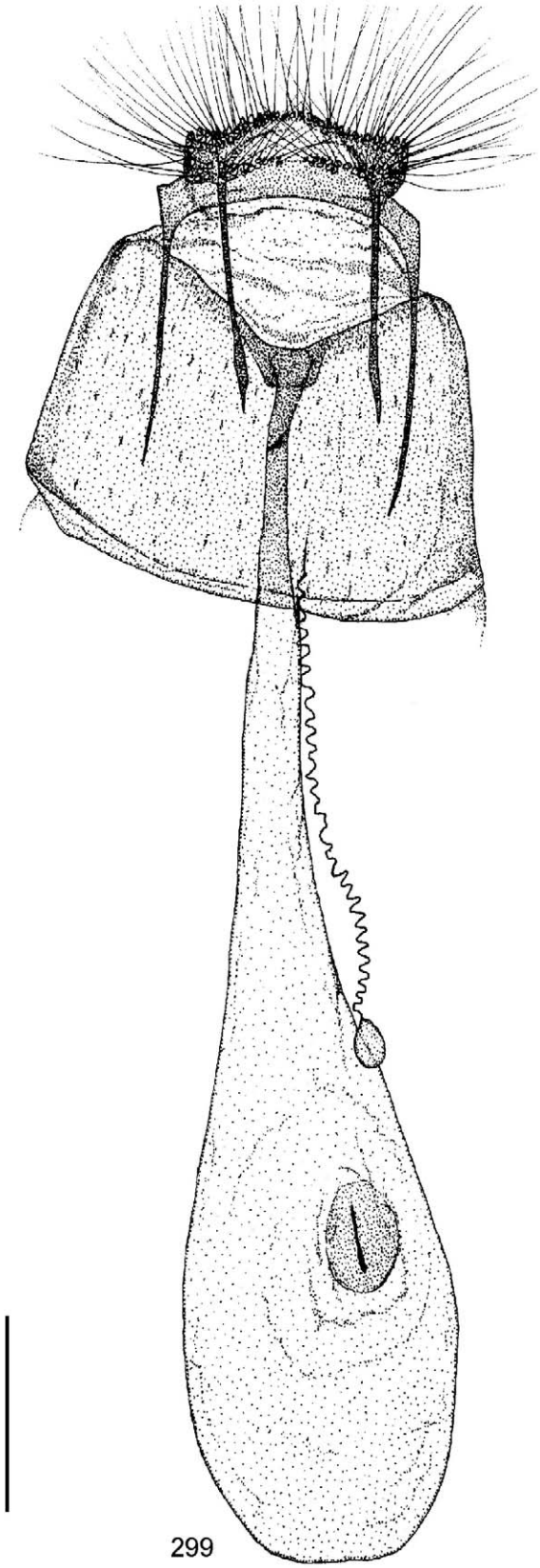


FIGURES 292–294. Female genitalia. Scale bar 200 µm. 292, *Neolithocolletis nsengai*, paratype, genitalia prep. MRAC/KMMA 00426, in RMCA. 293–294, *Neolithocolletis pentadesma*, the drawings are made by Willy De Prins after the additional description and the drawing of Kumata (1993: 8–9, fig. 5a,b). 293, ventral view. 294, a part of corpus bursae.

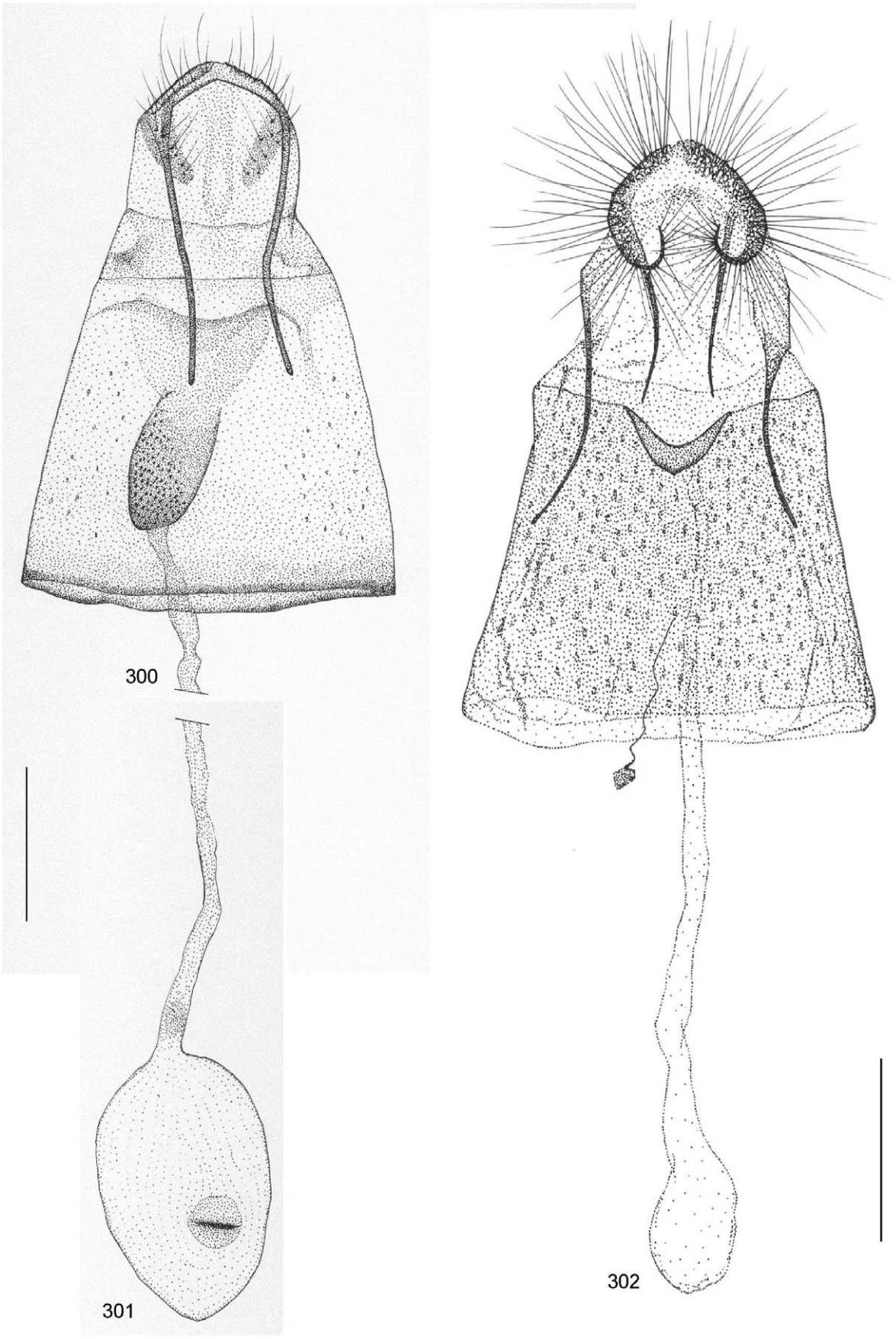


FIGURES 295–297. Female genitalia. Scale bar 200 µm. 295, *Neolithocolletis pentadesma*, genitalia prep. De Prins 3796, in CUMZ. 296–297, *Cameraria hexalobina*, genitalia prep. MRAC/KMMA 00418, in RMCA. 296, segments VII–X, lateral view. 297, corpus bursae.

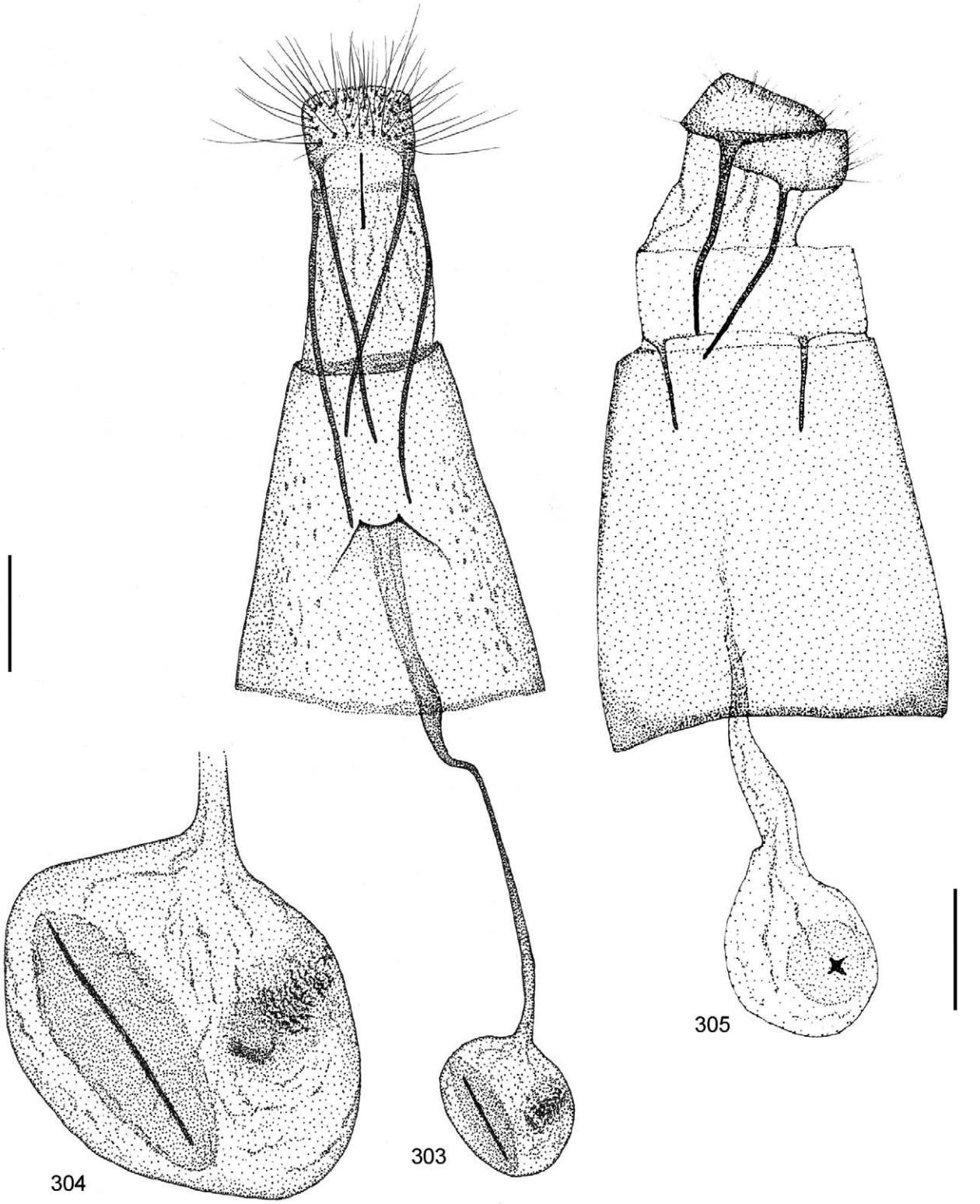




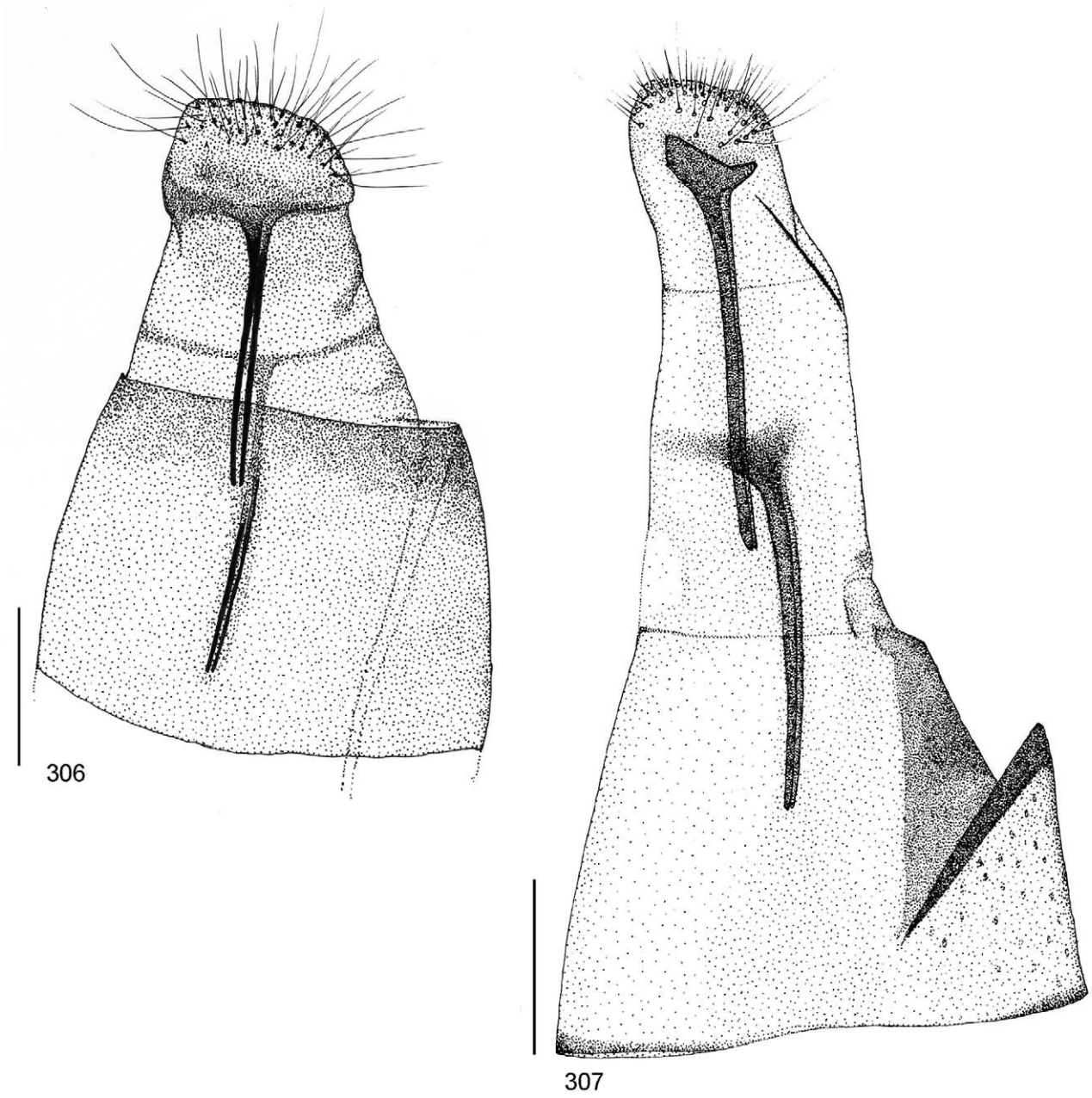
FIGURES 298–299. Female genitalia. Scale bar 200 µm. 298, *Cameraria fara*, holotype, genitalia prep. MRAC/KMMA 00395, in RMCA. 299, *Cameraria landryi*, paratype, genitalia prep. MRAC/KMMA 00416, in RMCA.



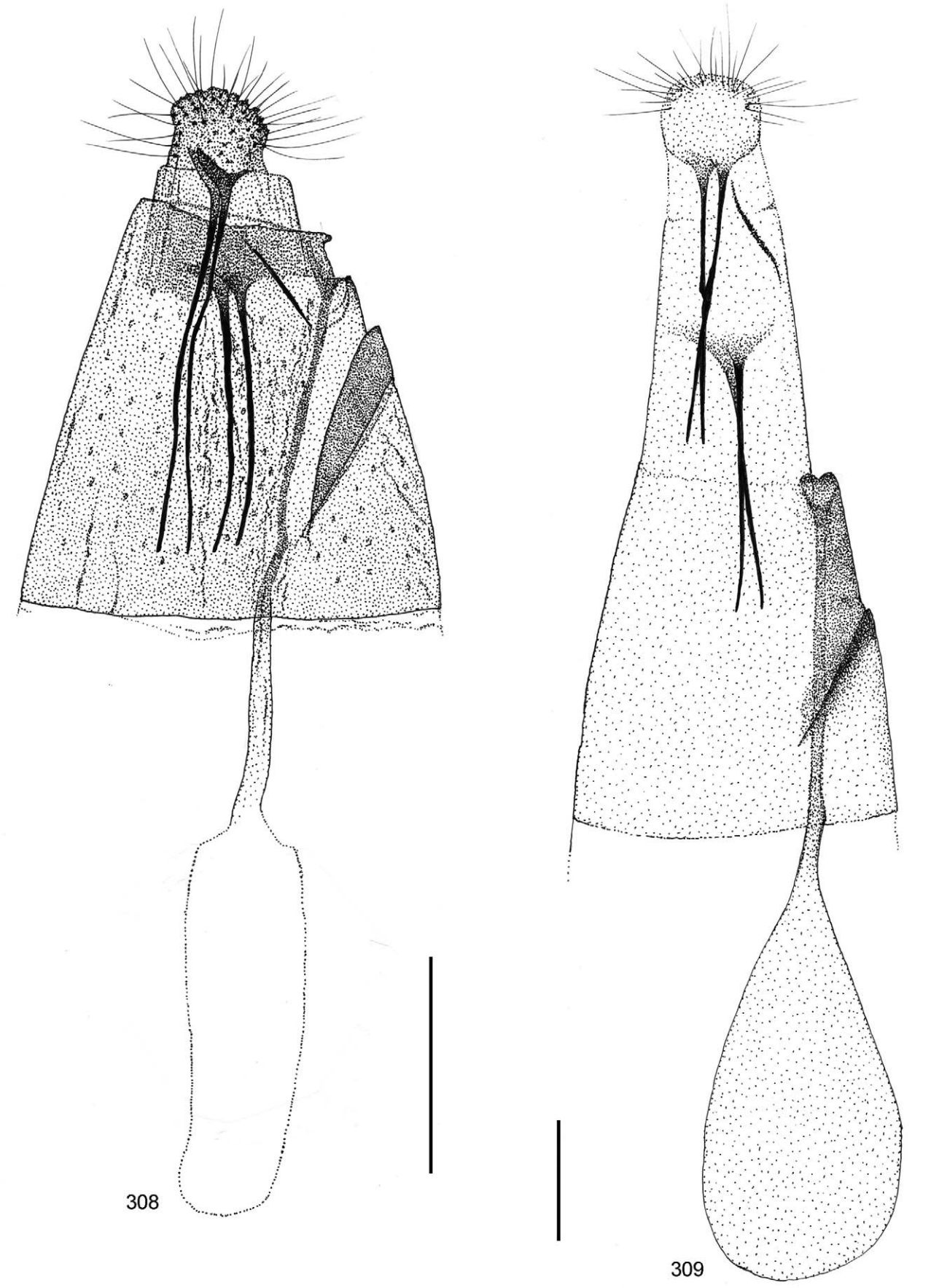
FIGURES 300–302. Female genitalia. Scale bar 200 µm. 300–301, *Cameraria varii*, paratype, genitalia prep. De Prins 3453, in TMSA. 300, segments VII–X, ventral view. 301, corpus bursae. 302, *Cameraria perodeaui*, holotype, genitalia prep. MRAC/KMMA 00451, in RMCA.



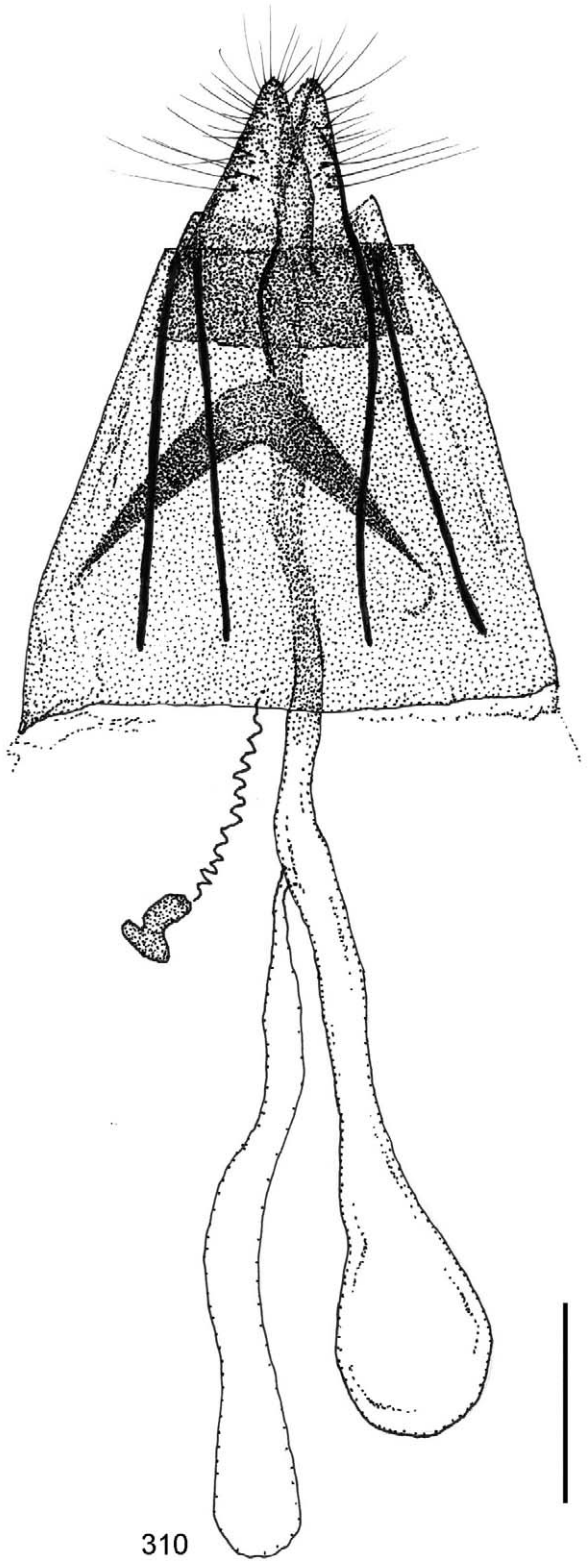
FIGURES 303–305. Female genitalia. Scale bar 200 µm. 303–304, *Cameraria torridella*, paratype, genitalia prep. MRAC/KMMA 00291, in RMCA. 303, corpus bursae. 304, segments VII–X, ventral view. 305, *Phyllonorycter achilleus*, paratype, genitalia prep. MRAC/KMMA 00380, in RMCA.

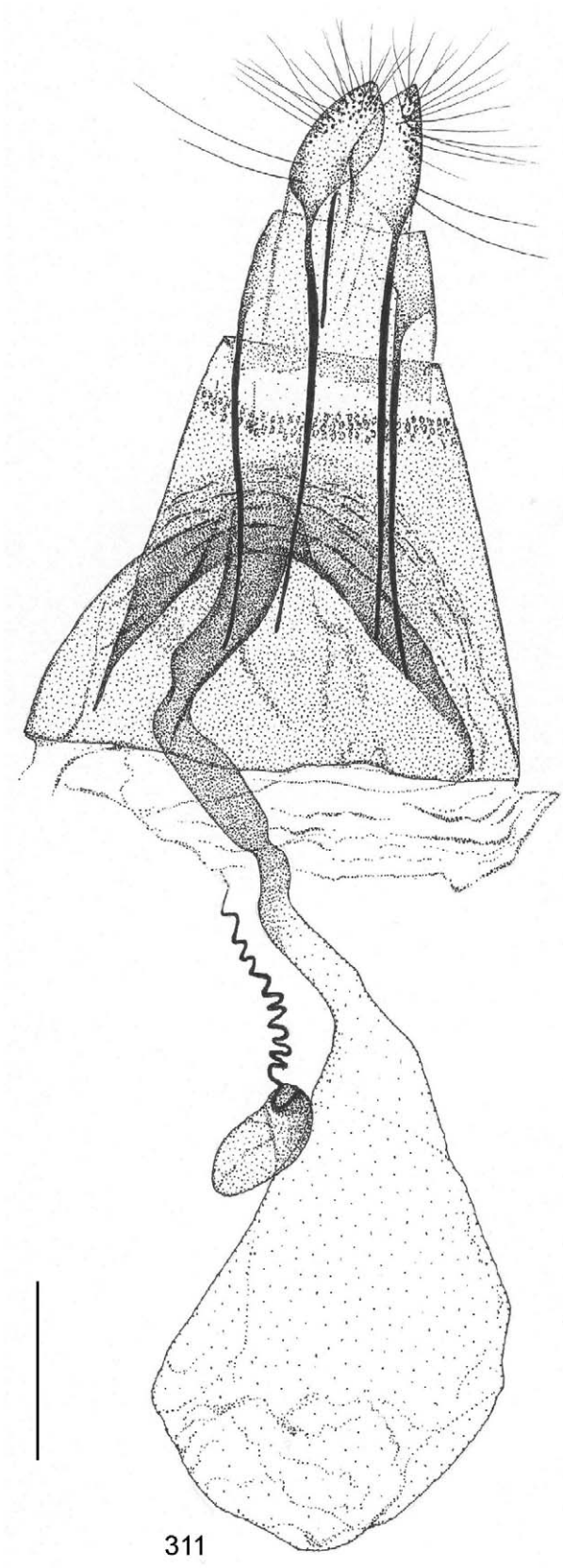


FIGURES 306–307. Female genitalia. Scale bar 200 µm. 306, *Phyllonorycter chionopa*, holotype, the drawing is made by Willy De Prins after the genitalia prep. Vári 7727, in TMSA. 307, *Phyllonorycter encaeria*, the drawing is made by Willy De Prins after the genitalia prep. Vári 7504, in TMSA.

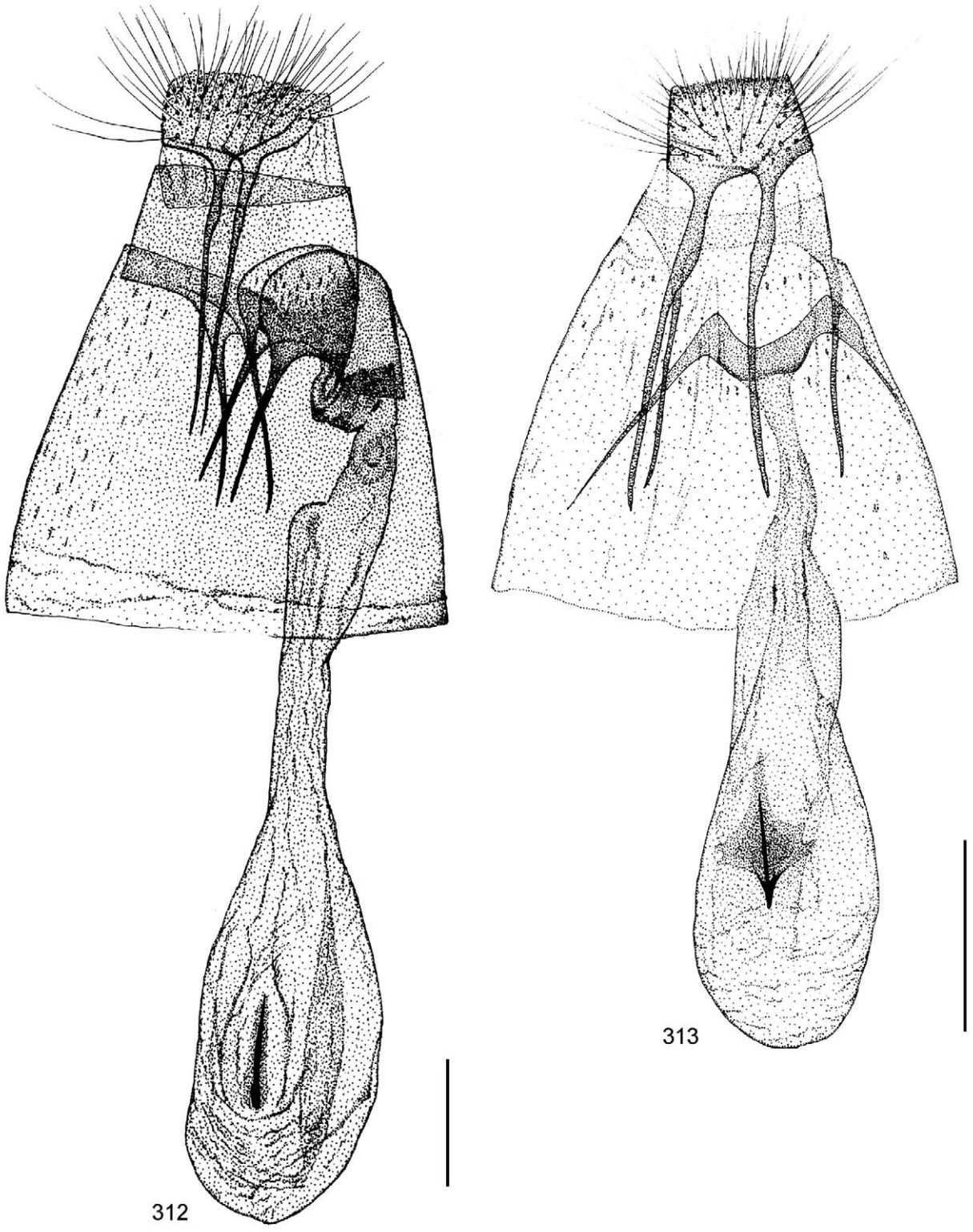


FIGURES 308–309. Female genitalia. Scale bar 200 µm. 308, *Phyllonorycter kazuri*, paratype, genitalia prep. MRAC/KMMA 00348, in RMCA. 309, *Phyllonorycter lantanae*, holotype, the drawing is made by Willy De Prins after the genitalia prep. Vári 7548, in TMSA.

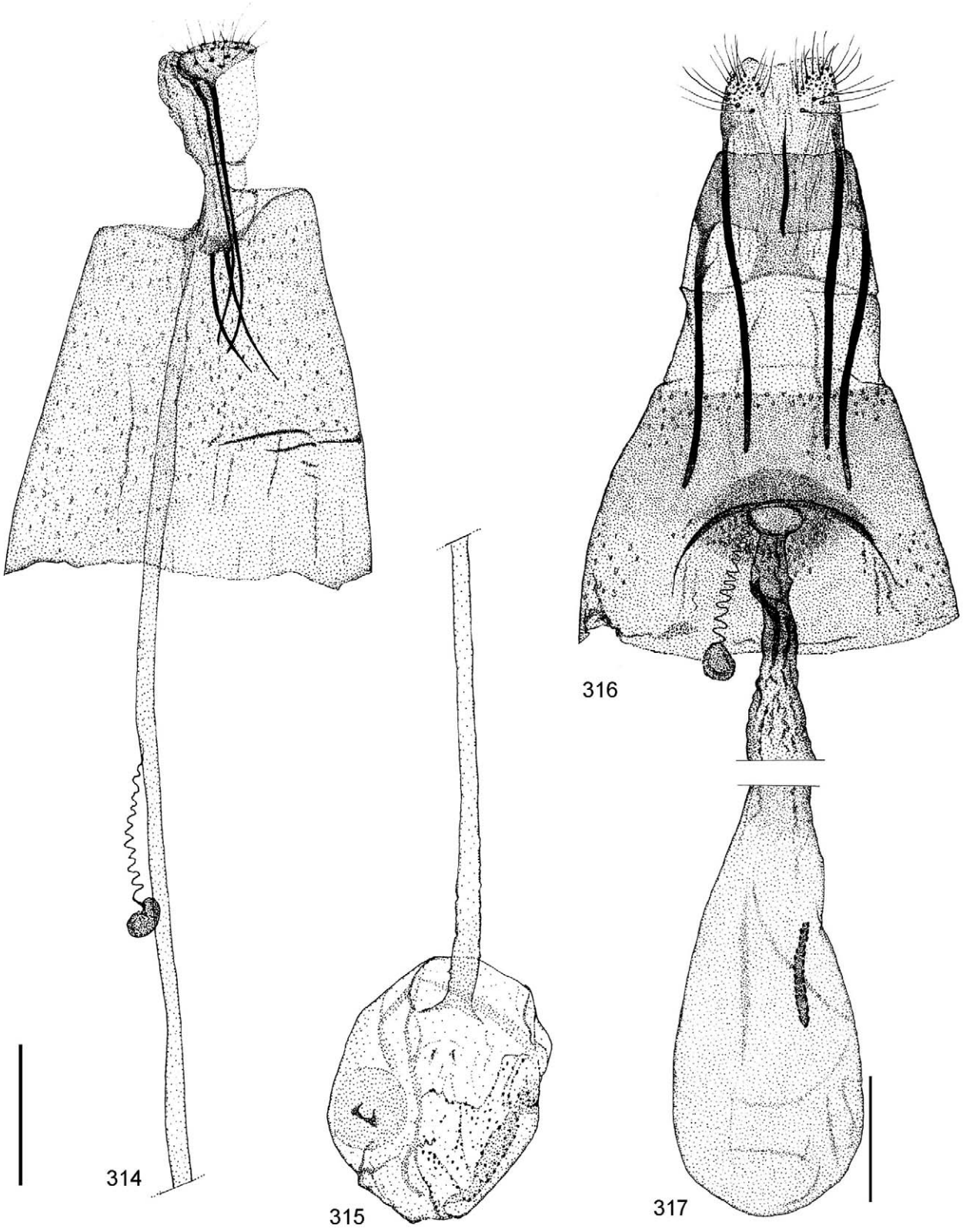




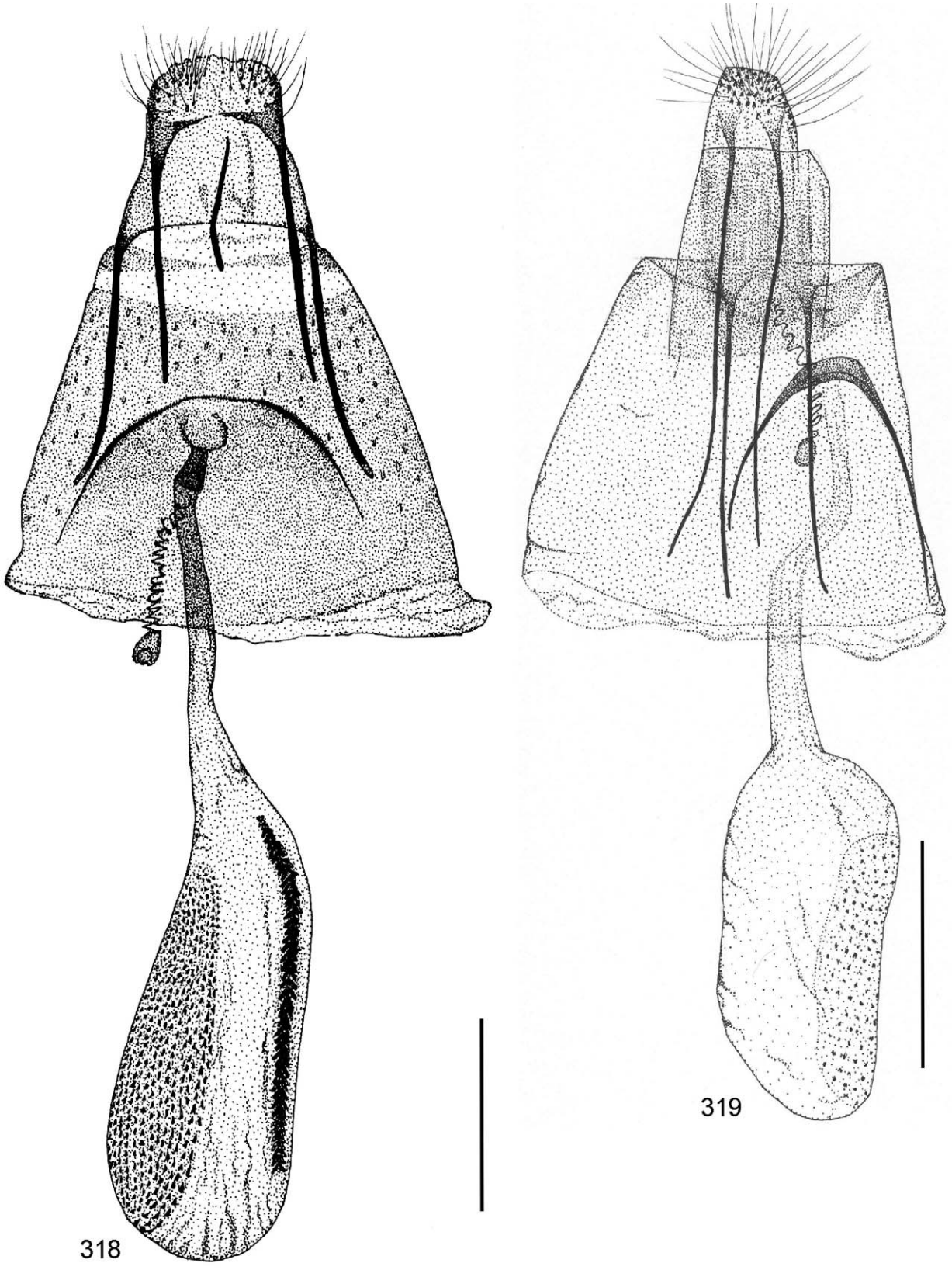
FIGURES 310–311. Female genitalia. Scale bar 200 µm. 310, *Phyllonorycter lantanae*, genitalia prep. De Prins 3703, in BMNH. 311, *Phylonorycter gato*, holotype, genitalia prep. MRAC/KMMA / 00486, in RMCA.



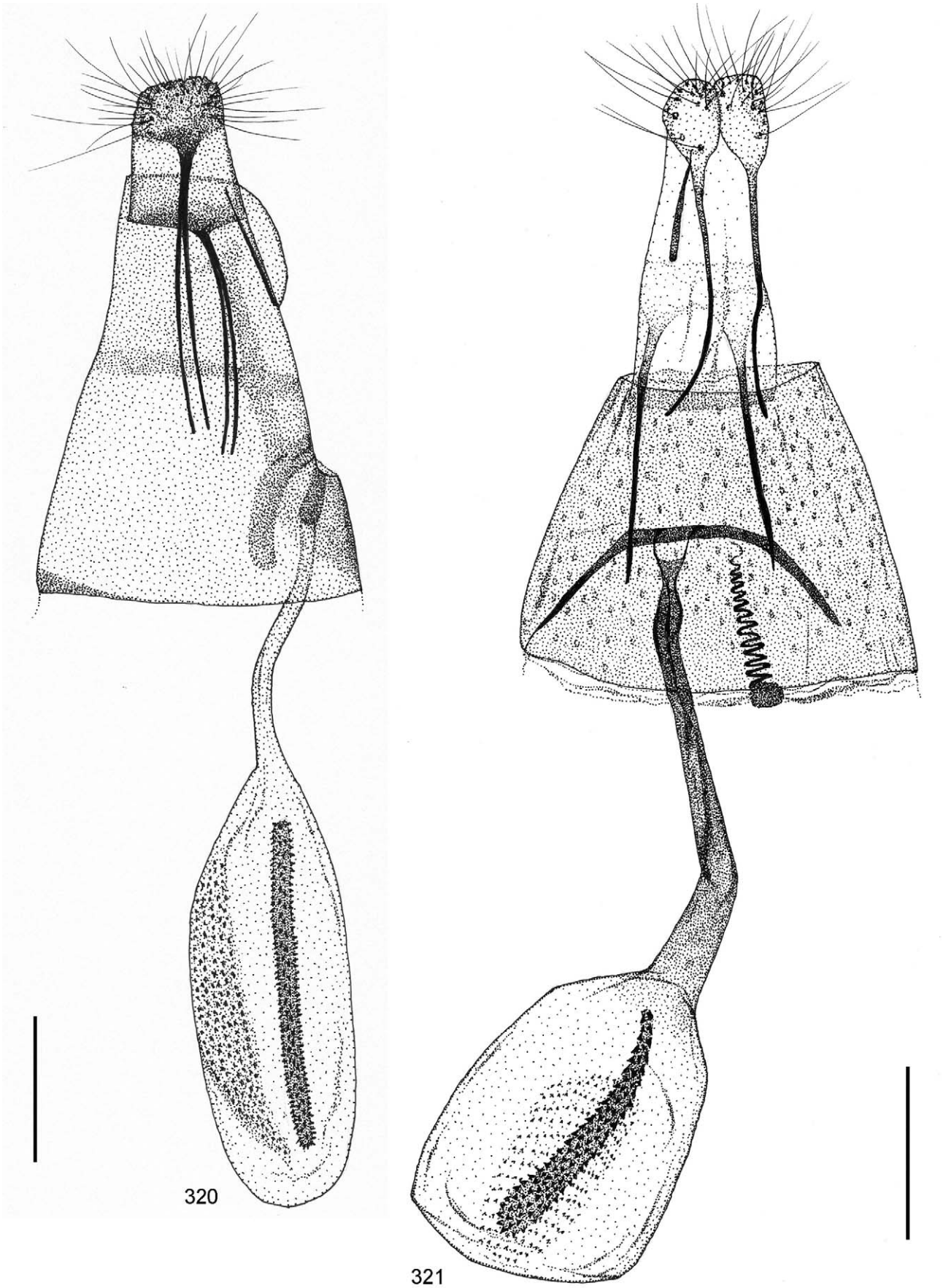
FIGURES 312–313. Female genitalia. Scale bar 200 µm. 312, *Phyllonorycter grewiaecola*, genitalia prep. MRAC/KMMA / 00277, in RMCA. 313, *Phyllonorycter grewiaephilos*, paratype, genitalia prep. MRAC/KMMA 00265, in RMCA.



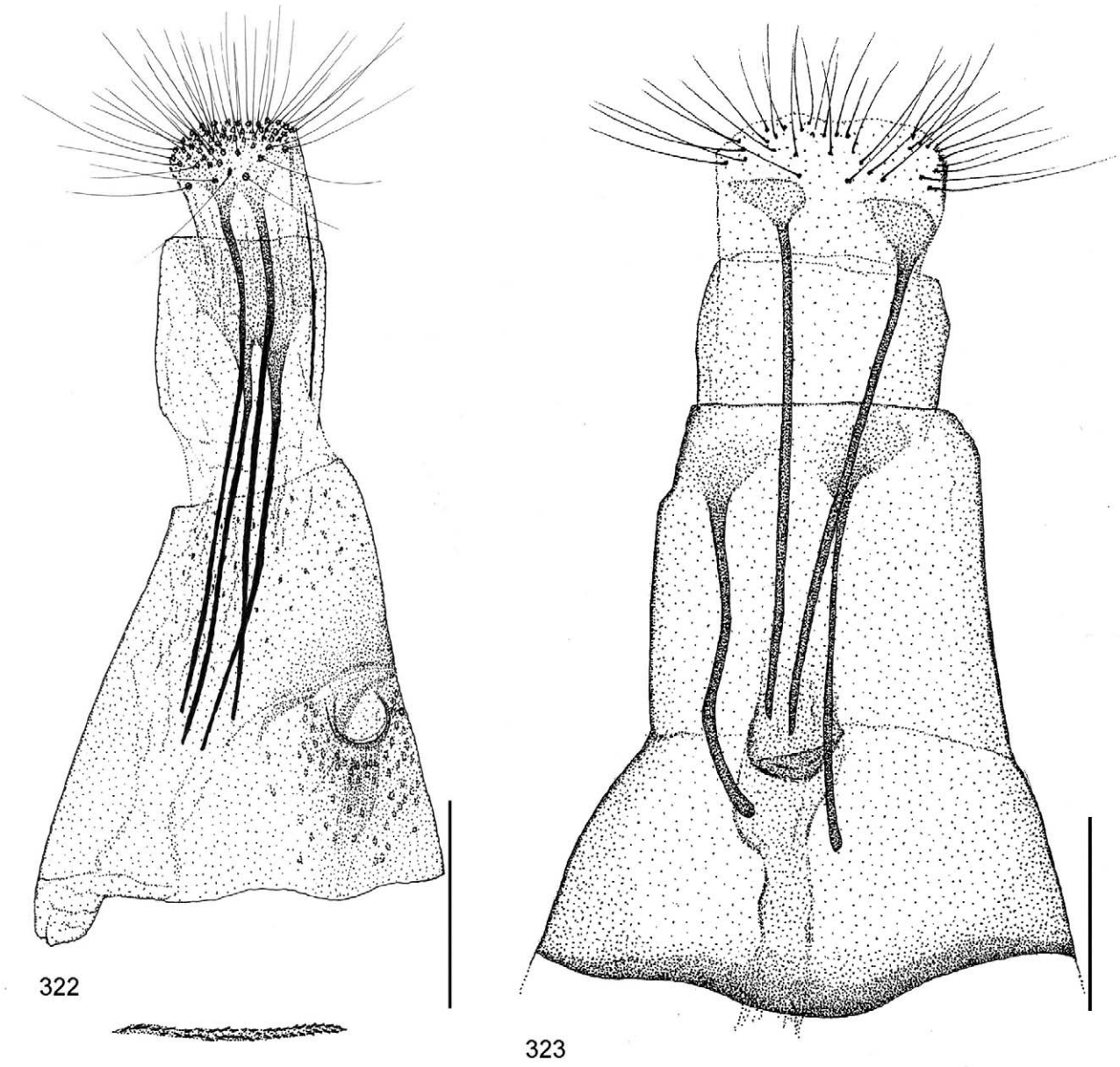
FIGURES 314–317. Female genitalia. Scale bar 200 µm. 314–315, *Phyllonorycter grewiella*, genitalia prep. MRAC/KMMA 00262, in RMCA. 314, segments VII–X, lateral view. 315, corpus bursae. 316–317, *Phyllonorycter acutulus*, holotype, genitalia prep. MRAC/KMMA 00419, in RMCA. 316, segments VII–X, ventral view. 317, corpus bursae.



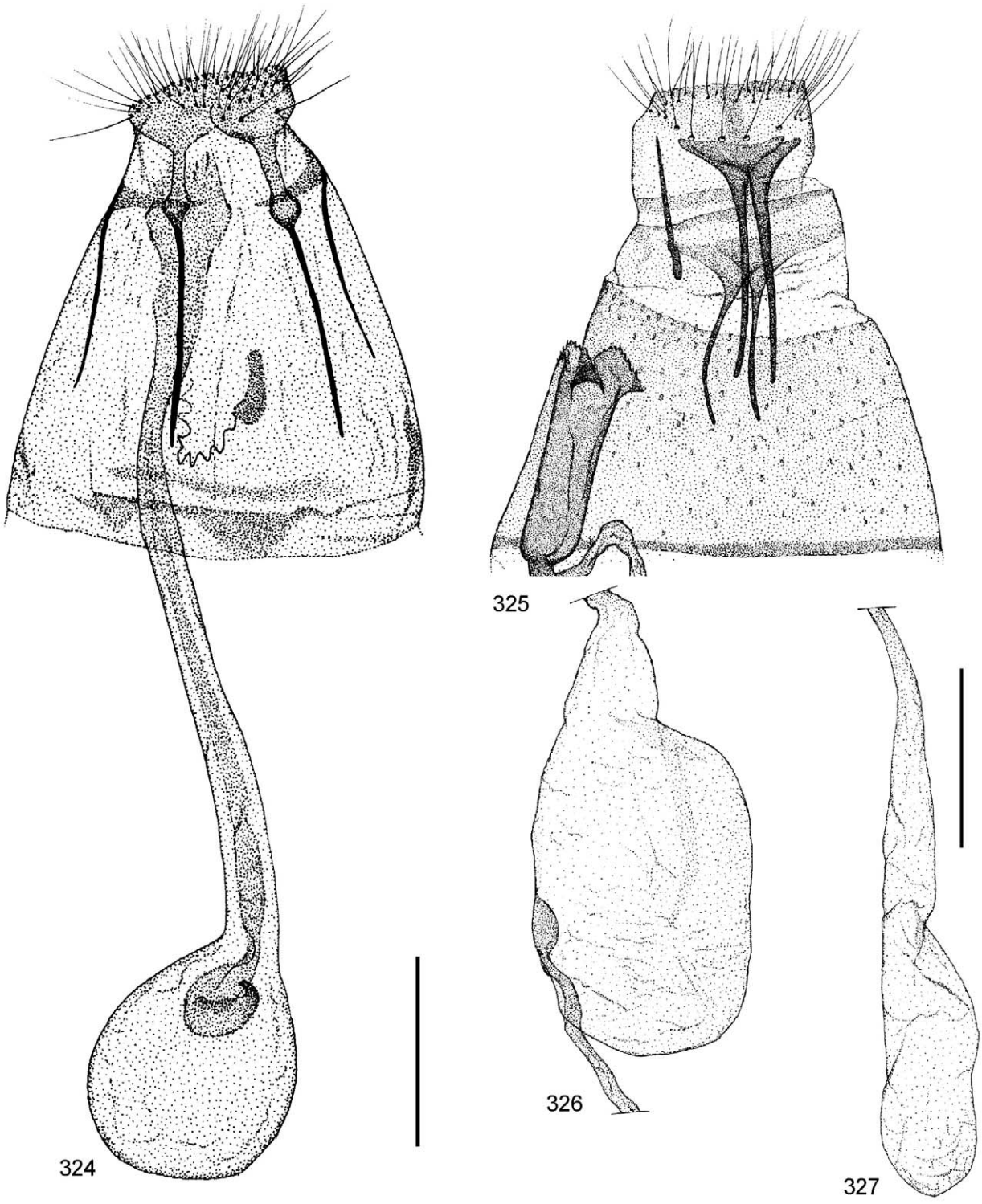
FIGURES 318–319. Female genitalia. Scale bar 200 µm. 318, *Phyllonorycter brachylaenae*, genitalia prep. De Prins 3710, in ZMHB. 319, *Phyllonorycter dombeyae*, paratype, genitalia prep. MRAC/KMMA 00459, in RMCA.



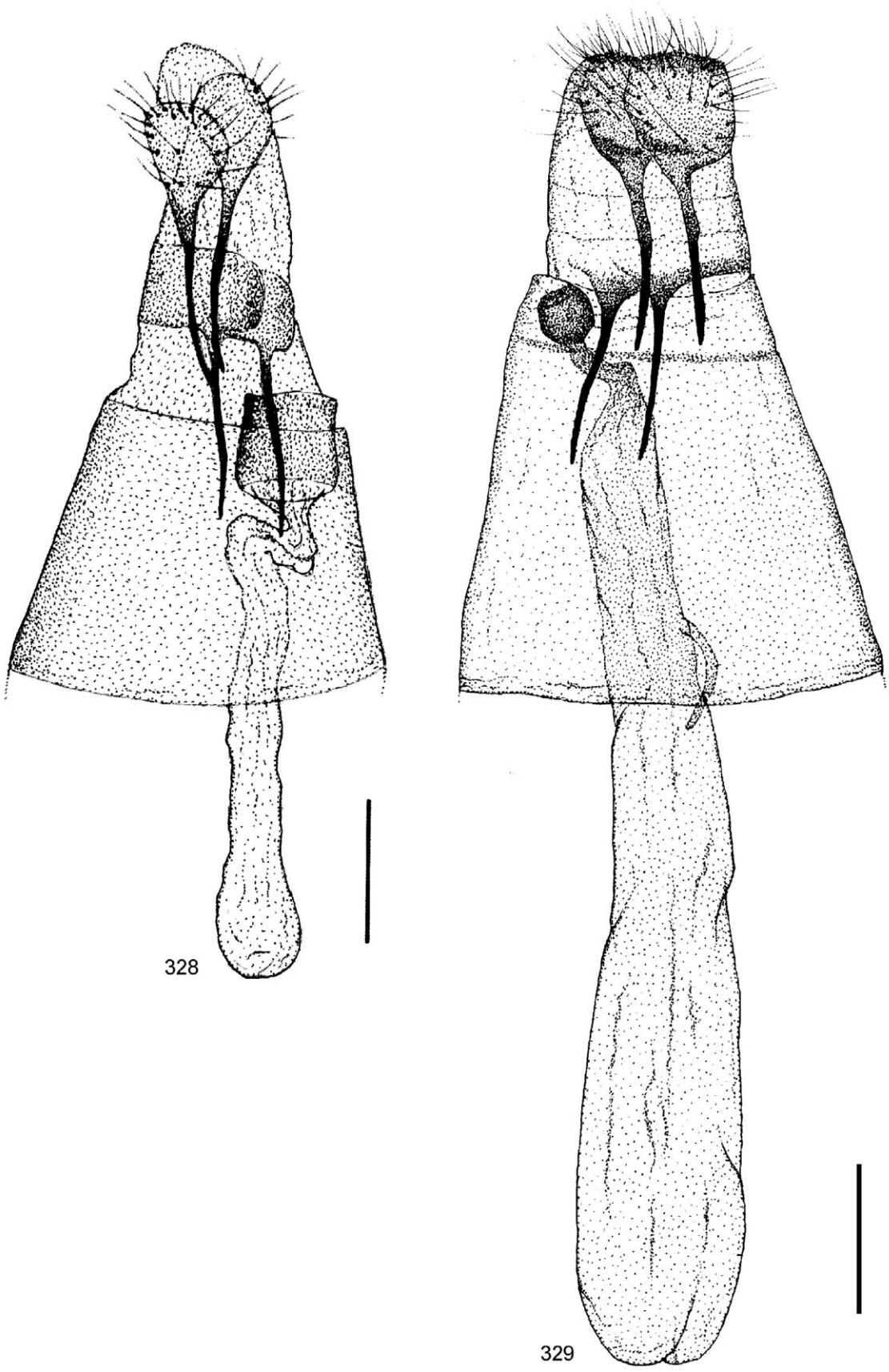
FIGURES 320–321. Female genitalia. Scale bar 200 µm. 320, *Phyllonorycter hibiscina*, paratype, the drawing is made by Willy De Prins after the genitalia prep. Vári 7187, in TMSA. 321, *Phyllonorycter ipomoellus*, holotype, genitalia prep. MRAC/KMMA 00484, in RMCA.



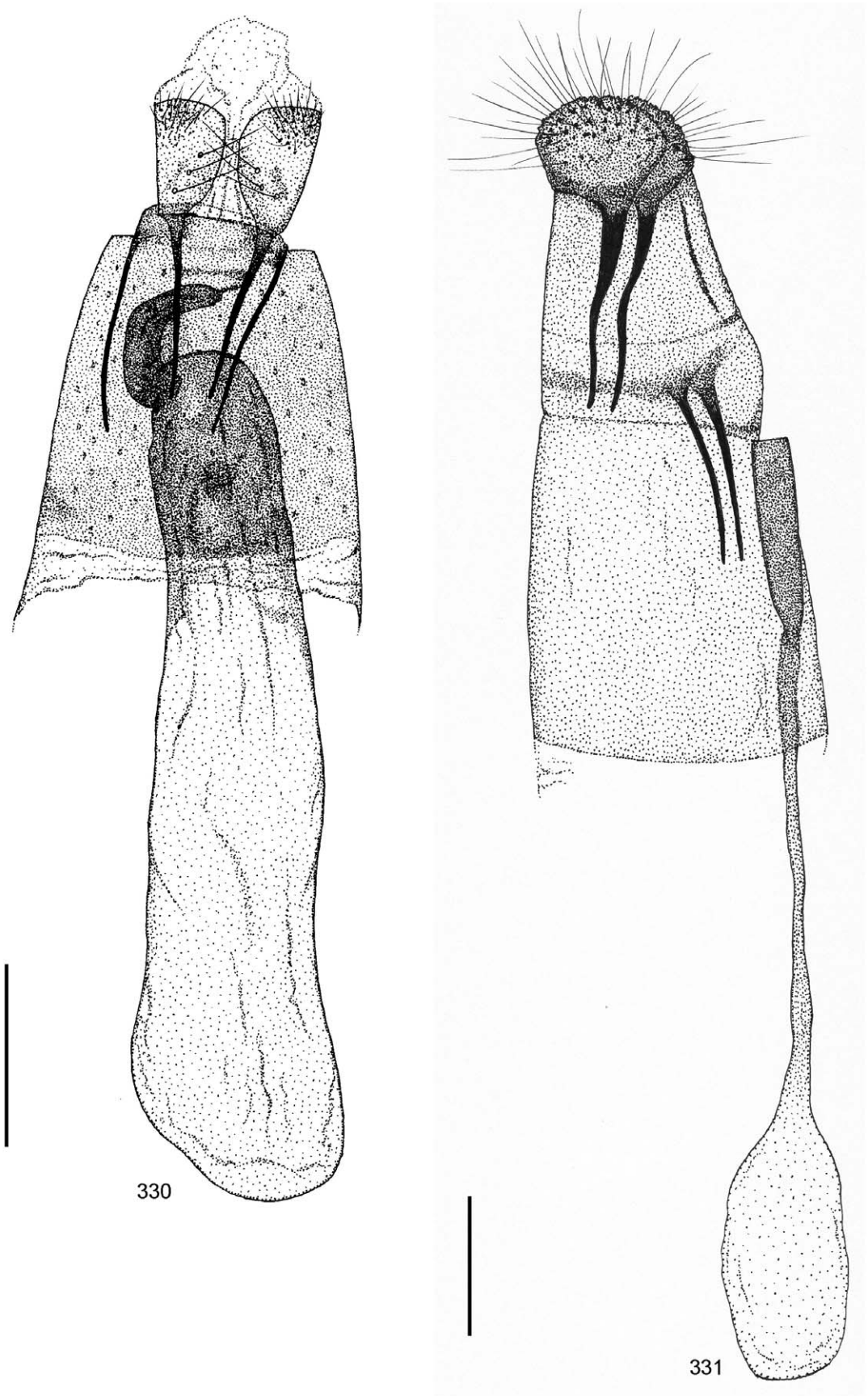
FIGURES 322–323. Female genitalia. Scale bar 200 µm. 322, *Phyllonorycter turensis*, holotype, genitalia prep. De Prins 3493, in BMNH. 323, *Phyllonorycter hibiscola*, paratype, genitalia prep. MRAC/KMMA 00384, in RMCA.



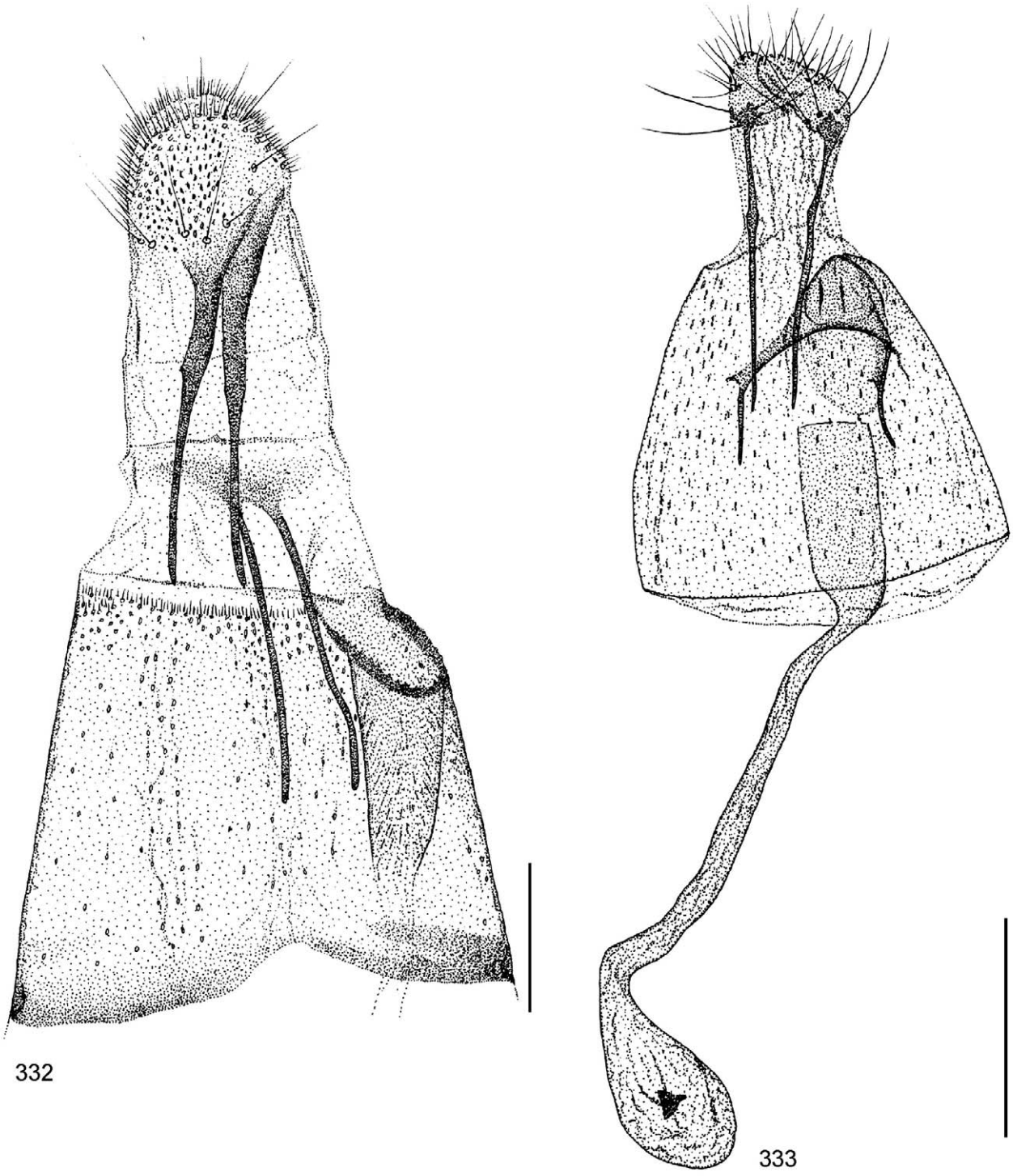
FIGURES 324–327. Female genitalia. Scale bar 200 µm. 324, *Phyllonorycter jabalshamsi*, paratype, genitalia prep. De Prins 3711, in ZMUC. 325–327, *Phyllonorycter lemarchandi*, paratype, genitalia prep. De Prins 3558, in MNHN. 325, segments VII–X, lateral view. 326, corpus bursae. 327, accessory bursae.



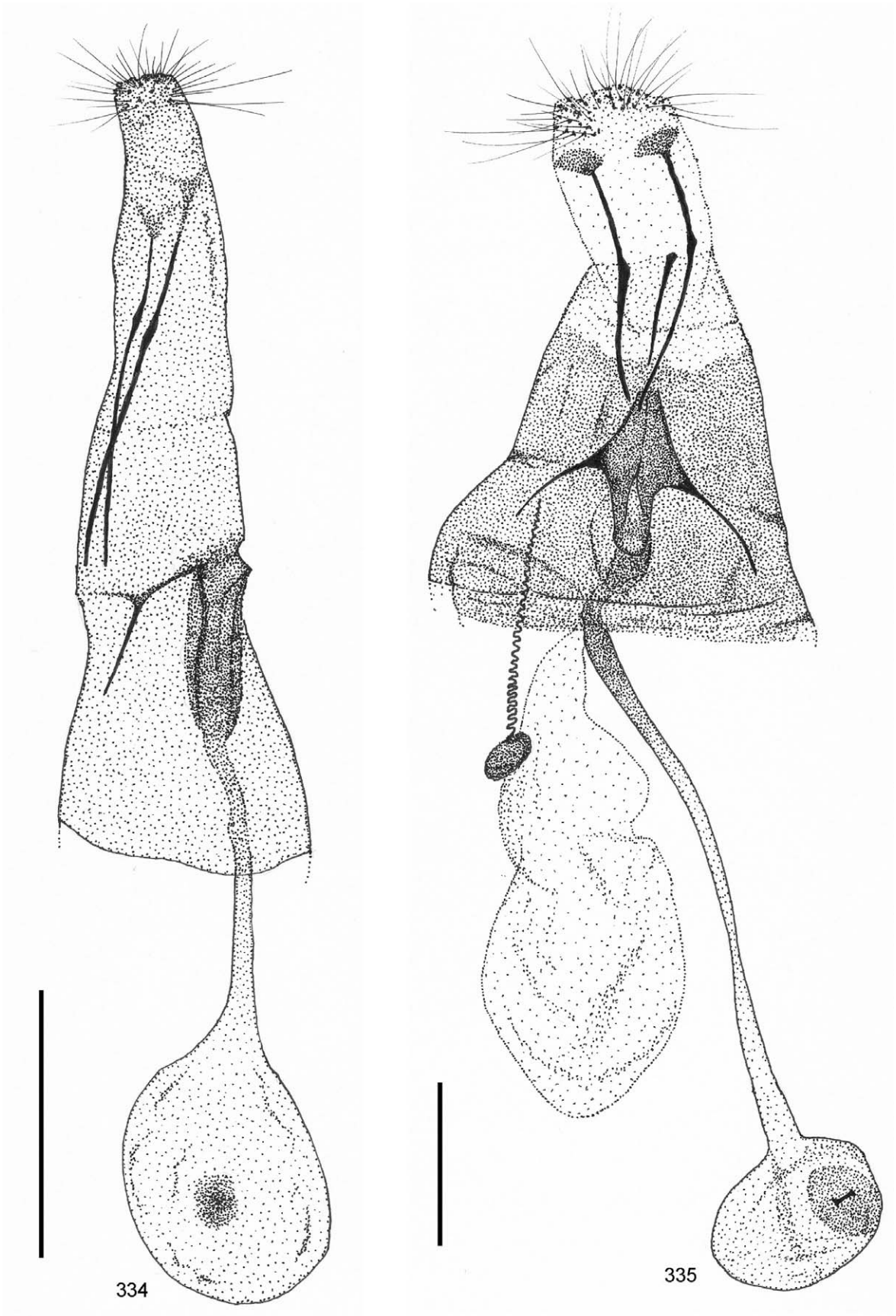
FIGURES 328–329. Female genitalia. Scale bar 200 µm. 328, *Phyllonorycter caudasimplex*, holotype, the drawing is made by Willy De Prins after the original description, examination of the genitalia prep. 21279, in BMNH and the drawing of Bland (1980: 33, fig. 2c). 329, *Phyllonorycter leucaspis*, paratype, the drawing is made by Willy De Prins after the original description, examination of the genitalia prep. trb 2793 in ZMHB and the drawing of Triberti (1980: 81–82, fig. 6d).



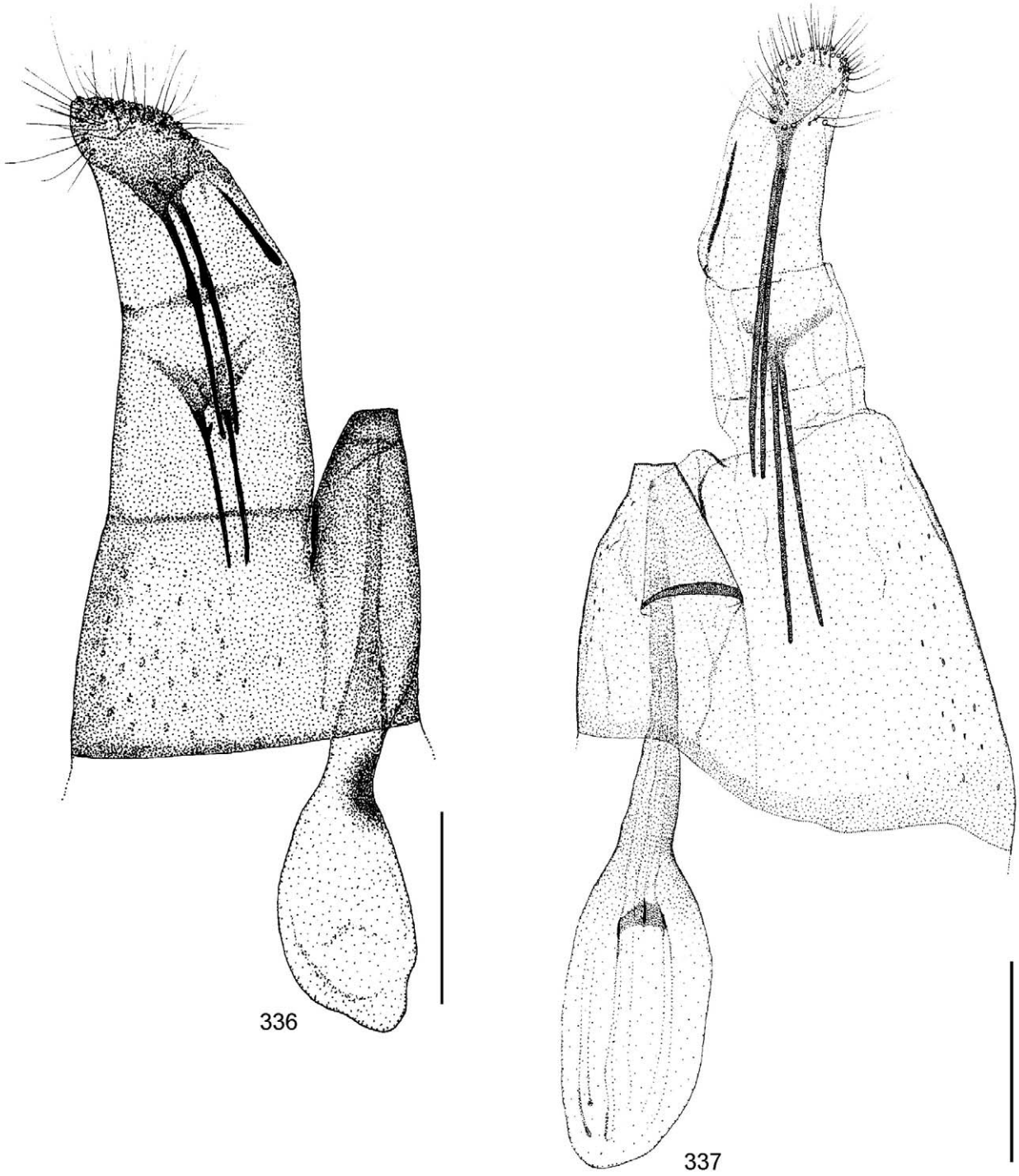
FIGURES 330–331. Female genitalia. Scale bar 200 µm. 330, *Phyllonorycter ruizivorus*, paratype, genitalia prep. 32528, in BMNH. 331, *Phyllonorycter didymopa*, holotype, the drawing is made by Willy De Prins after the genitalia prep. Vári 7169, in TMSA.



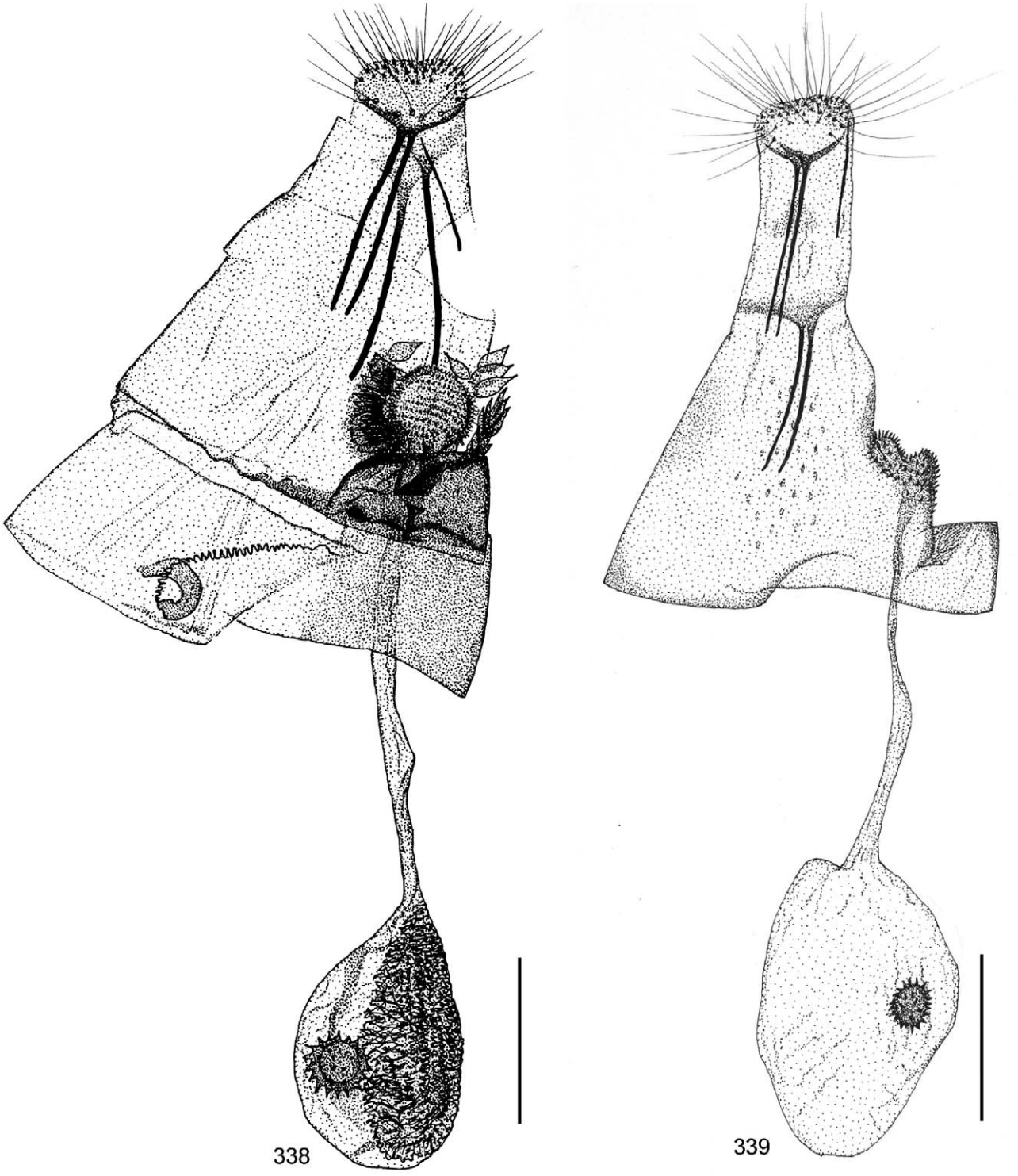
FIGURES 332–333. Female genitalia. Scale bar 200 µm. 332, *Phyllonorycter loxozona*, holotype, the drawing is made by Willy De Prins after the genitalia prep. 6110, in BMNH. 333, *Phyllonorycter aarviki*, holotype, genitalia prep. MRAC/KMMA 00370, in RMCA.



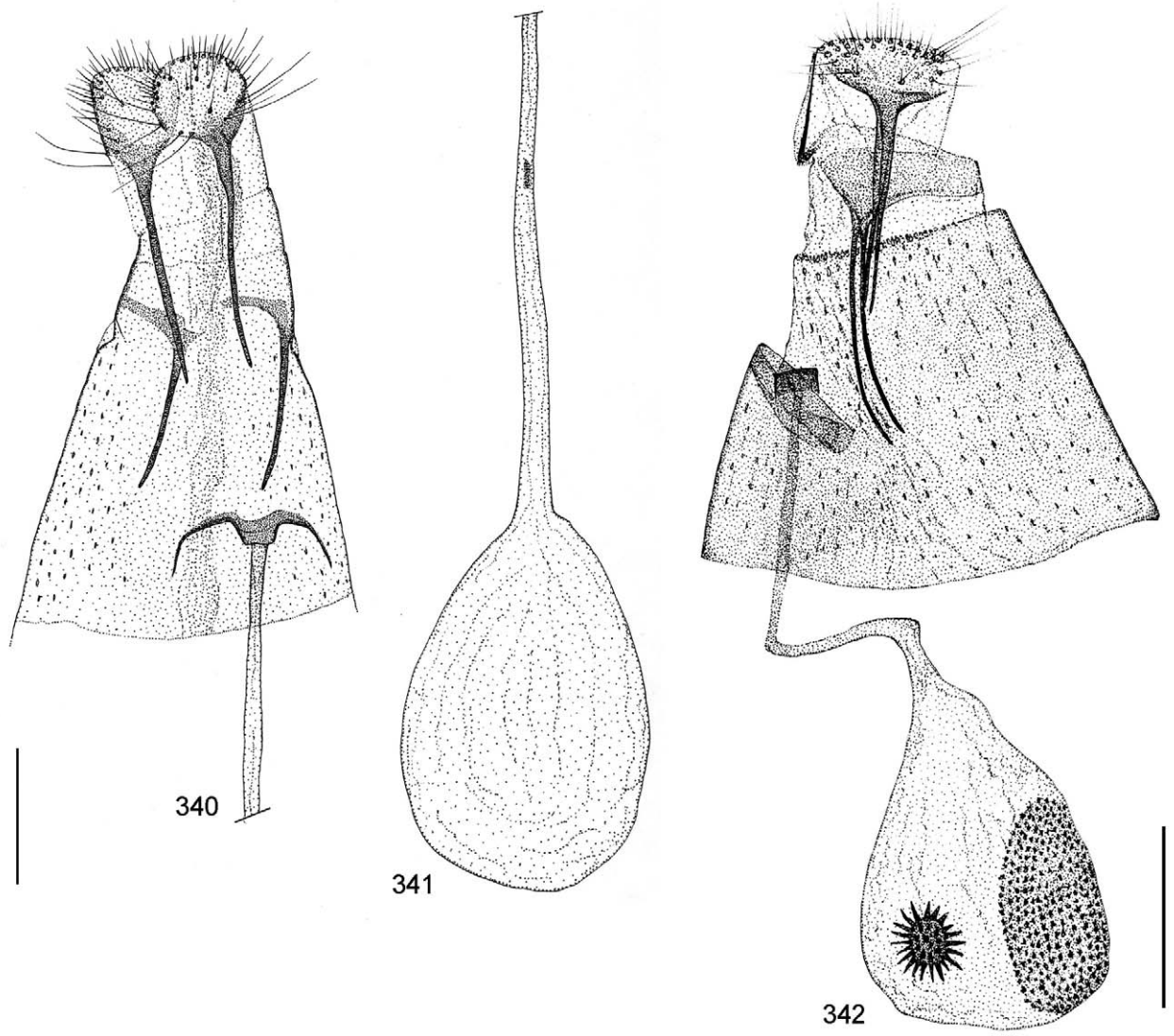
FIGURES 334–335. Female genitalia. Scale bar 200 µm. 334, *Phyllonorycter anchistea*, paratype, the drawing is made by Willy De Prins after the genitalia prep. Vári 7139, in TMSA. 335, *Phyllonorycter melanosparta*, genitalia prep. MRAC/ KMMA 00374, in RMCA.



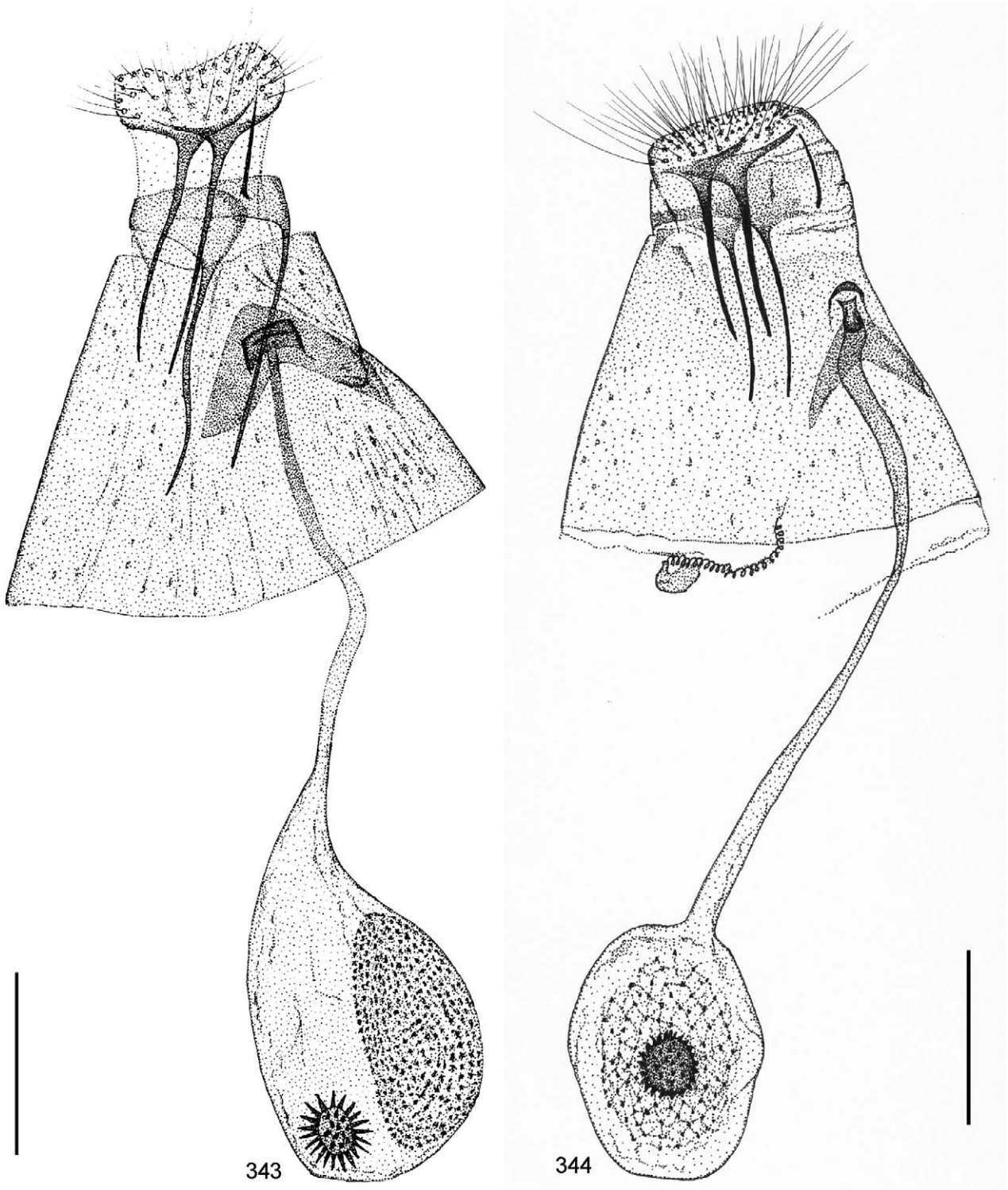
FIGURES 336–337. Female genitalia. Scale bar 200 µm. 336, *Phyllonorycter melhaniae*, paratype, the drawing is made by Willy De Prins after the genitalia prep. Vári 7496, in TMSA. 337, *Phyllonorycter rongensis*, holotype, genitalia prep. MRAC/KMMA 00383, in RMCA.



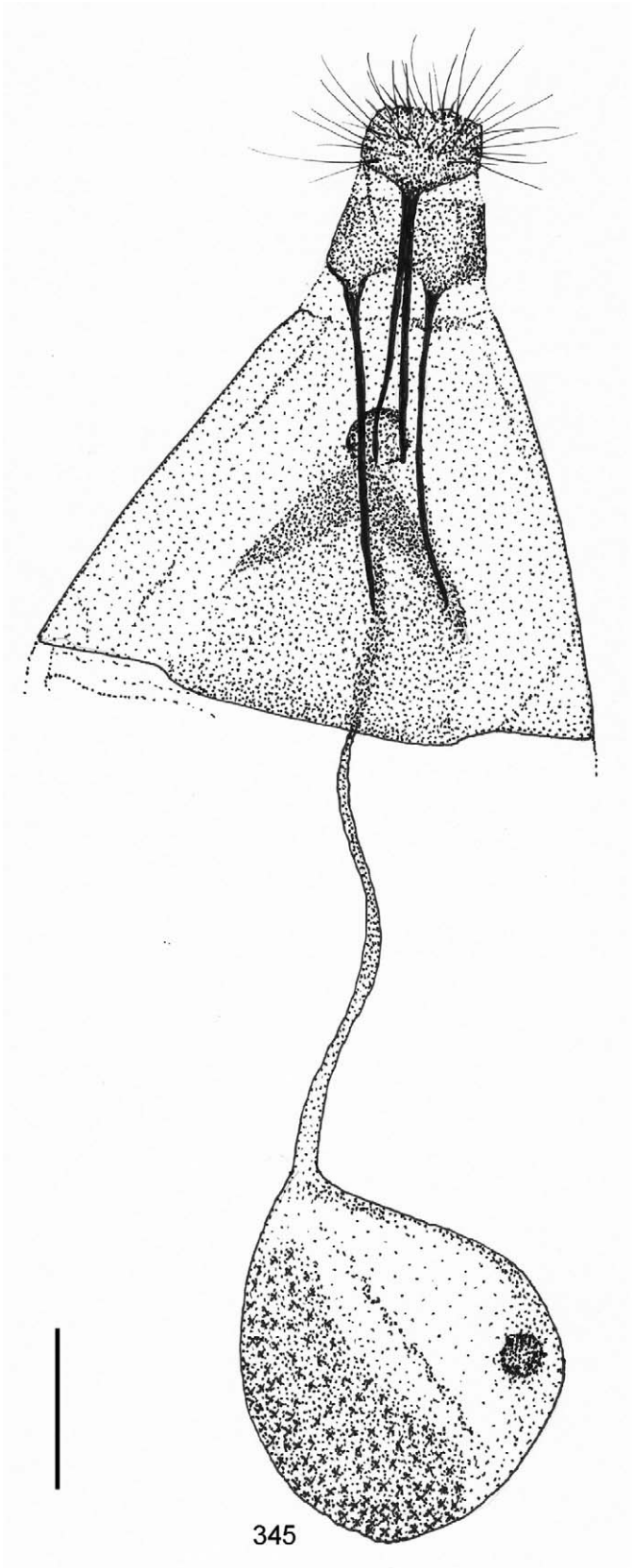
FIGURES 338–339. Female genitalia. Scale bar 200 µm. 338, *Phyllonorycter mida*, paratype, genitalia prep. 3715, in ZMUC. 339, *Phyllonorycter tsavensis*, paratype, genitalia prep. Vári 7501, in TMSA.

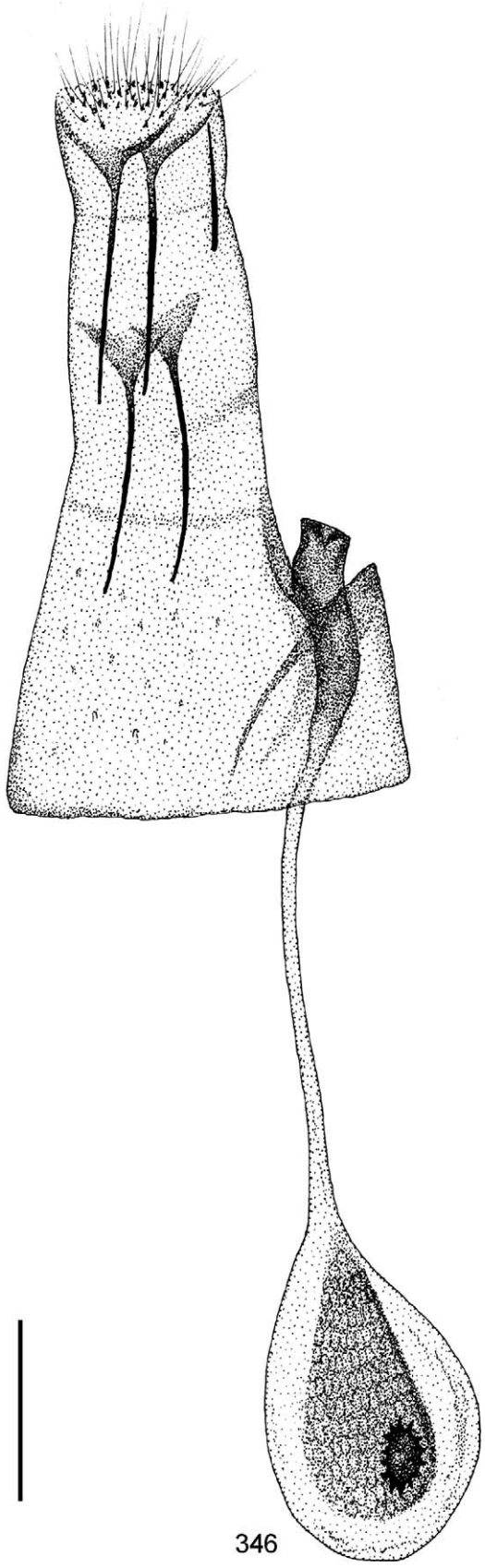


FIGURES 340–342. Female genitalia. Scale bar 200 µm. 340–341, *Phyllonorycter obandai*, genitalia prep. De Prins 3503, in BMNH. 340, segments VII–X, ventral view. 341, corpus bursae. 342, *Phyllonorycter farensis*, paratype, genitalia prep. MRAC/KMMA 00282, in RMCA.

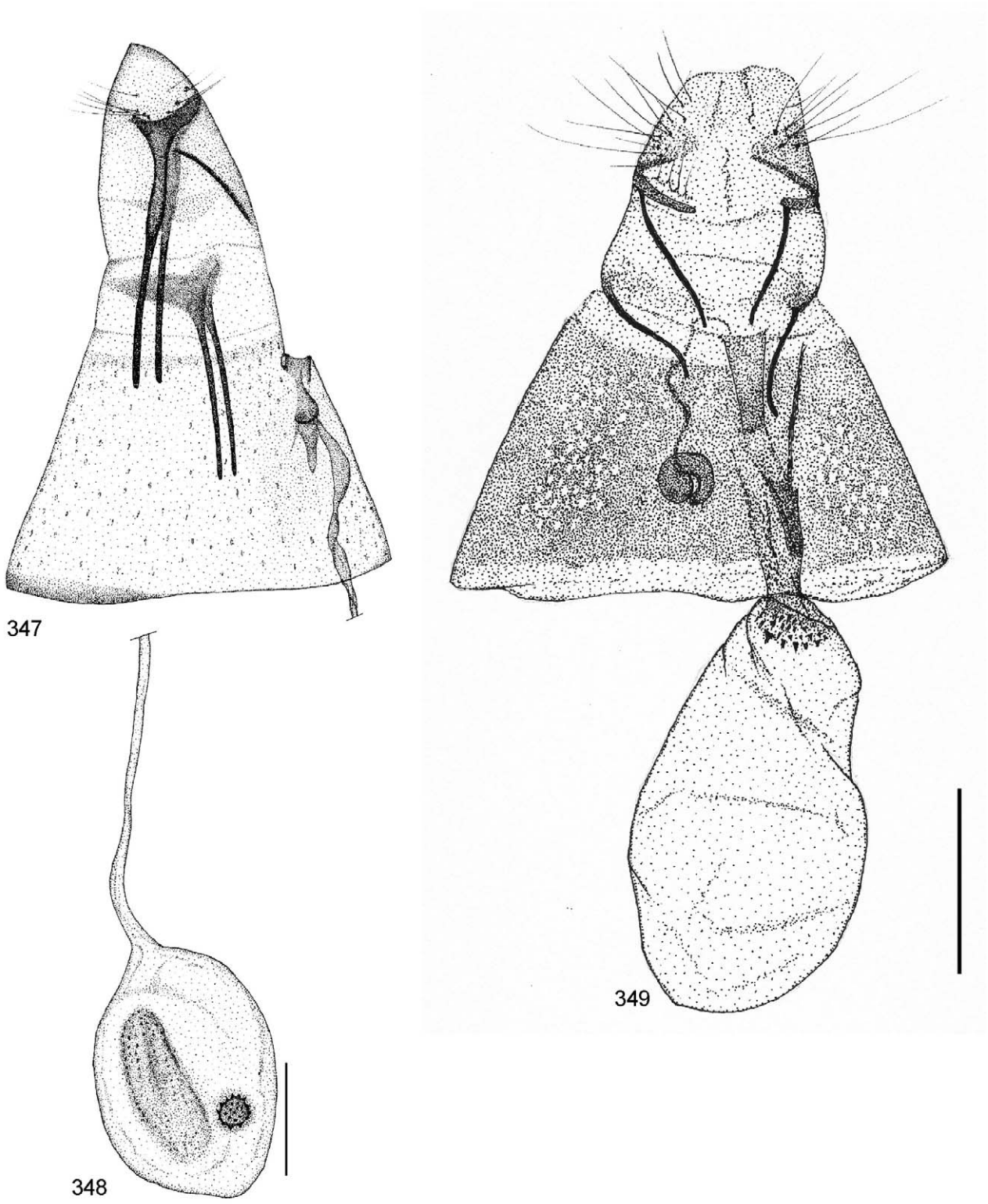


FIGURES 343–344. Female genitalia. Scale bar 200 µm. 343, *Phyllonorycter gozmanyi*, paratype, genitalia prep. MRAC/KMMA 00281, in RMCA. 344, *Phyllonorycter mwatawalai*, holotype, genitalia prep. MRAC/KMMA 00525, in RMCA.

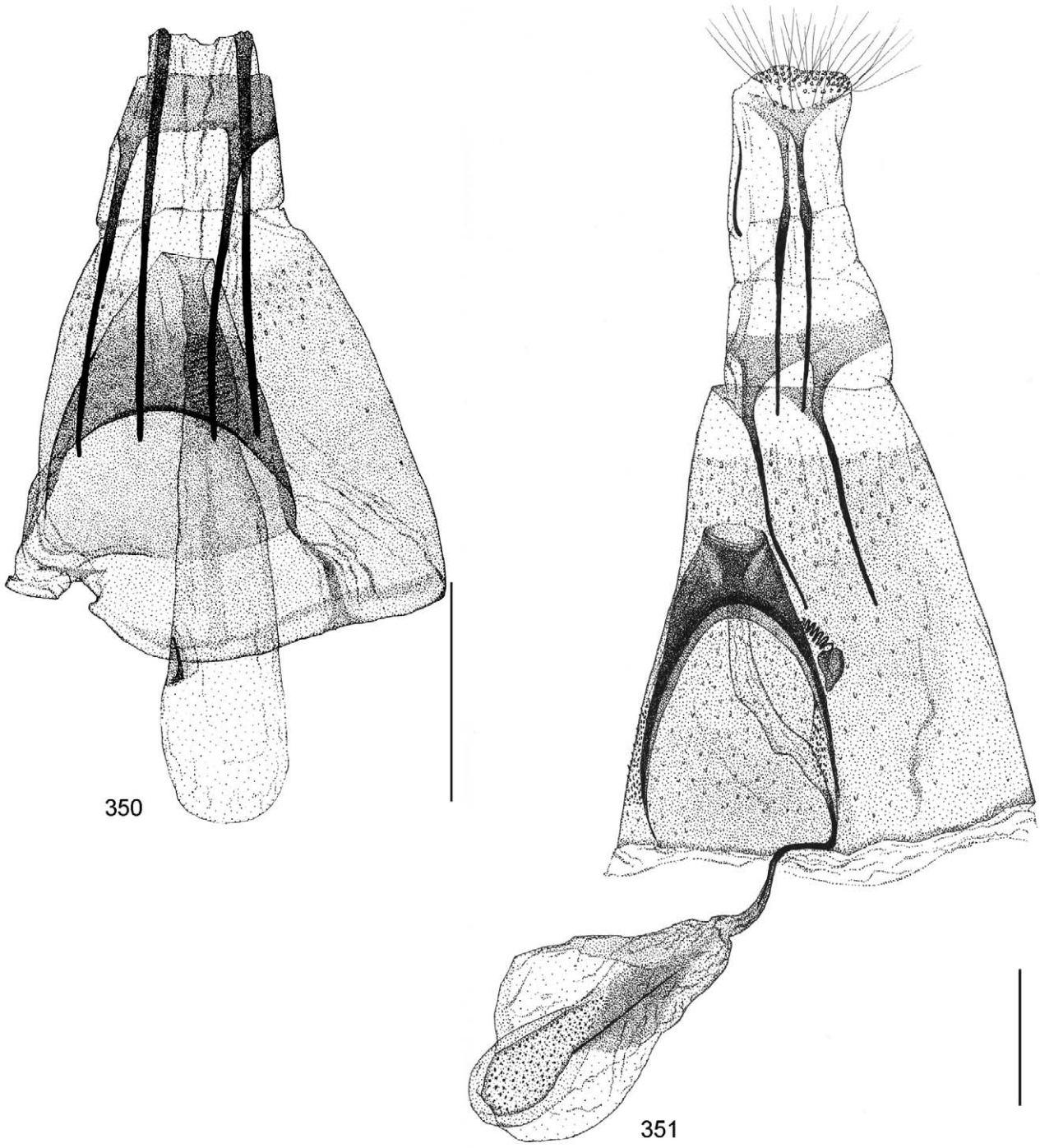




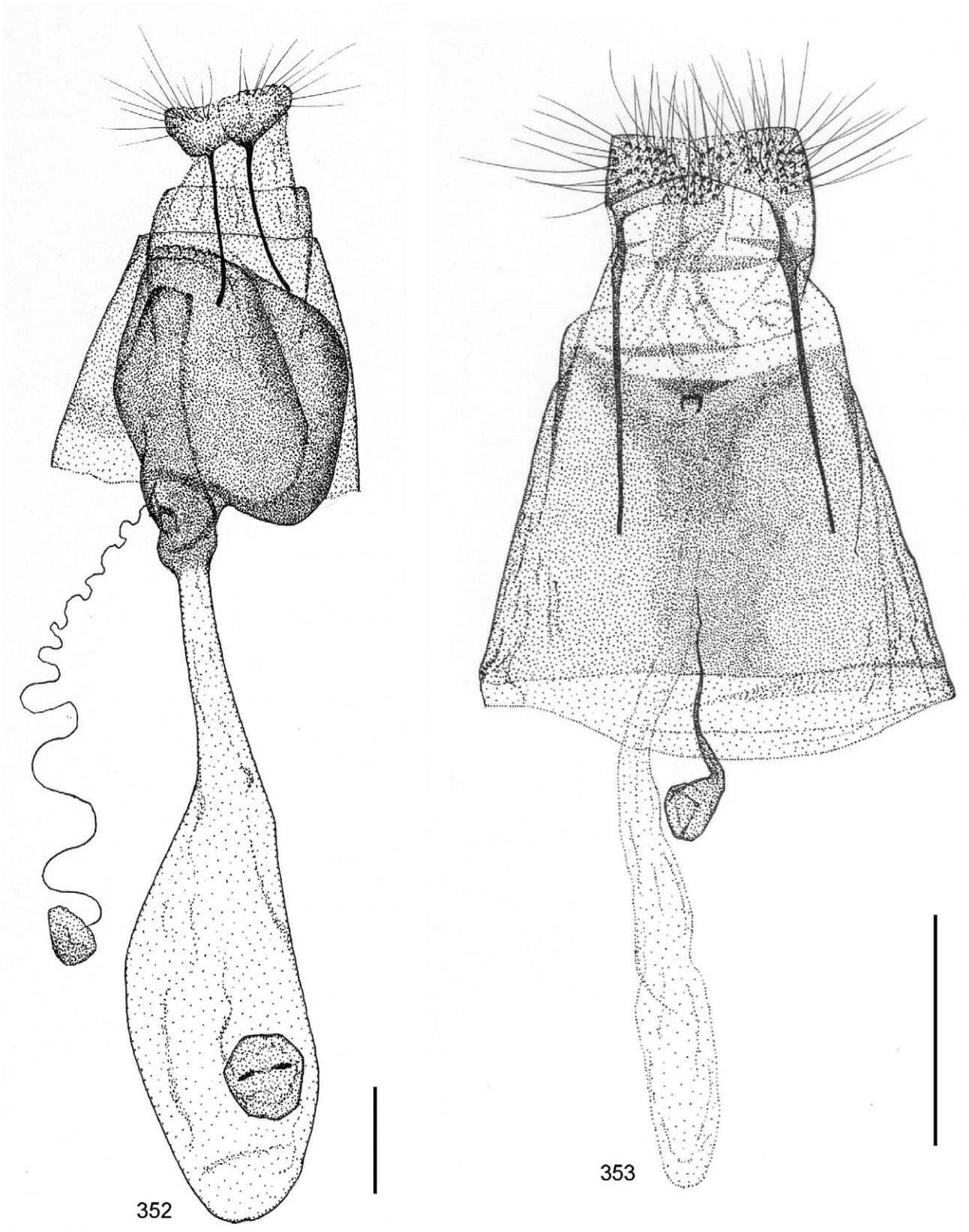
FIGURES 345–346. Female genitalia. Scale bar 200 µm. 345, *Phyllonorycter ocimellus*, paratype, genitalia prep. MRAC/KMMA 00353, in RMCA. 346, *Phyllonorycter pavoniae*, paratype, the drawing is made by Willy De Prins after the genitalia prep. Vári 7497, in TMSA.



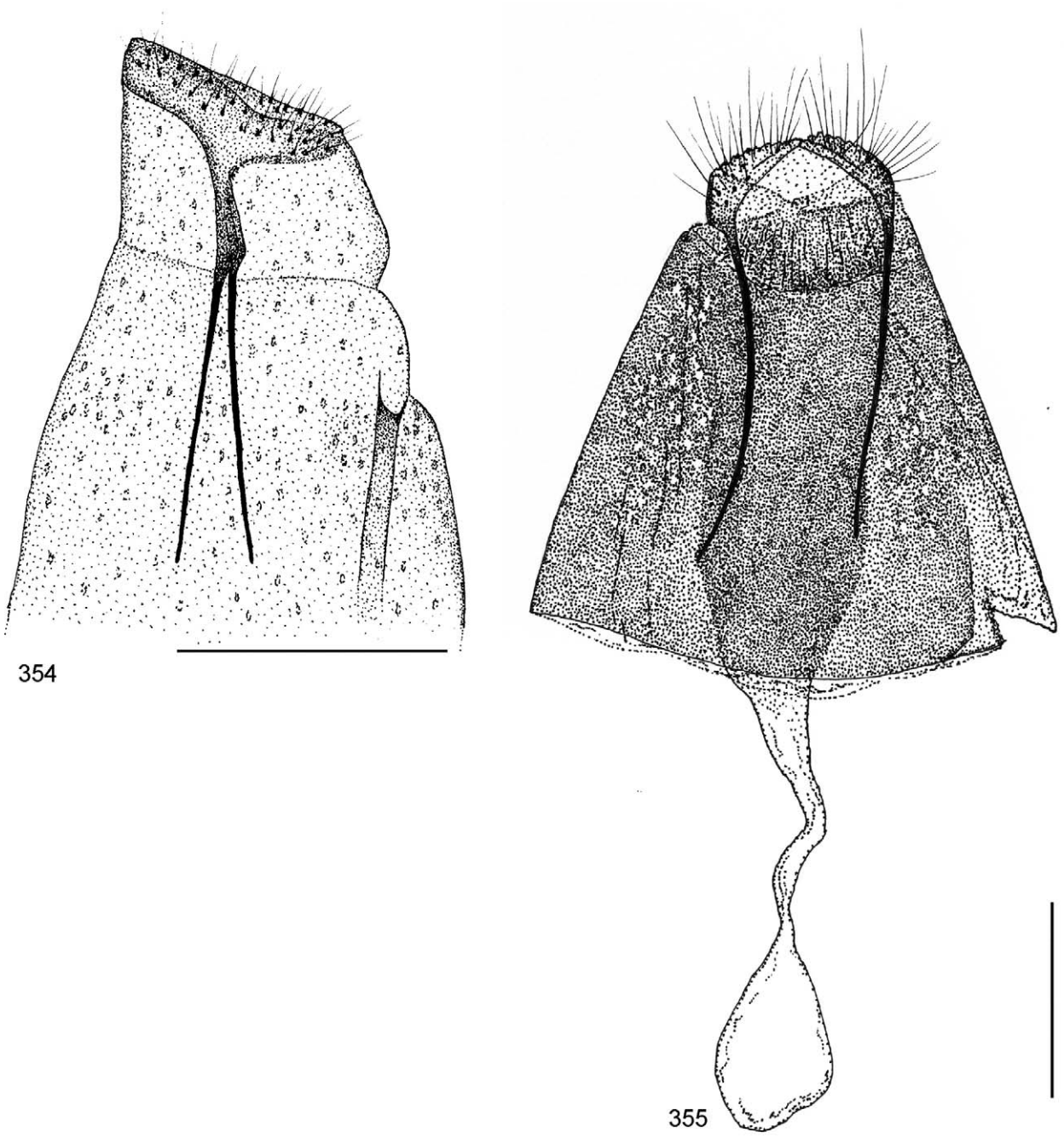
FIGURES 347–349. Female genitalia. Scale bar 200 µm. 347–348, *Phyllonorycter rhynchosiae*, paratype, the drawing is made by Willy De Prins after the genitalia prep. Vári 7123, in TMSA. 347, segments VII–X, lateral view. 348, corpus bursae. 349, *Phyllonorycter ruwenzori*, paratype, genitalia prep. 32534, in BMNH.



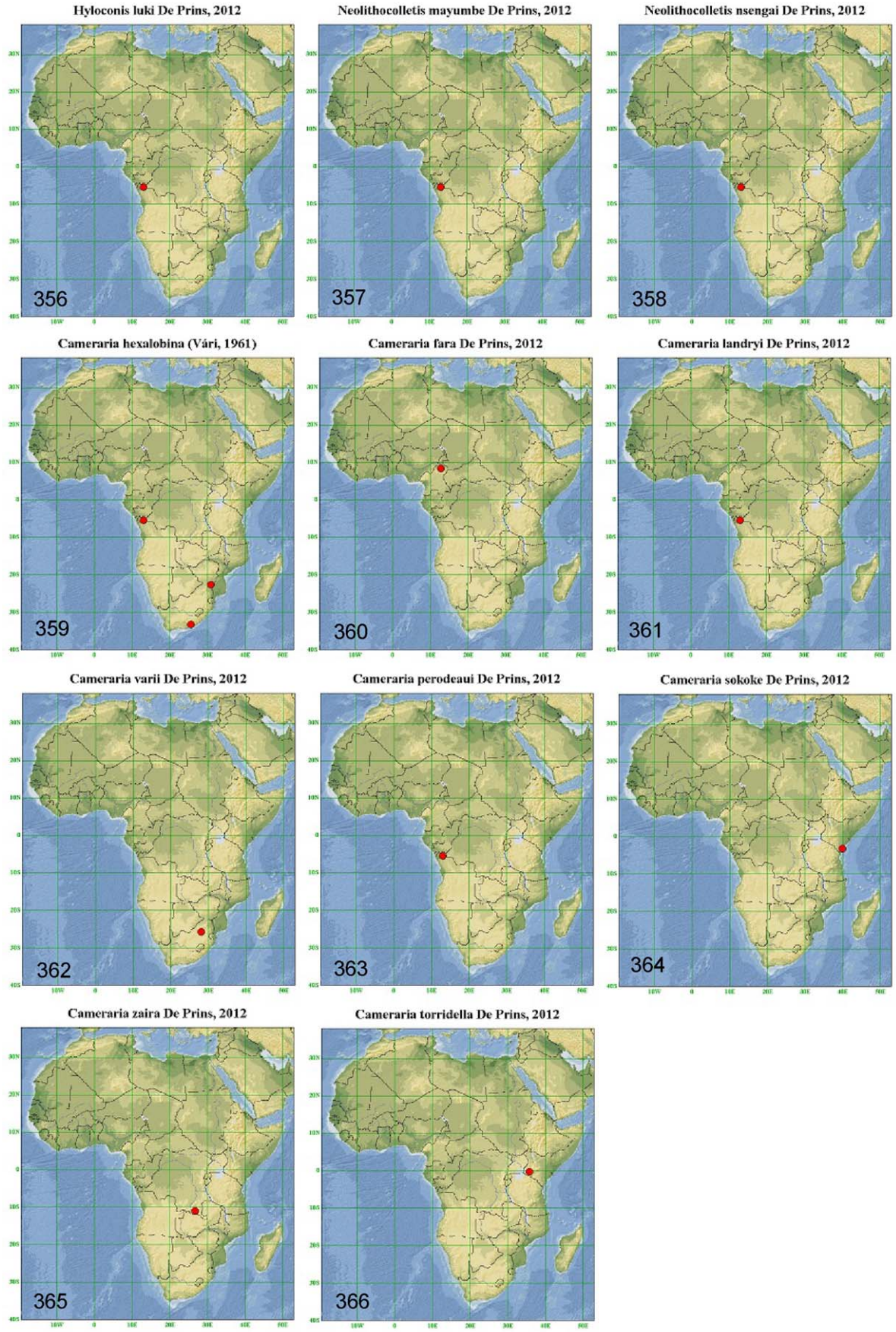
FIGURES 350–351. Female genitalia. Scale bar 200 µm. 350, *Phyllonorycter silvicola*, holotype, genitalia prep. MRAC/KMMA 00386, in RMCA. 351, *Phyllonorycter umukarus*, holotype, genitalia prep. MRAC/KMMA 00487, in RMCA.



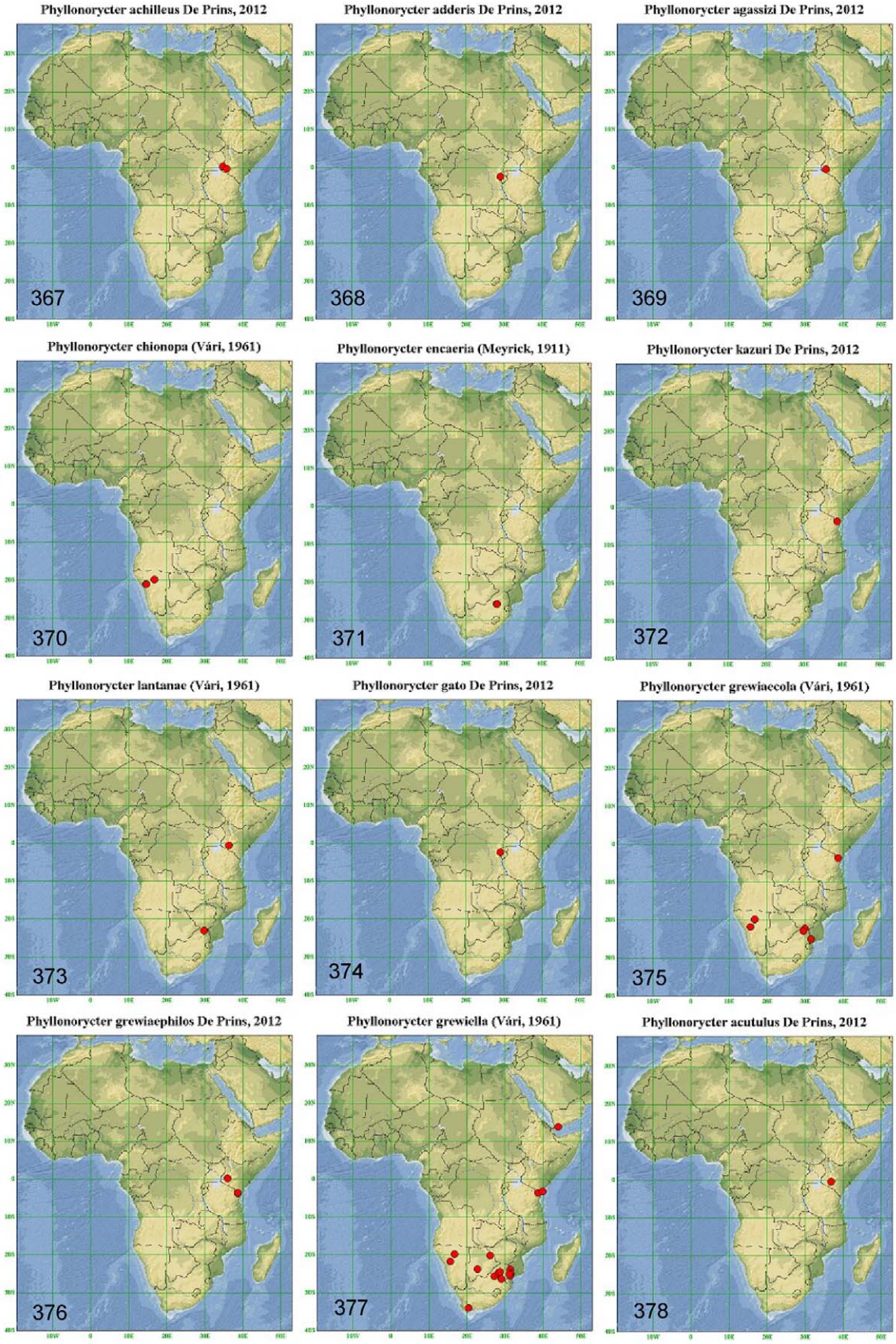
FIGURES 352–353. Female genitalia. Scale bar 200 μm. 352, *Cremastobombycia kipepeo*, paratype, genitalia prep. MRAC/KMMA 00390, in RMCA. 353, *Porphyrosela gautengi*, paratype, genitalia prep. MRAC/KMMA 00449, in RMCA.



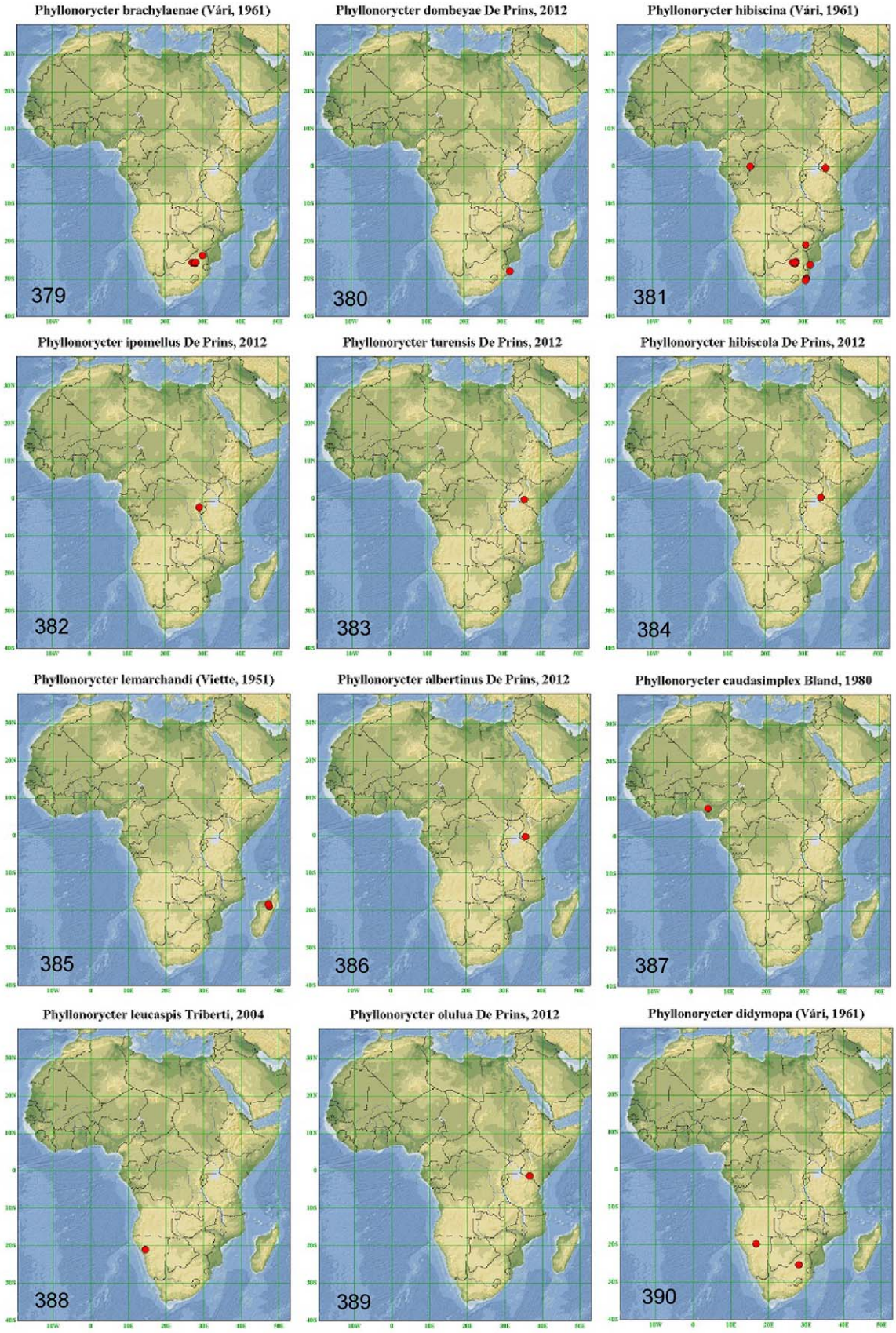
FIGURES 354–355. Female genitalia. Scale bar 200 µm. 354, *Porphyrosela homotropha*, paratype, the drawing is made by Willy De Prins after the original description and the drawing of Vári (1963: 12; fig. 11). 355, *Porphyrosela teramni*, genitalia prep. MRAC/KMMA 00433, in RMCA.



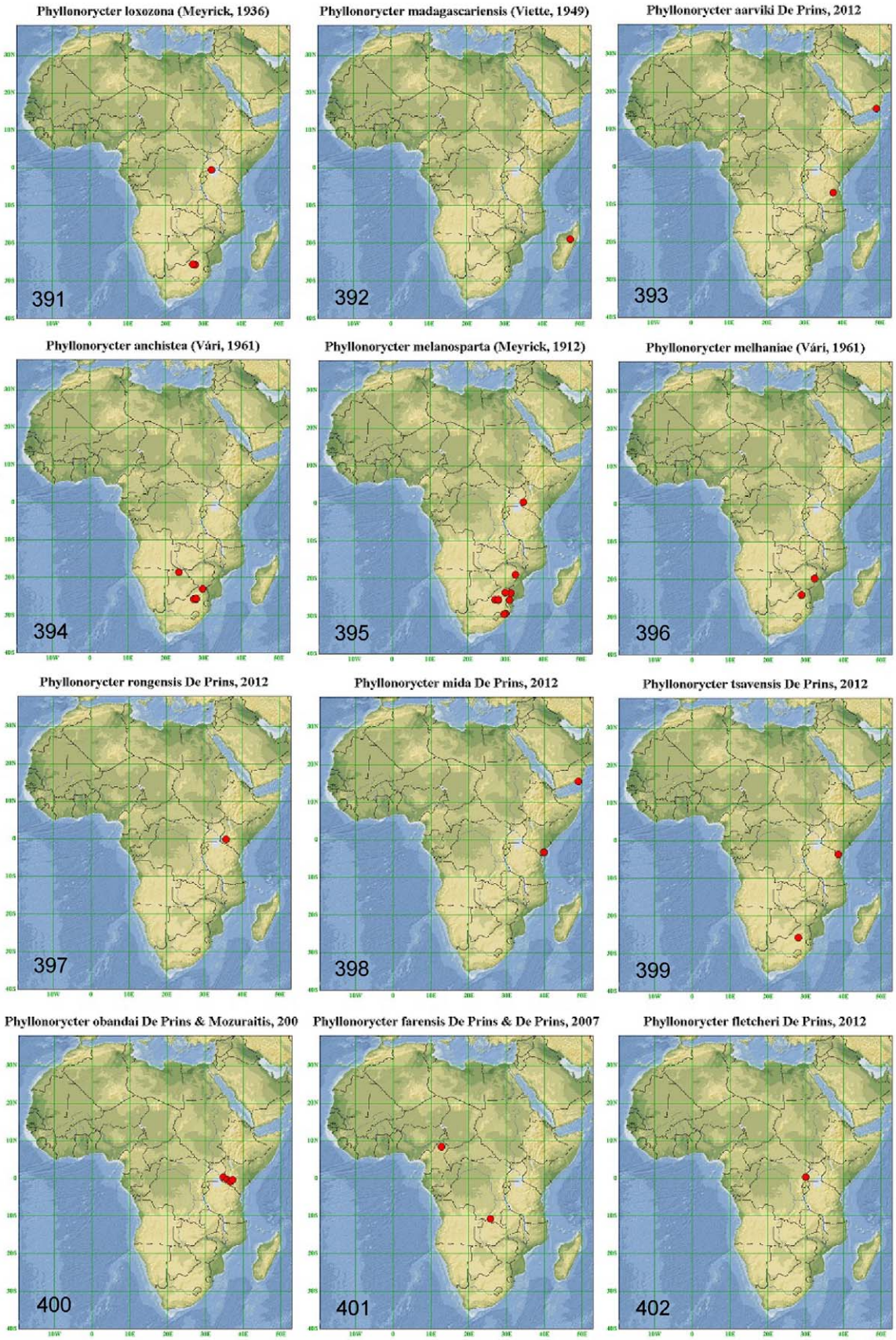
FIGURES 356–366. Distribution of Afrotropical Lithocolletinae species. 356, *Hyloconis luki*. 357, *Neolithocolletis mayumbe.* 358, *Neolithocolletis nsengai*. 359, *Cameraria hexalobina.* 360, *Cameraria fara*. 361, *Cameraria landryi.* 362, *Cameraria varii*. 363, *Cameraria perodeaui*. 364, *Cameraria sokoke*. 365, *Cameraria zaira*. 366, *Cameraria torridella.*



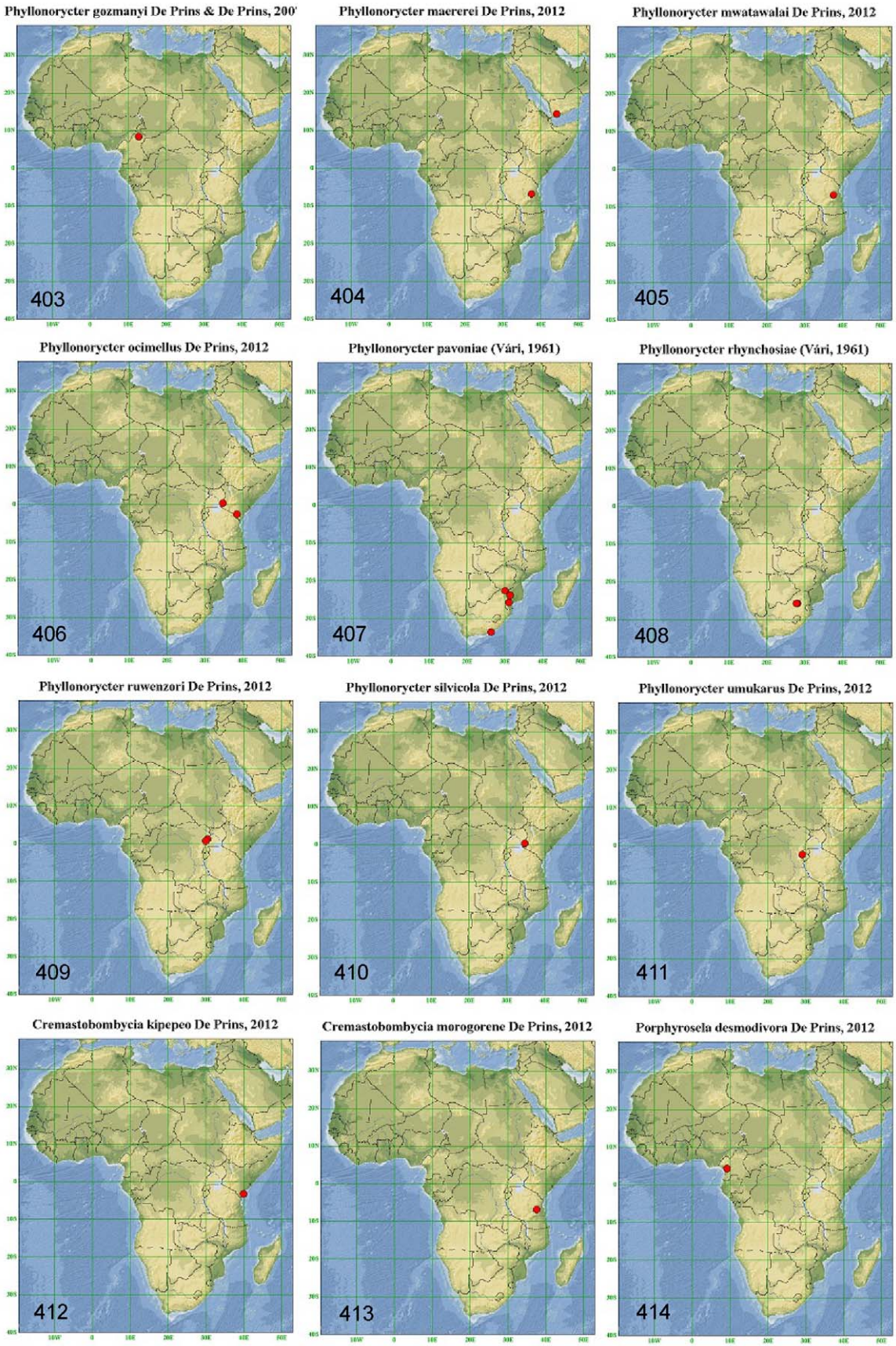
FIGURES 367–378. Distribution of Afrotropical Lithocolletinae species. 367, *Phyllonorycter achilleus*. 368, *Phyllonorycter adderis*. 369, *Phyllonorycter agassizi*. 370, *Phyllonorycter chionopa*. 371, *Phyllonorycter encaeria*. 372, *Phyllonorycter kazuri*. 373, *Phyllonorycter lantanae*. 374, *Phyllonorycter gato*. 375, *Phyllonorycter grewiaecola*. 376, *Phyllonorycter grewiaephilos*. 377, *Phyllonorycter grewiella*. 378, *Phyllonorycter acutulus*.



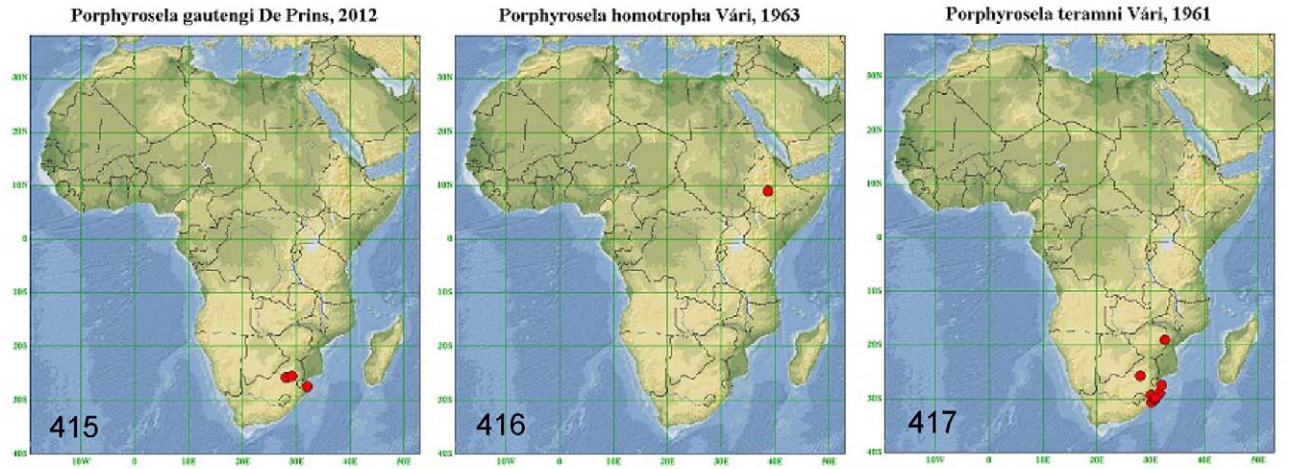
FIGURES 379–390. Distribution of Afrotropical Lithocolletinae species. 379, *Phyllonorycter brachylaenae*. 380, *Phyllonorycter dombeyae*. 381, *Phyllonorycter hibiscina*. 382, *Phyllonorycter ipomoellus*. 383, *Phyllonorycter turensis*. 384, *Phyllonorycter hibiscola*. 385, *Phyllonorycter lemarchandi*. 386, *Phyllonorycter albertinus*. 387, *Phyllonorycter caudasimplex*. 388, *Phyllonorycter leucaspis*. 389, *Phyllonorycter ololua*. 390, *Phyllonorycter didymopa*.



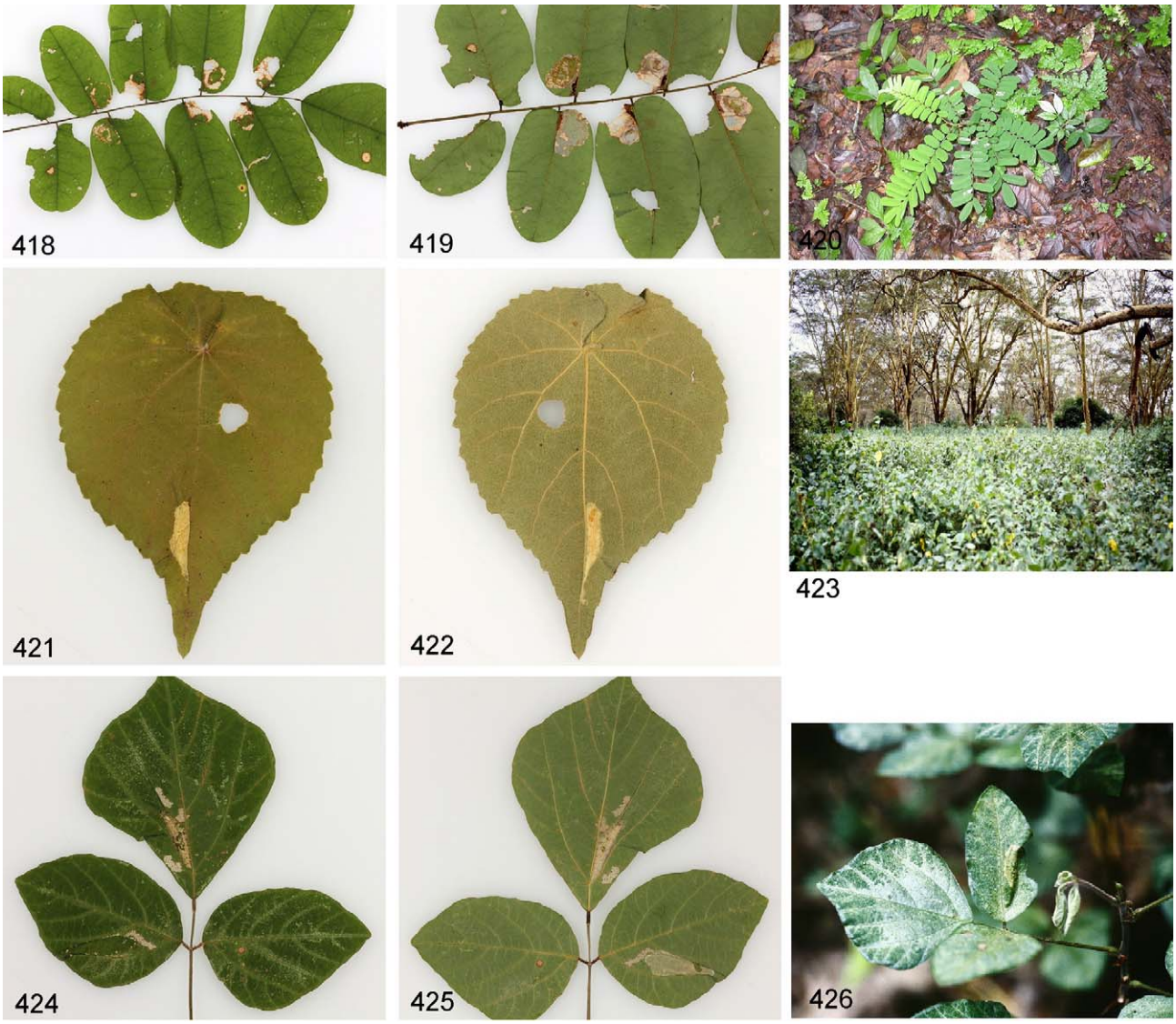
FIGURES 391–402. Distribution of Afrotropical Lithocolletinae species. 391, *Phyllonorycter loxozona*. 392, *Phyllonorycter madagascariensis*. 393, *Phyllonorycter aarviki*. 394, *Phyllonorycter anchistea*. 395, *Phyllonorycter melanosparta*. 396, *Phyllonorycter melhaniae*. 397, *Phyllonorycter rongensis*. 398, *Phyllonorycter mida*. 399, *Phyllonorycter tsavensis*. 400, *Phyllonorycter obandai*. 401, *Phyllonorycter farensis*. 402, *Phyllonorycter fletcheri*.



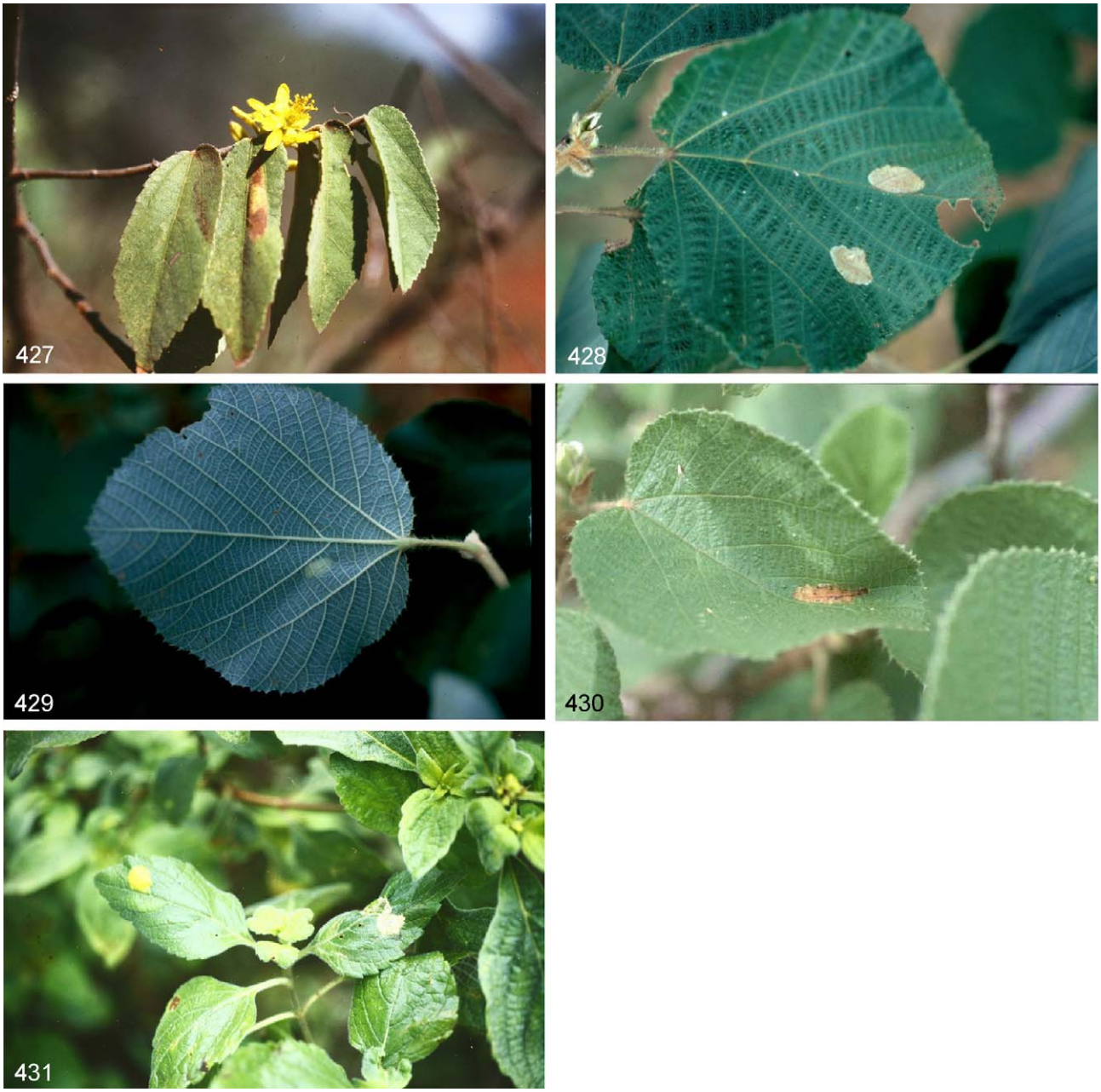
FIGURES 403–414. Distribution of Afrotropical Lithocolletinae species. 403, *Phyllonorycter gozmanyi*. 404, *Phyllonorycter maererei*. 405, *Phyllonorycter mwatawalai*. 406, *Phyllonorycter ocimellus*. 407, *Phyllonorycter pavoniae*. 408, *Phyllonorycter rhynchosiae*. 409, *Phyllonorycter ruwenzori*. 410, *Phyllonorycter silvicola*. 411, *Phyllonorycter umukarus*. 412, *Cremastobombycia kipepeo*. 413, *Cremastobombycia morogorene*. 414, *Porphyrosela desmodivora*.



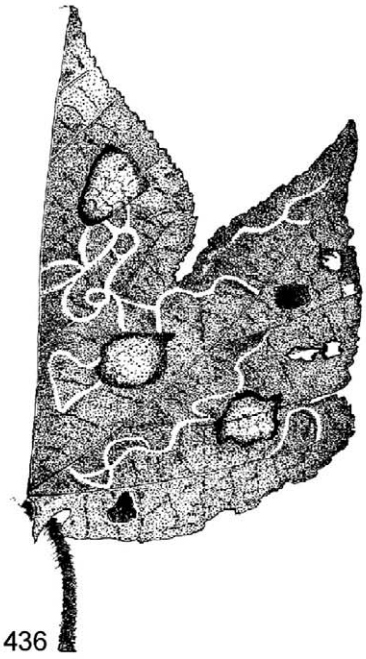
FIGURES 415–417. Distribution of Afrotropical Lithocolletinae species. 415, *Porphyrosela gautengi*. 416, *Porphyrosela homotropha*. 417, *Porphyrosela teramni*.



FIGURES 418–426. Leaf mines of Afrotropical Lithocolletinae species. 418–420, *Neolithocolletis nsengai* mine on *Dalbergia hostilis*[Fabaceae], Mayumbe Forest, 16 May 2007. 418, adaxial side. 419, abaxial blotch mine. 420, low under store host plant. 421–423, *Phyllonorycter hibiscina* mine on *Abutilon mauritianum* [Malvaceae], Nakuru, Kenya, 11 October 2001. 421, adaxial side. 422, abaxial tentiform mine. 423, the host plant dominates the understore vegetation of the habitat. 424–426, *Phyllonorycter melanosparta* mine on *Hylodesmum repandum* [Fabaceae], Kakamega Forest, Kenya, 25 March 2003. 424, adaxial side. 425, abaxial tentiform mine. 426, low under store host plant [Fabaceae].



FIGURES 427–431. Leaf mines of Afrotropical Lithocolletinae species. 427, *Phyllonorycter grewiaecola* abaxial mine on *Grewia tristis* [Malvaceae], Tsavo, Kenya, 12 April 2002. 428–429, *Phyllonorycter grewiaephilos* mine on *Grewia villosa* [Malvaceae], Tsavo, Kenya, 23 March, 2004. 428, adaxial side. 429, abaxial blotch/tentiform mine. 430, *Phyllonorycter grewiella* mine on *Grewia villosa* [Malvaceae], Tsavo, Kenya, 12 April 2002. 431, *Phyllonorycter ocimellus* mine on *Ocimum gratissimum* [Lamiaceae], Taita Hills, Kenya, 09 April, 2001.



FIGURES 432–436. Leaf mines of Afrotropical Lithocolletinae species. 432–433, *Phyllonorycter umukarus* mine on *Triumphetta cordifolia* [Malvaceae], Nyungwe, Rwanda, 28 July, 2008. 432, adaxial side. 433, host plant in open cutting. 434, *Phyllonorycter ipomoellus* mine on the climbing plant *Ipomoea bracteata* [Convolvulaceae], Nyungwe, Rwanda, 31 July, 2008. 435, *Phyllonorycter adderis* mine on *Urena lobata* [Malvaceae], Nyungwe, Rwanda, 03 August, 2008. 436, *Phyllonorycter madagascariensis* semi-transparrent, curved gallery mine which terminates as an irregular rounded blotch on *Dombeya spectabilis* [Malvaceae], Madagascar. The drawing is made by Willy De Prins after the description and the drawing of Paulian &Viette (1955: 157, fig. 15).

FIGURES 437–440. Habitats of Afrotropical Lithocolletinae species. 437, Arabuko Sokoke Forest, Kenya, April 2001. The habitat contains elements of coastal mixed forest as well as miombo / *Cynometra* woodland. 438, Tsavo, Kenya, April 2002. The habitat contains elements of semi-arid grassland and savannah. 439, Ololua Forest, Rift Valley, Kenya, April 2002. The habitat is dominated by tree vegetation. 440, Taita Hills, Kenya, April 2003. The habitat is a precambrian mountain range covered with moist forest housing many endemic species of flora and fauna.

FIGURES 441–445. Habitats of Afrotropical Lithocolletinae species. 441, Kakamega Forest, Kenya, April 2003. The habitat is the most eastern relict of the Guineo-Congolian rainforest. 442, Faro River area, Cameroon, May 2005. The habitat is a repeatedly burned savannah and bush land. 443, Mayumbe Forest, Democratic Republic of the Congo, May 2007. The habitat is an undisturbed primary rain forest. 444, Nyungwe Forest, Rwanda, August 2008. The habitat is a montane rain forest. 445, Morogoro are, Tanzania, July 2009. The habitat is variable: transitional dry lowland /submontane woodland.

FIGURES 446–447. Contributors to this study. 446, from left: Lajos Vári, Jurate De Prins and Willy De Prins in the Lepidoptera collection of the Ditsong National Museum of Natural History (formerly Transvaal Museum), Pretoria, South Africa, 20 November, 2004. 447, from left: Akito Kawahara, Jurate De Prins, Willy De Prins and local forest guide in Mayumbe Forest, Democratic Republic of the Congo after 8 hours of tracking, 23 May 2007.