

## New species and taxonomic changes in Sesiini from Asia and Europe (Sesiidae)

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**Abstract.** Two new clearwing moth species (Sesiidae) of the tribe Sesiini are described, *Cyanosesia ormosiae* sp. n. from Hong Kong, China, and *Lamellisphecia xerampelina* sp. n. from Kullu, Northern India. *C. ormosiae* was reared from larvae collected in the trunks of *Ormosia pachycarpa* (Fabaceae); *L. xerampelina* was collected with the help of pheromone lures. Furthermore, a number of taxonomic changes are introduced for the tribe Sesiini. *Sphecodoptera* Hampson, [1893] (gen. rev.) is resurrected from synonymy with *Sesia* Fabricius, 1775, and *Scasiba* Matsumura, 1931 (syn. n.) is established as its junior synonym. *Vespisesia* Heppner, 2010 (syn. n.) is found to be a junior synonym of *Sphecosesia* Hampson, 1910, and *Clavisphecia* nom. n. is introduced as a replacement name for *Clavigera* Kallies & Arita, 2004 (a homonym of *Clavigera* Hector, 1879 in Brachiopoda). *Synanthedon catalina* Meyrick, 1926 (syn. n.) is considered a junior synonym of *Sphecodoptera repanda* (Walker, 1856) comb. rev. Finally, the western Palaearctic species *Sesia melanocephala* Dalman, 1816 is transferred to the genus *Eusphecia* Le Cerf, 1937 (comb. n.).

### Introduction

The members of Sesiini of Palaearctic and Oriental regions were revised relatively recently (Kallies & Arita 2004, Špatenka et al. 1999). Since then only a small number of additional taxa have been described and few taxonomic changes introduced (Fischer 2005, Heppner 2010, Kallies & de Freina 2009, Petersen & Lingenhöle 1998).

Sesiini of the Palaearctic are well known and their diversity at least at the generic level is relatively low. Only three genera with 25 species are recognized, most of which occur in central and eastern Asia. Conversely, the Sesiini fauna of Southeast Asia is only partly known, but with nine genera and 54 named species, it shows a diversity unmatched anywhere in the world. The genus *Cyanosesia* is particularly rich with 13 named species.

Here a new species is described, the larvae of which were collected in the trunks of the economically important tree species *Ormosia pachycarpa* (Fabaceae) at Ma On Chan, Hong Kong. The moths that emerged from these larvae were initially identified as *Chimaerosphecia sinensis* Walker, [1865] (Cissuvorini) (Kendrick 2001, as *Toleria sinensis*). Re-examination of the specimens, however, revealed that they belong to a new species of the genus *Cyanosesia*, *C. ormosiae* sp. n., which is described here. Secondly, a new species of *Lamellisphecia* Kallies & Arita, 2004 is described from northern India. Only five other species of this genus are known, occurring from Thailand via Sumatra to Papua New Guinea (Fischer 2005, Kallies & Arita 2004, Kallies unpublished). Thus, the discovery of a new species, *Lamellisphecia xerampelina* sp. n., in northern India close to the limits of the Palaearctic region is of zoogeographic interest.

Interestingly, both new species described in this study are unusual amongst their congeners and do not easily fit the current concept of *Cyanosesia* and *Lamellisphecia*,



respectively. This may be explained by the fact that both species inhabit areas at the very edges of the known distribution ranges of their respective genera, or by the possibility that the characters used to separate Sesiini genera are plesiomorphic. Thus, rather than describing new, ill-defined genera, a conservative approach was adopted here and the species were described in existing genus-group taxa. However, discovery of additional species and further research may reveal the need to erect additional genera. Re-examination of several Sesiini taxa in the course of this study showed that further taxonomic changes are required as outlined below.

### Abbreviations

BMNH	British Museum of Natural History, London, U.K.
CAK	Personal collection of Axel Kallies
AFCD	Collection of the Agriculture, Fisheries and Conservation Department of the Government of the Hong Kong Special Administrative Region, China
ZMHB	Zoological Museum of the Humboldt University, Berlin, Germany
ETA	external transparent area
ATA	anterior transparent area

### Results

#### *Cyanosesia* Gorbunov & Arita 1995

Type species. *Cyanosesia tonkinensis* Gorbunov & Arita, 1995, by original designation.

*Cyanosesia* was described from Vietnam (Gorbunov & Arita 1995) on the basis of two species. It was further characterized and additional species were described from various parts of Southeast Asia later (Arita & Gorbunov 2002; Gorbunov & Kallies 1998; Kallies 2003; Kallies & Arita 1998, 2004). Only one species of *Cyanosesia*, *C. tonkinensis*, was known from mainland China to date (Kallies 2007); the new species, described below, is the second one.

Little is known about the biology and host plant preferences of *Cyanosesia*. *Litsea umbellata* (Lauraceae) was the only known host plant for the genus with both *C. tonkinensis* and *C. litseavora* Kallies & Arita, 2004 utilizing this tree species in Vietnam (Kallies & Arita 2004).

#### *Cyanosesia ormosiae* sp. n.

(Figs 1–3, 9, 10)

**Material.** Holotype ♂: 'Hong Kong: | New Territories, | Ma On Shan | 24. v. 1999 | P.-W. Chan', 'Ex larva in | *Ormosia* | *pachycarpa* tree trunk', 'BMNH(E) | 1999-229' (BMNH). Paratypes: 3♂, 10♀, same data as holotype (genitalia examined by Axel Kallies, slides Nos AK636, ♂, and AK693, ♀) (AFCD, 1♀ BMNH, 1♀ CAK).

**Description.** Male (Fig. 2). Alar expanse 21 mm, body length 9 mm. Head: antenna ciliate, yellow-brown, labial palp yellow, with some black ventrally; frons light grey, yellowish laterally; pericephalic scales yellow. Thorax: dark brown, tegula black, with



yellow margins; patagia yellow along the base. Forewing: apical area orange, veins black; transparent areas well developed, cells of ETA between R3 and R4/5 lightly covered with orange scales; discal spot orange, black proximally; costal area black with some orange; fringe dark fuscous; scaled parts of the wings bright orange ventrally. Legs: forecoxa yellow, remainder of foreleg orange; mid- and hindcoxae black; mid-femur yellow, remainder of midleg orange; hindfemur black, hindtibia orange, with a white patch near the anterior pair of spurs and a black patch dorsally. Abdomen: tergites I–II with base colour black, tergite II covered with blood-red scales and a narrow yellow posterior margin; tergite III black; tergite IV broadly yellow in anterior half, dark fuscous in posterior half; tergite V black; tergites VI–VII dark fuscous, with a narrow yellow-orange band in anterior part; sternites I–III dark fuscous; sternites IV and V yellow, posterior margins dark fuscous; sternites VI–VII dark fuscous with dark orange scales in anterior and lateral parts; anal tuft dirty yellow dorsally, black laterally, dirty orange ventrally. Female (Figs 1, 3) similar to male but significantly larger, alar expanse 32–35 mm, body length 17–18 mm. ETA mostly covered with dirty orange scales; discal spot wider and more extensively black; costal margin orange; all abdominal tergites with black posterior margins, in particular tergite III with wide black margin; tergite I orange-yellow; tergite II deep orange-red; tergites III–IV yellow; tergite V dirty orange; tergite VI orange brown.

**Male genitalia** (slide #AK636, Fig. 9). Uncus with few simple setae; gnathos consisting of two well-developed arms; valva long, pointed, with broad scale-like setae towards dorsal margin and long simple setae medially, apically and near ventral margin, crista broad triangular, covered with scale-like setae, with a small plate-like process; saccus long; phallus long and simple without plates or distinct cornuti.

**Female genitalia** (slide #AK693, Fig. 10). Ostium large, distal end of ductus bursae sclerotized; antrum well developed.

**Diagnosis.** Due to its characteristic wing and abdominal markings and the unique genitalia this species cannot be confused with any congener or any other known Sesiini.

**Remarks.** *C. ormosiae* sp. n. is an unusual species; the association with the genus *Cyanosesia* is based mainly on the ciliate antennae and the morphology of the valva (tapering and distinctly pointed, with a pronounced crista). While the ciliate antennae as well as the shape of the discal spot (relatively short and pointed towards the base, not oblique) would also allow a placement within *Sphecodoptera*, the morphology of the male genitalia, in particular the pointed valval apex, the absence of a setaceous field near the dorsal margin of the valva, and the absence of an apical plate on the phallus, precludes this.

### ***Lamellisphacia* Kallies & Arita, 2004**

Type species. *Lamellisphacia haematinea* Kallies & Arita, 2004, by original designation.

This genus was described on the basis of three species from Vietnam and Thailand (Kallies & Arita 2004). Subsequently, another species was described from Sumatra (Fischer 2005), and an additional species is known from Papua New Guinea (unpub-



lished). Species of *Lamellisphesia* are similar to *Cyanosesia* and *Sphecodoptera* but differ by the presence of pronounced antennal rami and details in their genitalia (compare Kallies & Arita 2004).

***Lamellisphesia xerampelina* sp. n.**

**(Figs 4, 11)**

**Material.** Holotype ♂: 'NW India, Himachal Pradesh | Distr. Kullu, Kullu Valley | 4 km S Kullu, Sastri Nagar | 31°56.49'N 77°06.68'E | ca. 1200 m, 26–29. IX. 1999 Ph. | leg. P. Kautt & V. Weisz' 'genitalia examined | by Axel Kallies | slide No AK233' (CAK, will be transferred to ZMHB).

**Description.** Male (Fig. 4). Alar expanse 23.5 mm, body length 12 mm. Head: antenna unipectinate, ciliate; labial palpus orange yellow with some black scales ventrally; pericephalic scales yellow laterally, black dorsally; frons light grey, white laterally, vertex brown, dirty yellow towards base; pericephalic scales pale yellow. Thorax: black to brown, patagia pale yellow along base; tegula with yellow scapular spot, with some orange distally and basally; mesothorax with dorsal yellow spot. Forewing: veins orange brown; ETA and posterior transparent area partially covered with orange brown scales, cell between M1 and M2 partly transparent, cells between M2/M3 and M3/CuA1 fully transparent; ATA divided by a line of brown scales that runs along rudimentary vein M. Legs: dirty orange, mid- and hindfemora yellow. Abdomen: segments I–III and V–VII dirty orange, segment IV yellow, segments II–IV narrow black posterior margins; segments V–VII with narrow yellow posterior margins; anal tuft black and yellow mixed.

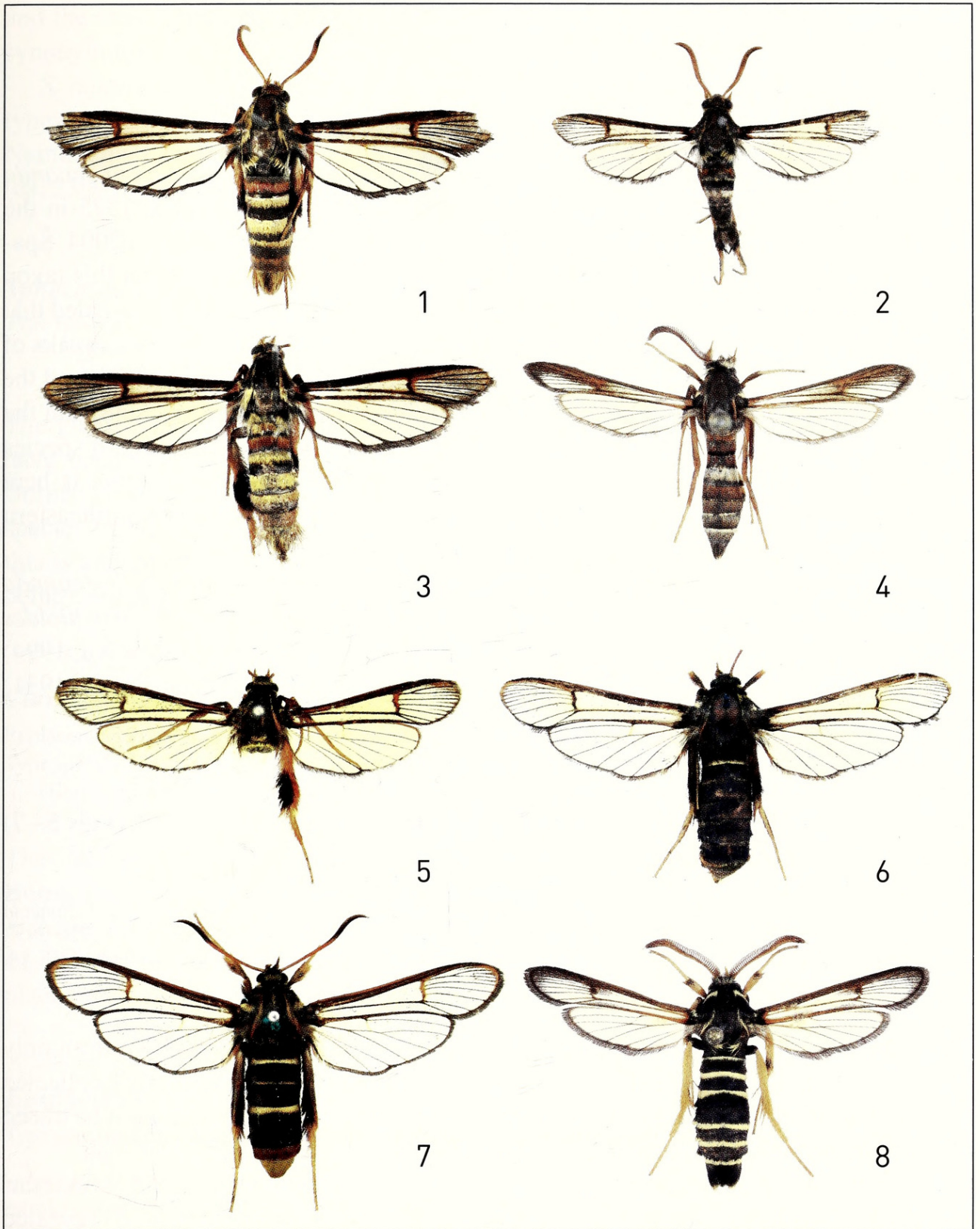
**Male genitalia** (slide #AK233, Fig. 11). Uncus with simple setae; gnathos reduced; valva short, pointed, with long simple setae and with a simple broad triangular crista; juxta with a well-sclerotized ventral band; saccus short; proximal end of phallus with short lateral extensions, distal end with a narrow well-sclerotized plate, vesica with a group of short cornuti.

**Diagnosis.** This is the smallest species of the genus (all previously known species are large, with alar expanse 30–41 mm). Due to its characteristic wing and abdominal markings and genitalia morphology it cannot be confused with any congener or any other known Sesiini.

**Remarks.** This species occupies an isolated position in the genus *Lamellisphesia*; however, both the morphology of the antennae and the simple setae of the valva support the placement in this genus and preclude a close relationship with either *Sphecodoptera* or *Cyanosesia*.

The type locality for *L. xerampelina* lies in the Kullu valley, in the foothills of the Himalaya Mts. The only known specimen was collected with the help of artificial pheromone lures together with several specimens of *Bembecia guesnoni* Špatenka & Tošovskí, 1994 or a species close to it. This is remarkable as the occurrence of *Bembecia* is typically restricted to the Palearctic region, whereas *Lamellisphesia* was known only from the Oriental region.





**Figs 1–8.** Sesiini specimens. **Figs 1–3.** *Cyanosesia ormosiae* sp. n. **1.** ♀, paratype, alar expanse 32–35 mm (AFCD, CAK). **2.** ♂, holotype, alar expanse 21 mm (BMNH). **3.** ♀, paratype, alar expanse 35 mm (CAK). **4.** *Lamellisphesia xerampelina* sp. n., holotype, ♂, alar expanse 23.5 mm (CAK). **Figs 5–7.** *Sphecodoptera repanda* comb. rev. **5.** ♂ (holotype of *Synanthedon catalina*), alar expanse 32 mm (BMNH). **6.** ♀ (holotype of *Sphecia repanda*), alar expanse 51 mm (BMNH). **7.** ♀, alar expanse 47 mm (BMNH). **8.** *Eusphesia melanocephala* comb. n., ♂, alar expanse 30 mm (CAK).



***Sphecodoptera* Hampson, 1893 gen. rev.**

Type species. *Sphecia repanda* Walker, 1856, by original designation.

= *Scasiba* Matsumura, 1931 syn. n.

Type species. *Scasiba taikanensis* Matsumura, 1931, by original designation.

*Sphecodoptera* was described by Hampson (1893) on the basis of *Sphecia repanda* Walker, 1856. The genus was considered a synonym of *Sesia* Fabricius, 1775 in the recent Sesiidae literature (Heppner & Duckworth 1981, Pühringer & Kallies 2004, Špatenka et al. 1999). Kallies & Arita (2004), however, already suggested that this taxon may be distinct from *Sesia*. Recent examination of material in the BMNH revealed that *Sphecia repanda* does not belong to *Sesia*. The presence of small wedge-like streaks of scales in the ETA, the form and colouration of the discal spot on the forewing, and the details of the venation (veins CuA1 and CuA2 arising from a common point from the posterior end of the discal spot) indicate that this species belongs to a group of species currently considered to belong to the genus *Scasiba*. Consequently, *Scasiba* is here regarded as a synonym of *Sphecodoptera*. The genus is distributed from northeastern Pakistan through northern India, to China, Japan, Taiwan, and Vietnam.

The following species are here considered to belong to *Sphecodoptera*: *S. repanda* (Walker, 1856) comb. rev., *S. okinawana* Matsumura, 1931 comb. rev., *S. rhynchioides* (Butler, 1881) comb. n., *S. scribai* (Bartel, 1912) comb. n., *S. sheni* (Arita & Xu, 1994) comb. n., *S. difficilis* (Kallies & Arita, 2004) comb. n., *S. taikanensis* (Matsumura, 1931) comb. n., and *S. tenuimarginata* (Hampson, [1893]) comb. n.

***Sphecodoptera repanda* (Walker, 1856) comb. rev.****(Figs 5–7)**

= *Synanthedon catalina* Meyrick, 1926 syn. n.

**Material.** 1♀ (holotype of *Sphecia repanda*) ‘*Sphecia* | *repanda* | Wkr., Type ♀’, ‘Type’, ‘3. *Sphecia repanda*.’ (BMNH); 1♀ ‘India: | Punjab, | Khyra Gully. | vii. 1881.’, ‘H. Roberts Coll. | B.M. 1926-395’, ‘*repanda* Walker’ (BMNH); 1♂ (holotype of *Synanthedon catalina*) ‘Muktesar, 7500’ | Kumaon | TBF. 14. 9. 22’, ‘*catalina* Meyr.’ (BMNH).

*Sphecia repanda*, the type species of *Sphecodoptera*, was previously known from only two specimens, the holotype (Fig. 6) and a second female (Fig. 7). Both were collected in former northern ‘British India’. While the type locality of *S. repanda* cannot be traced with accuracy, the second female was collected in present northeastern Pakistan.

*Synanthedon catalina* was described from a single specimen collected in ‘Muktesar’ in northwestern India (Meyrick 1926). Examination of the holotype (Fig. 5) revealed that this taxon does not belong to the tribe Synanthedonini but to Sesiini. The venation, shape, and colouration of the discal spot and the presence of small wedge-like streaks of scales in the ETA place this taxon in *Sphecodoptera*. Meyrick (1926) stated in his description that the holotype is a female. The specimen has lost its abdomen and antennae (preserved in a capsule with the specimen); however, the image (Fig. 5) suggests that the specimen is a male. Taking into consideration the sexual dimorphism typical for this genus, the similarity of the type specimens of *S. repanda* and *S. catalina*,



and the close proximity of the type localities, it is here concluded that these taxa are synonymous.

*S. repanda* seems to occur in the southern foothills of the Himalaya Mountains. The type specimen of *S. catalina* was collected in Mukteshwar in the Kumaon Hills in the Nainital district of Uttarakhand, India, in September. The elevation of the type locality (ca. 2300 m) indicates that this taxon should be considered a Palaearctic species.

### ***Sphecosesia* Hampson, 1910**

Type species. *Sphecosesia pedunculata* Hampson, 1910, by original designation.

= *Vespisesia* Heppner, 2010: 179 syn. n.

Type species. *Vespisesia vespiformis* Heppner, 2010, by original designation.

The genus *Sphecosesia* was reviewed and characterized extensively, and six species have been named to date, ranging from Sikkim (NE India) to the Philippines and Borneo (Kallies & Arita 2004). The genus *Vespisesia* was described based on a new species from Vietnam (Heppner 2010). The description and figure leave no doubt that this is a junior synonym of *Sphecosesia*, with its type species, *Vespisesia vespiformis*, being very similar or identical to *Sphecosesia ashinaga* Kallies & Arita, 2004.

### ***Clavisphecia* nom. n.**

Replacement name for *Clavigera* Kallies & Arita, 2004

Type species *Trochilium pugnax* Meyrick, 1926, by original designation [nec *Clavigera* Hector, 1879: 538 (Brachiopoda)]

The description of this genus was based on two species, *Trochilium pugnax* from Burma and Vietnam and *Aegeria chrysoptera* Hampson, 1919 from Sri Lanka (Kallies & Arita 2004). Subsequently, the name *Clavigera* was found to be preoccupied by *Clavigera* Hector, 1879 (in Brachiopoda). *Clavisphecia* is here introduced as a replacement name.

### ***Eusphecia* Le Cerf, 1937**

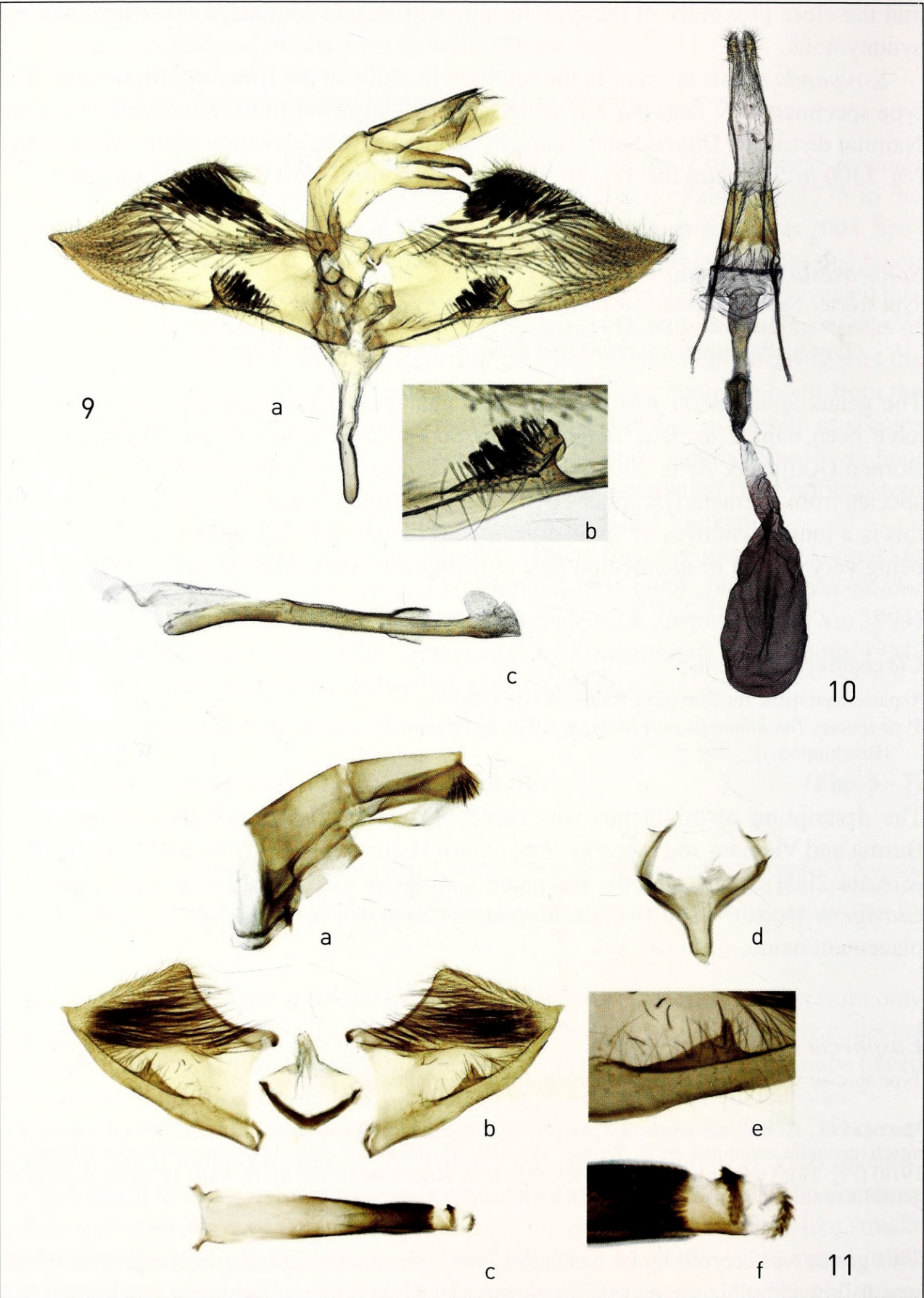
(Figs 8, 12)

Type species *Sesia pimplaeformis* Oberthür, 1872, by original designation

Material. *E. melanocephala*: 1♂, Germany, Brandenburg, Wernsdorf, 1–16. V. 2000 e.l., leg. F. Rämisch/genitalia examined by A. Kallies, slide No AK700 (CAK, Fig. 12); *Sesia yezoensis* (Hampson, 1919) (Fig. 13): 1♂, Far East Russia, Primorski Krai, Krounowka river, 8–12. VIII. 1994, leg. L. Kühne/genitalia examined by A. Kallies, slide No AK701 (CAK, Fig. 13).

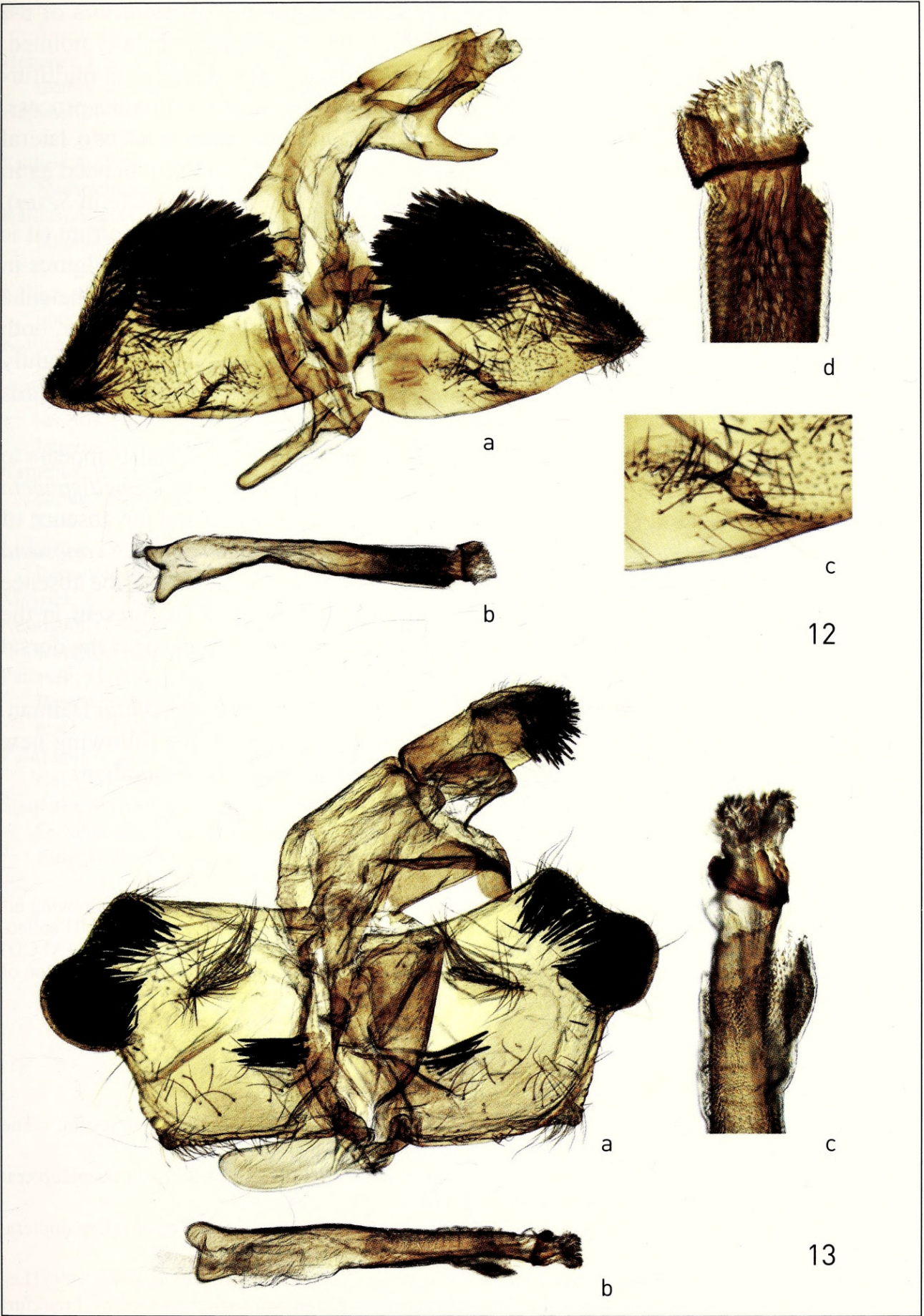
This genus was erected by Le Cerf (1937) to accommodate *Sesia pimplaeformis*, which was followed by Naumann (1971). Subsequently, however, *Eusphecia* was treated as a synonym of *Sesia* by several authors (e.g., Heppner & Duckworth 1981, Špatenka et al. 1999). In contrast, Kallies & Arita (2004) and Pühringer & Kallies (2004) considered it as a distinct genus, although without further explanation.





**Figs 9–11.** Sesiini, genitalia. **9–10.** *Cyanosesia ormosiae* sp. n. **9.** ♂, paratype. (a) ventral view, (b) crista of valva, enlarged, (c) phallus. **10.** ♀, paratype. **11.** *Lamellisphesia xerampelina* sp. n., ♂, holotype. (a) uncus tegumen complex, (b) valvae and juxta, (c) phallus, (d) vinculum and saccus, (e) crista of valva, enlarged, (f) distal end of phallus, enlarged.





**Figs 12–13.** Sesiini, male genitalia. **12.** *Eusphencia melanocephala* comb. n. (a) ventral view, (b) phallus, (c) crista of valva, enlarged, (d) distal end of phallus, enlarged. **13.** *Sesia yezoensis*. (a) ventral view, (b) phallus, (c) distal end of phallus, enlarged.



*Eusphecia* (Fig. 12) differs from *Sesia* (Fig. 13) in a number of characters of the male and female genitalia. The ventral part of the valva is extended, apically pointed, with a distinct and strong process near the ventral margin, and covered with multifurcate setae (the dorsal part of the valva is extended, apically rounded, without a process, and covered with strong simple setae in *Sesia*). The gnathos consists of two lateral branches that can be very short as in *E. pimphaeformis* or long and pronounced as in *E. melanocephala* comb. n. (it is typically in the shape of a triangular plate in *Sesia*). The ductus bursae is straight, relatively long and narrow, with a distinct antrum (it is short and angled, without antrum in *Sesia*) (compare Figs 12, 13, as well as figures in Naumann 1971 and Špatenka et al. 1999). According to Naumann (1971) and Špatenka et al. (1999) the male antennae in *Sesia* and *Eusphecia* are bipectinate; however, both genera have clearly unipectinate antennae. The rami are somewhat longer and slightly bent downwards in *Eusphecia*, while they are somewhat shorter and oriented upwards in *Sesia*.

*Eusphecia* is probably most closely related to *Lamellisphesia*, but it also appears to show similarities with *Sphecodoptera* and *Cyanosesia*. It differs from *Lamellisphesia* by the presence of scale-like setae on the inner surface of the valva and the absence of an apical plate on the phallus. *Eusphecia* differs from *Sphecodoptera* and *Cyanosesia* by having distinct antennal rami (rami not distinct in the genera compared), the absence of wedge-like extensions of scales from the apical area into the ETA (present in the genera compared) and the absence of a distinct field of scale-like setae near the dorsal margin of the valva (present in *Sphecodoptera*).

Re-examination of Palaearctic Sesiinae revealed that *Sesia melanocephala* Dalman, 1816 (Fig. 8) displays all characteristics of *Eusphecia*. Therefore, the following new combination is introduced, *Eusphecia melanocephala* (Dalman, 1816) comb. n.

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