

The systematic status of the genera
Ilseopsis POVOLNÝ, 1965, and *Empista* POVOLNÝ, 1968
(Lepidoptera : Gelechiidae : Gnorimoschemini)

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Abstract

The systematic status of the genera *Ilseopsis* POVOLNÝ and *Empista* POVOLNÝ, including its subgenus *Zeempista* POVOLNÝ, is discussed. *Ilseopsis* and *Zeempista* are recognized as junior subjective synonyms of *Scrobipalpa* JANSE and *Kiwaia* PHILPOTT respectively ; *Empista* is reduced to a subgenus of *Kiwaia*. One species is recalled from synonymy and 30 new combinations are introduced. The head structures of two *Scrobipalpa* species are illustrated by SEM photomicrographs.

Zusammenfassung

Der systematische Status der Gattungen *Ilseopsis* POVOLNÝ und *Empista* POVOLNÝ, einschließlich der Untergattung *Zeempista* POVOLNÝ, wird diskutiert. *Ilseopsis* und *Zeempista* werden als jüngere subjektive Synonyme zu *Scrobipalpa* JANSE bzw. *Kiwaia* PHILPOTT gezogen ; *Empista* wird zur Untergattung von *Kiwaia* heruntergestuft. Eine Art wird aus der Synonymie gerufen, und 30 neue Kombinationen werden eingeführt. Die Kopfstrukturen von zwei *Scrobipalpa*-Arten werden in REM-Fotos dargestellt.

The Gnorimoschemini are a tribe of the Gelechiidae : Gelechiinae with almost worldwide distribution. Most of the currently recognized 35 or so gnorimoschemine genera are based exclusively on morphological characters of the male and female genitalia and can be separated satisfactorily from each other by these structures. An exception is the monotypic genus *Ilseopsis* POVOLNÝ, 1965, containing *I. peterseni* POVOLNÝ from North Africa and Saudi Arabia. It will be shown in this paper that *Ilseopsis* cannot be separated from *Scrobipalpa* JANSE, 1951. It will also be shown that the genus *Empista* POVOLNÝ, 1968, originally described from Nepal, is merely a subgenus of the New Zealand genus *Kiwaia* PHILPOTT, 1930, and that *Zeempista* POVOLNÝ, 1974, originally proposed as a subgenus of *Empista*, is a junior subjective synonym of *Kiwaia*. The results of my studies are published here to be

available for the Gnorimoschemini volume of Microlepidoptera Palaearctica that is currently in preparation by POVOLNÝ with the assistance of ROESLER.

In the original description of *Ilseopsis*, POVOLNÝ emphasized as good generic characters in the male genitalia the strong bend at the basal third of the valva, the reduction of the first pair of saccular processes and the relatively short small saccus, and in the female genitalia the short apophyses anteriores. Before discussing the validity of these presumed generic characters, some aspects of the terminology adopted by POVOLNÝ must be clarified. In the male genitalia of *Scrobipalpa* (Figs 4, 5) and *Ilseopsis* (Figs 2, 3) the posterior margin of the vinculum is characterized by a V-shaped median emargination flanked by a pair of short but usually distinct processes. These are referred to by POVOLNÝ as the first pair of saccular processes ("erstes Paar der Saccularfortsätze") whilst the vinculum is interpreted as saccular fold ("Saccularfalte"). The proper sacculus is vaguely described as a shovel-shaped process fused with the base of the valva ("mit der Valvenbasis verwachsener schaufelförmiger Fortsatz") and in POVOLNÝ's later publications is termed "parabasal process of the valva".

The weakly clavate valva of most *Scrobipalpa* species is more or less straight ; however, in *S. ocellatella* (BOYD, 1858) (Fig. 4), an otherwise undisputed *Scrobipalpa*, it is bent nearly as strongly as in *peterseni* (Fig. 2). The posterior processes of the vinculum ("saccular processes") are very small in *peterseni*, but varying degrees of reduction are found in several *Scrobipalpa* species. Reference to the "first pair of saccular processes" implies that there should be at least a second pair ; however, no further pair exists in *Scrobipalpa* or *Ilseopsis* unless POVOLNÝ means the sacculi. The saccus of *peterseni* agrees perfectly with that of many *Scrobipalpa* species ; it is neither unusually short nor small. The female genitalia of *peterseni* with strong honeycomb pattern on segment VIII and a hook-like signum are consistent with those of *Scrobipalpa*. The apophyses anteriores are indeed very short, but their length can vary considerably between *Scrobipalpa* species and sometimes even within a species. None of these characters justifies the generic separation of *peterseni* from *Scrobipalpa*.

An unusual character overlooked by POVOLNÝ is the irregular frontal process on the head of *peterseni* (Figs 6-8), reminiscent of the processes of certain *Ornativalva* species, for example *O. lilyella* (LUCAS, 1944) (SATTler, 1976, pl. 6, figs 39-41). Modifications of the frontal region have evolved independently in several families of Lepidoptera, for example Cosmopterigidae, Symmocidae, Pyralidae, Geometridae, Thyrididae, Noctuidae and Notodontidae. In the Gelechiidae various frontal modifications, including clearly defined processes, are known in *Ornativalva* GOZMANY, 1955, *Athrips* BILLBERG, 1820, *Lita* TREITSCHKE, 1833, *Cerofrontia* JANSE, 1951, *Radio-*

nerva JANSE, 1951, *Leistogenes* MEYRICK, 1927, *Caulastrocecis* CHRÉTIEN, 1931, and others. None of the *Scrobipalpa* species examined for this character possesses a frontal process, but an evenly expanded frons with enlarged scale bases, the first step towards the development of a distinct process, was observed in *S. usingeri* POVOLNÝ, 1969, from Mongolia (Figs 9-11). Species with and without frontal processes are found side by side in several genera (for example *Ornativulva*, *Athrips* and *Lita*). The presence of this structure in *peterseni* is thus no justification for its exclusion from *Scrobipalpa*.



Fig. 1. *Scrobipalpa peterseni* (POVOLNÝ), ♂, Algeria, Biskra, 24.iii.1903 (WALSINGHAM) (BMNH).

The wings of *peterseni* (Figs 1, 12) are rather narrower than those of most *Scrobipalpa* species. The forewing in particular is broadly lanceolate and more pointed than that of most other species. The costa, which is usually gently arched and more or less evenly convex from base to apex in *Scrobipalpa*, is straight or even weakly concave between R1 and the apex in *peterseni*. Such modification of the forewing shape, sometimes with loss of an M vein, is observed in certain brachypterous species, and I consider it possible that both sexes of *peterseni* are flightless. It may therefore be significant that one of the examined specimens of *peterseni* lacks one of the M veins in the forewing, probably M2 or M3 (Fig. 12).



2



3

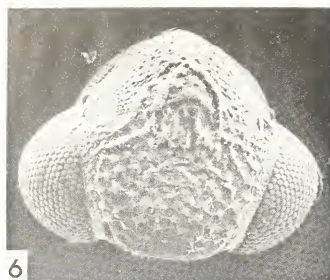


4

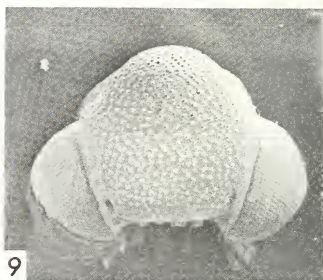


5

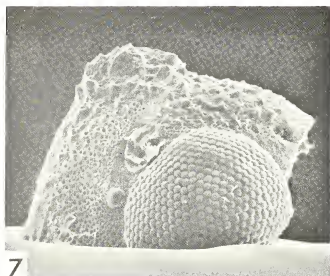
Figs 2-5. Male genitalia. 2, *Scrobipalpa peterseni* (POVOLNÝ), Algeria, Biskra, 24.iii.1903 (WALSINGHAM) (genitalia slide no. 15846 ; BMNH). 3, ditto, aedeagus. 4, *S. ocellatella* (BOYD), England, Winspit, 10.vii.1886 (BANKES) (genitalia slide no. 23615 ; BMNH). 5, ditto, aedeagus.



6



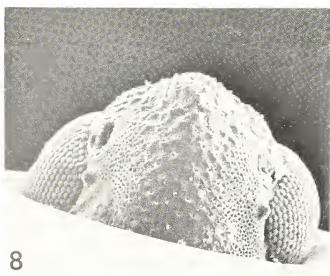
9



7



10



8



11

Figs 6-11. SEM photomicrographs of *Scrobipalpa* heads ; frontal, lateral and dorsal views. 6-8, *S. peterseni* (POVOLNY), ♂, Algeria, Hammam-es-Salahin, 6.iii.1904 (WALSINGHAM) (BMNH). 9-11, *S. usingeri* POVOLNY, ♂, Mongolia, Südgobi aimak, 100 km W v. Grenzposten Ovot Chuural, 1250 m, 22.vi.1967 (KASZAB, Nr. 834) (BMNH).

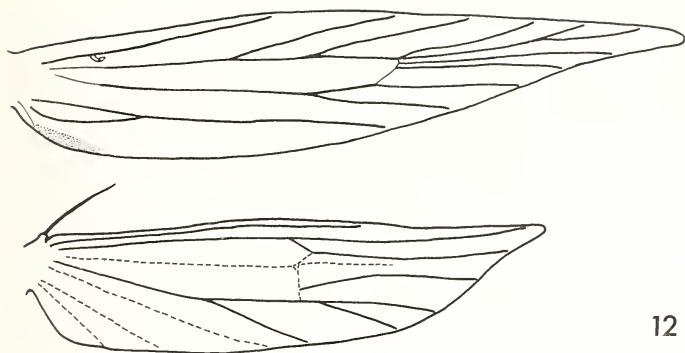


Fig. 12. Wing venation of *Scrobipalpa peterseni* (POVOLNÝ), ♂, Algeria, Hammam-es-Salahin, 5.iii.1904 (WALSINGHAM) (wing slide no. 15861 ; BMNH). Forewing with reduced number of M veins.

A more extreme example of flightlessness in the Gnorimoschemini is a brachypterous *Ephysteris* species from the island of Madeira (see below). In this species the apex of the forewing is even longer than in *peterseni*, veins R4 + 5 are coincident and one M vein is missing ; the hindwing is strongly reduced and has lost most of its venation. An analogous case of loss of an M vein in the forewing is also known in *Thyrocopa apatela* (WALSINGHAM, 1907) (Gelechioidea : Xyloryctidae) from the Hawaiian Islands, a flightless species with wing reduction in males and females (ZIMMERMAN, 1978 : 937, figs 645, 650).

Ephysteris sp. and *Thyrocopa apatela* are both undisputed members of genera with many closely related fully winged species. The slightly unusual forewing shape of *peterseni*, with occasional loss of an M vein, here interpreted as a tendency towards wing reduction, is in itself no justification for the separation of *Ilseopsis* from *Scrobipalpa*. Moreover, as all Gnorimoschemini genera are, without exception, defined by characters of the genitalia it would be inconsistent to break this principle for *peterseni*.

Having demonstrated that *peterseni* does not deserve a separate genus, its position within *Scrobipalpa* has to be established. *Scrobipalpa* is by far the largest genus of Gnorimoschemini ; the number of included species has doubled in the last 20 years to almost 300. The majority of species are found in arid areas of the western Palaearctic region ; no less than 60-70 species

are recorded from Europe. Their monophagous or oligophagous larvae are predominantly associated with Compositae, Chenopodiaceae and Solanaceae. On account of their great external uniformity the identification of many species was always problematic. Even many of those published in recent years are inadequately known because they were described from only one sex, sometimes a single imperfectly preserved and poorly documented specimen. Moreover, they were rarely compared with related species and no keys were provided. The large number of misidentifications found amongst material that had been examined in recent times by specialists with the aid of genitalia preparations is a clear indication that there is at present no one who can reliably identify all *Scrobipalpa* species. For example, specimens with genitalia preparations originally identified by POVOLNÝ as *S. acuminatella* (SIRCOM, 1850) and *S. artemisiella* (TREITSCHKE, 1833), and later as *S. murinella* (HERRICH-SCHÄFFER, 1854), were in fact *S. halonella* (HERRICH-SCHÄFFER, 1854) (SATTLER, 1987 : 452).

No attempt has ever been made to provide a systematic arrangement of *Scrobipalpa* into which newly discovered species could be integrated. In fact, it is hard to understand how, in the absence of a classification, "new" species could ever be recognized as such with any degree of certainty in a genus of this size. The unsatisfactory situation in *Scrobipalpa* contrasts sharply with that in other large genera. For example, the similarly uniform but even larger genus *Coleophora* HÜBNER, 1822 (Coleophoridae) was divided by TOLL (1953, 1962) into groups, sections and subsections, all made generally accessible through keys.

Frustrated by this chaos, POVOLNÝ in his numerous papers has resorted to treating the species in a roughly alphabetical sequence (in this "system" *peterseni* would be placed between *S. perinoides* POVOLNÝ, 1967, and *S. phagnalella* (CONSTANT, 1895) !) or at best grouping them vaguely by their host-plants (unknown for *peterseni*). Amongst the morphological characters that might help indicate relationship with other species is the forewing shape of *peterseni* with occasional loss of an M vein ; however, this specialization is not known in any other *Scrobipalpa*. A modified frons, although not a well-defined process as in *peterseni*, is found in *S. usingeri* POVOLNÝ, but experience in other gelechiid genera has shown that frontal processes can arise independently more than once and that closely related species can differ in the presence or absence of frontal modifications. Other morphological characters do not appear to confirm a closer relationship between *peterseni* and *usingeri*. A bent valva similar to that of *peterseni* is also found in *S. ocellatella* (BOYD), but other genitalic characters neither confirm nor contradict a closer relationship between these two species.

Scrobipalpa peterseni (POVOLNÝ, 1965) comb. n.

Ilseopsis peterseni POVOLNÝ, 1965, Acta ent. bohemoslovaca 62: 481, figs 1, 2. Holotype ♂, SAUDI ARABIA: Riyad, 700 m, 1.viii.-30.ix.1958 (DIEHL) (Landessammlungen für Naturkunde, Karlsruhe) [not examined].

Ilseopsis peterseni POVOLNÝ; POVOLNÝ, 1971: 43; 1979: 113; 1980a: 243; 1980b: 204; 1981: 394.

Head ♂, ♀ (Figs 6-8). Scale bases dense along margin of compound eyes and around ocelli and antennal sockets, almost absent from vertex between posterior margin of head and frontal process. Transfrontal sulcus indistinct. Frontal process short, rough, with irregular surface. Scale bases between frontal process and tentorial pits enlarged to irregular knobs or teeth.

Venation ♂, ♀ (Fig. 12). In forewing Sc to costa at about two-fifths, R1 and R2 free from cell, R3 free or connate with R4 + 5, common stalk longer than free ends of R4 and R5; M1 near R4 + 5, M2 and M3 approximated at base, almost connate; Cu1 and Cu2 parallel to M3, distance at base of M3-Cu1 about half Cu1-Cu2, A1 + 2 with basal fork, discocellular vein obsolete around base of M1 and M2. In hindwing Sc + R1 to costa at about two-thirds, basal section of R1 weak or absent between Rs and Sc, Rs to costa close to apex, M1 from cell, parallel to Rs, M2 gently curved, at base closer to M3 + Cu1, on termen closer to M1, M3 on short stalk with Cu1 from corner of cell, Cu2 arising behind middle of cell, parallel to Cu1, A1 weak, A2 obsolete, discocellular vein obsolete.

Host-plant unknown. POVOLNÝ (1980b: 204) suspected the larva to be a miner of Compositae but gave no reason for this view. If the bent valva of the males is a synapomorphy of *peterseni* and *ocellatella*, the host-plant will more likely be found amongst the Chenopodiaceae.

Distribution. Algeria, Tunisia, Saudi Arabia.

Material examined. Algeria: 2 ♂, 2 ♀, Hammam-es-Salahin, 14.iii.1903 (♀), 24.iii.1903 (♂), 5.iii.1904 (♂), 3.iv.1904 (♀) (WALSINGHAM) (BMNH, London).

The hitherto monotypic New Zealand genus *Kiwaia* was established for *K. jeanae*, a species based on two brachypterous males. The generic description emphasizes the striking dense cover of fine radiating hair-scales on the rudimentary hindwing. It was subsequently shown that the female of the type-species is also brachypterous but lacks the long erect hindwing scales.

Brachyptery is a comparatively rare phenomenon in the Lepidoptera. It is usually confined to the female and is exceedingly rare in the male. In the

Gelechioidea species with brachypterous males and females are known in the Xyloryctidae (*Thyrocopa apatela* (WALSINGHAM, 1907) – Hawaii), Oecophoridae (*Borkhausenia falklandensis* BRADLEY, 1965 – Falkland Islands), Elachistidae (*Elachista holdgatei* (BRADLEY, 1965) – Falkland Islands; *Elachista galathea* (VIETTE, 1954) – Campbell Island; *Elachista hookeri* (DUGDALE, 1971) – Auckland Islands; *Elachista pumila* (DUGDALE, 1971) – Auckland Islands), Scythrididae (*Areniscythris brachypteris* POWELL, 1976 – California) and Gelechiidae (*Ephysteris* sp. – Madeira; *Kiwaia jeanae* PHILPOTT, 1930 – New Zealand).

The *Ephysteris* specimens from Madeira were identified by POVOLNÝ (1964 : 346 ; 1965 : 490 ; 1968a : 5, 8) as *E. curtipennis* (ZERNY), a species described from the High Atlas in Morocco ; however, this identification is dubious. ZERNY (1936 : 138) described the male of *curtipennis* as having normal wings and specifically mentioned the parallel costal and dorsal margins of the hindwing. By contrast, the Madeiran males examined by me have broadly lanceolate hindwings, distinctly shorter than the forewings, and are clearly brachypterous like the females. POVOLNÝ initially stated that only the females of “*curtipennis*” (including the Madeiran specimens) were brachypterous (POVOLNÝ, 1964 : 346), whereas subsequently both sexes were said to be brachypterous (POVOLNÝ, 1965 : 490) or no reference to the sexes was made (POVOLNÝ, 1968a : 5, 8).

Thanks to the efforts of John S. DUGDALE (DSIR, Auckland, New Zealand) and Annette WALKER (formerly DSIR, now CIE, London), I was able to study live specimens of *Kiwaia jeanae*. The moths were field collected by John DUGDALE in individual tubes with some plant material and were brought to London by air by Annette WALKER. Both males and females of *jeanae* can run very fast and, like some other flightless moths, are able to make jumps of up to 150 mm. Unfortunately the males did not “display” in captivity and no observations could be made on the function of the striking hindwing scales on the live moth. When the specimen is at rest these scales lie along the upper surface of the hindwing and with it are hidden under the forewing. By manipulating the forewing of a freshly killed specimen with a fine needle it was possible to expose the hindwing. With the gradual exposure of the wing the long scales raised automatically and fanned out ; they returned in a similar way to their original position as the forewing was moved back over the hindwing. For colour illustrations of both sexes, with the male showing the radiating hindwing scales, see HUDSON, 1939, pl. 58, figs 9, 10.

At least some of the brachypterous species recorded here are undisputed members of large genera that otherwise consist of normal fully winged species. It is therefore not surprising to discover that *Kiwaia jeanae* is congeneric with and indeed very closely related to fully winged New Zealand

Gelechiidae. As a result of studies undertaken in conjunction with J. S. DUGDALE it was found that the majority of the New Zealand Gelechiidae hitherto placed in *Gelechia* HÜBNER, [1825], and *Phthorimaea* MEYRICK, 1902, must be transferred to *Kiwaia*. This includes four former *Phthorimaea* which POVOLNÝ (1977) had placed (together with a newly described species) in *Empista*, subgenus *Zeempista*. My studies have shown that *Empista* POVOLNÝ, 1968, can at best be given subgeneric rank whilst *Zeempista* POVOLNÝ, 1974, is a straight synonym of *Kiwaia*.

Subgenus *Kiwaia* PHILPOTT, 1930

Kiwaia PHILPOTT, 1930, Rec. Canterbury Mus. 3 : 248. Type-species : *Kiwaia jeanae* PHILPOTT, 1930, ibid. 3 : 249, by original designation and monotypy.

Zeempista POVOLNÝ, 1974, Acta ent. bohemoslovaca 71 : 414. Type-species : *Gelechia cheradias* MEYRICK, 1909, Trans. N. Z. Inst. 41 : 12, by original designation. Originally proposed as a subgenus of *Empista* POVOLNÝ, 1968, **Syn. n.**

The subgenus *Kiwaia* is confined to New Zealand and comprises the following species : *Kiwaia* (*Kiwaia*) *aerobatis* (MEYRICK, 1924) **comb. n.** ; *brontophora* (MEYRICK, 1885) **comb. n.** ; *caerulea* (HUDSON, 1925) **comb. n.** ; *calaspidea* (CLARKE, 1934) **comb. n.** ; *cheradias* (MEYRICK, 1909) **comb. n.** ; *contraria* (PHILPOTT, 1930) **comb. n.** ; *dividua* (PHILPOTT, 1921) **comb. n.** ; *eurybathra* (MEYRICK, 1931) **comb. n.** ; *glaucoterma* (MEYRICK, 1911) **comb. n.** ; **sp. rev.** ; *heterospora* (MEYRICK, 1924) **comb. n.** ; *hippeis* (MEYRICK, 1901) **comb. n.** ; *jeanae* PHILPOTT, 1930 ; *lapillosa* (MEYRICK, 1924) **comb. n.** ; *lenis* (PHILPOTT, 1929) **comb. n.** ; *lithodes* (MEYRICK, 1885) **comb. n.** ; *matermea* (POVOLNÝ, 1974) **comb. n.** ; *monophragma* (MEYRICK, 1885) **comb. n.** ; *neglecta* (PHILPOTT, 1924) **comb. n.** ; *para-pleura* (MEYRICK, 1885) **comb. n.** ; *parvula* (PHILPOTT, 1930) **comb. n.** ; *pharetria* (MEYRICK, 1886) **comb. n.** ; *plemochoa* (MEYRICK, 1916) **comb. n.** ; *pumila* (PHILPOTT, 1928) **comb. n.** ; *quieta* (PHILPOTT, 1927) (= *pulverea* PHILPOTT, 1928) **comb. n.** ; *schematica* (MEYRICK, 1885) **comb. n.** ; *thyracula* (MEYRICK, 1885) **comb. n.**

POVOLNÝ (1974 : 416) synonymized *glaucoterma* with *brontophora* ; this synonymy is not accepted here as both species can be clearly distinguished by external characters. The validity of *matermea* requires confirmation as POVOLNÝ at the time of its description was unaware of most of the 25 congeneric species.

Subgenus *Empista* POVOLNÝ, 1968, stat. n.

Empista POVOLNÝ, 1968b, Khumbu Himal 1 : 116. Type-species : *Empista palaeartica* POVOLNÝ, 1968b, ibid. 3 : 117, figs 1-3, by monotypy.

The subgenus *Empista* is at present known only from Nepal and comprises the following species : *Kiwaia* (*Empista*) *kumatai* (POVOLNÝ, 1976) **comb. n.** ; *palaeartica palaeartica* (POVOLNÝ, 1968) **comb. n.** ; *palaeartica secunda* (POVOLNÝ, 1976) **comb. n.** ; *spinosa* (POVOLNÝ, 1976) **comb. n.**

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