



(which has since been named *Charaxes mixtus tanzanicus*). We were lucky to get enough specimens of both sexes, both here and in a forest further on, Mihumu Forest. We spent two weeks at Kasye, after having sent home the two porters who were no longer needed.

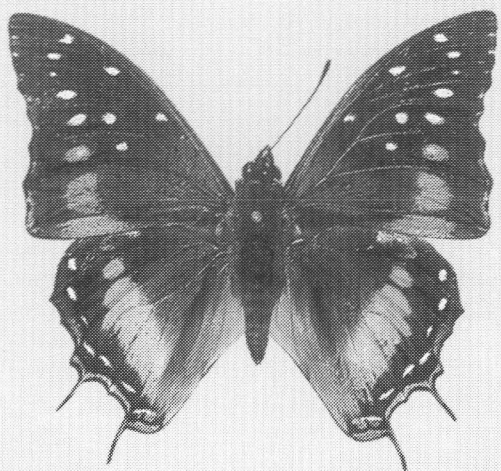
To my delight, chimpanzees were still present in Kasye Forest and a leopard as well as a lion were frequently heard at night. One day I sent Elias down to get more food and bananas for baiting the butterfly traps. He did not come back the first day, which meant that he would have had to go far to obtain what we wanted. In particular, ripe bananas were difficult to get nearby. Two hours after dark on the second day he arrived back to the accompaniment of a lion's roaring. He did not seem to be in the least perturbed by the lion, while Jason, on the other hand, was in quite a state. He was also frightened when the leopard coughed nearby; he was used to the presence of cattle only! It turned out that Elias had had to go to Lukoma, near Mgambo, to get ripe bananas, ten hour's walk each way, so no wonder it took him two days, and he had quite a load to carry as well.

From Kasye we went back to Helembe, and early next morning we caught the 'Mwangozo', a steamer which took us to a place called Kansanga (not the Kansanga down the lake to Zambia). Jason who had had enough of lions and skinned feet continued to Kigoma to take the train back to Dar es Salaam. It took quite a time for him to get there as the railway line had been disrupted by flood water near Dodoma. Elias and I took a canoe to Zunuka Village, opposite Lugufu River, and after I had seen the chairman of the village (who remembered me from an earlier safari years back), and bought some cassava flour from him, we set off, with two extra men to help carry our loads. We needed only one actually, but one man did not dare to go back through the bush alone, which meant we had to take two. So, for a rare change, I did not have to carry my own load.

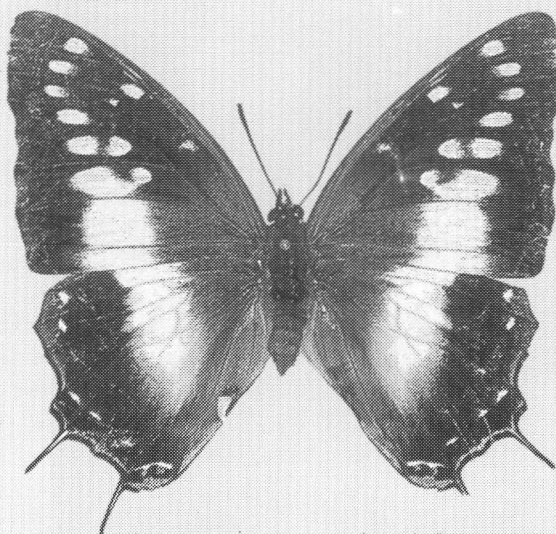
We walked until dark and camped near water. One of the porters was supposed to know the way, but next morning we soon got lost. I knew the direction though, so we only had to do some cross-country walking and soon hit a track, but further on the trail went in the wrong direction, so again we had to cut across country. I had been to Mihumu several times before, the last time in 1979, and have approached it from several directions, but now all the old elephant paths were gone; they were only visible now and again. Elias and I stayed a week at Mihumu, which is situated in a flat valley (the Kasikati basin) crossed by numerous small rivers lined by quite extensive forest. The basin itself, around 900 m. above sea level, is encircled by hills up to 1300 m. in height. Beside Ntakatta and Kasye Forests, Mihumu is amongst the best places I know of for butterflies. Every time I go there something new for Tanzania turns up, and this safari was no exception. We got the Liptenine *Citrinophila erastus pallida* there (a Lyceanid mimicking a Pierid), and I observed *Papilio lormieri* flying, both being new records for Tanzania. I also saw a Lyceanid which I could not identify; there were several specimens of it, but all the time they were too high up in the trees to reach, even with my extension-handled net. We trapped several specimens of *Charaxes mixtus tanzanicus* with banana bait. It is extraordinary that I have not seen it before, except perhaps once in Kasye Forest, although I have collected at Kasye more than a dozen times, and at Mihumu four times.

We arrived at Kigoma one and a half months after leaving Dar es Salaam, and, with my recent train experience in mind, I took the plane back to Dar!

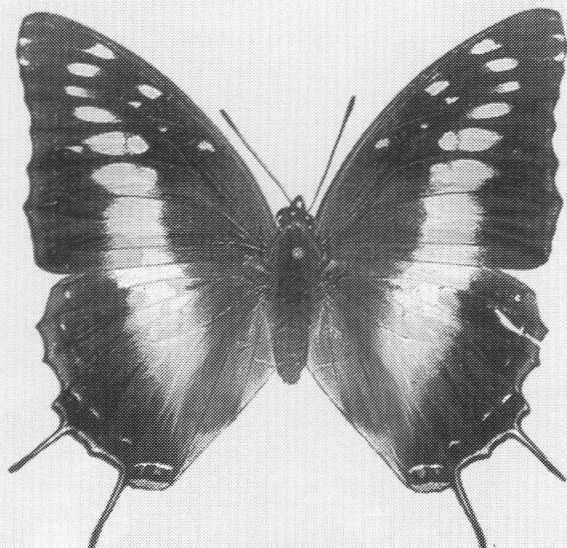
PLATE 31



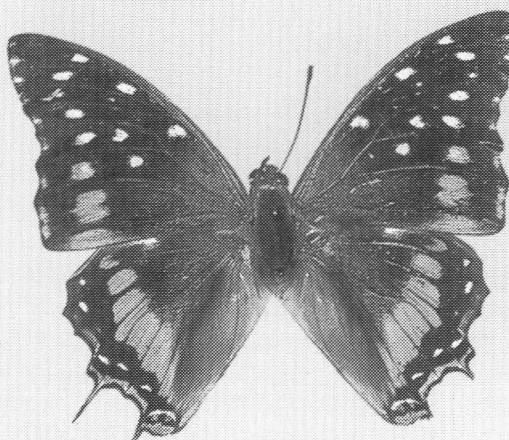
Ch. tavetensis tavetensis ♂ R



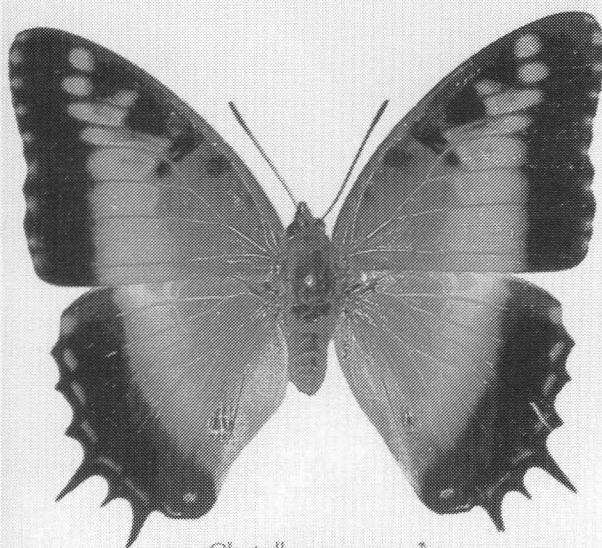
Ch. tavetensis tavetensis white f. ♀ R



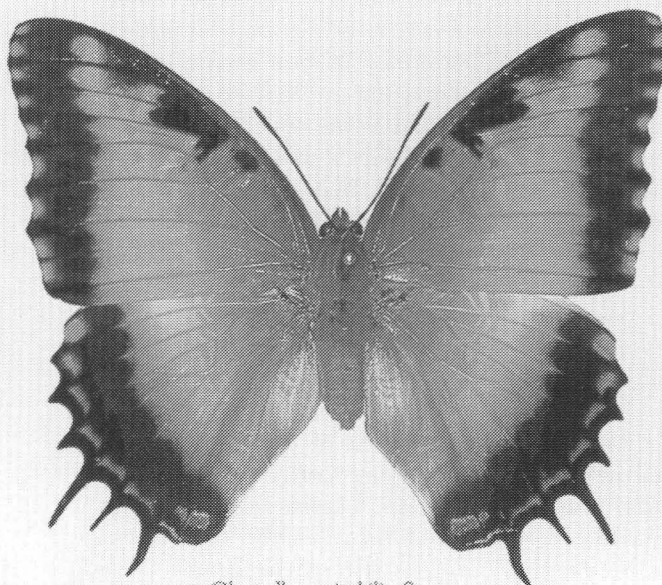
Ch. tavetensis tavetensis yellow f. ♀ R



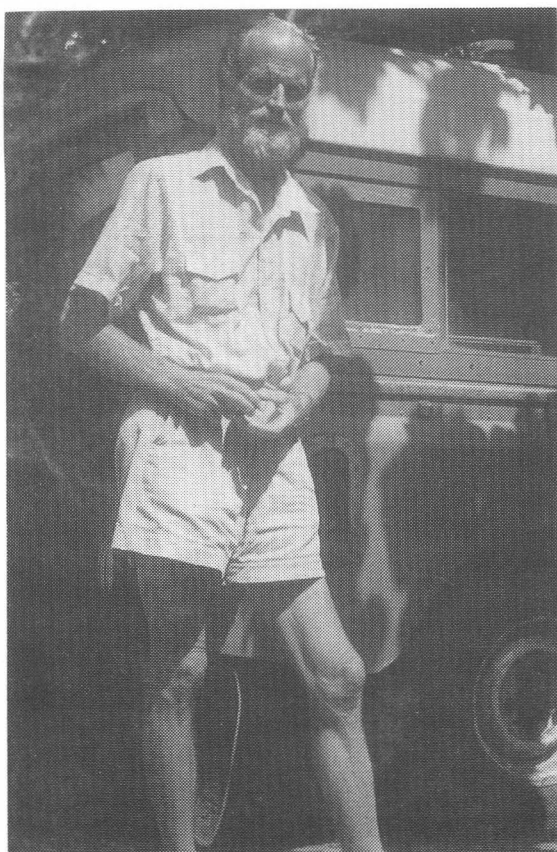
Ch. tavetensis shaba ♂ R



Ch. pollux nr. *maua* ♂ R



Ch. pollux mirabilis ♀ R



Jan Kielland was born in Oslo, Norway in 1923.

Many of his ancestors were sailors or explorers or both. His father rode across the Argentine Pampas in 1909. Before then, two of his father's brothers had been in and died in Africa (one in Congo (Zaire) and the other in South Africa). The author's maternal grandfather, C.A. Larsen, did a lot of exploring in the Antarctic seas, and was one of the pioneers of the whaling trade in that area. The author's mother, who celebrated her centenary in 1989, tells him that he first started 'chasing butterflies' in their garden in Oslo at the age of two, and he says that he clearly remembers that he had a tiny collection of lepidoptera and other insects in a wooden box when he was 6 years old. Soon after (perhaps at eight) he collected his first *Parnassius apollo*. He thinks the specimen, a large female, still exists in the Museum collection in Oslo (at least, it was deposited there, together with his other Norwegian insects, when he left for Tanzania on 15 December 1945).

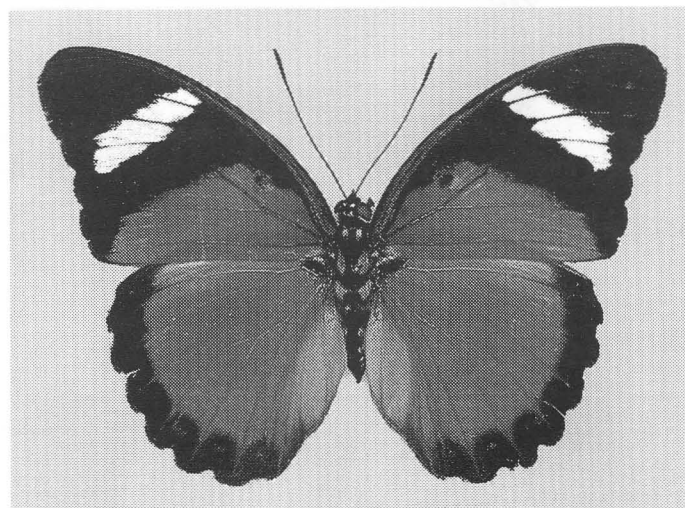
Jan Kielland finished college in Oslo at the age of 19, and as the world was at war he worked on farms as an agricultural apprentice for two years until the end of the war. During the last year of the war he also served in MILLORG (a resistance movement). Soon after the war he left for Tanzania to help his brother on his mixed farm in Oldeani, near Ngorongoro Crater.

In 1951 he started prospecting for mica and gold and mined mica in Kigoma and later Mpanda Districts. He seriously began collecting and studying Tanzanian butterflies after 1969, (the year in which he re-visited Norway for the first time after settling in Tanzania). At that time he had little else to do as mica prices were low and he was gradually winding down his business. Nevertheless he had a grand time collecting in, and exploring the remotest parts of Tanzania, areas where few foreigners had visited before.

In November 1974, he left Tanzania to try and resettle in Norway, but he found life there to be very dull. Since then he has very often visited Tanzania, staying from 3 to 12 months at a time, conducting research on butterflies. In this capacity he has collected in most parts of Tanzania.

The author has also been on a short collecting visit to Venezuela in South America, and to Thailand.

Jan Kielland is the author of many scientific papers and has described many new species and races of Tanzanian butterflies, some of which are published for the first time in this work.



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SYNOPSIS OF THE GENERA OF THE TRIBE GNORIMOSCHEMINI (LEPIDOPTERA: GELECHIIDAE)

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ABSTRACT.— The genera currently recognized in the tribe Gnorimoschemini are listed, together with a summary of their current species composition.

KEYWORDS: Afrotropical, Australian, biology, catalog, distribution, Ethiopian, fauna, hostplants, Nearctic, Neotropical, New World, Oceania, Old World, Oriental, Palearctic, phylogeny, taxonomy, USA.

Gnorimoschemine moths have been recognized as a group of similar species for some years, and finally segregated as a tribe of Gelechiidae nearly 40 years ago (Povolný, 1964b). Since then, more and more genera have been added to what is mainly a Holarctic group. Some of these subsequent additions resulted in their transfer, once identified as gnorimoschemine, from where they had been placed, scattered among the different gelechiid generic groups and even among other families like Lecithoceridae. Gnorimoschemine genera were provisionally arranged phylogenetically by Povolný and Šustek (1988), but are today further rearranged following numerous faunal additions. The studies by Povolný (1985a, 1991) offer the most comprehensive reviews of the tribe to date, and some of the introductory notes are reviewed below.

It should be noted that regardless of the extensive work already done on this group of moths, some of whose species are economically important, there nonetheless still remain a number of taxonomic and life history problems to elucidate, particularly among the tropical species. Nearly nothing is known of the actual genetics of the group, and few larvae have been described. We have some idea of the size of the tribe even though new species are still being described in large numbers (see Powell and Povolný, 2001), but biological studies are still greatly needed for most of the species.

The tribe Gnorimoschemini is now recognized to be one of the few discrete monophyletic entities of the Gelechiidae. The purely habitus definition of its taxa on external appearance of the moths is, however, rather difficult because of their overall similarity. Nevertheless, as shown by Povolný (1967b), there exist certain common trends in the forewing pattern characteristic of more or less extensive groups of species and genera (e.g., certain related species groups within the genera *Scrobipalpa*, *Euscrobipalpa*, *Gnorimoschema*, or the genera *Caryocolum* and *Microcraspedus*). These features include the presence of a triad of (dark) stigmata in the center of the forewing, a row of submarginal spots and a paler transverse subapical band (many species of *Euscrobipalpa*), or a dark forewing with more or less prominent white bands and or spotting (generally in *Caryocolum*). From such or similar groups of medial stigmata there often has developed a radiate pattern of uniformly longitudinal veins with or without a trace of spots (in several Nearctic and Neotropical species of the genus *Scrobipalpa* or in specialized Palearctic species of *Microcraspedus*), plus other probable derived forms of forewing pattern. On the other hand, a black forewing with white spotting characteristic of *Caryocolum* may occasionally and surprisingly occur also in other gnorimoschemine genera (*Euscrobipalpa*, *Scrobipalpa*, *Eurysacca*). The triad of (dark) stigmata mentioned above is, however, present also in several other gelechiine genera, and it seems that convergent forms of the forewing pattern (possibly also archetypic) may occur in various genera of this tribe which are not necessarily close relatives. Consequently, irrespective of the above

trends, no tangible characters are categorically indicative of the forewing pattern in tribe Gnorimoschemini.

The labial palpus is usually moderately long with some erect or roughened scales on the second segment, the third segment being a little, or visibly shorter, covered by appressed scales, moderately curved and usually not very acutely pointed. But there exist species having strikingly erect or roughened scales on the second segment (e.g., in the genus *Tila* and *Pogochaetia*, or in *Scrobipalpa* Povolný), or the whole palpus is considered elongate with an extremely long, straight second segment (in *Tecia venosa* (Butler) from Colombia), reminiscent of numerous genera in Dichomeriinae. But numerous other "exceptions" could be given, and these make it difficult to apply this character generally.

Wing venation is an adaptive character and unfortunately is liable to be inconstant. Consequently, it is of little value in separating many genera of Gelechiinae (Sattler, 1973). Irrespective of these facts, experience has shown that with practice based on a synthesis of identification characters it is possible to recognize the members of this tribe from even among little known or unknown taxa of Gelechiinae. Such experience is, of course, difficult to transmit to other persons and, moreover, individual species still reveal new surprises. Thus, the only really indisputable characters by which the gnorimoschemine taxa can be unambiguously identified are to be found in the genitalic structures of both sexes. In general, gnorimoschemine moths can be characterized as follows:

Forewing mostly without groups of (slightly) roughened scales. 3rd segment of labial palpus usually slender, moderately pointed. Male genitalia with uncus prominent, hood-shaped, not differentiated from tegumen, its upper margin smooth with only poor pubescence. Gnathos a deeply hanging hooklet (obviously secondarily reduced in *Caryocolum*, *Lutitabaria*, and related genera). Aedeagus usually straight, rather heavy and simple with basal inflation, short or long, occasionally with secondary spines or spiny fields on its wall. Valva simple and slender, clavate, often dilated terminally, slightly pubescent apically or with a row of bristles and having a distinct parbasal process. Saccus fold distinct, with a medial excision and with a paired process. Female genitalia with subgenital plate usually simple, with moderately long anterior apophyses, peristomally often with foam-like sculpture. Ostium bursae supported usually by a sclerotized narrow ringlet, ductus bursae sometimes (proximally) sclerotized. Signum of corpus bursae usually a little plate provided with a distinct to prominent thorn-formed hooklet or with a spine which is sometimes reduced (especially in several New World groups). Asymmetry of both male and female genitalia is rare and found in obviously specialized, mainly Neotropical taxa.

Adults have forewing lengths generally from 3.5-4mm in small species, as in the genera *Euscrobipalpa* and *Schmidtnielsenia*, and to 13-14mm in larger species like *Gnorimoschema gallaesolidaginis*, but the typical forewing length for species in the tribe is 6.5-7mm.

The distribution of the tribe is worldwide (Povolný, 1967b), and nearly 900 species have been described. About 550 species are restricted to the Palearctic region. This reflects more the intensity of

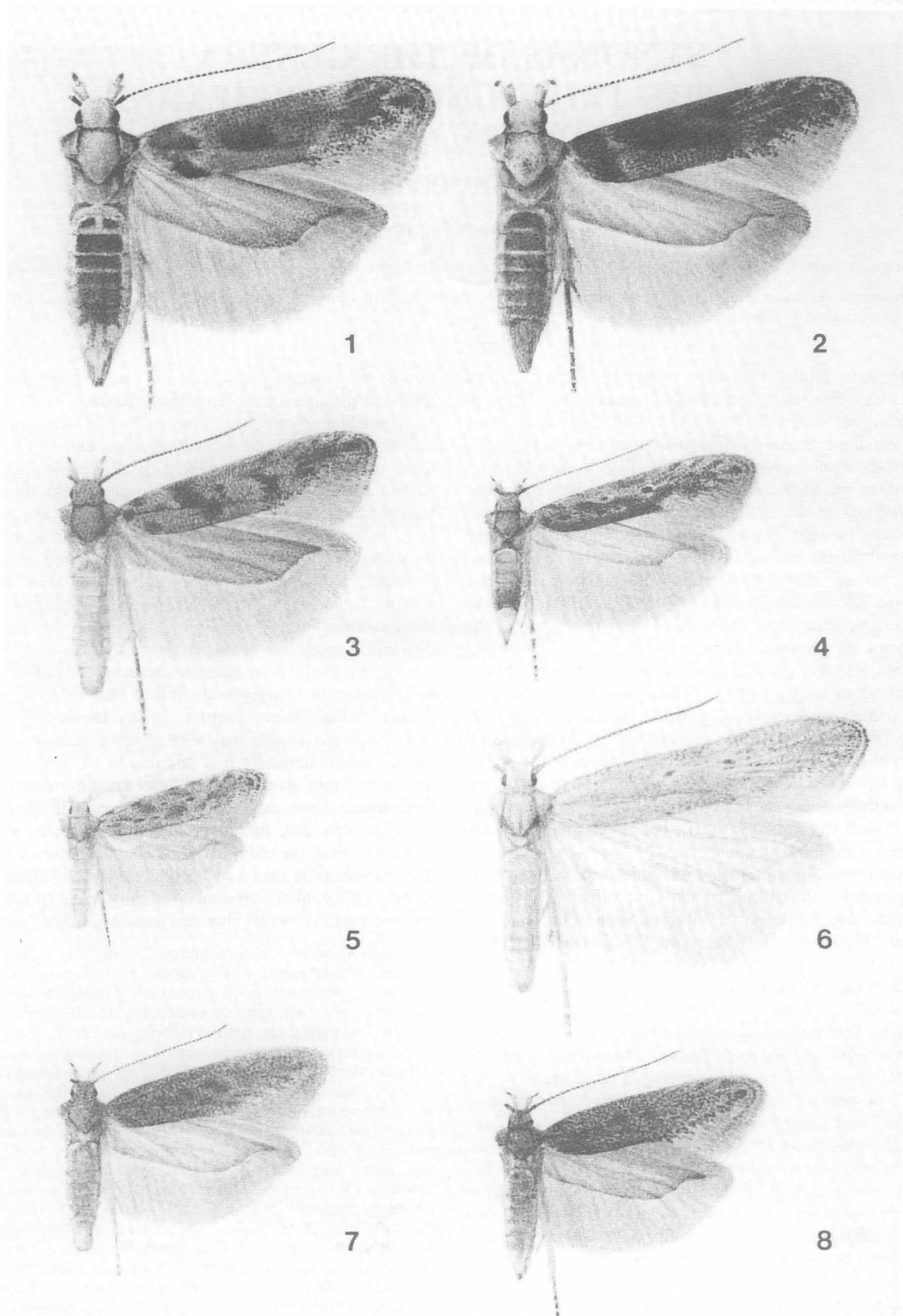


Plate 1. Typical Nearctic gnorimoschemine moths (from Powell and Povolný, 2001), all Californian: 1-2) *Gnorimoschema grindeliae* Povolný & Powell, females; 3) *G. debenedictisi* Povolný & Powell, male; 4) *Scrobipalpula gutierreziae* Povolný & Powell, female; 5) *Tuta chiquitella* (Busck), male; 6) *Exceptia sisterina* Povolný & Powell, male; 7-8) *Euscrobipalpa arenaceariella* Povolný & Powell, male, female dark form (Dr. F. Gregor, painter; all greatly enlarged).

research than the real situation, since discoveries of new species may be expected from the other regions. A revision of Afrotropical taxa remains an important task, and many undescribed species can be expected to exist, especially in the eremic steppes and semideserts of Africa. The present knowledge seems to indicate comparatively close relationship of the Afrotropical Gnorimoschemini with the taxa of the eremic habitats of the Palearctic Mediterranean (Povolný, 1981b), including the semideserts of the Near and Middle East. The Notogean (Oceania to Australia) Gnorimoschemini are generally poor in taxa and only a very limited number of endemic genera and species occurs in Australia and New Zealand. The Notogean members of some genera (*Kiwaia*, *Microcraspedus*, *Scrobipalpa*) show clear relationship to the Gnorimoschemini of adjacent semidesert habitats of Asia or are of pan-paleotropical distribution.

New World Gnorimoschemini comprise nearly 300 species, belonging obviously to deeply isolated genera outnumbering those of the Old World. The present picture of the Nearctic Gnorimoschemini remains very incomplete, as evidenced for example, by the fact that about 10 new species have recently been discovered just amongst material from the territorially limited sand dunes of California (see Powell and Povolný, 2001). Overall, Gnorimoschemini have been studied by relatively few authors and our present knowledge is rather scattered and nebulous. The present author has endeavoured for years to improve this situation (see Povolný, 1964-2001), but any estimate of the number of existing taxa is premature. The only way towards progress there seems to be with systematic regional research and the study of extensive series necessary for profound understanding of the species diversity and of the generic differentiation of the Neotropical Gnorimoschemini. We only may state that numerous relationships at the generic level exist in the Nearctic Gnorimoschemini (due to the obvious radiation of such genera as *Symmetrischema* and *Keiferia*, from South to North America) and that a high degree of Neotropical endemism exists, reflected by deeply isolated genera comprising often numerous species, of which many are still to be described.

Gnorimoschemini are essentially concealed feeders (Povolný, 1980b), living in shoots, buds, flowers, fruits and roots of their hostplants. Especially amongst the American (Nearctic) species, there is a strong trend towards development of galls (e.g., *Gnorimoschema*, s. str.), an apparent specialized feeding habit. Gall makers are less common or exceptional in other regions, but include *Scrobipalpa gallincolella* (Mann, 1872) in the Mediterranean and species of the genus *Vladimirea* on certain Zygophyllaceae in eremic habitats of the Palearctic region. A number of gnorimoschemine species have become pests of crops, and South America in particular has produced species of economic importance, mainly of cultivated Solanaceae which have been introduced to the Old World (e.g., *Phthorimaea operculella* (Zeller, 1873) and *Symmetrischema tangolias* (Gyen, 1913)). Some of them were described only comparatively recently, as for example *Eurysacca quinoae* Povolný, 1997, *Scrobipalopsis solanivora* Povolný, 1973, *Symmetrischema capsicum* (Bradley & Povolný, 1965) (see also Povolný, 1979; Rasmussen *et al.*, 2001). Among the approximately 600 species of the tribe, the food plants of about 150 are known (Povolný, 1980a, 1981b). Asteraceae are frequent hosts of many Holarctic species. Another important family of food plants is the Solanaceae, preferred mainly by New World (both Nearctic and Neotropical) species, irrespective of the still limited knowledge of these relationships. Halophilous Chenopodiaceae are known to be characteristic food plants of a considerable number of semidesert species of Palearctic *Scrobipalpa* (*Eusrobipalpa*), and this same plant family probably hosts gnorimoschemines in other regions, including South America. The related Caryophyllaceae seem to be nearly exclusive hostplants of the essentially Palearctic genus *Caryocolum*, which represents the best known group of Gnorimoschemini in this respect. Finally, Zygophyllaceae and Poaceae are known to be the hosts of the essentially Palearctic or

Old World genera *Vladimirea* and *Microcraspedus*, respectively. There exists, however, obvious oligophagy of several species of Gnorimoschemini on such families as Rhamnaceae, Zosteraceae, Plumbaginaceae, Ericaceae, Labiatae, Rosaceae, Cruciferae, Polygonaceae, and Salicaceae. It remains unclear whether this is just a part of certain survival strategies (e.g., in saline or in other similar habitats offering limited choice of food plants), or whether mutualistic relationship (parallel speciation) is a more general trend in the relationship between Gnorimoschemini and their hostplants.

The following synopsis provides a current listing of the genera of the tribe as far as is known to date, with a total of 878 species worldwide. Based on the numbers of new species that continue to be found, the eventual worldwide fauna of Gnorimoschemini will probably exceed 1000 species. The most up-to-date classification based on the presumed phylogeny gives the following listing of the genera, their current species totals and their general distribution (more details for each genus follows in the alphabetical listing):

GNORIMOSCHEMINI

<i>Symmetrischema</i>	55	New World
<i>Paraschema</i>	1	South America
<i>Scrobipalpoides</i>	1	South America
<i>Eurysacca</i>	24	South America
<i>Eurysaccoides</i>	2	USA (California)
<i>Scrobipalpula</i>	49	New World
<i>Keiferia</i>	24	New World
<i>Magnifacia</i>	5	South America
<i>Tuta</i>	20	New World
<i>Scrobipalpulopsis</i>	15	New World
<i>Phthorimaea</i>	4	Neotropical (1 cosmopolitan)
<i>Schmidttnielsenia</i>	1	South America
<i>Scrobipalpomima</i>	18	South America
<i>Scrobitasta</i>	1	Neotropical
<i>Tecia</i>	5	Argentina
<i>Scrobipalopsis</i>	8	Nearctic/Neotropical (1 Holarctic)
<i>Scrobipalpa</i>	3	Australia
<i>Eusrobipalpa</i>	297	Palearctic, also to Australia; USA
<i>Ilseopsis</i>	1	Palearctic
<i>Turcopalpa</i>	2	Palearctic
<i>Gobipalpa</i>	1	Palearctic
<i>Ergasiola</i>	1	Mediterranean to Japan, Africa
<i>Australiopalpa</i>	3	Australia
<i>Exceptia</i>	2	USA (California)
<i>Microcraspedus</i>	63	Palearctic to Australia; USA
<i>Ephysteris</i>	1	Palearctic; Africa
<i>Ochrodia</i>	1	Palearctic, also to Australia
<i>Vladimirea</i>	13	Palearctic
<i>Phloeocecis</i>	1	Oriental
<i>Hedma</i>	6	Palearctic, Africa, Oriental
<i>Kiwaia</i>	20	New Zealand; Palearctic
<i>Gnorimoschema</i>	83	Holarctic
<i>Neoschema</i>	2	USA (California/Nevada)
<i>Neopalpa</i>	1	USA (California); Mexico
<i>Cosmardia</i>	1	Palearctic
<i>Tila</i>	2	Palearctic
<i>Nevadopalpa</i>	6	USA (California)
<i>Sattleria</i>	1	Palearctic
<i>Caryocolum</i>	120	Palearctic (2 Holarctic)
<i>Klimeschiopsis</i>	3	Palearctic (1 Holarctic)
<i>Lutlabria</i>	2	Palearctic
<i>Pogochaetia</i>	1	Palearctic
<i>Agonochaetia</i>	6	Palearctic; 1 Nearctic
<i>Fruementa</i>	2	Nearctic
TOTAL	878	(plus ca. 175 undescribed)

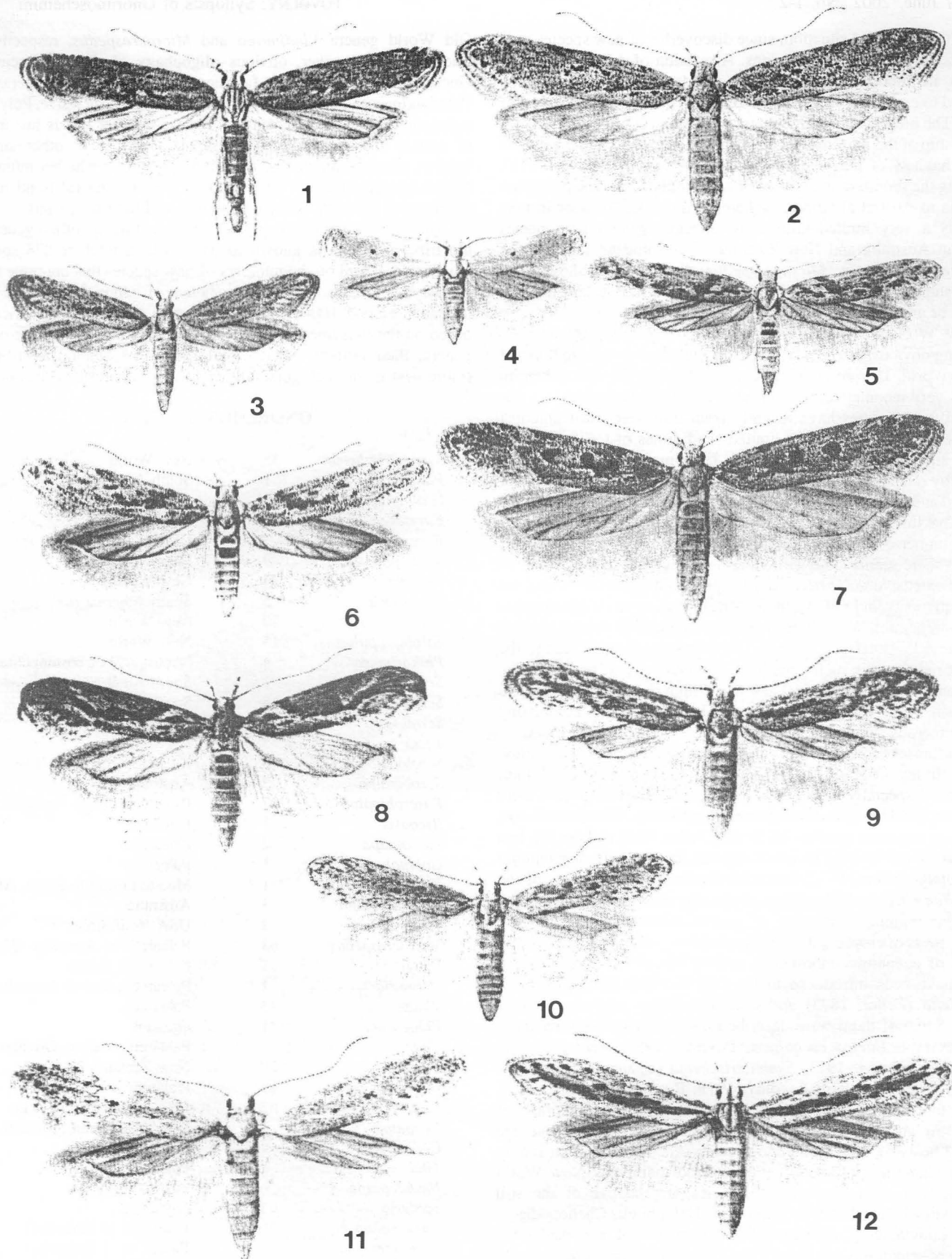


Plate 2. Typical Palearctic gnorimoschemine moths (No. 8 is Nearctic) (from Povolný, 1964b): 1) *Phthorimaea operculella* (Zeller), Morocco; 2) *Euscrobipalpa salinella* (Zeller), Corsica; 3) *Ergasiola ergasima* (Meyrick), Spain; 4) *Euscrobipalpa soffneri* Povolný, Bulgaria; 5) *Gnorimoschema herbichi* (Nowicki), Slovakia; 6) same, Macedonia; 7) *Euscrobipalpa instabilella* (Douglas), Germany; 8) *Gnorimoschema gallaesolidaginis* (Riley), USA (Connecticut); 9) *Scrobipalpula psilella psilella* (Herrich-Schäffer), Austria; 10) *Microcraspedus treskensis* (Povolný), Macedonia; 11) *Microcraspedus insulellus* (Heinemann), Bulgaria; 12) *Scrobipalpula psilella seniorum* (Povolný), Macedonia. (Dr. F. Gregor, painter; all greatly enlarged).

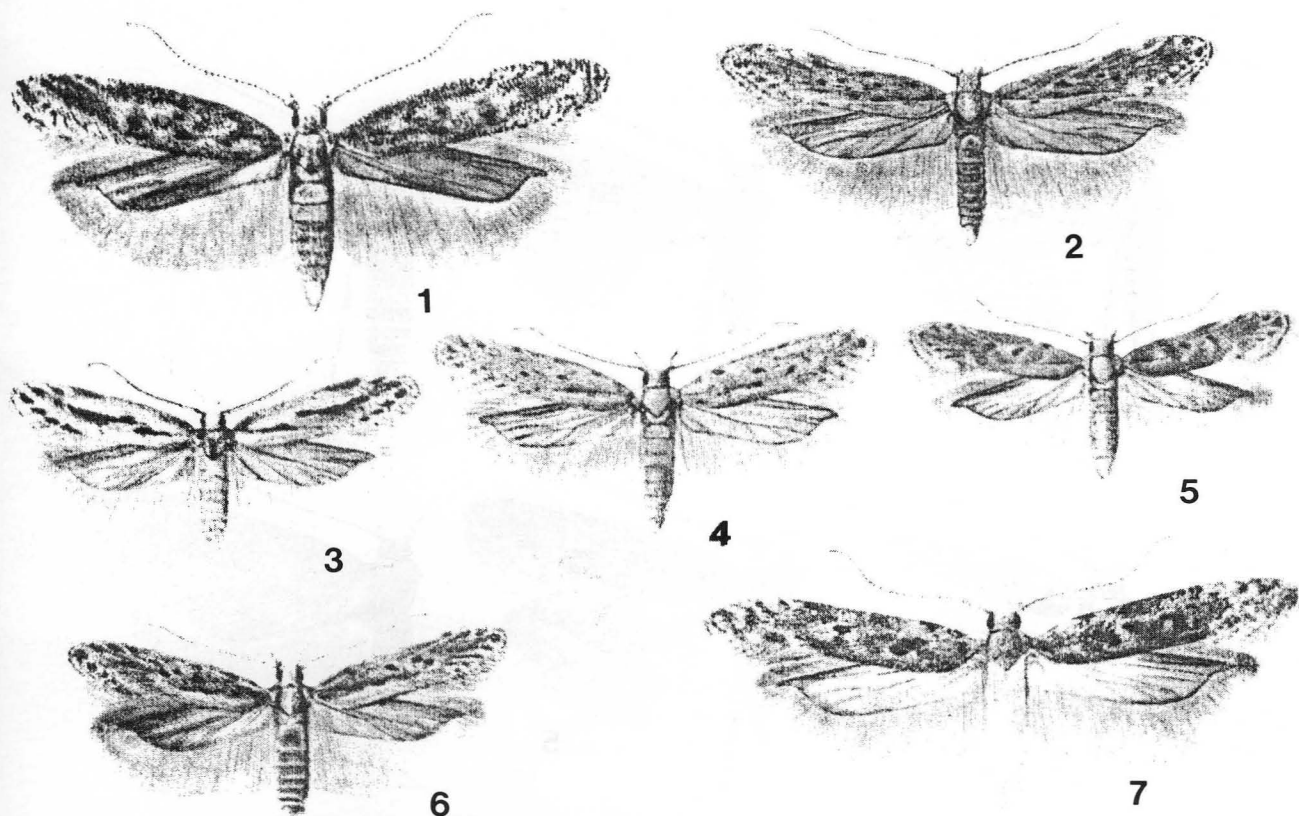


Plate 3. Typical Palearctic gnorimoschemine moths (from Povolný, 1964b): 1) *Microcraspedus inustellus* (Zeller), Slovakia; 2) *Euscrobipalpa samadensis* (Pfaffenzeller), Switzerland; 3) [*Mirificarma burdonella* (Rebel), Corsica (since the publication of this plate the species has been excluded from Gnorimoschemini)]; 4) *Euscrobipalpa obsoletella* (Fischer von Röslerstamm, Europe (introduced to South Africa); 5) *Euscrobipalpa gallincolella* (Mann), Spain; 6) *Euscrobipalpa suaedella* (Richardson), England; 7) *Euscrobipalpa erichi* Povolný, Hungary. (Dr. F. Gregor, painter; all greatly enlarged).

GENERIC NOTES

AGONOCHAETIA Povolný, 1965

6 sp. in total: 5 sp. are Palearctic and 1 sp. is Nearctic.

AUSTRALIOPALPA Povolný, 1974

3 sp. from Australia, with 2 sp. being in the subgenus *Australiopulpa* Povolný, 1974.

BRACHYPSALTIS Meyrick, 1931

See *Tecia* Strand, 1910.

CARYOCOLUM Gregor & Povolný, 1954

120 sp. are Palearctic, 2 of which are Holarctic (possibly 2-3 sp. remain undescribed in the Nearctic) (see Huemer, 1988).

COSMARDIA Povolný, 1965

1 sp. in the Palearctic.

DISTINXIA Povolný, 1967

See *Vladimirea* Povolný, 1967; a subgenus of *Vladimirea*.

ECHINOGLOSSA Clarke, 1965

See *Microcraspedus* Janse, 1958.

EMPISTA Povolný, 1968

See *Kiwaia* Philpott, 1930; a subgenus of *Kiwaia*.

EPHYSTERIS Meyrick, 1908

1 sp. from Europe to central and southern Asia, plus Africa.

ERGASIOLA Povolný, 1967

1 sp. in India, now also distributed in Africa, the Mediterranean area (including Canary Is.) and Arabia to Japan, and in the Oriental Region: the species is a pest of eggplant.

EURYSACCA Povolný, 1967

24 sp. from South America (additional species remain to be described); 2 sp. are economic on potatoes (see Povolný, 1997).

EURYSACCOIDES Povolný, 1998

2 sp. in California.

EUSCROBIPALPA Povolný, 1967

297 sp. described (possibly with as many as 400 sp.): 292 sp. are Palearctic, plus 1 sp. from Australia, 1-2 sp. are Afrotropical, 1 sp. is Oriental, and 1 sp. is in California (USA) (possibly 2-3 other species remain undescribed in the Nearctic).

EXCEPTIA Povolný, 1967

2 sp. in California.

FAPUA Strand, 1910 (in Kieffer & Jörgensen)

See *Tecia* Strand, 1910.

FAPUA Strand, 1911, redesc.

See *Tecia* Strand, 1910.

FRUMENTA Busck, 1939

2 sp. in the Nearctic.

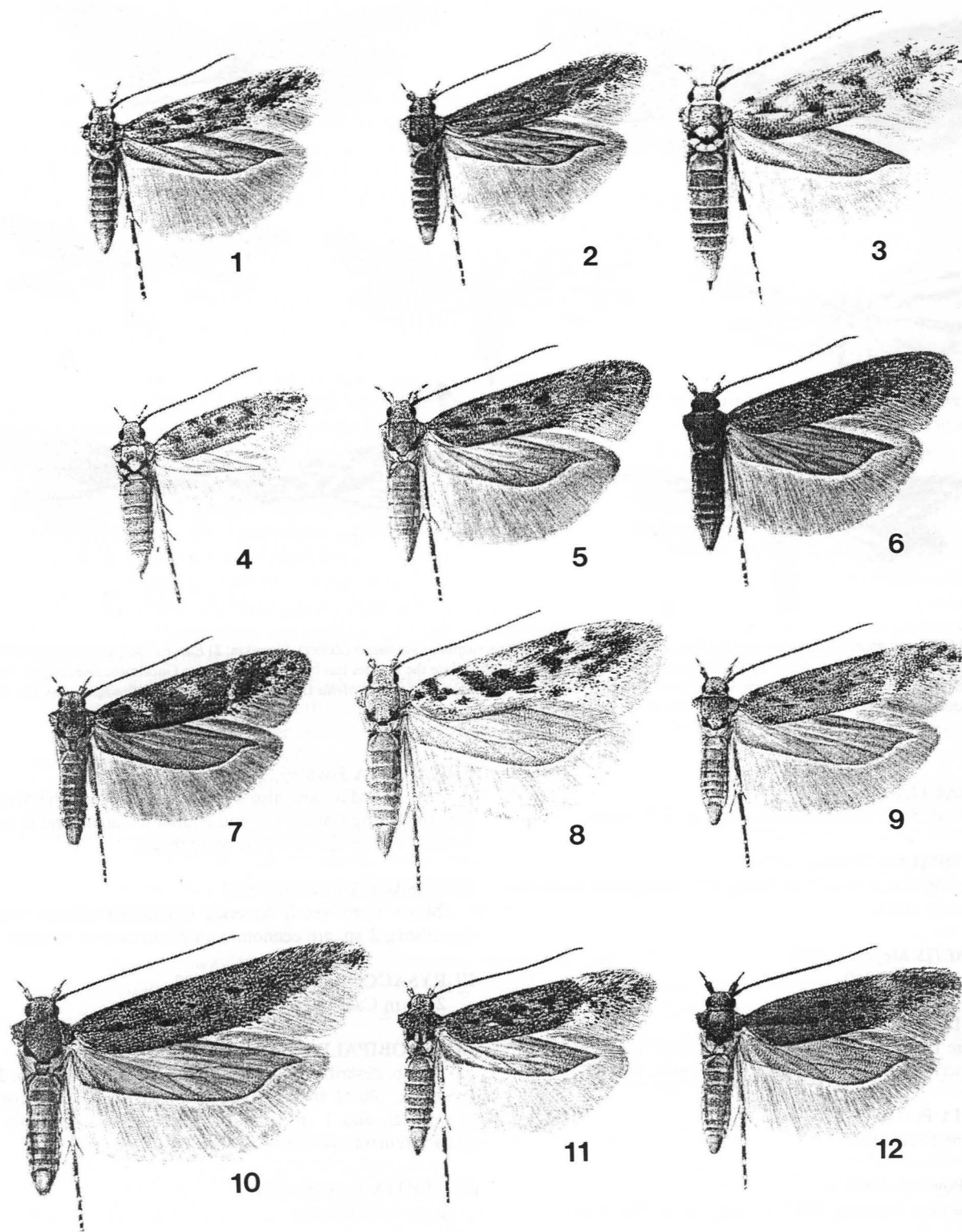


Plate 4. Typical Palearctic *Gnorimoschema* moths (from Povolný, 1992): 1) *G. antiquum antiquum* Povolný, Turkey; 2) *G. antiquum montanum* Povolný, Iran; 3) *G. bodillum* Karsholt & Nielsen, Denmark; 4) *G. elbursicum* Povolný, Iran; 5) *G. epithymellum epithymellum* (Staudinger), Spain; 6) *G. epithymellum brunneomaculellum* Hackman, Finland; 7) *G. streliciellum streliciellum* (Herrich-Schäffer), Czech Rep.; 8) *G. streliciellum hoeferi* (Rebel), Austria; 9) *G. mongolorum* Povolný, Mongolia; 10) *G. cinctipunctellum* (Erschoff), Russia (Amur); 11) *G. valesiellum* (Staudinger), Switzerland; 12) *G. vabei* (Wolff), Greenland. (Dr. F. Gregor, painter; all greatly enlarged).

GNORIMOSCHEMA Busck, 1900*Lerupsia* Riedl, 1965

83 sp. described so far, with 65 sp. in the Nearctic and 15 sp. in the Palearctic region, while 3 sp. are Holarctic. The total number of species may exceed 80 sp. in the Nearctic.

GOBIPALPA Povolný, 1973

1 sp. in the Palearctic.

HEDMA Dumont, 1932

6 sp. described: 4 sp. are Palearctic, of which 1 sp. is also distributed in the Afrotropical region; 1 sp. is Oriental; and 1 sp. is from South Africa.

ILSEOPSIS Povolný, 1965

1 sp. in the Palearctic.

KEIFERIA Busck, 1939*Tildenia* Povolný, 1967

24 sp. in the New World, with 20 sp. being Neotropical, 3 sp. Nearctic, and 1 sp. widespread in both regions.

KIWAIA Philpott, 1930*Zeempista* Povolný, 1974

20 sp. described: 15 sp. in New Zealand, plus 5 sp. in the Palearctic in the subgenus *Empista* Povolný, 1968.

KLIMESCHIOPSIS Povolný, 1967

3 sp. are Palearctic, 1 of which is Holarctic.

LATA Strand, 1910 (in Kieffer & Jörgensen)See *Tecia* Strand, 1910.**LATA** Strand, 1911, redesc.See *Tecia* Strand, 1910.**LERUPSIA** Riedl, 1965See *Gnorimoschema* Busck, 1900.**LUTILABRIA** Povolný, 1965

2 sp. in the Palearctic.

MAGNIFACIA Povolný, 1967

5 sp. in South America.

MICROCRASPEDUS Janse, 1958*Opacopsis* Povolný, 1964*Echinoglossa* Clarke, 1965

63 sp. described: 60 sp. are Palearctic and in the eastern Oriental; 1 sp. is Australian; 2 sp. are from California.

NEOPALPA Povolný, 1998

1 sp. in California and Baja California.

NEOSCHEMA Povolný, 1967

2 sp. from California and Nevada.

NEVADOPALPA Povolný, 1998

6 sp. in California.

OCHRODIA Povolný, 1966

1 sp. in the Palearctic, ranging to Africa and Australia.

OPACOPSIS Povolný, 1964See *Microcraspedus* Janse, 1958.**PARASCHEMA** Povolný, 1990

1 sp. from South America.

PHLOEOCECIS Chrétien, 1908

1 sp. in the Oriental Region, including Pakistan.

PHTHORIMAEA Meyrick, 1902

4 sp. in the Neotropical region (only 2 sp. may be valid). *Phthorimaea operculella* (Zeller) is now cosmopolitan as an introduced pest of potatoes.

POGOCHAETIA Staudinger, 1879

1 sp. in the Palearctic.

PRIMISCHEMA Povolný, 1989

See *Symmetrischema* Povolný, 1967; subgenus of *Symmetrischema*.

[PTYCERATA Ely, 1910]

This genus is not gnorimoschemine, but related to *Monochroa* and *Isophrictis* (Powell and Povolný, 2001). Hodges, in the 1983 North American Lepidoptera catalog erroneously listed *Ptycerata* as a senior name for *Scrobipalpopsis*.

SATTLERIA Povolný, 1965

1 sp. in the Palearctic (with 3-4 sibling species).

SCHMIDTNIELSENIA Povolný, 1987

1 sp. from South America.

SCROBIPALPA Janse, 1951

3 sp. from Australia.

SCROBIPALPOIDES Povolný, 1985

1 sp. from South America (Argentina).

SCROBIPALPOMIMA Povolný, 1985

18 sp. in the Neotropical region (possibly a number more remain undescribed).

SCROBIPALPOPSIS Povolný, 1967

8 sp., of which 6 sp. are Nearctic. 1 sp. is from the northern Neotropics, and 1 sp. is Holarctic.

SCROBIPALPULA Povolný, 1964

49 sp. known, with 30 sp. described being Neotropical and 11 sp. Nearctic, plus 1 sp. widespread in the New World and reaching the Palearctic (additional Neotropical species are expected).

SCROBIPALPULOIDES Povolný, 1987See *Tuta* Strand, 1910.**SCROBIPALPULOPSIS** Povolný, 1987

15 sp. known, with 8 sp. being described thus far for the Neotropical Region and 2 sp. in the Nearctic (mainly California and Nevada).

SCROBISCHEMA Povolný, 1980See *Tecia* Strand, 1910.**SCROBITASTA** Povolný, 1985

1 sp. in the Neotropical region.

SYMMETRISCHEMA Povolný, 1967

55 sp. from the New World (possibly many more to be de-

scribed). Three subgenera are involved in this Neotropical group: *Symmetrischemulum* Povolný, 1989, with 7 sp.; *Primischema* Povolný, 1989, with 7 sp.; and the nominate *Symmetrischema*, with 33 sp. in the Neotropical region, 3 also to the Nearctic (with 1 sp. introduced now to Australia), 5 only in the Nearctic.

SYMMETRISCHEMULUM Povolný, 1989

See *Symmetrischema* Povolný, 1967; subgenus of *Symmetrischema*.

[SYNTHESIOPALPA Povolný, 1966]

See *Trychnopalpa* Janse, 1958.

TECIA Strand, 1910 (in Kieffer & Jörgensen)

Fapua Strand, 1910 (in Kieffer & Jörgensen)

Lata Strand, 1910 (in Kieffer & Jörgensen)

Tecia Strand, 1911, redesc.

Fapua Strand, 1911, redesc.

Lata Strand, 1911, redesc.

Brachypsaltis Meyrick, 1931

Scrobischema Povolný, 1980

5 sp. in Argentina.

This genus and its synonyms have confused authorship due to the antecedent publication of the names by the botanists Kieffer and Jörgensen in 1910, with the Strand paper not published until 1911. Kieffer and Jörgensen reared the moths from galls in Argentina, which they sent to Strand for identification. Strand replied that the species were undescribed and even considered them in 3 genera: these new names he sent to Kieffer and Jörgensen who then published the new names with Strand as author in their paper of 1910. The formal publication by Strand did not occur until 1911. Later study of the types has revealed that all the species are congeneric, thus they all belong in the first genus named, *Tecia* (see Povolný, 1993a). Sattler (1973) and Hodges and Becker (1990) attributed the names to Kieffer and Jörgensen, but these botanists knew nothing of moth taxonomy and only used the names Strand had given them ahead of his publication. My conclusion is that Strand should be attributed as author of these names, as Strand in Kieffer & Jörgensen, 1910; the Strand, 1911 names would be redescrptions. *Tecia* was erroneously placed in Lecithoceridae on the basis of their unusual labial palpi. In the world catalog of Lepidoptera genera part on generic names of Microlepidoptera (Nye and Fletcher, 1991), *Tecia* was placed in Gelechiidae and Strand, 1911 was given authorship; Nye and Fletcher state that the 1910 publication of the names by Kieffer and Jörgensen was inadvertant use of manuscript names; since the names were published, this cannot be stated in this way, and thus listing Strand, 1910 in Kieffer & Jörgensen is the proper solution in this case.

TECIA Strand, 1911, redesc.

See *Tecia* Strand, 1910.

TILA Povolný, 1965

2 sp. in the Palearctic.

TILDENIA Povolný, 1967

See *Keiferia* Busck, 1939.

[TRYCHNOPALPA Janse, 1958]

Synthesiopalpa Povolný, 1966

This African genus is now excluded from Gnorimoschemini.

TURCOPALPA Povolný, 1973

2 sp. in the Palearctic.

TUTA Strand, 1910

Scrobipalpuloides Povolný, 1968

20 sp. from the New World (mostly in saline and maritime habitats).

VLADIMIREA Povolný, 1967

13 sp. in the Palearctic (subgenus *Distinxia* Povolný, 1967, with 1 sp., the remainder in the nominotypic subgenus).

ZEEMPISTA Povolný, 1974

See *Kiwaia* Philpott, 1930.

APPENDIX

The other tribes of the subfamily Gelechiinae include Gelechiini, Apatetrini, Anomologini, Metzneriini (or Isophrictini), Teleiodini, Anacamptini, and Chelariini.

Gelechiini

This tribe appears to still be heterogeneous and polyphyletic. The genus *Gelechia* s. str. has no gnathos, which is substituted by two ligulate ledges. *Chionodes* has the valva so reduced that it is like a filament. *Filatima* and *Neofriseria* have extremely short unguate saccus, slender valva, extremely strong hook-shaped gnathos, uncus with spines, and a very short aedeagus.

Apatetrini

This tribe seems to be a well defined group. They show very subtle genitalia with the uncus-tegumen bilobate and membranous, valva short and armored with groups of minor but striking spines; aedeagus is minute.

Anomologini

A monophyletic tribe when certain genera are included, such as *Megacraspedus*, *Aristotelia*, and *Bryotropha*, with uncus distinct, gnathos spined and extremely robust, saccus well developed, and aedeagus strong.

Metzneriini

This is one of the best defined tribes (also called Isophrictini), other than Gnorimoschemini. The genera *Chrysoesthia*, *Xystophora*, *Isophrictis*, *Metzneria* (the largest genus in the tribe), *Ptocheusa*, *Monochroa* (another large genus), and *Eulamprotes* form a well defined monophyletic group, all showing completely reduced elements of the uncus, with tegumen reduced to only its base and membranous, valva short and crescent-like, with dense hair-like setae, aedeagus extremely robust with strong subovate caecum aedeagi and short corpus aedeagi (often with striking cornuti), sacculus part of valva foliate or lobate; and female genitalia with entire perigenital sclerites membranous, signa either absent (membranous) or present as small plates with a minor spine, with distal part of ductus bursae sometimes with sclerotized walls.

Teleiodini

Also a well defined tribe, with rather complex male genitalia, with saccus either membranous or completely absent, valva completely altered as filiform and long spine-like branches, with sacculus elongate lobate or secondarily changed and sometimes forming a complex structure together with the valva; gnathos membranous or absent, aedeagus mostly membranous, tubulose; uncus often with a double tuft of stiff setae; female genitalia with subgenital plate (8th sternite) mostly membranous but peristomium well visible due to sclerotization; ductus bursae thin and extremely long, and bursa short and globate; signum a sclerotized subtrapezoidal plate with lateral indentation. Genera included are *Teleiodes*, *Coleotechnites*, *Exoteleia*, *Carpatolechchia*, *Pseudotelphusa*, *Teleiopsis*, *Xenolechia*, and *Altenia*.

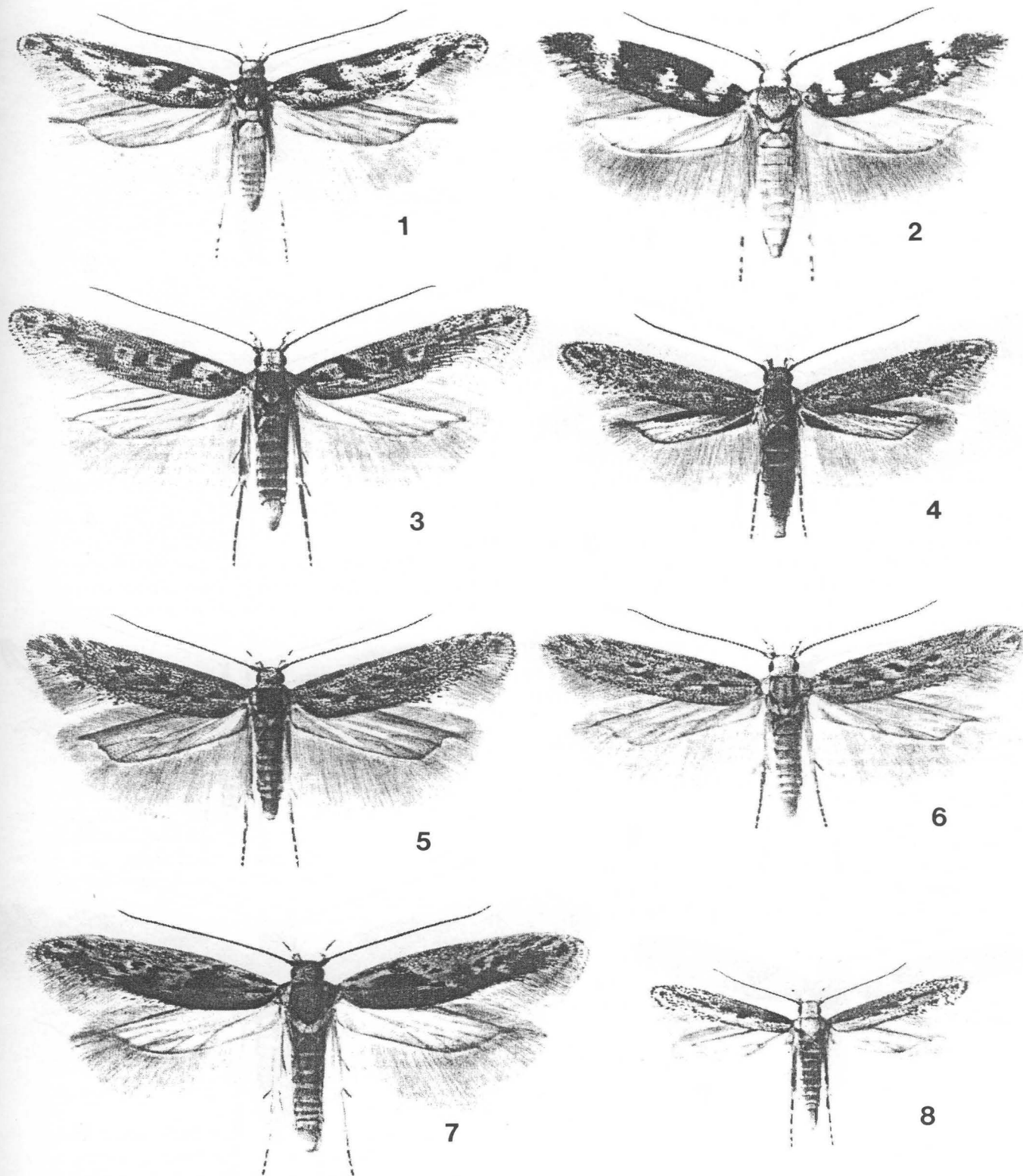


Plate 5. Typical Neotropical gnorimoschemine moths (from Povolný, 1994a): 1) *Scrobipalpomima excellens* Povolný, Argentina (Chubut); 2) *Scrobitasta varians* Povolný, Argentina (Neuquen); 3) *Scrobipalpula falcata* Povolný, Argentina (Neuquen); 4) *Scrobipalpula patagonica* Povolný, Argentina (Neuquen); 5) *Tuta inapparens* Povolný, Argentina (Neuquen); 6) *Magnifacia unispina* Povolný, Argentina (Salta); 7) *Phthorimaea robusta* Povolný, Argentina (Santa Cruz); 8) *Schmidnielsenia nielseni* Povolný, Argentina (Neuquen). (Dr. F. Gregor, painter; all greatly enlarged).

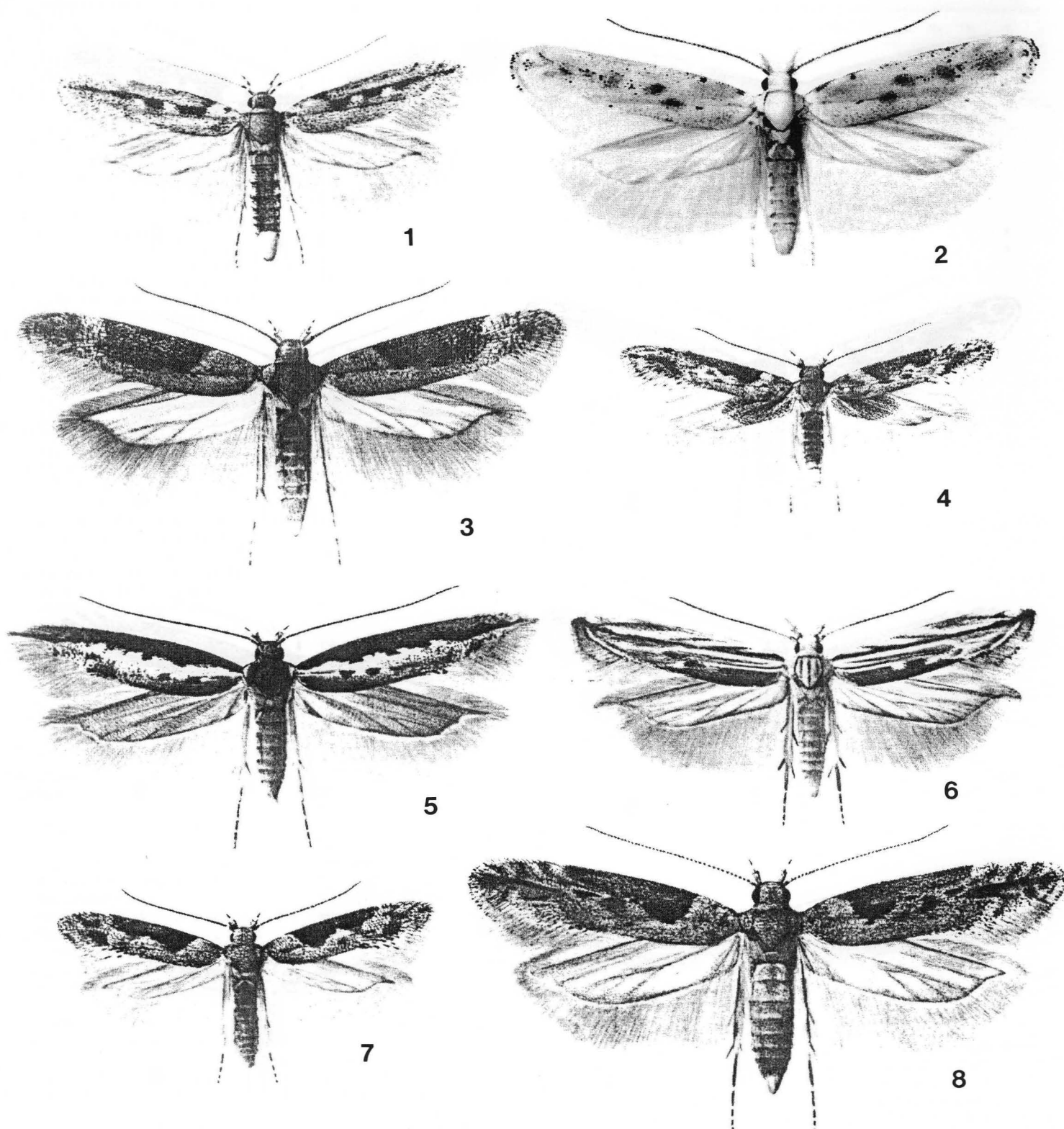


Plate 6. Typical Neotropical gnorimoschemine moths (from Povolný, 1994a): 1) *Eurysacca annulata* Povolný, Argentina (Neuquen); 2) *Eurysacca splendida* Povolný, Argentina (Neuquen); 3) *Eurysacca tenebrosa* Povolný, Argentina (Santa Cruz); 4) *Symmetrischema disciferum* Povolný, Argentina (Neuquen); 5) *Symmetrischema symmetricum* Povolný, Peru (Lima); 6) *Symmetrischema striatellum* (Murtfeldt), Chile; 7) *Symmetrischema nummulatum* Povolný, Argentina (Rio Negro); 8) *Symmetrischema tangolias* (Gyen), Peru (Uyurpampa). (Dr. F. Gregor, painter; all greatly enlarged).

Anacampsini

The tribe is possibly monophyletic but morphologically with very heterogeneous genital characters. Genera included are *Sophronia*, *Stomopteryx*, *Iwaruna*, *Anacampsis*, *Mesophleps*, and *Syncopacma*. All the main parts of the male genitalia (uncus, tegumen, valva, saccus, sacculus, aedeagus) well developed and often extremely "exaggerated": the aedeagus in *Syncopacma* is gigantic, bipartite with a filiform bifurcation, etc. The female perigenital sclerites, ductus bursae and bursa are mostly membranous; signum bursae either absent or more or less small and reduced.

Chelariini

The main genus is *Anarsia*, and together with *Hypatima* and *Nothris* show partly strongly asymmetrical male genitalia (*Anarsia* with valva asymmetrical), with long filiform process on a stronger valva, and valva with fields of striking osmotic scales which are also sometimes present on the sacculus of *Hypatima* and *Nothris* when symmetrical; aedeagus well developed, terminally provided with a filiform ending; 8th sternite of female genitalia short and broad, poorly sclerotized; ductus and bursa complex membranous, and in *Nothris* a surprisingly long, spiral ductus bursae; signum a small subovate plate with serrate margin.

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ADDITIONS AND CORRECTIONS TO THE BIBLIOGRAPHY OF BUTTERFLIES, IN THE ATLAS OF NEOTROPICAL LEPIDOPTERA No. V. COMPRISING MOSTLY WORKS PUBLISHED IN 2000

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The fourth set of *Additions and Corrections* to the annotated *Bibliography of Butterflies* (Lamas, Robbins, and Field, 1995) in the series *Atlas of Neotropical Lepidoptera*, Vol. 124, was published a year ago (Lamas, 2001, *Lepidoptera News* 2000(3): 21-35. The 289 additional references included herein comprise mostly works published in 2000, such as were recorded until August 31, 2001.

In the *Corrections* section, rather than repeating whole bibliographic entries, I have used **bold** typeface to indicate corrections made, which I hope will be self explanatory.

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CORRECTIONS

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International Commission on Zoological Nomenclature

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\$50.00 (non-ATL: \$150.00)

Fasc. 124A. Noctuidae: Introduction (Heppner). ca. 260 pp. (8½ x 11 in). ISBN: 0-945417-99-3

in prep.

SHIPPING HANDLING: \$2 first book, \$1 each added book (outside USA, add another \$1 for each book).

Lepidopterorum Catalogus only: \$2 for first 80 pages (e.g., 5 parts each with viii+8 pp. = 80pp), \$1 each added 40 pages (outside USA, add \$1 for first 80pp and another \$1 for each added 250pp) [NOTE: Fasc. 124 ships at bookrate of \$7 in the USA, for 3 volumes].

BOOK NEWS

BUTTERFLIES OF THE WORLD

12. *Papilionidae* VI. *Ornithoptera*

by Oliver Schaffler

2001. Goecke & Evers, Keltern, Germany. 2 pts. (19pp, 52 pl.) (24 x 34cm), (ca. \$37) paper. ISBN 0-931374-83-1 (also in German edition).

Also available from Flora & Fauna Books, P. O. Box 15718, Gainesville, FL. Continuing the series *Butterflies of the World*, this 12th part covers birdwing butterflies not treated in or updated from Bela von Knötgen's 1997 book, entitled *Ornithoptera*. Part 12 is published in 2 sections, one for the text and one for the 52 color plates. The text section also has a color plate on the back cover, being a copy of a Rippon plate from 1892. The text section also has some black and white plates of some species. Various forms are noted, some of which are invalid according to the Zoological Code. The series is also available with German text.

Supplement 4. *Catalogue of the Genera of Oeneis and Davidiana*

by V. Lukhtanov and U. Eitschberger

2001. Goecke & Evers, Keltern, Germany. 37pp (24 x 34cm), \$25 paper. ISBN: 3-931374-52-1.

This issue in the *Butterflies of the World* series presents a catalog for color part No. 11. The issue is titled as a supplement, even though the previous supplements were only French language editions of texts published in English and German. The main text and color plates for this supplement were published in 2000 by the same authors, so the catalog summarizes the taxonomy involved. There are distribution maps added, plus some genitalia figures. There also is the description of one additional new subspecies for an *Oeneis* from Russia (Siberia).

MACROMOTHS OF NORTHWEST FORESTS AND WOODLANDS

by Jeffrey C. Miller and Paul C. Hammond

2000. USDA Forest Service, Morgantown, WV (U. S. Geological Survey, Corvallis, OR). 133pp (21 x 28cm), paper (FHTET-98-18).

This large-format booklet illustrates, in color, 251 of the larger moths to be found in the northwestern United States, plus diagnostic notes on another 300 species, thus covering about a third of the macro-moth fauna of the region. Families treated include Arctiidae, Diopitidae, Drepanidae, Geometridae, Lasiocampidae, Lymantriidae, Noctuidae, Notodontidae, Saturniidae, Sphingidae, and Thyatiridae. Also noted briefly in the preliminary text is the family Epiplemyidae, but no species are illustrated. A brief introduction covers Lepidoptera biology and techniques of moth collecting and rearing. Species texts are brief, with notes on identification markings, habitat, flight period, and known hostplants. This is the first book to illustrate western North America moths in color since Holland included a few western species in his *Moth Book* of 1898.

NOCTUID MOTHS OF TAIWAN

by H.-Y. Wang

2001. Ilan County Museum, Ilan, Taiwan. 295pp (15 x 21cm), paper.

This new book presents an overview of Taiwan Noctuidae, but mainly concentrates on the deltoid and catocaline species, with a scattering of other species added in at the end. The book treats 245 of the more than 950 noctuid species known for Taiwan. Text is entirely in Chinese except for the translated title and some English notes about the author in the cover flaps. Species have Latin names. There is no index, so one must peruse the contents pages to find a species. The excellent color photographs are all from museum specimens except for a few photos taken from nature, like on the cover, that are scattered throughout the

book. The book will help enthusiasts identify some of the noctuids in Taiwan by comparison with the figures.

A WORLD REVISION OF THE GENUS *Spodoptera* GUENÉE (*Lepidoptera: Noctuidae*)

by M. G. Pogue

2002. American Entomological Society, Philadelphia, PA (*Memoir* 43). 202pp (19 x 27cm), \$30.00 paper.

This revision treats an important economic genus of moths, commonly called armyworms for their often devastating caterpillar ravages, and provides the first modern and comprehensive worldwide revision of the genus. The world fauna encompasses 30 species and about half of these are often serious pests. In North America there are 9 species. The revision includes detailed descriptions of all species, and both for adults and larvae, amply illustrated (no color), plus range maps. There is a checklist, cladistic analysis, keys to adults and larvae, bibliography and index. The checklist is alphabetical and does not indicate localities, so one must dig through the main text to follow the phylogenetic relationships of the species and the distributions. Some new synonymies are recorded, mainly for the more obscure species.

A REVIEW OF THE AFROTROPICAL SPECIES OF THE GENUS *Graphium* (*Lepidoptera: Rhopalocera: Papilionidae*)

by Campbell R. Smith and R. L. Vane-Wright

2001. *Bull. Nat. Hist. Mus. (Ent.)* (London), 70:503-719, (17 x 25cm), £45 paper. (from Intercept, Hampshire, England. e-mail: intercept@andover.co.uk).

The authors have produced a major revision of the *Graphium* swallow-tails of tropical Africa, recognizing 37 species, including one new species described from the Central African Republic. The revision includes a modern cladistic analysis of all taxa. There also is a clarification of the correct tribal name to be applied to what has been usually called "Graphini" in recent years and, thus, Leptocircini is the correct name to apply to this group of swallowtails. The prices for parts of the Natural History Museum journal is exceedingly high due to the Museum letting a commercial dealer handle production and sales; previously, the prices for each part were about 30% of what they now cost. The current revision includes 12 pages of color figures of adults and larvae; there also are some color distribution maps. The revision is based only on European collections plus two in Africa, with the only exception being study of material at the Carnegie Museum, in Pennsylvania (no other American collections were studied for added specimen data).

BUTTERFLIES OF EUROPE

by T. Tolman (illustrations by R. Lewington)

2002. Princeton Univ. Press, Princeton, NJ. 320pp, 106 color pl. (13 x 19cm), \$26.95 paper.

This is a new edition of the 1997 Tolman book in the Collins Field Guides series, *Butterflies of Britain & Europe*, and now produced as a Princeton Field Guide. The text and plates are identical with the 1997 printing, thus this really is only a reprint edition in paperback. The color plates (104 numbered, plus two added plates as A and B) appear to be as excellent as the 1997 version, possibly reproduced even slightly better (the color printing was done in Hong Kong, while the 1997 version was printed in Singapore). Richard Lewington is the artist for the color plates. The price is about the same as the original cloth edition; it is uncertain if there previously was a paper edition.

MEETINGS

2002	Apr 5-7	Association for Tropical Lepidoptera, Gainesville, Florida, USA
	Jun 1-6	Societas Europaea Lepidopterologica, Korsør, Denmark
	Jun 13-16	Lepidopterists' Society, Charleston, South Carolina, USA
2003	Sep 25-28	Association for Tropical Lepidoptera, Gainesville, Florida, USA
2004	Sep	Association for Tropical Lepidoptera, Gainesville, Florida, USA (dates to be announced)
2006	Jun 30-Jul 3	joint meeting of ATL and the Lepidopterists' Society, Gainesville, Florida, USA (dates tentative)

LEPIDOPTERA NEWS

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