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Records of oldest Lepidoptera*)

Andrzej W. Skalski

Muzeum Okregowe, Ratusz B, PL-42200 Czestochowa, Poland

Before MacKay's descritpion (1970) of a caterpillar head of a member of the Tineoidea from Canadian amber**) of upper Cretaceous age, the fossil Lepidoptera were known from Tertiary. Most remains of these insects were preserved in Baltic amber (mainly Microlepidoptera) of Eocene-Oligocene age (Skalski 1976) and in Neogene rock beds of Europe and North America (mainly Macrolepidoptera). Some older forms were erroneously included in the Lepidoptera (Hennig 1969: 370—372) and the assignment of the Triassic group Paratrichoptera to the Lepidoptera (Riek 1976) seems to be doubtful, too. Because some authors (Smart & Hughes 1972 and others) were sceptical with respect to occurence of the Lepidoptera in Creataceous, the opinion that these insects were not recorded in this period was very common.

But in recent years new material of Cretaceous Lepidoptera has been found. Kühne, Kubig & Schlüter (1973) and Schlüter (1974) described scales of Zeugloptera from Franch amber. The Lepidoptera were generally mentioned from Siberian amber by Sukatsheva & Zherichin (1973) and Skalski (1976). Whalley (1977) published preliminary results of the investigations of the Lepidoptera inclusions in Lebanese amber. A homoneurous moth from rock beds of Unda region in Transbaikalia was studied by myself. (Skalski 1978). The additional unpublished material comes from Canadian amber (personal communication from Dr. A. Mutuura), Lebanese amber (personal communication from Dr. G.

	Age	Locality	Source
Cretaceous Upper	Maestrichtian Campanian Santonian	Cedar Lake, Mantioba	Canadian amber
		Tajmyr, N. Siberia	Siberian amber
	Coniacian Turonian	Karatau, Kazahstan	rock beds
	Cenomanien	Durtal, N.W. France	Franch amber
Cretaceous Lower	Albian	Unda, Transbaikalia	rock beds
	Aptian Neocomian	S. Lebanon	Lebanese amber

*) Read at the 1st European Congress of Lepidopterolgy in Paris, 1978.

**) The term „amber" is understand here as common name of fossil resin no younger than Pliocene age,without detail mineralogical classification of several resins.

Mickoleit), Siberian amber from Tajmyr region in North Siberia and rock beds of Karatau in Kazahstan. The material from Soviet Union is now being studied by the author.

The geological age of all known localities of Creataceous Lepidoptera are given in the table

All the Lepidoptera known from the Tertiary are very near to present day forms. They belong to recent families and several of them have been included in recent genera e.g. *Micropterix* Hübner, *Zygaena* Fabricius. It is worthy of notice that some genera, such as mentioned Micropterix and Zygaena or generic groups as *Depressaria-Agonopterix* complex, at present distributed only in Palearctic and Holarctic during the Tertiary were also associated with North Continent — Praholartic (Skalski 1976: 224—225, in press, a, b.) These and many others facts indicate that Tertiary Lepidoptera were highly stabilisated evolutionary in modern sense and its

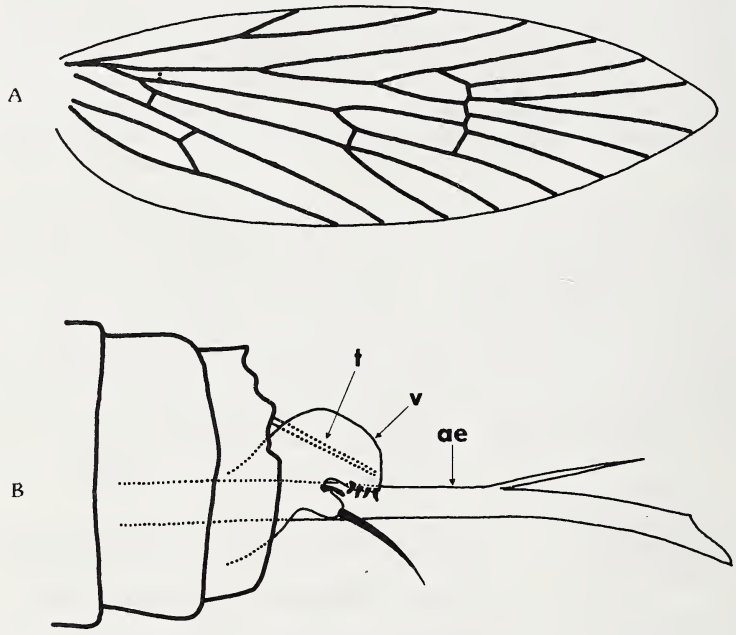

Fig. 1. Lophocornid like specimen from Tajmyr. A — Forewing venation B — Genital armature (t — tegumen, v — valva, ae — aedoeagus).

fossil remains coming from that period have not contributed really to the knowledge of the early evolution of the order from the Trichoptera-Lepidoptera stock within the Mecopteroidea complex. Therefore we will now consider the extent to which the Cretaceous Lepidoptera have contributed to the clarification of the above problem. The present preliminary note is mainly based on the material examined by myself.

There are 5 specimens from Siberian amber, among them 4 imagines and one fragment of a caterpillar which does not allow more precise determination. Three imagines represent Homoneura and one specimen belongs to te Incurvariidae. But only one homoneurous specimen is excellently preserved (Fig. 1). Its mouth parts, anal sector of forewing venation and valva are very similar to that in the Australian family Lophocornidae (Common 1973), but the very long edaeagus with long paramere is developed as in the Eriocraniidae. On the foretibia there is an epiphysis. The genital armature has well developed tegumen. In the forewing venation the radial and medial sector are similar to that in the Micropterigidae. The hindwing is a different type, veins r_2 and r_3 arise directly from the r stream. The specimen shows a mixture of characters from several recent families of the Homoneura. The forewing venation of second homoneurous inclusion can be compared with that in the New Zaeland Mnescharchaeidae. In the next inclusion only a fragment of forewing with venation of the Homoneura type is preserved. The incurvariid specimen is also well preserved. Its mouth parts, venation of both wings, coupling mechanism of the hindwing consisting of a single spined frenulum and row of stout spines on humeral margin, shape and form of epiphysis on the foretibia are typically developed as in the Incurvariidae. This specimen is very near to recent incurvariids.

Fig. 2 + Undopterix sukatshevae Skalski

In Karatau there has been found a leaf mines undoubtedly belonging to the Nepticulidae. Mines of a very similar type are produced by some existing species, e. g. Nepticula tityrella Stainton.

The specimen from Unda has been described as new genus and species *Undopterix sukatshevae* Skalski. This taxon shows several interesting archaic and intermediate features (Fig. 2) Its visible part of the last segments of the abdomen and the female genitalia are of the Dacnonypha (especially Eriocraniidae) type. But the well preserved venation of both wings is rather similar to recent members of the Micropterigidae, particulary the Sabatinca group. On the other hand the median cell is absent in the both wings, veins of the medial sector and the area between the radial and medial stems are developed similarly to that in the Permotrichoptera (Martynova 1958), which are considered as a most probable ancestor of the Lepidoptera derived from common stock of Permian Trichoptera within the Amphiesmenoptera (Fig. 3). At present the oldest known lepidopterous remains suggest predominance of the Homoneura in the Cretaceous paleolepidopterofauna. For comparission in Baltic amber the Homoneura make up about 1,59 % of all lepidopterous inclusions. More than half the specimens examined by the author belong to this group. Homoneura have also been reported from Cretaceous resins of France and Lebanon. Monotrisia were well developed too. This suborder is represented in the material by the Incurvariidae and the highly ecologically specialised family Nepticulidae. In Cretaceous both families were stabilised evolutionary in modern sense. Above fossil data confirm the opinion of Razowski (1974: 16) that Homoneura, Nepticuloidea and Incurvarioidea originated before the Cretaceous and the remaining families evolved late in the Cretaceous or in the beginning of the Tertiary. The occurence of the Ditrysia in late Cretaceous can be discussed because the family assignment of the caterpillar head described by MacKay (1970) has not been determined with certainty, only a possible tineid connection was suggested. It is also worthy of notice that all the oldest known indisputable Lepidoptera come from the northern land plate (Pangea) while according to Jeannel's (1949) hypothesis these insects originated on the Southern Continent (Gondwana).

Mosaic characters of the Cretaceous Homoneura (specimens from Tajmyr and Unda) seem to indicate the existence in that period of a large and probably widely distributed archaic group, Paleohomoneura, from which several lines of the recent Zeugloptera and Dacnonypha have evolved. Some of these old fossil homoneurous forms can be compared with recent micropterigids of the Sabatinca group inhabiting Australia, New Zaeland, New Caledonia and South Africa (Agrionympha Meyr). Whalley (1977) included to this group his specimen from Lebanese amber and *Micropterix pervetus* Cockerell. from Burmese amber of Miocene age. Most probably these forms are characterized by small size and a poor flight were distributed on all the continent before the division of the land mass in the Cretaceous period. The part of the ancient Mesosoic forms became extinct during change in fauna in the end Cretaceous and beginning Tertiary. Others, as such as *Micropterix proavitella* Rebel. from Baltic amber (it belongs to different fossil genus), inhabited the Northern Hemisphere in Tertiary but they were extinct in this area in the Pleistocene. Rests of these old paleolepidopterofauna survived as relicts in particulary in the Australian region (Mnescharchaeidae, Lophocornidae, *Sabatinca* Walker and others) and South Africa / *Agrionympha* Meyer/.

The Cretaceous Lepidoptera are still very poorly known. On the basis of above fossil evidences we can conclude that in the Cretaceous the Lepidoptera were undoubtedly a group well developed and highly specialised. But the material of these insects known at present from this time has not contributed really to the reconstruction of the early evolution of the order from the Mecopteroidea complex. Surely fossil material older than that from the Cretaceous must exist in Jurassic or Triasic depostis.

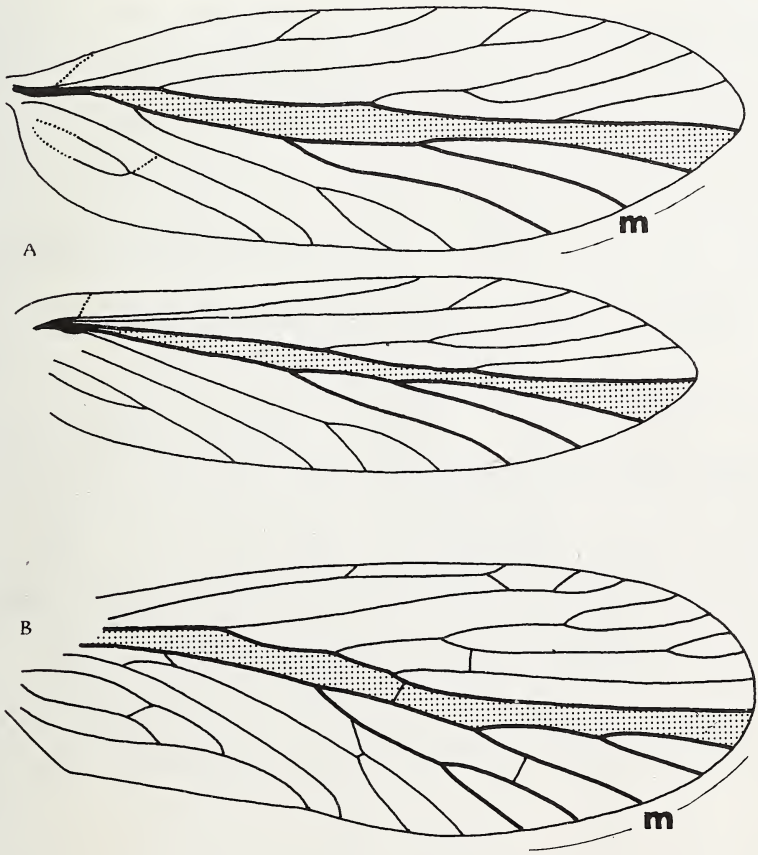

Fig. 3. + Undopterix sukatshevae Skalski. A — Venation of both wings. + Microptysma sibiricum Martynova, Permotrichoptera / Amphiesmenoptera /. B — Forewing venation.

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