ECOGEOGRAPHIC STRUCTURE OF THE MOTH FAUNA (LEPIDOPTERA, DREPANOIDEA, BOMBYCOIDEA, NOCTUOIDEA) IN UPPER TISA RIVER BASIN AND ADJACENT AREAS (UKRAINE)

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KEYWORDS: moth fauna, Upper Tisa River Basin, ecogeographic complexes, habitat groups, biogeography and environment.

ABSTRACT

The results of investigations of the moth fauna in Upper Tisa River Basin as well as some adjacent districts of Czornohora Mts and Transcarpathian Lowland (Ukraine) are given. The research was carrying out during 2007–2010 at 12 investigation points situated in all principal vertical vegetation belts of East Carpathians, within elevation profile from 170 to 1850 m altitudes. There is totally 534 species of *Drepanoidea, Bombycoidea* and *Noctuoidea* found in the area. The analysis of its ecogeographic structure is given and general regularities of species distribution through vegetation belts are determined. There are some variations of species distribution caused by local environmental conditions, mountain biogeographic barriers or inversions revealed and discussed.

RÉSUMÉ: La structure échographique de la faune des hétérocères (Lepidoptera, Drepanoidea, Bombycoidea et Noctuoidea) dans le basin supérieur de la Tisza et des régions avoisinantes (Ukraine).

Sont présentés les résultats des investigations sur la faune des hétérocères du bassin supérieur de la Tisza ainsi que dans quelques-uns des départements avoisinants des Montagnes de Czornohora et de la dépression Transcarpatique (Ukraine). La recherche a été effectuée pendant la période de 2007–2010 sur 12 stations de recherche situées dans les principales étages de végétation des Carpates Orientaux, entre 170 et 1850 m altitude. Nous avons identifie un total de 534 espèces de of *Drepanoidea, Bombycoidea* et *Noctuoidea* dans la zone étudiée. L'analyse de sa structure écogéographique y est présentée ainsi que les modèles de distribution générale de l'espèce dans les étages de vegetation investiguées. Les quelques variations dans la distribution de l'espèce causées par les conditions environnementales locales, par les barrières biogéographiques montagneuses ou par les inversions identifiées sont présentées et discutées.

REZUMAT: Structura ecogeografică a faunei de molii (Lepidoptera: Drepanoidea, Bombycoidea, Noctuoidea) din bazinul superior al Tisei şi arealele adiacente (Ucraina).

Rezultatele investigaţiilor faunei de molii din bazinul superior al Tisei şi din câteva districte adiacente din Munţii Czornohora şi din Depresiunea Transcarpatică (Ucraina) sunt

prezentate. Cercetările au fost efectuate în perioada 2007-2012 în 12 puncte de investigare situate în toate principalele centuri de vegetaţie verticală din Carpaţii de Est, în interiorul profilului de altitudine dintre 170 şi 1850 m. În total, 534 de specii de *Drepanoidea, Bombycoidea* şi *Noctuoidea* au fost găsite în zonă. Analiza structurii ecogeografice este oferită şi tiparele de distribuţie a speciilor în raport cu centurile de vegetaţie sunt determinate. Pot fi identificate anumite variaţii în distribuţia speciilor cauzate de condiţii de mediu locale, bariere biogeografice montane sau inversiuni, care au fost prezentate şi discutate.

INTRODUCTION

Superfamily *Noctuoidea* together with much lesser by taxonomical size *Bombycoidea* and *Drepanoidea* is rather well outlined in systematical and ecological aspects *Lepidoptera* group with principally night activity of imago. The group's representatives have a considerable share or predominate in *Lepidoptera* communities by species diversity, number and biomass in almost all world biogeographic regions, as well as in European Nemoral region (Kryzhanovskii, 2002). They are playing great role as herbivores consumers and pollinators, as well as important forage source for numerous insectivores (bats, birds etc.). There are many moth species might cause a serious damage for forestry or agriculture, but there is great number of the rare, threatened and narrow-spread species, which could be good indicators of ecological conditions of natural ecosystems.

High species diversity both with considerable biogeographic and ecological differentiation of the moth fauna allow to use it as a subject of ecological and biogeographic research in the aim to determine regularities of distribution of the living organisms in dependence on environmental conditions of natural landscapes. The Upper Tisa Basin is perfect range for such research because it presents almost of all vertical vegetation belts of Carpathians – from lowland oak woodland up to alpine tundra, and it situated on the distribution limits for many species of Boreal or Mediterranean origin.

MATERIAL AND METHODS

The field research were carrying out during 2007–2010 at 12 investigation points situated (with the single exception) in Ukrainian part of Tisa River Basin and Transcarpathian administrative region. There are 8 points situated within Upper Tisa Basin, above "Khust Gates". The Pozhezhevska point situated near watershed of Tisa and Prut river basins at the border of Transcarpathian and Ivano-Frankivsk regions, and another 3 points (Beregszasz, Akli Hegy, Czorna Hora) belong to Transcarpathian chain of volcanic hills. All investigation points offer the profile through vertical vegetation belts from the lowland up to highest mountain massifs of Ukrainian Carpathians (Czornohora, Marmarosh or Maramures Mts) (Table 1).

Table 1: Geographical situation of investigation points

POINT	COORDINATES	ALTITUDE, m	LANDSCAPE DISTRICT	VEGETATION BELT*
Beregszasz	48^0 11.04' N 22^0 40.88' E	192	Transcarpathian Lowland	Querceta roboris / petraeae
Akli Hegy	48^0 01.02' N 23^0 03.57' E	187	Transcarpathian Lowland	Querceta roboris / petraeae
Czorna Hora	48^0 08.24' N 23^0 04.09' E	232	Volcanic Range	Querceta roboris / petraeae

Kireshi	48^0 10.68' N 23^0 20.96' E	171	Upper Tisa Depression	Querceta roboris / petraeae
Mala Uholka	48^0 15.24' N 23^0 37.37' E	424	Polonyna Range	Fageta sylvaticae
Kuzij	47^0 56.16' N 24^0 06.19' E	380	Marmarosh Mts	Querceto-Fageta
Rakhiv	48^0 01.56' N 24^0 10.03' E	430	Marmarosh Mts	Fageta sylvaticae
Keveliv	48^0 11.57' N 24^0 18.00' E	585	Svydovets Mts Czornohora Mts	Fageta sylvaticae
Ust-Hoverla	48^0 04.06' N 24^0 27.24' E	650	Czornohora Mts	Abieto-Fageta Fageto-Abieta
Czorna Tysa	48^0 18.20' N 24^0 16.87' E	780	Svydovets Mts Gorgany Mts	Fageto-Abieto-Piceeta
Pozhezhevska	48^0 09.26' N 24^0 32.07' E	1430	Czornohora Mts	Piceeta abietis Pineta mugi
Pip Ivan	47^0 55.96' N 24^0 19.39' E	1600 1850	Marmarosh Mts	Prata subalpina Prata alpina

* (Stoyko, 2009)

The principal part of field research carried out on the territory of Carpathian Biosphere Reserve (CBR) by the framework of scientific cooperation between CBR and Institute of Ecology of the Carpathians NAS of Ukraine (IEC), State Museum of Natural History NAS of Ukraine.

The results of research were publishing partially in preceding works (Geryak, Bidychak, 2009; Geryak, Kanarskyi, 2008; Lyashenko, 2009ab). The principal part of original materials concerning present and former occurrence of *Noctuoidea* species within Transcarpathian region as well as references analysis of these data are published in recent faunal work (Geryak, 2010). The aim of present work is to generalize obtained during research time data concerning *recent* regional moth fauna and to consider it from environmental point of view. However, this work contains some unpublished before original data concerning distribution of the moth species through investigated area.

The materials were collecting by standard for the taxonomical group methods (Novak, 1969). The basic collecting method for night active moths was night catching by means of daylight lamps with a share of UV-eradiation in the spectrum (BML250W, BML400W). There were stationary light traps mounted at 6 points on CBR territory (Kireshi, Mala Uholka, Kuzij, Rakhiv (Central Office), Ust-Hoverla) as well as at vicinities of Beregovo (Beregszasz). The traps were working each night during whole vegetation season, and the principal part of materials was collecting there. In the sites Czorna Hora, Akli Hegy, Czorna Tysa as well as in high mountains (Pip Ivan, Pozhezhevska), where stationary traps were unavailable, periodic collecting was carried out with mobile light traps or screen. At the day time moths were collecting by butterfly-net. Also visual observations upon *Lepidoptera* both with collecting of preimaginal stages were pursuing near by investigation points immediately.

The identification and systematic processing of the materials made using modern sources (Carter et al., 1987; Fibiger, 1990, 1993, 1997; Fibiger, Hacker, 2004, 2007; Fibiger et al., 2009, 2010; Goater et al., 2003; Hacker et al., 2002; Macek et al., 2007, 2008; Nowacki,

1998; Ronkay, 1994, 1995; Zilli et al., 2005). There are genitalia preparations produced and investigated for doublet species.

The concept of ecogeographic complex applied in the way to following interpretation of the materials. According to some biogeographic surveys concerning Palaearctic insect fauna (Emelyanov, 1974; Kryzhanovskii, 2002) it looks to be worth to distinguish 9 ecogeographic complexes (ECs) in the regional fauna of *Lepidoptera*.

Alpine (A): contains the species with disjunctive Alpine or Arctic-Alpine distribution ranges restricted to higher altitude levels of European mountain regions above the tree line.

Boreal (B): the species with the principal part of ranges coincided with Eurasian taiga zone (or Euro-Siberian Boreal biogeographic region) and which are not penetrating generally outside southern limits of temperate forest zone.

Boreomontane (BM): the species attracted to higher mountainous regions of Europe and might less or more widely distributed in Boreal taiga zone of Eurasia. They often have an interrupted (disjunctive) ranges.

Boreonemoral or **Temperate (T):** the species with wide Palaearctic, Euro-Siberian or West-Central-Palaearctic ranges generally restricted to temperate (both coniferous and deciduous) forest zone of Eurasia.

Nemoral (N): the species with West-Palaearctic or Ancient-Mediterranean ranges which are generally restricted to the deciduous forest zone of Europe (or European Nemoral biogeographic region).

Nemoral-Montane (NM): the species inherent to European Nemoral region mainly and attracted to *Fageta sylvaticae* forest formations in lower mountainous areas. There are number of Ancient-Mediterranean relics among these species (Kryzhanovskii, 2002).

Steppe (S): the species with Pontic-Mediterranean or Centralasian ranges restricted mainly to continental steppe or forest-steppe zones (from Central and South-Eeast Europe to Kazakhstan, Mongolia or Far East). This area considered separately as the Scythian Steppe biogeographic region (Emelyanov, 1974).

Mediterranean (MT): the species with ranges restricted to Mediterranean or Hesperic (follow Emelyanov, 1974) biogeographic region (including some Palaeotropical migrants), which are penetrating into warmer regions of temperate Europe from south.

Polyzonal (P): eurychoric species without clearly defined bioclimatic preferences. They are able to inhabit permanently or temporarily (as the migrants) most of natural zones of the continent – from tundra to deserts or sclerophylous formations in the wider sense.

Each EC contains species with different habitat preferences which have to be altered depending to local geographical conditions of concrete region. These variations are reflected generally by ecological (habitat) groups of species, which are separated according to their demands of soil and climatic (mesophiles, xerothermophiles, hygrophiles etc.) or spatial and synmorphologic (nemoral, seminemoral, grassland species) conditions of the habitat. According to popular scheme (Kudrna, 1986; Macek et al., 2007, 2008) there are 12 habitat groups of moth species (HGs) separated:

U (ubiquists) – eurytopic and eurychoric species occur in diverse habitats;

M1 (grassland mesophiles) – the species with relatively wide ecological adaptation scale which prefer open meadow habitats generally;

M2 (seminemoral mesophiles) – the species preferring half-open ecotones or succession stages of mesophile forest ecosystems (woodland clearings and margins, cuttings, coppice etc.);

M3 (nemoral mesophiles) – the species preferring mesophile forest ecosystems, which are held up under the tree canopy mainly;

X1 (grassland xerothermophiles) – the species attracted to open xeric habitats such as steppes or dry meadows and heaths;

X2 (seminemoral xerothermophiles) – the species preferring half-open warm and xeric habitats with moderately developed but not closed wood vegetation, such as forest-steppe, bushy steppes or dry woodland margins;

X3 (nemoral xerothermophiles) – the species preferring dry and warm sparse pine woods or thermophile oak woodland;

H1 (grassland hygrophiles) – the species preferring open wet habitats such as eutrophic wetlands, damp or boggy meadows;

H2 (nemoral hygrophiles) – the species preferring wet habitats with developed tree or bush canopy, such as floodplain woodland, bushy alluvia etc;

HT (hygrothermophiles) – the species attracted to warm and wet habitats;

TF (tyrfophiles) – the species restricted to raised or transitional peat bogs and surrounding swamp woodland;

A (alpicols) – the species restricted to high-mountain habitats situated above the tree line generally.

The range characteristics and habitat preferences of the moth species determined by analysis of the surveys concerning Central-European fauna (Macek et al., 2007, 2008; Nowacki, 1998, et al.).

The following original formula applied to the characteristic of ecogeographic structure of the moth fauna in each case:

#P #T #N #S #MT #BM: #U #M #X #H #TF #A,

– the part in species composition, % (a single species with the part < 0.5% marked +); P – Polyzonal, T – Temperate, N – Nemoral (both with Nemoral-Montane), S – Steppe, MT – Mediterranean, BM – Boreomontane (both with Boreal and Alpine) species; U – ubiquists, M – mesophiles, X – xerothermophiles, H – hygrophiles (both with hygrothermophiles), TF – tyrfophiles (if present), A – alpicols (if present).

RESULTS AND DISCUSSIONS

There are 534 moth species belonging to outlined taxa found in investigated area during 2007–2010. The checklist contains 16 species of *Drepanoidea,* 39 – *Bombycoidea* and 479 – *Noctuoidea* species (Table 2). The most richness is characteristic for *Noctuidae* family with its 335 species. It is worth to note that the 42 moth species (*marked with asterisk* *) are found for the first time in the Ukrainian Carpathian region (Geryak, 2010; Geryak, Bidychak, 2009; Lyashenko, 2009a). From other side, there are only about 10 species formerly known from investigated area which have not confirmed at the present (Geryak, 2010; et al.). There are *Saturnia spini* (Denis and Schiffermueller, 1775), *Thaumetopoea processionea* (Linnaeus, 1758), *Hyphantria cunea* (Drury, 1773), *Orgyia recens* (Huebner, 1819), *Grammodes stolida* (Fabricius, 1775), *Cucullia argentea* (Hufnagel, 1766), *Anarta dianthi* (Tauscher, 1809), *Actebia praecox* (Linnaeus, 1758), *Dichagyris candelisequa* (Denis & Schiffermueller, 1775). Another few formerly uncertain species there were found recently but apart from our research (Nowacki, Bidychak, 2009; Nowacki et al., 2010): *Callopistria latreillei* (Duponchel, 1827), *Episema glaucina* (Esper, 1798), *Chersotis multangula* (Huebner, 1803).

Table 2: Checklist of the moth species found in investigated area

#	TAXA	FINDS BY THE POINTS												EC	HG
		Beregszasz	Akli Hegy	Czorna Hora	Kireshi	Mala Uholka	Kuzij	Rakhiv	Keveliv	Ust-Hoverla	Czorna Tysa	Pozhezhevska	Pip Ivan		
	DREPANOIDEA														
	THYATIRIDAE														
1	*Thyatira batis*	+	+	+	+	+	+	+	+	+	+			T	M3
2	*Habrosyne pyritoides*	+	+	+	+	+	+	+	+	+	+			T	M2
3	*Tethea ocularis*	+	+	+	+	+	+	+						T	M2
4	*Tethea or*	+	+	+	+	+	+	+	+	+	+			T	M3
5	*Tetheella fluctuosa*				+	+	+	+	+	+	+			T	H2
6	*Ochropacha duplaris*	+		+	+	+	+	+	+	+				T	H2
7	*Cymatophorina diluta*	+	+	+	+		+							N	X3
8	*Polyploca ridens*	+	+	+		+	+							N	X3
9	*Achlya flavicornis*							+	+	+				T	M3
	DREPANIDAE														
10	*Falcaria lacertinaria*			+	+	+	+	+	+	+	+			T	M3
11	*Watsonalla binaria*	+	+	+	+	+	+							N	X2
12	*Watsonalla cultraria*					+	+	+	+	+				NM	M3
13	*Drepana curvatula*	+	+	+	+	+	+	+	+	+	+			T	H2
14	*Drepana falcataria*	+	+	+	+	+	+	+	+	+	+			T	M3
15	*Sabra harpagula*	+	+	+	+	+	+	+	+	+	+			T	M3
16	*Cilix glaucata*	+	+	+	+	+	+	+	+	+	+			N	X2
	BOMBICOIDEA														
	LASIOCAMPIDAE														
17	*Poecilocampa populi*	+	+	+	+	+	+	+	+	+	+			T	M2
18	*Trichiura crataegi*	+	+	+	+	+	+	+	+	+	+	+	+	T	M2
19	*Malacosoma neustria*	+	+	+	+	+	+	+	+					T	M2
20	*Eriogaster lanestris*	+	+	+										T	X2
21	*Eriogaster catax*	+		+	+									N	X2
22	*Lasiocampa trifolii*				+		+	+						N	X1
23	*Lasiocampa quercus*			+				+				+	+	T	M2
24	*Macrothylacia rubi*	+	+	+	+	+	+	+	+	+	+	+	+	T	M2
25	*Euthrix potatoria*			+	+	+	+	+	+					T	H2
26	*Cosmotriche lobulina*							+	+	+	+	+		BM	M3
27	*Gastropacha quercifolia*	+	+	+	+	+	+	+						T	X2
28	*Gastropacha populifolia*	+		+	+		+	+						T	H2
29	*Phyllodesma ilicifolia*							+						T	H2
30	*Phyllodesma tremulifolia*						+	+						N	M2
31	*Dendrolimus pini*						+	+	+	+	+	+		B	M3
32	*Odonestis pruni*	+	+	+	+	+	+	+	+	+	+			T	M2

	LEMONIIDAE														
33	*Lemonia dumi*				+									T	M1
	ENDROMIDIDAE														
34	*Endromis versicolora*					+	+	+	+	+				T	M3
	SATURNIIDAE														
35	*Aglia tau*				+	+	+	+	+	+				NM	M3
36	*Saturnia pyri*	+	+	+	+									MT	X2
37	*Saturnia pavonia*					+						+		T	M2
38	*Saturnia pavoniella* *	+	+	+	+									MT	X2
	SPHINGIDAE														
39	*Agrius convolvuli*	+	+	+	+	+	+	+	+	+	+	+	+	MT	U
40	*Acherontia atropos*			+				+				+		MT	U
41	*Sphinx ligustri*	+	+		+		+							T	M2
42	*Hyloicus pinastri*					+	+	+	+	+	+			T	M3
43	*Marumba quercus* *		+											MT	X3
44	*Mimas tiliae*	+	+	+	+	+	+	+	+	+	+			T	M3
45	*Smerinthus ocellata*	+	+	+	+	+	+	+	+	+	+			T	M2
46	*Laothoe populi*	+	+	+	+	+	+	+	+	+	+			T	M2
47	*Hemaris fuciformis*						+	+	+	+				T	M2
48	*Hemaris tityus*			+	+	+	+	+						T	M1
49	*Macroglossum stellatarum*	+	+	+	+	+	+	+	+	+	+	+	+	P	U
50	*Proserpinus proserpina*	+	+	+	+			+						N	M2
51	*Hyles euphorbiae*	+	+	+	+		+	+						T	X1
52	*Hyles galii*	+	+	+	+	+	+	+	+	+	+	+	+	T	M2
53	*Hyles livornica*	+	+									+		MT	U
54	*Deilephila elpenor*	+	+	+	+	+	+	+	+	+	+	+	+	T	M2
55	*Deilephila porcellus*	+	+	+	+	+	+	+	+					N	M2
	NOCTUOIDEA														
	NOTODONTIDAE														
56	*Clostera curtula*	+	+	+	+	+	+	+	+	+	+			T	H2
57	*Clostera pigra*	+	+	+	+	+	+	+	+	+	+			T	M2
58	*Clostera anachoreta*				+	+	+	+	+	+	+			T	M2
59	*Clostera anastomosis*	+	+	+	+	+	+	+	+	+	+			T	M2
60	*Notodonta dromedarius*	+	+	+	+	+	+	+	+	+	+	+		T	M3
61	*Notodonta torva*					+	+	+	+	+	+	+		B	H2
62	*Notodonta tritophus*	+	+	+	+	+	+	+	+					T	H2
63	*Notodonta ziczac*	+	+	+	+	+	+	+	+	+	+	+		T	H2
64	*Drymonia dodonaea*	+	+	+	+	+	+	+	+	+				N	M3
65	*Drymonia ruficornis*	+			+	+	+	+	+					N	X3
66	*Drymonia obliterata*					+	+	+	+	+				NM	M3
67	*Drymonia velitaris*						+							MT	X2
68	*Drymonia querna*	+	+	+	+		+							MT	X2
69	*Pheosia tremula*	+	+	+	+	+	+	+	+	+	+	+		T	M2

70	*Pheosia gnoma*	+	+	+	+	+	+	+	+	+	+	+		T	M3
71	*Pterostoma palpina*	+	+	+	+	+	+	+	+	+	+	+		T	M2
72	*Ptilophora plumigera*	+	+	+	+	+	+	+	+					T	M3
73	*Leucodonta bicoloria*					+	+	+	+	+	+			B	M3
74	*Ptilodon capucina*	+	+	+	+	+	+	+	+	+	+	+		T	M3
75	*Ptilodon cucullina*	+	+	+	+	+	+	+	+					N	M3
76	*Odontosia carmelita*					+	+	+	+	+				T	M3
77	*Gluphisia crenata*	+	+	+	+	+	+	+						T	H2
78	*Cerura vinula*	+		+	+	+	+	+	+	+	+			T	M2
79	*Cerura erminea*	+			+	+	+	+	+	+				T	M2
80	*Furcula furcula*	+	+	+	+	+	+	+	+	+	+	+		T	M3
81	*Furcula bicuspis*				+	+	+	+	+					T	M3
82	*Furcula bifida*	+	+	+	+	+	+	+	+	+				T	M3
83	*Phalera bucephala*	+	+	+	+	+	+	+	+	+	+			T	M3
84	*Phalera bucephaloides*			+										MT	X2
85	*Peridea anceps*					+	+							N	M3
86	*Stauropus fagi*	+	+	+	+	+	+	+	+	+	+	+		T	M3
87	*Harpyia milhauseri*	+	+	+	+	+	+							N	M2
88	*Dicranura ulmi* *	+		+										MT	M3
89	*Spatalia argentina*	+	+	+	+	+	+							N	M3
	NOLIDAE														
90	*Meganola albula*	+	+	+	+	+	+	+						T	H2
91	*Meganola strigula*	+		+	+		+	+						N	M3
92	*Meganola togatulalis* *	+												N	M2
93	*Nola cucullatella*	+	+	+	+	+	+							N	X2
94	*Nola cicatricalis* *	+												N	M3
95	*Nola confusalis*					+	+	+	+	+	+			T	M2
96	*Nola aerugula*	+		+	+		+							T	H2
97	*Nola cristatula*				+		+							MT	HT
98	*Nola chlamitulalis*	+		+										S	X1
99	*Bena bicolorana*	+	+	+	+	+	+							N	M3
100	*Pseudoips prasinanus*	+	+	+	+	+	+	+	+	+	+	+		T	M3
101	*Nycteola revayana*	+			+	+	+	+				+		T	M3
102	*Nycteola asiatica*	+	+	+	+		+							T	H2
103	*Nycteola siculana* *	+												N	H2
104	*Earias clorana*	+	+	+	+	+	+	+	+	+	+			T	H2
105	*Earias vernana* *	+												N	H2
	ARCTIIDAE														
106	*Chelis maculosa*	+												S	X1
107	*Phragmatobia fuliginosa*	+	+	+	+	+	+	+	+	+	+	+		P	M2
108	*Phragmatobia luctifera* *	+	+											S	M1
109	*Parasemia plantaginis*					+				+	+	+	+	BM	M2
110	*Spilosoma lutea*	+	+	+	+	+	+	+	+	+	+			T	M2
111	*Spilosoma lubricipeda*	+	+	+	+	+	+	+	+	+	+	+		T	M2
112	*Spilosoma urticae*	+	+		+	+	+							T	M2

113	*Cycnia luctuosa* *	+												S	X1
114	*Diaphora mendica*	+	+	+	+	+	+	+						T	M2
115	*Diacrisia sannio*	+	+	+	+	+	+	+	+	+	+	+		T	M2
116	*Rhyparia purpurata*	+	+	+										T	X2
117	*Pericallia matronula*							+						T	M2
118	*Arctia caja*	+	+	+	+	+	+	+	+					T	M2
119	*Arctia villica*	+		+										N	X2
120	*Callimorpha dominula*				+	+	+	+	+	+	+			T	M2
121	*Euplagia quadripunctaria*	+	+	+		+	+	+		+				N	M2
122	*Nudaria mundana*						+		+					NM	M3
123	*Thumatha senex*				+		+	+						T	H1
124	*Miltochrista miniata*	+	+	+	+	+	+	+	+	+	+	+		T	M3
125	*Cybosia mesomella*	+		+	+	+	+	+	+	+	+			T	M2
126	*Pelosia muscerda*	+	+	+	+	+	+	+	+	+	+			T	H2
127	*Pelosia obtusa* *	+												T	H1
128	*Atolmis rubricollis*	+	+	+	+	+	+	+	+	+	+	+		T	M3
129	*Lithosia quadra*	+	+	+	+	+	+	+	+	+	+	+		T	M3
130	*Eilema caniola* *	+												MT	X1
131	*Eilema complana*	+	+	+	+	+	+	+	+	+	+			T	M2
132	*Eilema depressa*	+		+	+	+	+	+	+	+	+	+		T	M3
133	*Eilema griseola*	+			+	+	+	+	+	+	+	+		T	H2
134	*Eilema lurideola*	+		+	+	+	+	+	+	+	+	+		T	M2
135	*Eilema lutarella*	+	+	+										T	X1
136	*Eilema palliatella* *	+	+	+										N	X1
137	*Eilema pygmaeola* *	+	+	+										N	X1
138	*Eilema sororcula*				+	+	+	+	+	+	+	+		T	M3
139	*Setina irrorella*	+												T	M1
140	*Amata phegea*	+	+	+										N	X2
141	*Dysauxes ancilla*	+	+	+	+									N	X2
	LYMANTRIIDAE														
142	*Calliteara pudibunda*	+	+	+	+	+	+	+	+	+	+	+	+	N	M3
143	*Orgyia antiqua*	+	+	+	+	+	+	+	+	+	+	+		T	M2
144	*Euproctis chrysorrhoea*	+	+	+	+	+	+	+	+	+	+			N	M3
145	*Euproctis similis*	+		+	+	+	+	+	+	+	+			T	M3
146	*Arctornis l-nigrum*	+	+	+	+	+	+	+	+	+	+			T	M3
147	*Leucoma salicis*	+		+	+	+	+	+	+	+				P	M2
148	*Lymantria monacha*					+	+	+	+	+	+	+	+	T	M3
149	*Lymantria dispar*	+	+	+	+	+	+	+	+	+	+			T	M3
	EREBIDAE														
150	*Rivula sericealis*	+	+	+	+	+	+	+	+	+	+	+		P	M1
151	*Parascotia fuliginaria*					+	+	+	+	+	+			T	M3
152	*Hypenodes humidalis*				+									T	H1
153	*Schrankia costaestrigalis*	+												P	H2

154	*Schrankia taenialis*	+												N	M2
155	*Eublemma amoena* *	+												S	X1
156	*Eublemma ostrina* *		+											MT	X1
157	*Eublemma parva* *	+												MT	X1
158	*Eublemma purpurina*	+	+	+	+	+	+							N	X2
159	*Calymma communimacula*	+												MT	X2
160	*Idia calvaria*	+			+	+	+	+						N	H2
161	*Simplicia rectalis*	+					+							N	M2
162	*Paracolax tristalis*		+	+	+	+	+	+	+					N	M3
163	*Macrochilo cribrumalis*	+			+									T	H2
164	*Herminia grisealis*	+	+	+	+	+	+	+	+	+	+			T	M2
165	*Herminia tarsicrinalis*	+	+	+	+	+	+	+	+	+	+			T	M3
166	*Herminia tarsipennalis*					+	+	+	+					T	M2
167	*Polypogon strigilata*	+		+	+	+	+	+	+	+	+			T	M3
168	*Polypogon tentacularia*	+		+	+	+	+	+	+	+	+	+		T	H2
169	*Zanclognatha lunalis*	+	+	+	+	+	+	+						T	X2
170	*Pechipogo plumigeralis*		+											S	X1
171	*Hypena proboscidalis*	+	+	+	+	+	+	+	+	+	+	+	+	T	M3
172	*Hypena rostralis*	+	+	+	+	+	+	+	+	+	+	+		T	M2
173	*Hypena crassalis*					+	+	+	+	+	+	+		T	M3
174	*Hypena obesalis*										+	+		BM	H2
175	*Colobohyla salicalis*	+	+	+	+	+	+	+	+	+				T	H2
176	*Phytometra viridaria*	+	+	+	+	+	+	+	+	+	+			T	H1
177	*Trisateles emortualis*	+	+	+	+	+	+	+	+					T	M3
178	*Laspeyria flexula*	+	+	+	+	+	+	+	+	+	+			T	M3
179	*Scoliopteryx libatrix*	+	+	+	+	+	+	+	+	+	+	+	+	P	U
180	*Calyptra thalictri* *				+									N	M2
181	*Lygephila craccae*	+	+	+	+	+	+							N	X2
182	*Lygephila lusoria*				+									S	X1
183	*Lygephila pastinum*	+		+	+									N	X2
184	*Lygephila viciae*					+	+	+	+	+	+			T	X2
185	*Euclidia mi*				+		+	+	+					T	M1
186	*Euclidia glyphica*	+	+	+	+	+	+	+	+	+	+	+		T	M1
187	*Catephia alchymista*	+												N	X2
188	*Minucia lunaris*	+	+	+	+	+	+							N	X3
189	*Dysgonia algira*	+	+	+										MT	X2
190	*Catocala sponsa*	+	+	+		+	+	+						N	M3
191	*Catocala promissa*	+	+	+		+	+	+						N	M3
192	*Catocala conversa* *		+											MT	X2
193	*Catocala nymphagoga* *	+												MT	X2
194	*Catocala fulminea*		+	+	+	+	+	+	+					T	M2
195	*Catocala hymenaea*	+	+	+										S	X2
196	*Catocala fraxini*	+		+	+	+	+	+	+	+	+			T	M3
197	*Catocala nupta*	+	+	+	+	+	+	+	+	+	+			T	H2

198	*Catocala elocata*	+	+	+	+	+	+	+						N	H2
199	*Catocala electa*				+	+	+	+	+	+	+			T	H2
	NOCTUIDAE														
	Plusiinae														
200	*Abrostola asclepiadis*	+	+	+	+	+	+							T	X2
201	*Abrostola tripartita*	+	+	+	+	+	+	+	+	+	+	+	+	T	M2
202	*Abrostola triplasia*	+	+	+	+	+	+	+	+	+	+	+	+	T	M2
203	*Abrostola agnorista* *	+												MT	X2
204	*Trichoplusia ni* *	+												P	X1
205	*Macdunnoughia confusa*	+	+	+	+	+	+	+	+	+	+	+	+	T	U
206	*Diachrysia chrysitis*	+	+	+	+	+	+	+	+	+	+	+	+	T	U
207	*Diachrysia stenochrysis*	+	+	+	+	+	+	+	+	+	+	+	+	T	U
208	*Diachrysia chryson*					+	+	+	+	+	+			BM	H2
209	*Diachrysia zosimi*				+									T	H1
210	*Euchalcia variabilis*						+	+	+	+	+			BM	M2
211	*Euchalcia modestoides*				+						+			BM	M2
212	*Lamprotes c-aureum*		+		+									NM	M2
213	*Polychrysia moneta*						+				+			T	M2
214	*Plusia festucae*	+		+	+	+	+	+	+					T	H1
215	*Plusia putnami*				+									BM	H1
216	*Autographa gamma*	+	+	+	+	+	+	+	+	+	+	+	+	P	U
217	*Autographa pulchrina*					+	+	+	+	+	+	+	+	BM	H2
218	*Autographa buraetica*						+	+	+	+	+			BM	H2
219	*Autographa jota*				+	+	+	+	+	+	+	+		NM	M2
220	*Autographa bractea*						+	+	+	+	+	+		BM	H2
221	*Syngrapha interrogationis*						+	+	+	+	+	+	+	BM	TF
	Eustrotiinae														
222	*Protodeltote pygarga*	+	+	+	+	+	+	+	+	+	+			T	M2
223	*Deltote bankiana*	+	+	+	+	+	+	+	+					T	H1
224	*Deltote deceptoria*	+	+		+		+							T	M2
225	*Deltote uncula*	+		+	+		+							T	H1
	Acontiinae														
226	*Emmelia trabealis*	+	+	+	+	+	+							T	X1
227	*Acontia lucida*	+		+	+									MT	X1
228	*Aedia funesta*	+	+	+	+	+	+	+						MT	HT
229	*Aedia leucomelas*	+	+	+										MT	HT
	Pantheinae														
230	*Panthea coenobita*					+	+	+	+	+	+	+		BM	M3
231	*Calocasia coryli*	+	+	+	+	+	+	+	+	+	+	+		T	M3
	Dilobinae														
232	*Diloba coeruleocephala*	+	+	+	+	+	+	+						N	M2
	Acronictinae														
233	*Moma alpium*	+	+	+	+	+	+	+	+	+	+			T	M3

234	*Acronicta alni*				+	+	+	+	+	+	+	+		T	M3
235	*Acronicta cuspis*	+		+	+	+	+							T	H2
236	*Acronicta psi*	+	+	+	+	+	+	+	+	+	+	+		T	M3
237	*Acronicta tridens*	+	+	+	+	+	+	+	+					T	M2
238	*Acronicta aceris*	+	+	+	+	+	+							N	M3
239	*Acronicta leporina*				+	+	+	+	+	+	+	+		T	H2
240	*Acronicta megacephala*	+	+	+	+	+	+	+	+	+	+			T	M3
241	*Acronicta strigosa*	+	+	+	+	+	+	+						T	M2
242	*Acronicta menyanthidis*										+	+		B	TF
243	*Acronicta auricoma*	+	+	+	+	+	+	+				+		T	M2
244	*Acronicta euphorbiae*	+			+									T	X2
245	*Acronicta rumicis*	+	+	+	+	+	+	+	+	+	+	+		T	M2
246	*Simyra albovenosa*	+		+	+									T	H1
247	*Craniophora ligustri*	+	+	+	+	+	+	+	+	+	+			T	M2
	Metoponiinae														
248	*Panemeria tenebrata*	+		+	+	+	+	+	+					N	M1
249	*Tyta luctuosa*	+	+	+	+	+	+							N	X1
	Cuculliinae														
250	*Cucullia fraudatrix*	+		+	+									S	X1
251	*Cucullia absinthii*	+		+	+									N	X1
252	*Cucullia artemisiae*	+		+	+									T	X1
253	*Cucullia xeranthemi* *	+		+										S	X1
254	*Cucullia asteris*	+												S	X1
255	*Cucullia lactucae*	+		+	+							+		T	X1
256	*Cucullia pustulata* *											+		S	X1
257	*Cucullia lucifuga*					+	+	+	+	+	+	+		BM	X1
258	*Cucullia umbratica*	+	+	+	+	+	+	+	+	+		+		T	M1
259	*Cucullia tanaceti*	+		+	+									N	X1
260	*Cucullia chamomillae*	+		+	+									N	X1
261	*Cucullia scrophulariae*	+			+									N	M2
262	*Cucullia gozmanyi* *	+												S	X1
263	*Cucullia lanceolata*				+									S	X1
264	*Cucullia lychnitis*	+			+									N	X1
265	*Cucullia verbasci*	+		+	+					+				N	X1
266	*Cucullia prenanthis*					+	+	+	+	+				NM	M2
	Oncocnemidinae														
267	*Calophasia lunula*	+	+	+	+	+	+							T	X1
268	*Calliergis ramosa*										+	+		BM	M2
269	*Lamprosticta culta*		+											MT	X2
	Amphipyrinae														
270	*Amphipyra pyramidea*	+	+	+	+	+	+	+	+					T	M3
271	*Amphipyra berbera*				+	+	+	+	+				+	T	M2
272	*Amphipyra perflua*	+		+	+	+	+	+	+	+	+			T	M3
273	*Amphipyra livida*	+			+		+							T	M2
274	*Amphipyra tragopoginis*	+		+	+	+	+	+	+	+	+	+		T	M2

275	*Amphipyra tetra* *	+												S	X2
	Psaphidinae														
276	*Asteroscopus sphinx*	+	+	+	+	+	+	+						N	M2
277	*Asteroscopus syriacus* *	+												S	X2
278	*Brachionycha nubeculosa*	+			+	+	+	+	+	+				T	M2
279	*Valeria oleagina*	+	+	+										MT	X2
280	*Allophyes oxyacanthae*	+		+	+	+	+	+	+					N	M2
	Heliothinae														
281	*Schinia scutosa*	+		+	+		+							MT	X1
282	*Heliothis viriplaca*	+	+	+	+	+	+	+	+	+	+	+		P	X1
283	*Heliothis maritima*	+	+	+	+		+							P	X1
284	*Heliothis peltigera*	+		+	+									MT	X1
285	*Heliothis nubigera*			+										MT	X1
286	*Helicoverpa armigera*	+	+	+	+		+					+	+	MT	U
287	*Periphanes delphinii*		+											MT	X1
288	*Pyrrhia umbra*	+	+	+	+		+	+				+	+	P	U
	Condicinae														
289	*Acosmetia caliginosa*	+	+	+	+									S	HT
290	*Eucarta amethystina*	+	+	+	+	+	+	+						S	HT
291	*Eucarta virgo*	+	+	+	+		+	+						S	HT
	Eriopinae														
292	*Callopistria juventina*	+	+	+	+	+	+	+	+	+				N	M3
	Bryophilinae														
293	*Cryphia fraudatricula*	+	+	+	+		+							S	X2
294	*Cryphia receptricula*	+												MT	X1
295	*Cryphia algae*	+	+	+	+									N	M3
296	*Cryphia felina* *	+												N	X1
	Xyleninae														
297	*Pseudeustrotia candidula*	+	+	+	+	+	+	+	+	+	+			T	M2
298	*Elaphria venustula*	+	+	+	+	+	+	+	+					T	X2
299	*Spodoptera exigua*	+												MT	U
300	*Caradrina morpheus*			+	+	+	+	+	+	+				T	H2
301	*Caradrina kadenii*	+		+										MT	X1
302	*Paradrina clavipalpis*	+		+	+	+	+	+	+	+		+		T	M1
303	*Paradrina selini*										+			N	M2
304	*Hoplodrina ambigua*	+	+	+	+	+	+	+	+			+	+	T	M2
305	*Hoplodrina blanda*	+	+	+	+	+	+	+	+					T	X2
306	*Hoplodrina octogenaria*	+	+	+	+	+	+	+	+	+	+			T	M2
307	*Hoplodrina respersa*						+	+						N	X2
308	*Hoplodrina superstes*	+	+	+										MT	X2
309	*Rusina ferruginea*	+	+	+	+	+	+	+	+	+	+			T	M2
310	*Charanyca trigrammica*	+	+	+	+	+	+	+	+	+	+			N	M2

311	*Chilodes maritimus*				+									T	H1
312	*Athetis gluteosa*	+	+	+	+									S	X1
313	*Athetis furvula*	+	+	+	+									S	X1
314	*Hydrillula pallustris*								+					T	H1
315	*Proxenus lepigone*	+		+	+									S	X1
316	*Enargia paleacea*	+		+	+	+	+	+	+					T	M3
317	*Ipimorpha retusa*	+		+	+	+	+	+	+	+	+			T	H2
318	*Ipimorpha subtusa*	+			+	+	+	+	+					T	H2
319	*Cosmia affinis*	+					+							T	H2
320	*Cosmia diffinis*	+		+										N	H2
321	*Cosmia pyralina*	+	+	+	+	+	+	+	+	+	+			T	M3
322	*Cosmia trapezina*	+	+	+	+	+	+	+	+	+	+	+		T	M3
323	*Dicycla oo* *	+												N	X3
324	*Atethmia centrago* *	+												N	M2
325	*Mesogona acetosellae*	+			+		+	+						N	X2
326	*Mesogona oxalina*				+									T	H2
327	*Dipterygia scabriuscula*	+	+	+	+	+	+	+	+	+	+	+		T	M2
328	*Mormo maura*						+							N	H2
329	*Trachea atriplicis*	+	+	+	+	+	+	+	+	+	+			T	M2
330	*Polyphaenis sericata*	+	+	+										MT	X2
331	*Thalpophila matura*	+		+	+	+	+	+	+	+				N	M2
332	*Actinotia polyodon*	+	+	+	+	+	+	+	+	+	+	+		T	M2
333	*Actinotia radiosa* *		+											MT	X2
334	*Chloantha hyperici*	+	+	+	+									N	X1
335	*Hyppa rectilinea*					+	+	+	+	+	+	+		B	H2
336	*Phlogophora meticulosa*	+	+	+	+	+	+	+	+	+	+	+	+	P	U
337	*Phlogophora scita*					+	+	+	+	+	+			NM	M3
338	*Euplexia lucipara*	+		+	+	+	+	+	+	+	+	+		T	M2
339	*Apamea monoglypha*	+	+	+	+	+	+	+	+	+	+	+	+	T	M1
340	*Apamea syriaca tallosi*	+	+	+										MT	X1
341	*Apamea lithoxylaea*	+			+	+	+	+						T	X1
342	*Apamea crenata*				+	+	+	+	+	+	+	+		T	M2
343	*Apamea epomidion*						+	+						N	M3
344	*Apamea lateritia*					+		+	+	+	+	+		T	M1
345	*Apamea furva* *	+												T	X1
346	*Apamea maillardi*											+		A	A
347	*Apamea rubrirena*										+	+		BM	M2
348	*Apamea illyria* *											+		BM	M2
349	*Apamea remissa*					+	+	+	+	+	+	+		T	M2
350	*Apamea anceps*	+	+	+	+		+							T	X2
351	*Apamea sordens*	+	+	+	+	+	+	+	+	+	+	+		T	M1
352	*Apamea scolopacina*					+	+	+						T	M3
353	*Apamea ophiogramma*	+	+		+	+	+	+				+		B	H2
354	*Oligia strigilis*	+	+	+	+	+	+	+	+	+	+	+		T	M2
355	*Oligia versicolor*				+		+	+	+		+			N	H1

356	*Oligia latruncula*	+	+	+	+	+	+	+	+	+	+	+		T	U
357	*Mesoligia furuncula*	+	+	+	+	+	+	+						T	M2
358	*Mesapamea secalis*	+		+	+	+	+	+	+					N	M2
359	*Mesapamea didyma*	+		+	+	+	+	+	+			+		N	M2
360	*Photedes captiuncula*											+		BM	M2
361	*Photedes minima*	+	+		+									T	H1
362	*Luperina testacea*	+			+	+	+							N	X1
363	*Luperina zollikoferi*	+												S	X1
364	*Amphipoea oculea*	+				+	+	+	+					T	H1
365	*Amphipoea fucosa*	+		+	+	+	+	+	+	+	+			T	H1
366	*Hydraecia micacea*	+		+	+	+	+	+	+					T	H1
367	*Hydraecia ultima*				+		+	+						B	H2
368	*Hydraecia petasitis*					+	+	+	+					BM	H2
369	*Gortyna flavago*	+			+		+							T	H1
370	*Helotropha leucostigma*	+			+		+	+	+					B	H1
371	*Calamia tridens*	+		+										T	X1
372	*Chortodes pygmina*	+			+		+	+						T	H1
373	*Chortodes extrema*	+	+	+										T	X2
374	*Chortodes fluxa*	+	+	+	+		+	+						T	H2
375	*Oria musculosa* *	+												MT	X1
376	*Nonagria typhae*	+			+	+	+	+						T	H1
377	*Rhizedra lutosa*	+			+		+	+						B	H1
378	*Archanara algae*	+												N	H1
379	*Archanara geminipuncta*				+									N	H1
380	*Archanara neurica* *	+												N	H1
381	*Archanara sparganii*	+			+		+	+						T	H1
382	*Arenostola phragmitidis**	+												B	H1
383	*Episema tersa* *	+												S	X1
384	*Brachylomia viminalis*				+	+	+	+	+	+	+	+	+	BM	H2
385	*Parastichtis suspecta*	+		+	+		+							T	M2
386	*Parastichtis ypsillon*	+				+	+	+	+					T	H2
387	*Atypha pulmonaris*	+			+	+	+	+	+			+		N	H2
388	*Xanthia togata*	+		+	+	+	+	+	+	+	+			B	H2
389	*Cirrhia gilvago*	+												N	X3
390	*Cirrhia icteritia*	+	+	+	+	+	+	+	+	+	+	+		T	H2
391	*Cirrhia ocellaris*	+		+	+		+							N	M2
392	*Tiliacea citrago*	+	+	+		+	+	+	+					N	X3
393	*Tiliacea aurago*	+	+	+		+	+	+	+	+				N	M3
394	*Tiliacea sulphurago*					+	+							MT	X2
395	*Agrochola circellaris*	+	+	+	+	+	+	+	+	+	+	+		T	M3
396	*Agrochola lychnidis* *	+	+	+										N	M3
397	*Agrochola macilenta*	+	+	+	+	+	+	+	+	+	+			N	M3
398	*Agrochola lota*				+	+	+	+	+	+	+			T	H2

399	*Agrochola litura*	+	+	+	+	+	+	+	+	+	+	+		N	M2
400	*Agrochola nitida*	+		+			+							N	X3
401	*Agrochola humilis*	+	+	+		+	+							MT	X2
402	*Agrochola helvola*	+	+	+	+	+	+	+	+					T	M3
403	*Agrochola laevis*	+	+	+										N	X3
404	*Conistra erythrocephala*	+		+										N	M2
405	*Conistra ligula*	+		+			+							N	X2
406	*Conistra rubiginea*	+	+	+	+	+	+	+	+					N	M2
407	*Conistra rubiginosa*	+	+	+	+									N	M2
408	*Conistra vaccinii*	+	+	+	+	+	+	+	+	+	+	+		T	M2
409	*Lithophane furcifera*	+			+	+	+							T	H2
410	*Lithophane ornitopus*	+	+	+	+	+	+	+						N	M2
411	*Lithophane socia*	+		+	+	+	+	+	+					T	M2
412	*Lithophane consocia*	+			+	+	+	+	+	+	+	+		BM	H2
413	*Lithomoia solidaginis*										+	+		BM	TF
414	*Xylena exsoleta*	+												T	M2
415	*Xylena vetusta*				+									T	H2
416	*Eupsilia transversa*	+	+	+	+	+	+	+	+	+	+	+		T	M3
417	*Griposia aprilina*	+	+	+		+	+							N	X3
418	*Dichonia aeruginea* *	+												MT	X2
419	*Dichonia convergens*	+	+	+										MT	X3
420	*Dryobotodes eremita*	+		+										N	X3
421	*Antitype chi*	+		+										T	X2
422	*Ammoconia caecimacula*	+		+	+	+	+	+						N	M2
423	*Aporophyla lutulenta*	+		+	+									S	X1
424	*Mniotype adusta*					+	+	+	+	+	+	+	+	BM	H2
425	*Mniotype satura*	+		+	+	+	+	+	+	+	+			T	M3
	Hadeninae														
426	*Panolis flammea*								+					T	M3
427	*Dioszeghyana schmidti* *	+												MT	X2
428	*Orthosia cerasi*	+	+	+	+	+	+	+	+	+	+			N	M3
429	*Orthosia cruda*	+	+	+	+	+	+	+	+	+	+			N	M3
430	*Orthosia gothica*	+	+	+	+	+	+	+	+	+	+	+		P	U
431	*Orthosia gracilis*	+	+	+	+	+	+	+						T	H2
432	*Orthosia incerta*	+	+	+	+	+	+	+	+	+	+	+		T	M3
433	*Orthosia miniosa*	+	+	+										N	M2
434	*Orthosia opima*	+	+	+	+	+								T	M2
435	*Orthosia populeti*	+	+	+	+		+	+	+	+				T	H2
436	*Anorthoa munda*	+	+	+	+	+	+	+	+	+				T	M3
437	*Egira conspicillaris*	+	+	+	+	+	+	+	+	+				N	M2
438	*Tholera cespitis*	+		+	+	+	+	+	+					T	M1
439	*Tholera decimalis*	+	+	+	+	+	+	+	+	+	+			T	M1
440	*Cerapteryx graminis*					+	+	+	+	+	+	+		B	M1
441	*Anarta trifolii*	+	+	+	+	+	+	+	+					T	X1
442	*Polia bombycina*	+			+	+	+	+	+	+	+	+		T	M2

443	*Polia hepatica*							+	+	+	+	+		T	M2
444	*Polia nebulosa*	+	+	+	+	+	+	+	+	+	+	+		T	M2
445	*Pachetra sagittigera*					+	+	+						T	X2
446	*Lacanobia aliena*						+	+						S	X2
447	*Lacanobia contigua*	+	+	+	+	+	+	+	+	+	+			T	M3
448	*Lacanobia oleracea*	+	+	+	+	+	+	+	+	+	+			T	M1
449	*Lacanobia splendens*	+			+		+	+						T	H2
450	*Lacanobia suasa*	+	+	+	+	+	+	+	+	+	+			T	M2
451	*Lacanobia thalassina*	+	+	+	+	+	+	+	+	+	+	+		T	M3
452	*Lacanobia w-latinum*	+	+	+	+	+	+	+	+	+	+	+		T	X2
453	*Melanchra persicariae*	+	+	+	+	+	+	+	+	+	+	+		T	M2
454	*Ceramica pisi*					+	+	+	+	+	+	+		T	M1
455	*Papestra biren*											+		BM	H2
456	*Mamestra brassicae*	+	+	+	+	+	+	+	+	+	+	+	+	T	U
457	*Hada plebeja*	+	+	+	+	+	+	+	+	+	+	+		T	H2
458	*Sideridis reticulatus*	+		+	+		+							N	X2
459	*Sideridis rivularis*	+	+	+	+	+	+	+	+	+		+		T	X1
460	*Sideridis turbida*	+		+										T	X1
461	*Conisania luteago*	+	+	+	+	+	+	+						T	X1
462	*Hecatera bicolorata*	+	+	+	+							+		T	X1
463	*Hecatera dysodea*	+	+	+	+									N	X1
464	*Hadena albimacula* *	+												N	X1
465	*Hadena capsincola*	+		+	+		+							T	M2
466	*Hadena compta*	+		+	+							+		T	X1
467	*Hadena confusa*	+		+	+		+	+						T	M1
468	*Hadena filograna* *	+												N	X1
469	*Hadena irregularis*	+												N	X1
470	*Hadena perplexa*	+	+	+	+		+	+		+				T	X1
471	*Mythimna albipuncta*	+	+	+	+	+	+	+	+	+	+	+	+	T	M1
472	*Mythimna conigera*	+		+	+	+	+	+	+	+	+	+		T	M1
473	*Mythimna ferrago*	+	+	+	+	+	+	+	+	+	+	+	+	T	M1
474	*Mythimna impura*	+			+									T	H1
475	*Mythimna l-album*	+	+	+	+	+	+	+	+	+				N	H1
476	*Mythimna pallens*	+	+	+	+	+	+	+	+	+	+	+		T	M1
477	*Mythimna pudorina*	+	+	+	+									T	H1
478	*Mythimna straminea*	+			+									T	H1
479	*Mythimna turca*	+	+	+	+	+	+	+	+	+	+			T	M2
480	*Mythimna unipuncta* *	+												MT	U
481	*Mythimna vitellina*	+	+	+	+	+	+	+	+	+	+	+	+	MT	U
482	*Leucania comma*					+	+	+	+	+	+	+	+	BM	H1
483	*Leucania obsoleta*	+			+									T	H1
484	*Lasionycta imbecilla*						+	+			+			BM	H2
485	*Lasionycta proxima*											+		BM	X2
486	*Senta flammea*				+									B	H1

	Noctuinae														
487	*Peridroma saucia*												+	P	U
488	*Dichagyris flammatra*							+				+	+	MT	X1
489	*Euxoa birivia*										+			A	A
490	*Euxoa tritici*	+												N	X1
491	*Agrotis bigramma*	+												N	X1
492	*Agrotis cinerea*					+	+	+						N	X1
493	*Agrotis clavis*	+		+	+	+	+							T	X1
494	*Agrotis exclamationis*	+	+	+	+	+	+	+	+	+	+	+	+	P	U
495	*Agrotis ipsilon*	+	+	+	+	+	+	+	+	+	+	+	+	P	U
496	*Agrotis segetum*	+	+	+	+	+	+	+	+	+	+	+	+	P	U
497	*Axylia putris*	+	+	+	+	+	+	+	+	+	+	+		P	M1
498	*Ochropleura plecta*	+	+	+	+	+	+	+	+	+	+	+		P	M1
499	*Diarsia brunnea*	+		+	+	+	+	+	+	+	+	+	+	T	M2
500	*Diarsia dahlii*						+	+				+		B	H2
501	*Diarsia florida*					+	+	+	+	+	+	+		BM	H2
502	*Diarsia mendica*						+	+	+	+	+	+		BM	M2
503	*Diarsia rubi*	+			+	+	+	+	+	+				B	H2
504	*Cerastis rubricosa*	+	+	+	+	+	+	+	+	+	+			T	M1
505	*Cerastis leucographa*	+			+	+	+	+	+					T	M2
506	*Paradiarsia punicea*				+									B	H1
507	*Lycophotia porphyrea*										+			B	TF
508	*Rhyacia simulans*											+		T	X1
509	*Rhyacia lucipeta*												+	MT	X1
510	*Chersotis rectangula*												+	BM	X2
511	*Noctua comes*	+	+	+	+		+							N	M2
512	*Noctua fimbriata*	+	+	+	+	+	+	+	+	+	+	+	+	T	M2
513	*Noctua interposita*	+	+	+	+	+	+	+	+	+	+	+	+	N	M2
514	*Noctua janthe*	+	+	+	+	+	+					+		N	M2
515	*Noctua janthina*	+	+	+	+	+	+					+		N	M2
516	*Noctua orbona*	+	+	+	+									N	M2
517	*Noctua pronuba*	+	+	+	+	+	+	+	+	+	+	+	+	P	U
518	*Epilecta linogrisea*	+		+										N	X1
519	*Spaelotis ravida*	+												T	X1
520	*Opigena polygona*	+												T	X1
521	*Eurois occulta*				+	+	+	+	+	+	+	+		BM	M2
522	*Graphiphora augur*	+			+		+	+			+			B	M2
523	*Anaplectoides prasina*				+	+	+	+	+	+	+	+	+	T	M2
524	*Xestia baja*	+		+	+	+	+	+	+	+	+	+	+	T	M2
525	*Xestia c-nigrum*	+	+	+	+	+	+	+	+	+	+	+	+	P	U
526	*Xestia collina*											+		BM	M2
527	*Xestia ditrapezium*	+		+	+	+	+	+	+	+	+			T	M2
528	*Xestia stigmatica*					+	+	+	+					N	M2
529	*Xestia sexstrigata*	+										+		N	M2
530	*Xestia triangulum*	+			+	+	+	+	+					T	M2

531	*Xestia xanthographa*	+		+	+	+	+	+					N	M2
532	*Eugraphe sigma*	+			+	+	+	+	+	+	+		T	M2
533	*Eugnorisma depuncta*						+	+	+				T	M2
534	*Naenia typica*	+			+		+						T	H1

Ecogeographic structure of regional moth fauna presented further (Table 3). There is Temperate EC dominate with 265 species and a share of about 50% in total species amount. The next dominating Nemoral EC consist 116 species or 22% in total amount. These two complexes are forming "standard" Middle-European ecogeographic block. Following ECs have not exceeding a part of 10%: Mediterranean (46 species, 8.6%), Boreomontane (31, 5.8%), Steppe (27, 5.1%), Polyzonal (21, 3.9%), Boreal (18, 3.4%), Nemoral-Montane (8, 1.5%) and Alpine (2 species, < 1%).

Among HGs seminemoral mesophiles (M2) prevailing with its 138 species and 26% in total amount. There are totally 253 mesophile species or 47% in amount, 144 xerothermophiles with 27%, 107 hygrophiles with 20% and 24 ubiquists with almost 5% accordingly. The strictly specialized and sthenotopic tyrfophiles (TF) or alpicols (A) are presented by few species only.

The general ecogeographic structure of regional moth fauna looks as:

4P 50T 23N 5S 9MT 10BM: 4U 47M 27S 20H 1TF +A.

The species diversity is richest in mixed lowland & hilly terrain of Transcarpathia within *Querceta robori-petraeae* vegetation belts. There are 417 species occur totally at the points situated on volcanic hills of Bereg Uplands (Beregszasz), Czorna Hora and Klenova Hora (Akli Hegy), and 83 of them is found only there.

Table 3: Ecogeographic structure of the moth fauna in investigated area

CATEGORY	SPECIES NUMBER BY THE POINTS												
	Beregszasz	Akli Hegy	Czorna Hora	Kireshi	Mala Uholka	Kuzij	Rakhiv	Keveliv	Ust-Hoverla	Czorna Tysa	Pozhezhevska	Pip Ivan	**Total**
Ecogeographic complexes (ECs)													
A	–	–	–	–	–	–	–	–	–	1	1	–	2
B	7	1	1	9	7	13	13	8	7	9	7	–	18
BM	1	–	–	5	12	17	18	17	17	23	23	7	31
T	214	143	184	223	200	223	209	182	151	136	85	22	265
N	103	55	78	69	54	69	46	28	17	11	8	2	116
NM	–	1	–	3	6	7	6	7	6	2	1	–	8
S	22	9	12	11	1	4	3	–	–	–	1	–	27
MT	32	22	23	11	5	10	5	2	2	2	6	5	46
P	20	17	18	18	16	18	17	16	16	15	16	11	21
Habitat groups (HGs)													
U	22	20	20	19	17	19	19	17	17	17	21	18	24
M1	20	14	19	21	21	22	23	21	18	16	15	3	26

M2	105	72	89	107	100	112	103	87	72	70	50	15	138
M3	64	54	64	64	78	82	79	75	65	54	27	3	89
X1	63	22	40	35	12	17	11	4	5	2	9	2	76
X2	43	30	34	22	15	24	11	5	3	3	2	1	55
X3	12	8	9	3	5	7	2	2	–	–	–	–	13
H1	25	5	9	29	9	18	15	11	4	4	1	1	36
H2	40	18	27	44	42	55	50	37	31	28	19	3	65
HT	5	5	5	5	2	4	3	–	–	–	–	–	6
TF	–	–	–	–	–	1	1	1	1	4	3	1	4
A	–	–	–	–	–	–	–	–	–	1	1	–	2
Total	399	248	316	349	301	361	317	260	216	199	148	47	534

The richest fauna is characteristic to **Beregszasz** point, where 399 species found:
5P 54T 26N 6S 8MT 2BM: 6U 47M 30X 18H.

There is largest amount of Mediterranean and Steppe species (totally 54) among all points as well as Nemoral species (103) revealed. It is associated with location of the point, which situated on xeric stony hill covered by Pannonic oak woods with *Quercus petraea* (Kish et al., 2006) or scrub and dry grassy clearings mosaics, and opened onto Transcarpathian plain. The unexpectedly high part of hygrophiles (70 species) as well as presence of Boreal elements (7 species) here is caused by the proximity of surrounding humid plain with lowland oak woods and damp meadows. There are 45 species found only at this point during our investigations, and most of them are Mediterranean, Steppe or Nemoral xerothermophiles. Also there 35 of 42 newly found in Ukrainian Carpathian region moth species occur.

The species composition found at another points **Akli Hegy** and **Czorna Hora** seems like much poor (248 and 316 species accordingly), but it caused generally by unavailability of stationary catching with light traps there. At the same time, ecogeographic structure of species composition at these points is similar to the previous:

Akli Hegy – 7P 58T 23N 4S 9MT +BM: 8U 56M 24X 11H;
Czorna Hora – 6P 58T 25N 4S 7MT +BM: 6U 54M 26X 13H.

These points have more xeric environments and it marks up on nearly absence of Boreal species as well as lower parts of hygrophiles in the structure in comparison with Beregszasz point.

There are interesting finds at both of points occurred. The Akli Hegy is the only known locality of Mediterranean hawkmoth *Marumba quercus* (Denis and Schiffermueller, 1775) in western region of Ukraine, where it found at the first time at 2009. There are number of rare xerothermophile *Noctuoidea* species found recently: *Eublemma ostrina* (Huebner, 1808), *Pechipogo plumigeralis* (Huebner, 1825), *Catocala conversa* (Esper, 1787), *Lamprosticta culta* (Denis and Schiffermueller, 1775), *Periphanes delphinii* (Linnaeus, 1758), *Actinotia radiosa* (Esper, 1804) at Akli Hegy (Geryak, 2010); *Callopistria latreillei*, *Episema glaucina*, *Chersotis multangula* at Czorna Hora (Nowacki, Bidychak, 2009; Nowacki et al., 2010).

The volcanic hills of Transcarpathian Lowland is famous by its unique as for Ukrainian Carpathians Submediterranean (Pannonic) wood vegetation with participation of *Quercus cerris, Q. dalechampii, Q. polycarpa, Fraxinus ornus, Tilia tomentosa, Staphylea pinnata, Cornus mas, Ligustrum vulgare* etc. (Kish et al., 2006; Stoyko, 2009). There are last plots of Pannonic xeric grasslands in Transcarpathia remained on some these hills. Most of specific Mediterranean or Steppe moth species are associated with its formations, but their

future survival both with unique ecosystems here is rather doubtful. Some present kinds of human activity in this area have been causing a serious threat for regional biodiversity at the close perspective. It is concerning to open mining (especially at Bereg Uplands) which has further continue, rapid oak woods cutting, recently activated re-mastering of xeric slopes for commodity vineyards, burnings of dried vegetation etc.

Another investigated point within *Querceta robori-petraeae* vegetation belts is **Kireshi** or famous Valley of Narcissi. There are humid to wet meadows in combination with alluvial *Salix* or other shrubs and remnants of oak woods presented. The humid environmental conditions determine significantly ecogeographic structure of the moth fauna:

5P 64T 21N 3S 3MT 4BM: 5U 55M 17X 22H.

There are rare hygrophile *Noctuoidea* species found, such as *Diachrysia zosimi* (Huebner, 1822), *Plusia putnami* (Grote, 1873), *Archanara geminipuncta* (Haworth, 1809), *Xylena vetusta* (Huebner, 1813), *Senta flammea* (Curtis, 1828), *Paradiarsia punicea* (Huebner, 1803), which not occurred elsewhere in investigated area. It is right also for Nemoral mesophile *Calyptra thalictri* (Borkhausen, 1790). However, there are many xerothermophile moth species characteristic to most dry and warm Transcarpathian localities occur. There are *Eriogaster lanestris* (Linnaeus, 1758), *E. catax* (Linnaeus, 1758), *Saturnia pyri* (Denis & Schiffermueller, 1775), *S. pavoniella* (Scopoli, 1763), *Drymonia querna* (Denis & Schiffermueller, 1775), *Dysauxes ancilla* (Linnaeus, 1767), *Cucullia lychnitis* (Rambur, 1833), *Heliothis peltigera* (Denis & Schiffermueller, 1775) as well as rare Steppe species *Lygephila lusoria* (Linnaeus, 1758), *Cucullia lanceolata* (Villers, 1789). Thus, unique combination of hygrophile and xerothermophile elements of diverse biogeographic origin has result as very rich moth fauna with 349 species found totally.

Following three points are representing lower parts of *Fageta sylvaticae* vegetation belts. **Mala Uholka** point situated closely to famous Uholka massif of virgin beech forest, but the species diversity of its moth fauna is much poor than in almost woodless Kireshi site.

There are 301 species found and ecogeographical structure of its composition is rather "standard":

5P 66T 20N +S 2MT 6BM: 6U 66M 10X 18H.

There are not any species occurred only at this point, but Boreomontane species (12) become to consist a visible part in the structure as well as parts of Mediterranean or Steppe species (totally 6) is decreasing considerably in comparison with localities of *Querceta robori-petraeae* vegetation belts. The low habitat diversity of the site which presented by mesophile beech forest with its clearings and margins at general is rather most important cause of relatively mediocre character of local moth fauna.

Unlike of Mala Uholka the **Kuzij** is most interesting by the moth fauna among the points situated within *Fageta sylvaticae* vegetation belts. It situated near Tisa River Valley at the western foothills of Marmarosh Mts, which are rising rapidly from 350 to 1090 m altitude at this place. It is the zone of sharply defined transition between Upper Tisa Depression with *Querceta robori-petraeae* vegetation and higher mountain massifs of Interior Carpathians with *Fageta sylvaticae* and *Piceeta abietis* vegetation belts. The mountains of Marmarosh built with hard metamorphic rocks and have rapid stony slopes. These features as well as complicated relief with barrens of carbonate rocks cause mosaic pattern of distribution of the habitats and vegetation communities with its rich biodiversity. As an example of that diversity, there is unique fact of occurrence of *Quercetum petraeae* forest community at the Tempa Mt near 1000 m altitude known (Stoyko, 2009).

The Kuzij point surrounded by rapid slopes of the same named stream valley, which covered by plentiful broadleaf forest of *Fagus sylvatica* with participation of *Quercus robur, Carpinus betulus, Acer pseudoplatanus, Fraxinus excelsior* and *Tilia cordata*. There are open mesophile grassy clearings and margins as well as fragments of the damp riverside woods and coppice of *Alnus glutinosa, A. incana* and *Ulmus laevis* in immediate environs.

There are 361 species moth species in species composition, and it is largest amount found among the points within *Fageta sylvaticae* vegetation belts:

5P 62T 21N 1S 3MT 8BM: 5U 60M 13X 21H +TF.

As it seen, the species structure has more diverse character than that it is at Mala Uholka point. This richness and diversity caused, on the one hand, by availability of damp woodland habitats, which attract many hygrophile species. As result, there is largest amount of nemoral hygrophiles among all of investigation points (55) and almost largest – of hygrophiles generally (77). On the other hand, near Tisa River Valley playing a role of ecological corridor by which Mediterranean, Steppe or other xerothermophile species have to penetrate into cooler mountain terrains. Thus there are 10 Mediterranean, 4 Steppe and 48 generally xerothermophile species found at Kuzij in comparison with 5, 1 and 32 such species accordingly at Mala Uholka point. Another characteristic feature of this site is large amount of Boreal and Boreomontane species (totally 30), which is caused both by local environmental conditions (situation in the damp and relatively cool valley) and biogeographic influence of near higher mountain terrains. It is worth to note, that the biogeographic barrier effect also sharply defined at the site. For example, there are few xerothermophile moth species characteristic to Transcarpathian Lowland localities occurred at the near vicinity of Kuzij – the Luh village, which situated at open to Upper Tisa Depression SW foothills of the same mountain massif, but never found at Kuzij: *Saturnia pyri*, *Lamprosticta culta, Agrochola laevis* (Huebner, 1803), *Dryobotodes eremita* (Fabricius, 1775).

The species diversity of moth fauna at the **Rakhiv** point is less rich than at Kuzij. The point has similar environmental surrounding but it situated at 50 m higher vertically by Tisa River and after the series of its sharp meanders within strict and squeezed by mountains valley. The climatic conditions there are also cooler than at Kuzij site.

There are 317 moth species found:

5P 66T 16N 1S 2MT 10BM: 6U 65M 8X 21H +TF.

There is considerable decrease of the parts and amounts both of Nemoral and xerothermophile elements becomes – from 76 and 48 species at Kuzij to 52 and 24 at Rakhiv accordingly. It is associated probably both with climatic condition changes and the lesser availability for the species penetrating from Upper Tisa Depression, which caused by the valley relief. It looks like the next biogeographic barrier becomes through mentioned 50 m altitude rise.

There are two rare in Ukrainian Carpathians Temperate species caught only at this point: *Phyllodesma ilicifolia* (Linnaeus, 1758) and *Pericallia matronula* (Linnaeus, 1758).

Another 2 points **Keveliv** and **Ust-Hoverla** situated also in Tisa or Bila Tisa river valleys within *Fageta sylvaticae* vegetation belts but at much higher altitudes (585 and 650 m accordingly). There are 260 moth species found at Keveliv as well as 216 at Ust-Hoverla points: Keveliv – 6P 70T 13N 1MT 10BM: 7U 70M 4X 18H +TF;

Ust-Hoverla – 7P 70T 11N 1MT 11BM: 8U 72M 4X 16H +TF.

There is seen that the species diversity became decreasing rapidly with altitude rise. The Steppe and hygrothermophile species are absent totally at these points, and single Mediterranean species occur. There are small number of mostly Temperate xerothermophiles

penetrates into these mountain terrains, but the parts and amounts of Nemoral elements in species compositions decreased at 1.5-2 times in comparison with Rakhiv point.

The **Czorna Tysa** point presents another qualitative change in the structure of moth species composition. Despite it situated ultimately within *Fageta sylvaticae* vegetation belts by its average altitude intervals (Stoyko, 2009), there are belts descended at this site because of situation in cold and almost closed for warm SW air masses valley in uppers of Tisa River, between Svydovets and Gorgany Mts. Thus, there is vegetation of *Piceeta abietis* belts dominate as well as *Picea abies* in surrounding forest communities. There are also damp meadows and riverside coppice of *Alnus incana* and *Salix spp.* presented near the point.

There are 199 moth species found:

8P 68T 7N 1MT 17BM: 9U 70M 3X 16H 2TF 1A.

There are Nemoral species decreasing naturally, and a few of Mediterranean are widespread migrants, such as *Agrius convolvuli* (Linnaeus, 1758) or *Mythimna vitellina* (Huebner, 1808). But there is largest amount of Boreoalpine, in wider sense (B+BM+A), species (33) among all of investigation points, as well as all 4 tyrfophiles occurring in Upper Tisa River Basin found. There are such specific Boreomontane species as *Cosmotriche lobulina* (Denis & Schiffermueller, 1775), *Parasemia plantaginis* (Linnaeus, 1758), *Syngrapha interrogationis* (Linnaeus, 1758), *Acronicta menyanthidis* (Esper, 1789), *Cucullia lucifuga* (Denis & Schiffermueller, 1775), *Calliergis ramosa* (Esper, 1786), *Apamea rubrirena* (Treitschke, 1825), *Lithomoia solidaginis* (Huebner, 1803) characteristic to *Piceeta abietis* both with Subalpine vegetation belts. The Boreal tyrfophile species *Lycophotia porphyrea* (Denis and Schiffermueller, 1775) both with Alpine *Euxoa birivia* (Denis and Schiffermueller, 1775) found only at this point.

The moth species composition has furthermore decrease through the rising up to the tree line. There are 148 species found at **Pozhezhevska** point, which situated at the border of *Piceeta abietis* and *Pineta mugi / Prata subalpina* vegetation belts:

11P 57T 6N 1S 4MT 21BM: 14U 62M 7X 14H 2TF 1A.

There are largest parts in the species composition both Temperate and Polyzonal ECs consist (101 species or 68% totally), but next richest are Boreal and Boreomontane ECs with its 31 species totally (including single rare Alpine species *Apamea maillardi* (Geyer, 1834). Most of species are characteristic for *Piceeta abietis* belt generally, but there are some interesting finds occur. The continental Steppe species *Cucullia pustulata* (Eversmann, 1848) [= *fraterna* auct.] was found there at 2007 at the first time in Ukrainian Carpathians, as well as Boreomontane *Apamea illyria* (Freyer, 1846) at 2008 (Geryak, Bidychak, 2009).

The point is interesting by its situation on the migratory way through highest chains of Carpathians. There are Mediterranean vagrants such as *Acherontia atropos* (Linnaeus, 1758) or *Hyles livornica* (Esper, 1780) occur during its migrations to north. The last mentioned species observed there in number near 100 individuals during a few night hours in August 2007. There are another Mediterranean migrants or xerothermophiles of other origin registered, which not occurred generally in the lower mountain terrains: *Cucullia lactucae* (Denis and Schiffermueller, 1775), *Heliciverpa armigera* (Huebner, 1808), *Dichagyris flammatra* (Denis and Schiffermueller, 1775), *Rhyacia simulans* (Hufnagel, 1766) etc. (Geryak, Bidychak, 2009). It looks like peculiar biogeographic inversion, where some xerothermophile species occur in the cold high mountain terrains more often than in the lower and warmer areas.

The last considered point is **Pip Ivan** situated near the border of Subalpine and Alpine belt of Marmarosh Mts. Actually, there was not a single point because of investigations were

carrying out with mobile light trap and screen within wider vertical scale from 1600 to 1850 m altitude or even higher (Geryak, Bidychak, 2009). There were moth fauna naturally poor with 47 species found only:

23P 47T 4N 11MT 15BM: 38U 45M 6X 9H 2TF.

The most of those species are Polyzonal and Temperate ubiquists or other widespread elements, including few Mediterranean migrants. Most interesting find there was Boreomontane xerophile (or xeromontane) species *Chersotis rectangula* (Denis and Schiffermueller, 1775) which not found in the region elsewhere (Geryak, Bidychak, 2009). At the same time, the absence of Alpine species there is common for Ukrainian Carpathians fact. The question of its potential distribution is still remains opened (Kanarskyi, 2009).

CONCLUSIONS

1. There are 534 moth species found in investigated area during the research, including 16 species of *Drepanoidea,* 39 – *Bombycoidea* and 479 – *Noctuoidea.* The row of recent finds of new for the regional fauna moth species shows that its composition not ascertained completely at present.

2. The species richness of moth fauna is not decreasing gradually with altitude rise. Its amounts by the localities remain near the same (about 300–400 species) within lower parts of *Fageta sylvaticae* vegetation belts as it is in lowland *Querceta robori-petraeae* belts up to 450 m approximately. This limit is evidently coincident with an average upper limit of relatively common forest communities containing *Quercus* sp. in Upper Tisa River Basin. After the species richness decreases rapidly to about 210–260 species in the higher parts of *Fageta sylvaticae* belts and further to 150–200 species within *Piceeta abietis* belts. There are near 100 species for Subalpine and less than 50 species for Alpine belts localities characteristic.

3. The general trend in changes of ecogeographic structure of the moth species composition in the way to rise up by altitude consists in the decrease of the parts and amounts of mostly xerothermophile Mediterranean, Steppe and Nemoral species as well as parts of Boreal or Boreomontane species increase. However, these changes have not strictly determined by altitude, because local environmental conditions such as habitat diversity, microclimate or physical barriers might have much significant role in the species distribution.

4. The most original elements in the moth species composition with large number of rare and locally distributed species are characteristic to the sites within *Querceta robori-petraeae* vegetation belt, where there are lot of Nemoral, Steppe, Mediterranean both xerothermophile and hygrophile species. These elements are more or less gradually diminishing by altitude rise, and the “standard” widespread Temperate or Nemoral mesophiles become prevailing. The original features of the species composition within upper *Fageta sylvaticae* and *Piceeta abietis* vegetation belts are supported by generally not very numerous Boreal or Boreomontane species as well as thermophile species penetrating from the lower terrains. The species composition of high mountain sites situated above the tree line is most “primitive” and it consists of Polyzonal and Temperate ubiquists or other widespread elements mainly, including few Mediterranean migrants.

5. There is not visible impoverishment of the general species diversity within investigated area determined in about 100-year retrospective, but some kinds of human activity, especially open mining or oak woods cutting in Transcarpathian Lowland and its volcanic hills, causing serious threat for regional diversity of moth fauna as well as unique xeric or floodplain woodland and grassland ecosystems. These habitats need protection at the first turn.

AKNOWLEDGEMENTS

The authors wish to thank the all who were assisting us at the field research.

We especially grateful for the kind assistance or participation in collecting work to following people: Dmytro Sukhariuk, Vasyl Pokyn'chereda and Mykhailo Mojsiuk (CBR, Rakhiv); Ivan Yarema, Sergij Verbytskyi and Omelyan Gapchuk (Institute of Geophysics NAS of Ukraine, Lviv); Yurii Holobin (Biological Station of IEC, Vorokhta); Pavlo Savytskyi, Mykhailo Gomba, Svitlana and Leonid Pokrytiuk (Beregovo).

AUTHORITY NOTES

The conception of the paper as well as methodological processing and generalization of presented materials belong principally to Yu.Kanarskyi. The particular interpretations with analysis of diverse ecological and faunal aspects of the species are authorities of Yu. Geryak (*Noctuoidea*) and E.Lyashenko (*Drepanoidea* and *Bombycoidea*) mainly. The materials are collecting in the framework of common field research with all authors. All original zoological materials of *Noctuoidea* are processing by Yu.Geryak.

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