2021

Diversity of Moths (Lepidoptera: Heterocera) in North-Central Mongolia

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Erforsch. biol. Ress. Mongolei (Halle/Saale) 2021 (**14**): 361-377

Diversity of moths (Lepidoptera: Heterocera) in north-central Mongolia

E. Khishigdelger, M. Pfeiffer, M. Uuganbayar & B. Bazartseren

Abstract

In this study, was aimed at 1) collecting baseline data in order to study distribution of moths in the future, and 2) estimating diversity of moths distributed in central and northern Mongolia. For this study were collected specimens from 266 species, representing 15 families from 7 study sites during 92 nights spanning over two years. Samples were collected around the research stations Tunkhel and Khonin Nuga in Selenge Aimag, Ikhtamir in Arkhangai Aimag, Mungunmorit and Undurshireet Soums in Tuv Aimag, as well from Shargamorit near Ulaanbaatar, the capital of Mongolia, and from Tsenkhermandal Soum in Khentii Aimag. So were found more species at Tunkhel (121) and Khonin Nuga (100) compared to the other five study sites; also the diversity measures were higher at these sites and moth communities were most similar to each other.

Key words: Lepidoptera, Mongolia, moth, species diversity

1. Introduction

Scientists strive to understand how climate change will affect insects as they play key roles as agricultural pests, pollinators, and food sources for vertebrates, vectors of human disease, and drivers of various ecosystem processes. Global change in earth's ecosystems affects species in different ways. Due to climate change, interactions between plants and insects are being disrupted (MEMMOTT et al. 2007). Some species are moving to higher latitudes towards cooler areas, contracting their range, while other species are becoming more abundant and expanding their range. For example, as a result of warming temperature, it was shown that the mean elevational distribution of some moth species is increasing (CHEN et al. 2009); the northward range of northern hemisphere moths is expanding (PARMESAN 2006); voltinism of butterflies and moths (ALTERMATT 2010) is changing.

Researchers believe that butterflies and moths may be particularly susceptible to population fluctuations in response to climate change - especially at high latitudes and high elevations (HUNTER et al. 2014). Moreover, monitoring their numbers and ranges can give us vital clues to changes in our own environment, such as the effects of pasture degradation and climate change (DONNELLY et al. 2004; BACHAND et al. 2014). Thus, were chosen moths to study the impact of climate change on their distribution pattern. To obtain a general picture of the future species-specific shifts in geographical ranges of moths, it is necessary to study the current moth distribution pattern as baseline data of species diversity and abundance (ITÄMIES et al. 2011). In Mongolia there are about 1000 species of 346 genera of 35 families that have been recorded so far (NAMKHAIDORJ et al. 2008). However, there was still no sufficient information on their distribution and diversity.

Therefore, were included following objectives for this study:

1. Collecting baseline data of species richness and distribution of moths; and
2. Estimating diversity of moths distributed in central and northern Mongolia.

2. Material and methods

Study area

All study sites (fig. 1) belong to the Khangai and Khentii mountainous regions, with most being specifically in Khentii region. Khentii region is a transition territory, which connects the taiga of Lake Baikal and the desert steppe of Central Asia. Khentii region's northern part is covered by dense taiga and there are many rivers and streams due to relative high precipitation in that area. In the southern part, there is almost no water in broad valleys and dry steppe.

In Khentii region, the duration of summer is not long and it is not particularly warm, with average temperature of July is 12°-18°C. The amount of precipitation fluctuates between 220-330 mm annually. In terms of vegetation, most parts of Khentii region are included in the steppe biome (TSEGMID 1969).

Table 1: Study sites, dates of material collection, geographical coordinates and used abbreviations

study site	abbreviation	date	geographical coordinates
Tsenkhermandal Soum, Khentii Aimag	TM	16.08.-22.08.2012	47°40.973' N / 108°56.768' E
Khonin Nuga, Selenge Aimag	KN	17.07.-22.07.2012; 03.07.-07.07.2013	49°04.800' N / 107°17.250' E
Tunkhel village, Selenge Aimag	TU	29.06.-08.07.2012; 11.05.-18.05.2013 & 14.07.-20.07.2013	48°40.134' N / 106°52.449' E
Undurshireet, Tuv Aimag	UN	01.08.-20.08.2013	47°27.82' N / 105°03.11' E
Mungunmorit, Tuv Aimag	MM	13.09.-16.09.2012	48°25.915' N / 108°47.755' E
Shargamorit, Tuv Aimag	SM	27.07.-29.07.2012; 15.06.-17.06.2013	48°05.041' N / 106°57.151' E
Ikhtamir, Arkhangai Aimag	IT	01.08.-20.08.2013	47°32.56.42' N / 101°15.250' E

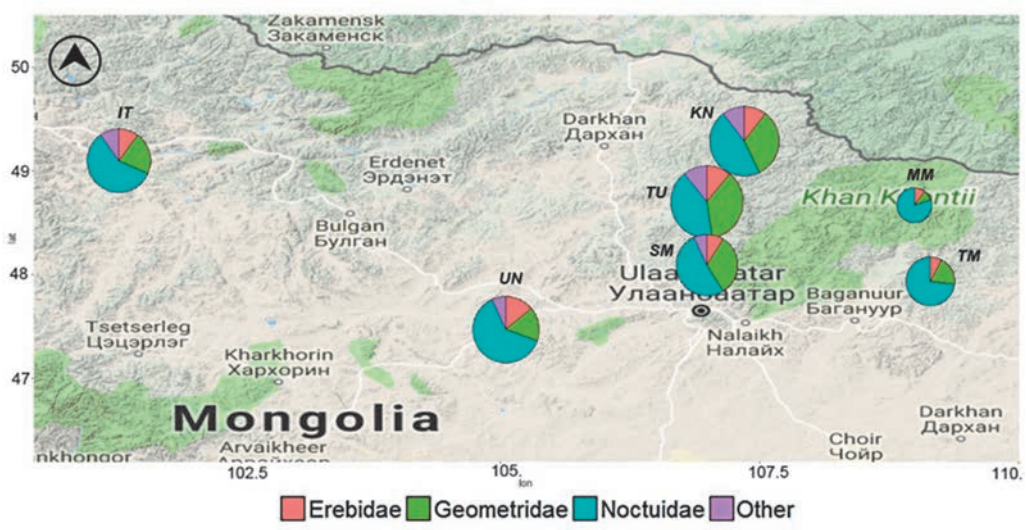

Fig. 1: Sampling locations of north-central Mongolia included in this study (IT-Ikhtamir, UN-Undurshireet, SM-Shargamorit, TU-Tunkhel, KN-Khonin Nuga, MM-Mungunmorit, TM-Tsenkhermandal). Pie charts show percentage of moth families of study sites, here only the biggest families as Erebidae, Geometridae and Noctuidae. Other, smaller families are summarized in 'Other' (Crambidae, Drepanidae, Endromidae, Lasiocampidae, Notodontidae, Oecophoridae, Pterophoridae, Pyralidae, Saturniidae, Sphingidae, Tortricidae and Yponomeutidae).

At the following locations moths were studied:

Tunkhel research camp of GIZ (*German Corporation for International Cooperation GmbH*) located in Mandal Sum; Selenge province belongs to Khentii mountainous region according to its zoogeographical zonation and is about 110 km north of Ulaanbaatar. Samples were taken at the edge of a birch-larch mixed forest and near the top of mountain.

Khonin Nuga is a valley in the West-Khentii region of northern Mongolia. It is situated in the buffer zone of the *Strictly Protected Area of Khan Khentii* where two rivers Sharlan and Hongo meet and create the river Eroo, in the upper part of the Selenge River Basin. The study site is in the transition zone between the southern extension of the Siberian taiga and Mongolian forest steppe (MÜHLENBERG et al. 2001). Sampling was carried out near to the forest edge and at the riverbank.

Mungunmorit study station is 220 km far away from Ulaanbaatar. Out of different types of forest, larch-birch forest was predominant. Samples were taken near to the forest edge.

***Tsenkhermandal Soum*.** Due to low number of moths caught, the data of Dadal, Batshireet, Umnudelger and Tsenkhermandal Soums of Khentii Aimag were merged. Because of bad weather condition (continous rain) during the sampling, few moths came to the light trap. Most moths were caught from Tsenkhermandal Soum. Tsenkhermandal Soum is 200 km away from Ulaanbaatar. Moths were caught near the forest edge.

Shargamorit is 33 km away from Center of Ulaanbaatar. Birch and larch trees were predominating in the forest.

Undurshireet and ***Ikhtamir.*** Undursireet Soum is located at 180 km and Ikhtamir Soum is 570 km from Ulaanbaatar, respectively. At the both study areas moths were caught simultaneously (2013.08.01-2013.08.20). Vegetation type of Undurshireet is mountain steppe, while vegetation type of Ikhtamir is forest steppe. Results on these sample points have already been reported (ENKHTUR et al. 2017).

Methods

Moths were caught from 21:00 hours to 24:00 hours by using an ultraviolet light trap (small semitransparent fabric light tower with 12V ultra violet light produced by Bioform, Germany) and killed them in a bottle with cyanide (Bioform), following the “Methods of Collecting, Treating and Preserving of Insects” (NAMKHAIDORJ 1981). From each species were mounted 1-2 individuals in the field, brought to a laboratory and identified by using www.catocala.narod.ru and www.omflies.narod.ru websites, as well as the identification keys in "Noctuidae Sibirica" (KONONENKO 2010), “Identification Key of Insects of Mongolia”, Volume II, second part (NAMKHAIDORJ et al. 2008), and volume V of the "Identification key of Insects of Far East, Russia" (LERA 2005), with the help of Mr. T. Enkhbayar, the research assistant of the Department of Biology at NUM.

Shannon-Wiener diversity (exp *H*), Simpson Inverse diversity (*D*) and Shannon Evenness (*E*) were used as measures of species diversity and species evenness of moths in each site. Shannon-Wiener diversity is calculated as the exponent of the Shannon-Wiener diversity index (*H*) and results of different plots can be compared directly as this measure is linear (JOST 2006). Sorensen’s and Jaccard’s indices were used to assess similarity of moth communities among sites. EstimateS Win 8.20 program was applied to calculate these indices (COLWELL 2013).

Single linkage agglomerative clustering on normalized data was performed to assess similarity of the sampling sites. Individual-based rarefaction curve was calculated with Statistica 7 program (STATSOFT 2004). Samples at the same sample size were compared.

All species were categorized by their abundance according to Chandler score (1970) (HUGGINS et al. 1988) to check species abundance. Categories of abundance are: *present* 1-2, *few* 3-10, *common* 11-50, *abundant* 51-100, *highly abundant* 100+ individuals.

3. Results

In all sites together 17,814 individuals of 266 species and 15 families of moth were caught (Crambidae 15, Drepanidae 1, Endromidae 1, Erebidae 25, Geometridae 70, Lasiocampidae 5, Noctu-

idae 125, Notodontidae 3, Oecophoridae1, Pterophoridae 4, Pyralidae 6, Saturniidae 1, Sphingidae 4, Tortricidae 4 and Yponomeutidae 1 (fig. 2), (Appendix, table 1). *Eudia pavonia* (Saturnidae) and *Sphinx ligustri* (Sphingidae) are registered as rare species in the Red Data Book of Mongolia (2014). *Euida pavonia* was caught from Tunkhel, while *Sphinx ligustri* was caught from Khonin Nuga. From Tunkhel and Khonin Nuga more species were found, also the diversity measures were higher at these sites (table 2). Ikhtamir and Undurshireet were much higher in individual numbers due to only one species *Loxostege sticticalis.* Results of the Jackknife species richness estimator showed that in all plots more species than caught have to be expected (table 2).

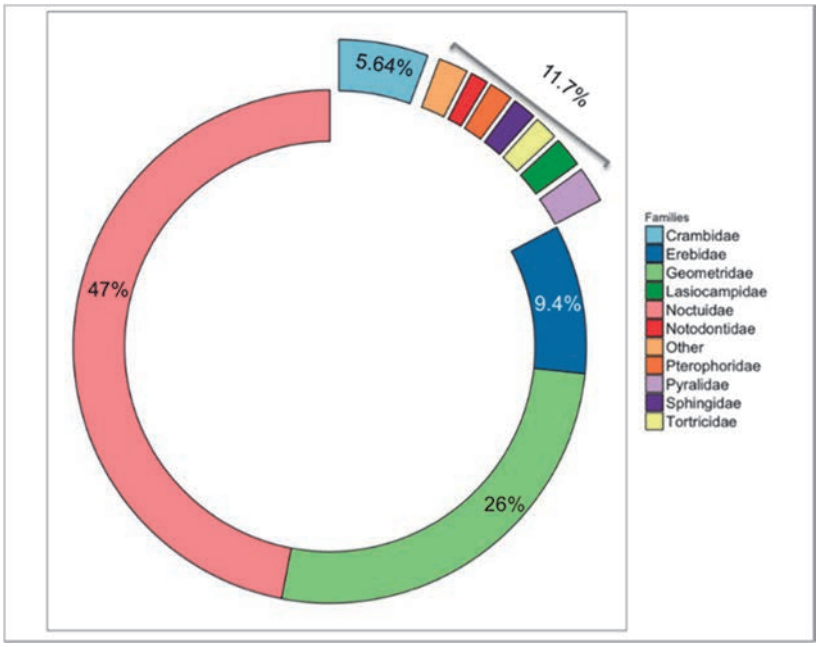

Fig. 2: Totally were caught 266 species of 15 families in all sites. Numbers on pie sectors represent species number. The most dominant families were Noctuidae and Geometridae. In category “Other” families with only one species are combined: Drepanidae, Endromidae, Oecophoridae, Saturniidae, Yponomeutidae.

When Individual-based rarefaction curves were calculated, it was demonstrated that Undurshireet and Ikhtamir approached the species saturation, as curves reached a plateau within sample size, but for Tunkhel, Tsenkhermandal, Khonin Nuga, Shargamorit and Mungunmorit rarefaction curves tend to rise strongly, indicating that with the current sample number (< 1000) species saturation was not achieved for the latter localities (fig. 3). Therefore, the samples do not include all species of that area.

Table 2: Results of diversity analyses of study sites (abbreviations are the same as in tab. 1)

	IT	TM	KN	MM	SM	TU	UN
Species richness	67	25	100	10	59	121	81
Individual number	7856	313	683	45	204	804	7907
Shannon diversity	6.08	11.09	39	5.93	38.06	67.44	2.32
Simpson diversity	3.21	7.68	19.66	4.12	26.61	48.07	1.33
Jacknife estimator	77	32	134	13	84	169	100

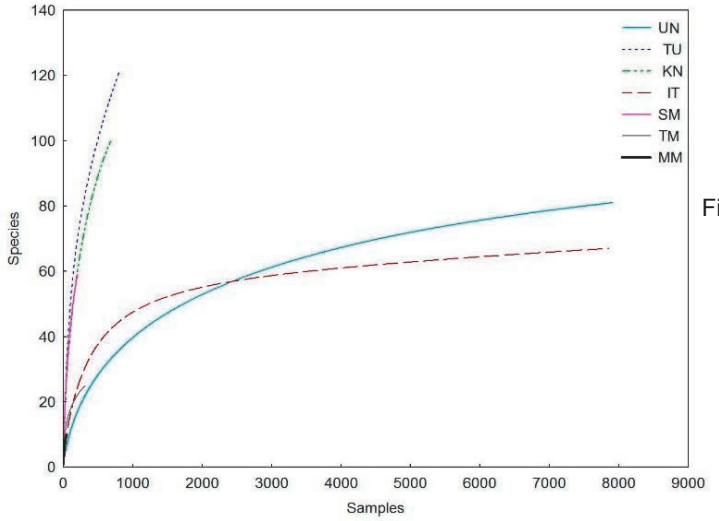

Fig. 3: Rarefaction curves of Undurshireet (UN), Tunkhel (TU), Khonin Nuga (KN), Ikhtamir (IT), Shargamorit (SM), Tsenkhermandal (TM) and Mungunmorit (MM).

Because of calculation of Chandler score most species fell in the categories of present, few and common (fig. 4). But in Ikhtamir, Undurshireet and Tunkhel number of common species were higher than other sites. Only Ikhtamir and Undurshireet had very abundant species due to one species - *Loxostege sticticalis*.

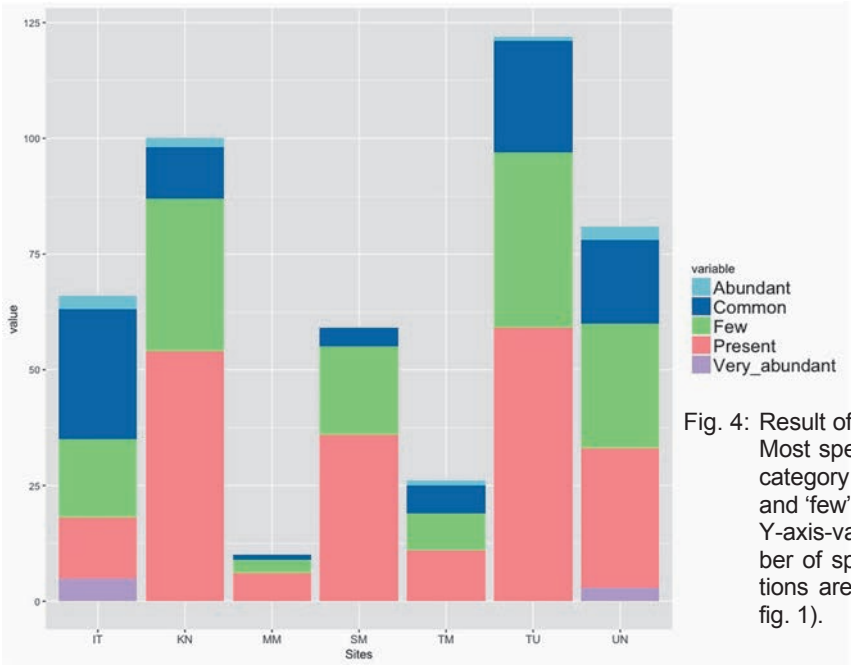

Fig. 4: Result of Chandler score. Most species were in the category of 'present' (1-2) and 'few' (3-10). Y-axis-value shows number of species (abbreviations are the same as in fig. 1).

As calculated, the similarity of moth communities of study plots with Sorensen index, the most similar plots were Khonin Nuga and Tunkhel (0.55) followed by Shargamorit and Tunkhel (0.302). However, by estimation of Chao-Sorensen-Est Abundance-based calculation, which is an estimator of beta diversity under complete sampling, the most similar plots were Khonin Nuga and Tunkhel (0.782) and Ikhtamir and Undurshireet (0.714) (table 3). This result was corroborated by cluster analysis (fig. 5).

Results of the Jaccard's index were also matching with the result of cluster analysis (fig. 5). The plots most near to each other were Shargamorit and Tunkhel (65 km), and the plots most far away from each other were Ikhtamir and Tsenkhermandal (669 km) (table 4).

If correlation of beta diversity with the distance of the plots in km was tested with the Mantel test was found no significance for the Sorensen Index (1-Sorensen-Index, Mantel Test, Pearson corr. $r = 0.1153$, $p = 0.309$) or for the Chao-Sorensen-Estimated Abundance-based index (1-index, Mantel Test, Spearman corr. $r = 0.2923$, $p = 0.211$). This indicates that the difference in species composition between the plots is not due to the distance of the plots (table 3, 4). Similarly, no correlation was found for the distances between the plots as measured by degree of northern latitude and beta diversity of plots (1- Sorensen-Index, Mantel Test, Pearson corr. $r = -0.1069$, $p = 0.653$).

Table 3: Jaccard's classic index above the diagonal and distance between study fields (in km beeline) below the diagonal (abbreviations are the same as above)

	IT	TM	KN	MM	SM	TU	UN
IT		0.134	0.136	0.055	0.156	0.105	0.165
TM	669		0.05	0.091	0.149	0.057	0.126
KN	473	328		0.009	0.178	0.379	0.097
MM	533	241	126		0.045	0.015	0.011
SM	418	367	104	127		0.266	0.129
TU	404	364	127	154	65		0.115
UN	277	521	229	279	160	185	

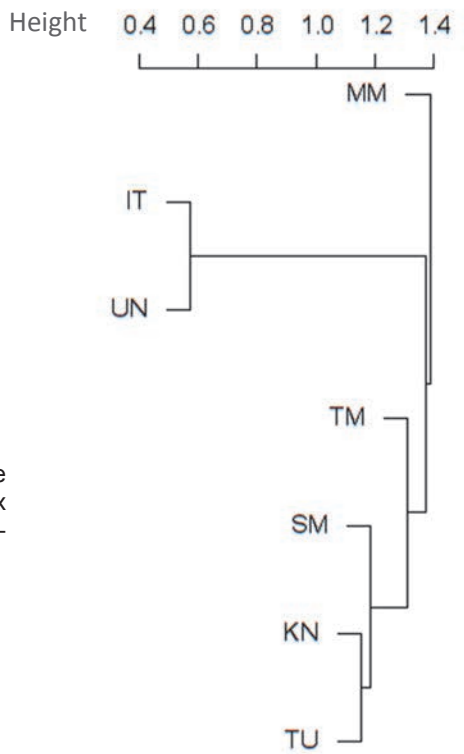

Fig. 5: Dendrogram based on single linkage agglomerative clustering of a matrix of chord distances among sites (abbreviations same as above).

Conclusions

The diversity analyses were done for all plots, Tunkhel and Khonin Nuga were the most diverse plots and most similar to each other. This may be due to the common vegetation type of the study fields and their low grazing pressure. Diversity and species richness were higher in Tunkhel and Khonin Nuga and lower for Mungunmorit and Tsenkhermandal. Weather condition, duration of sampling nights and sampling month influenced the success of our collections. In Khonin Nuga, Shargamorit and Tunkhel was sampled in two years. In Mungunmorit moths were caught in the beginning of September of 2012 and only at four days. In addition, for Tsenkhermandal, weather condition was bad during sampling, it rained a lot and it was very cold at that time. Moth communities of Tunkhel and Khonin Nuga, also Ikhtamir and Undurshireet, respectively, were the most similar to each other, which may be due to their location, because Tunkhel and Khonin Nuga are located in the same longitude, while Ikhtamir and Undurshireet are located in the same latitude. There was no correlation between distance and similarity of study sites. This may be in part due to differences between sampled habitats (plots with and without forest). But the reason for this result can also be the small sample sizes that did not allow to sample the whole species community.

Depending on location of study sites, results of diversity analysis differed. In less disturbed study sites such as Tunkhel and Khonin Nuga, moth community was more diverse compared with other sites. As a baseline data, 266 species of 15 families in seven study sites were recorded. However, the study was influenced by bad weather conditions during the sampling. The data presented here are still not enough for a comprehensive baseline study and more long-term research is needed to reveal the complete structure of the current distribution of moths in northern Mongolia.

Acknowledgements

We acknowledge the Taylor Family-Asia Foundation Endowed Chair in Ecology and Conservation Biology and the *German Corporation for International Cooperation GmbH* for supporting our project. We thank the Phase IV of Green Gold Project funded by the Swiss Development Cooperation Agency for supporting our fieldwork in Undurshireet and Ikhtamir. We are very grateful to Mr. T. Enkhbayar for helping in identification and verification of moth species.

References

ALTERMATT, F. (2010): Climatic warming increases voltinism in European butterflies and moths. - Proc. Royal Soc. B: Biological Sciences **277** (1685): 1281–1287. https://doi.org/10.1098/rspb.2009.1910.

BACHAND, M.; PELLERIN, S.; CÔTÉ, S.D.; MORETTI, M.; DE CÁCERES, M.; BROUSSEAU, P.M.; CLOUTIER, C.; HÉBERT, C.; CARDINAL, É.; MARTIN, J.-L.; POULIN, M. (2014): Species indicators of ecosystem recovery after reducing large herbivore density: Comparing taxa and testing species combinations. - Ecological Indicators **38**: 12–19. - https://doi.org/10.1016/j.ecolind.2013.10.018.

BERLOV, E.; BERLOV, O. (1999-2014): 1000 Siberian Butterflies and Moths. - Retrieved from http://catocala.narod.ru (01.05.2018)

CHEN, I.-C.; SHIU, H.-J.; BENEDICK, S.; HOLLOWAY, J.D.; CHEY, V.K.; BARLOW, H.S.; HILL, J.K.; THOMAS, C.D. (2009): Elevation increases in moth assemblages over 42 years on a tropical mountain. - Proc. Nat. Acad. Sci. **106** (5): 1479–1483. - https://doi.org/10.1073/pnas.0809320106.

COLWELL, R.K. (2013): EstimateS: Statistical estimation of species richness and shared species from samples. Vers. 8. User's Guide and application. - Published: http://purl.oclc.org/estimates.

DONNELLY, A.; JONES, M.B.; SWEENEY, J. (2004): A review of indicators of climate change for use in Ireland. - Int. J. Biometeorol. **49**:1–12. - https://doi.org/10.1007/s00484-004-0215-5.

ENKHTUR, K.; PFEIFFER, M.; LKHAGVA, A.; BOLDGIV, B. (2017): Response of moths (Lepidoptera: Heterocera) to livestock grazing in Mongolian rangelands. - Ecological Indicators **72**: 667-674. - https://doi.org/10.1016/j.ecolind.2016.08.053.

HUGGINS, D.G.; MOFFETT, M.F. (1988): Proposed biotic and habitat indices for use in Kansas streams. - Report No. 35, Kansas Biological Survey, Lawrence.
HUNTER, M.D.; KOZLOV, M.V.; ITÄMIES, J.; PULLIAINEN, E.; BÄCK, J.; KYRÖ, E.M.; NIEMELÄ, P. (2014): Current temporal trends in moth abundance are counter to predicted effects of climate change in an assemblage of subarctic forest moths. - Global Change Biol. **20** (6): 1723–1737. - https://doi.org/10.1111/gcb.12529.
ITÄMIES, J.H.; LEINONEN, R.; MEYER-ROCHOW, V.B. (2011): Climate Change and Shifts in the Distribution of Moth Species in Finland, with a Focus on the Province of Kainuu. - In: BLANCO, J.; KHERADMAND, H.: Climate Change - Geophys. Found. Ecol. Effects: 273-296.
JOST, L. (2006): Entropy and diversity. - Oikos **213** (2): 363-375. - https://doi.org/10.1111/j.2006.0030-1299.14714.x.
KONONENKO, V. (2010): Noctuidae Sibirica. (Vol. **2**). - Apollo Books, Vester Skerninge, Denmark; Entomological Press.
KNYAZEV S.A. (2000): Electronic atlas of Lepidoptera of Omsk field. - Retrieved (01.05.2018) from http://omflies.narod.ru.
LERA, P.A. (2005): Identification key of Insects of Far East, Russia. Vol. **5**: Trichoptera and Lepidoptera. - Vladivostok: Dalinauka.
MEMMOTT, J.; CRAZE, P.G.; WASER, N.M.; PRICE, M.V. (2007): Global warming and the disruption of plant-pollinator interactions. - Ecol. Letters **10** (8): 710-717. - https://doi.org/10.1111/j.1461-0248.2007.01061.x.
NAMKHAIDORJ, B. (1981): Method of Collecting, Treating and Preserving of Insects. - Nat.Publ., Ulaanbaatar, Mongolia.
NAMKHAIDORJ, B.; PUNTSAGDULAM, J.; MYAGMARSUREN, D. (2008): Identification key of Insects of Mongolia (Vol. II). - Ulaanbaatar, Mongolia.
OKSANEN, J.; BLANCHET, G.F.; FRIENDLY, M.; KINDT, R.; LEGENDRE, P.; MCGLINN, D.; MINCHIN, P.R.; O'HARA, B.R.; SIMPSON, G.L.; SOLYMOS, P.; STEVENS, M.H.H.; SZOECS, E.; WAGNER, H. (2018): VEGAN: Community Ecology Package. - R package version 2.4-6.
PARMESAN, C. (2006): Ecological and Evolutionary Responses to Recent Climate Change. - Ann. Rev. Ecol., Evol. and System. **37** (1): 637–669. - https://doi.org/10.1146/annurev.ecolsys.37.091305.110100.
STATSOFT, I. (2004): Statistica für Windows [Software-System für Datenanalyse]. Version 7. edn. www.statsoft.com.
TSEGMID, S. (ed.) (1969): Physical geography of Mongolia. - Nat. Publ., Ulaanbaatar, Mongolia.

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Appendix

Appendix table 1: Species list of moths at study sites. Given are Ikh-Ikhtamir, Kh-Khentii, KN-Khonin Nuga, MM-Mungunmorit, SM-Shargamorit, TU-Tunkhel, UN-Undurshireet. The numbers are individual numbers of each species in each site. In IT and UN we sampled 20 nights in August 2013, respectively. In Tunkhel: 10 nights in July, 2012; 8 nights in May and 8 nights in July, in 2013. In KN duration of sampling was 6 nights in July, 2012; 5 nights in July 2013. In MM 4 nights in September, 2012. In Tsenkhermandal 7 nights in August 2012.

	Family	Subfamily	Species	IT	TM	KN	MM	SM	TU	UN
1	Crambidae	Crambinae	*Agriphila selasella*	0	0	0	0	0	0	1
2	Crambidae	Crambinae	*Catoptria lythargyrella*	9	0	0	0	0	0	17
3	Crambidae	Crambinae	*Catoptria permiaca*	0	0	1	0	0	0	0
4	Crambidae	Crambinae	*Crambus perlellus*	1	0	1	0	1	13	0
5	Crambidae	Crambinae	*Crambus sibiricus*	0	0	0	0	0	3	0
6	Crambidae	Crambinae	*Udea costalis*	0	0	3	0	6	15	0
7	Crambidae	Crambinae	*Xanthocrambus lucellus*	0	0	4	0	0	0	0
8	Crambidae	Evergestiinae	*Evergestis lichenalis*	0	0	0	0	0	0	70
9	Crambidae	Pyraustinae	*Loxostege manualis*	7	0	8	0	0	0	0
10	Crambidae	Pyraustinae	*Loxostege sticticalis*	3661	0	0	0	2	0	6855
11	Crambidae	Pyraustinae	*Mecyna flavalis*	0	0	35	0	4	12	2
12	Crambidae	Pyraustinae	*Nascia cilialus*	0	0	5	0	0	4	22
13	Crambidae	Pyraustinae	*Ostrinia palustralis*	9	0	0	0	0	0	0
14	Crambidae	Pyraustinae	*Pyrausta virginalis*	0	0	46	0	0	1	0
15	Crambidae	Pyraustinae	*Paratalanta hyalinalis*	0	0	3	0	0	10	0
16	Drepanidae	Thyatirinae	*Thyatira batis*	0	0	71	0	0	9	0
17	Endromidae	Endrominae	*Endromis versicolora*	0	0	0	0	0	1	0
18	Erebidae	Arctiinae	*Arctia caja*	5	0	2	0	0	1	2
19	Erebidae	Arctiinae	*Chelish dahurica*	1	0	4	0	0	22	0
20	Erebidae	Arctiinae	*Diacrisia sannio*	0	0	2	0	0	7	0
21	Erebidae	Arctiinae	*Grammia turbans*	57	0	0	0	0	0	0
22	Erebidae	Arctiinae	*Rhyparia purpurata*	0	0	0	0	0	1	0
23	Erebidae	Arctiinae	*Watsonarcita deserta*	0	0	0	0	0	1	0
24	Erebidae	Arctiinae	*Atolmis rubricollis*	0	0	1	0	0	0	0
25	Erebidae	Arctiinae	*Pelosia muscerda*	0	0	0	0	0	0	1
26	Erebidae	Arctiinae	*Setina irrorella*	0	0	0	0	1	0	0
27	Erebidae	Arctiinae	*Stigmatophora micans*	0	0	1	0	0	0	42
28	Erebidae	Calpinae	*Scoliopteryx libatrix*	0	0	0	1	0	1	0
29	Erebidae	Catocalinae	*Catocala adultera*	0	0	0	0	1	0	0
30	Erebidae	Catocalinae	*Catocala deuteronympha*	0	0	0	0	0	0	1
31	Erebidae	Catocalinae	*Catocala helena*	0	0	0	0	0	0	3
32	Erebidae	Catocalinae	*Catocala pacta*	0	1	0	0	0	0	0

33	Erebidae	Catocalinae	*Callistege fortalitium*	0	0	0	0	0	0	11
34	Erebidae	Catocalinae	*Chrysorithrum flavomacula*	0	0	8	0	1	10	0
35	Erebidae	Catocalinae	*Drasteria rada*	0	0	0	0	0	0	1
36	Erebidae	Catocalinae	*Drasteria* sp.	0	0	0	0	0	0	22
37	Erebidae	Catocalinae	*Lygephilla ludicra*	0	1	4	0	2	10	76
38	Erebidae	Catocalinae	*Lygephilla vicia*	1	0	1	0	0	5	0
39	Erebidae	Lymantriinae	*Leucoma salicis*	8	0	6	0	0	0	0
40	Erebidae	Lymantriinae	*Lymantra dispar*	22	0	0	0	1	1	36
41	Erebidae	Lymantriinae	*Euproctis similis*	0	0	0	0	0	1	0
42	Erebidae	Lymantriinae	*Dicallomera fascelina*	0	0	0	0	0	6	0
43	Geometridae	Ennominae	*Abrax grossulariata*	0	0	1	0	0	0	0
44	Geometridae	Ennominae	*Angerona prunaria*	0	0	5	0	0	16	0
45	Geometridae	Ennominae	*Aperia syringaria*	0	0	0	0	0	1	0
46	Geometridae	Ennominae	*Alcis bastelbergeri*	0	0	0	0	1	3	0
47	Geometridae	Ennominae	*Aspilates gilvaria*	17	1	0	0	0	0	0
48	Geometridae	Ennominae	*Biston betularius*	0	0	2	0	0	0	0
49	Geometridae	Ennominae	*Cabera pusaria*	0	0	0	0	0	1	0
50	Geometridae	Ennominae	*Chiasma clathrata*	0	0	9	0	2	26	0
51	Geometridae	Ennominae	*Cleora cinctaria*	5	0	0	0	1	13	0
52	Geometridae	Ennominae	*Deileptenia ribeata*	0	0	6	0	0	5	0
53	Geometridae	Ennominae	*Dysgnophos subsplendidaria*	0	0	1	0	12	5	0
54	Geometridae	Ennominae	*Epirranthis diversata*	0	0	0	0	0	1	0
55	Geometridae	Ennominae	*Hypomecis roboraria*	3	0	9	0	0	19	0
56	Geometridae	Ennominae	*Hypoxystis pluviaria*	0	0	0	0	1	4	0
57	Geometridae	Ennominae	*Itame circumflexaria*	0	0	0	0	1	1	1
58	Geometridae	Ennominae	*Kemtrognophos remmi?*	0	0	1	0	0	0	0
59	Geometridae	Ennominae	*Lycia hirtaria*	0	0	0	0	0	6	0
60	Geometridae	Ennominae	*Macaria notata*	0	0	2	0	0	0	0
61	Geometridae	Ennominae	*Megaspilates mundataria*	0	0	0	0	0	2	0
62	Geometridae	Ennominae	*Narraga fasciolaria*	0	0	0	0	0	0	4
63	Geometridae	Ennominae	*Ourapteryx sambucaria*	0	0	0	0	0	1	0
64	Geometridae	Ennominae	*Perconai strigillaria*	8	0	0	0	0	0	0
65	Geometridae	Ennominae	*Selenia tetralunaria*	0	0	0	0	0	1	0
66	Geometridae	Ennominae	*Siona lineata*	0	0	1	0	0	0	0
67	Geometridae	Ennominae	*Synopsia strictaria*	0	0	2	0	0	1	0
68	Geometridae	Ennominae	*Tephrina arenacearia*	0	0	5	0	0	0	0
69	Geometridae	Ennominae	*Tephrina murinaria uralica*	0	0	0	0	3	11	0
70	Geometridae	Geometrinae	*Hemistola chrysoprasaria*	0	0	0	0	0	1	0
71	Geometridae	Geometrinae	*Geometra papilionaria*	0	0	33	0	0	18	0
72	Geometridae	Geometrinae	*Thalera fimbrialis*	0	0	0	0	0	1	1

73	Geometridae	Larentiinae	*Anticlea badiata*	0	0	0	0	0	1	0
74	Geometridae	Larentiinae	*Anticlea derivata*	0	0	0	0	0	5	0
75	Geometridae	Larentiinae	*Catarhoe cuculata*	0	0	1	0	0	2	0
76	Geometridae	Larentiinae	*Cidaria fulvata*	0	0	0	0	6	1	0
77	Geometridae	Larentiinae	*Dysstroma citrata*	1	0	0	1	5	0	0
78	Geometridae	Larentiinae	*Ecliptopera capitata*	0	0	2	0	0	0	0
79	Geometridae	Larentiinae	*Epirrhoe pupillata*	0	0	9	0	2	5	0
80	Geometridae	Larentiinae	*Eulithis achatinellaria*	0	0	0	0	0	0	1
81	Geometridae	Larentiinae	*Eulithis populata*	21	3	0	0	4	0	3
82	Geometridae	Larentiinae	*Eulithis testata*	6	0	0	0	0	0	0
83	Geometridae	Larentiinae	*Eupithecia centaureata*	0	0	0	0	0	0	1
84	Geometridae	Larentiinae	*Eupithecia indigata*	0	0	0	0	3	0	0
85	Geometridae	Larentiinae	*Euphyia unangulata*	0	0	1	0	1	1	0
86	Geometridae	Larentiinae	*Gandaritis pyraliata*	0	3	0	0	4	14	0
87	Geometridae	Larentiinae	*Horisme falcata*	31	0	0	0	0	0	0
88	Geometridae	Larentiinae	*Horisme scotosiata*	1	7	0	0	0	0	0
89	Geometridae	Larentiinae	*Lampropteryx suffumata*	123	0	0	0	0	0	0
90	Geometridae	Larentiinae	*Ochyria quadrifasiata*	47	0	15	0	0	1	0
91	Geometridae	Larentiinae	*Pareulype taczanowskiaria*	19	0	0	0	0	0	0
92	Geometridae	Larentiinae	*Pelurga comitata*	0	0	1	0	0	0	3
93	Geometridae	Larentiinae	*Perizoma sagitatum*	0	0	0	0	0	1	0
94	Geometridae	Larentiinae	*Scotopteryx chenopodiata*	0	0	7	0	3	32	0
95	Geometridae	Larentiinae	*Spargania luctuata*	0	0	2	0	0	1	0
96	Geometridae	Sterrhinae	*Idea rusticata*	0	0	0	0	1	0	0
97	Geometridae	Sterrhinae	*Idea serpentata*	0	0	3	0	0	0	0
98	Geometridae	Sterrhinae	*Rhodostrophia jacularia*	0	0	0	0	0	0	2
99	Geometridae	Sterrhinae	*Rhodostrophia vibicaria*	0	0	0	0	0	1	0
100	Geometridae	Sterrhinae	*Scopula beckeraria*	0	0	0	0	0	0	24
101	Geometridae	Sterrhinae	*Scopula decorata*	0	0	0	0	0	0	3
102	Geometridae	Sterrhinae	*Scopula immorata*	0	0	2	0	0	3	0
103	Geometridae	Sterrhinae	*Scopula immutata*	10	0	0	0	0	0	0
104	Geometridae	Sterrhinae	*Scopula marginepunctata*	0	0	0	0	0	0	18
105	Geometridae	Sterrhinae	*Scopula rubiginata*	0	0	0	0	0	0	6
106	Geometridae	Sterrhinae	*Scopula virgulata*	0	1	100	0	6	19	0
107	Geometridae	Sterrhinae	*Scopula umbelaria*	0	0	21	0	0	1	0
108	Geometridae	Sterrhinae	*Timandra comae*	0	0	2	0	0	0	0
109	Geometridae		*Geometridae sp* 1	0	0	0	0	0	2	0
110	Geometridae		*Geometridae sp* 2	0	0	3	0	0	1	0
111	Geometridae		*Geometridae sp* 3	0	0	0	0	0	1	0
112	Geometridae		*Geometridae sp* 4	0	0	1	0	0	1	0

113	Lasiocampidae	Malacosominae	*Malacosoma castrensis*	0	0	1	0	22	1	0
114	Lasiocampidae	Pinarinae	*Dendrolimus superans*	0	0	0	0	3	9	0
115	Lasiocampidae	Pinarinae	*Euthrix potaroria*	0	0	0	0	0	3	0
116	Lasiocampidae	Pinarinae	*Gastropacha populifolia*	0	0	2	0	0	0	0
117	Lasiocampidae	Pinarinae	*Gastropacha quercifolia*	0	0	12	0	0	23	157
118	Noctuidae	Acontiinae	*Acontia trabealis*	0	0	1	0	0	0	0
119	Noctuidae	Acronictinae	*Acronicta psi*	0	0	0	0	0	0	2
120	Noctuidae	Acronictinae	*Acronicta rumicis*	0	0	2	0	0	1	0
121	Noctuidae	Acronictinae	*Acronicta vulpina*	0	0	1	0	0	0	0
122	Noctuidae	Acronictinae	*Simyra nervosa*	0	0	0	0	0	0	1
123	Noctuidae	Amphipyrinae	*Amphipyra livida*	0	0	0	0	0	0	75
124	Noctuidae	Cuculliinae	*Cucullia argentea*	0	0	0	0	0	0	5
125	Noctuidae	Cuculliinae	*Cucullia asteris*	0	0	1	0	0	1	0
126	Noctuidae	Cuculliinae	*Cucullia propinqua*	0	0	4	0	0	0	0
127	Noctuidae	Cuculliinae	*Cucullia scoparia*	0	0	0	0	0	0	12
128	Noctuidae	Cuculliinae	*Cucullia splendida*	13	0	0	0	0	0	39
129	Noctuidae	Cuculliinae	*Cucullia umbratica*	1	0	0	0	0	0	2
130	Noctuidae	Hadeninae	*Anarta stigmosa*	0	0	0	0	0	0	1
131	Noctuidae	Hadeninae	*Anarta trifoli*	0	0	0	0	0	0	131
132	Noctuidae	Hadeninae	*Anorthoa munda*	0	0	0	0	0	21	0
133	Noctuidae	Hadeninae	*Ceramica pisi*	0	0	1	0	3	1	0
134	Noctuidae	Hadeninae	*Cerapteryx graminis*	23	0	0	0	0	0	0
135	Noctuidae	Hadeninae	*Hadena aberrans*	0	0	0	0	0	0	4
136	Noctuidae	Hadeninae	*Hadena compta*	0	0	0	0	1	0	0
137	Noctuidae	Hadeninae	*Hadena confusa*	17	0	0	0	0	0	5
138	Noctuidae	Hadeninae	*Hadena corrupta*	0	3	0	0	0	0	0
139	Noctuidae	Hadeninae	*Hadena variolata*	0	0	1	0	0	1	0
140	Noctuidae	Hadeninae	*Hyssia cavernosa*	0	0	4	0	0	4	0
141	Noctuidae	Hadeninae	*Lacanobia contigua*	1	0	0	0	0	0	1
142	Noctuidae	Hadeninae	*Lasionycta imbecilla*	0	0	0	0	0	15	0
143	Noctuidae	Hadeninae	*Lasionycta leucocycla*	0	0	3	0	0	0	0
144	Noctuidae	Hadeninae	*Mythimna comma*	0	0	2	0	0	4	0
145	Noctuidae	Hadeninae	*Mythimna conigera*	17	0	0	0	2	11	2
146	Noctuidae	Hadeninae	*Mythimna impura*	10	0	7	0	0	0	0
147	Noctuidae	Hadeninae	*Mythimna pallens*	0	0	1	0	0	0	0
148	Noctuidae	Hadeninae	*Mythimna pudorina*	0	0	0	0	1	2	0
149	Noctuidae	Hadeninae	*Mythimna turca*	0	0	1	0	0	5	0
150	Noctuidae	Hadeninae	*Mythimna velutina*	0	0	0	0	0	2	22
151	Noctuidae	Hadeninae	*Orthosia gothica*	0	0	0	0	1	20	0
152	Noctuidae	Hadeninae	*Orthosia gracilis*	0	0	0	0	0	33	0

153	Noctuidae	Hadeninae	*Orthosia opima*	0	0	0	0	0	3	0
154	Noctuidae	Hadeninae	*Perigrapha circumdacta*	0	0	0	0	0	4	0
155	Noctuidae	Hadeninae	*Polia altaica*	0	1	1	0	0	1	9
156	Noctuidae	Hadeninae	*Polia bombycina*	0	11	0	0	2	69	3
157	Noctuidae	Hadeninae	*Sideridis reticulata*	46	0	2	0	9	0	0
158	Noctuidae	Heloithinae	*Heloithis maritima*	0	0	0	0	0	0	2
159	Noctuidae	Heloithinae	*Heloithis ononis*	9	0	4	0	0	12	12
160	Noctuidae	Heloithinae	*Pyrrhia exprimens*	0	0	1	0	0	0	0
161	Noctuidae	Hypeninae	*Hypena obesalis*	0	0	1	0	0	0	0
162	Noctuidae	Noctuinae	*Actebia difficilis*	65	49	0	0	0	0	0
163	Noctuidae	Noctuinae	*Actebia poecila*	8	0	0	0	0	0	0
164	Noctuidae	Noctuinae	*Actebia squalida*	0	0	0	0	11	1	0
165	Noctuidae	Noctuinae	*Agrotis clavis*	2	1	14	0	11	34	0
166	Noctuidae	Noctuinae	*Agrotis exclamations*	0	0	0	0	6	0	0
167	Noctuidae	Noctuinae	*Agrotis ripae*	0	0	0	0	0	0	5
168	Noctuidae	Noctuinae	*Agrotis ruta*	7	46	0	0	0	0	0
169	Noctuidae	Noctuinae	*Anaplectoides prasina*	0	0	9	0	0	0	0
170	Noctuidae	Noctuinae	*Archanara dissoluta*	46	0	0	0	0	0	0
171	Noctuidae	Noctuinae	*Brachionycha nubeculosa*	0	0	0	0	0	4	0
172	Noctuidae	Noctuinae	*Chersotis deplanata*	0	0	1	0	0	3	0
173	Noctuidae	Noctuinae	*Chersotis elegans*	1	0	0	0	0	0	0
174	Noctuidae	Noctuinae	*Chersotis transiens*	0	0	0	0	7	1	0
175	Noctuidae	Noctuinae	*Cryptocala chardinyi*	0	0	0	0	0	9	0
176	Noctuidae	Noctuinae	*Diarsia dahlii*	0	0	0	0	0	0	1
177	Noctuidae	Noctuinae	*Dichagiris musiva*	0	0	0	0	0	0	9
178	Noctuidae	Noctuinae	*Eurois occulta*	58	5	2	0	0	1	9
179	Noctuidae	Noctuinae	*Euxoa conspicua*	2	0	0	0	0	0	0
180	Noctuidae	Noctuinae	*Euxoa cursoria*	44	76	0	0	0	0	23
181	Noctuidae	Noctuinae	*Euxoa nigricans*	26	0	0	0	1	0	0
182	Noctuidae	Noctuinae	*Euxoa novoobscurior*	0	38	0	0	9	0	0
183	Noctuidae	Noctuinae	*Euxoa obelisca*	0	0	0	0	0	0	1
184	Noctuidae	Noctuinae	*Euxoa ochrogaster*	0	9	0	0	1	0	5
185	Noctuidae	Noctuinae	*Euxoa phantoma*	0	7	0	0	2	0	4
186	Noctuidae	Noctuinae	*Euxoa recussa*	0	0	0	0	0	0	2
187	Noctuidae	Noctuinae	*Euxoa varia*	0	0	0	0	0	0	2
188	Noctuidae	Noctuinae	*Feltia nigrita*	0	0	0	0	0	2	0
189	Noctuidae	Noctuinae	*Isochlora grumi*	0	0	2	0	0	0	0
190	Noctuidae	Noctuinae	*Orcheuplera plecta*	0	0	0	0	0	1	0
191	Noctuidae	Noctuinae	*Paradiarsia punicea*	0	0	8	0	0	19	4
192	Noctuidae	Noctuinae	*Prognorisma albifurca*	0	0	0	0	1	7	3

193	Noctuidae	Noctuinae	*Pseudohermonassa*	18	0	0	0	0	0	0
194	Noctuidae	Noctuinae	*Rhyacia ledereri*	16	0	0	0	1	0	0
195	Noctuidae	Noctuinae	*Xestia baja*	0	0	0	0	0	0	3
196	Noctuidae	Noctuinae	*Xestia c-nigrum*	29	0	0	0	0	0	0
197	Noctuidae	Noctuinae	*Xestia ditrapezium*	0	0	2	0	0	1	0
198	Noctuidae	Noctuinae	*Xestia kollari*	0	0	0	0	0	0	1
199	Noctuidae	Noctuinae	*Xestia triangulum*	0	0	0	0	0	0	3
200	Noctuidae	Xyleninae	*Agrochola circellaris*	0	0	0	0	0	0	5
201	Noctuidae	Xyleninae	*Agrochola vulpecula*	0	0	0	3	1	0	0
202	Noctuidae	Xyleninae	*Amphipoea asiatica*	22	1	0	0	2	0	2
203	Noctuidae	Xyleninae	*Apamea laterita*	11	18	4	2	10	10	6
204	Noctuidae	Xyleninae	*Apamea sordens*	0	0	1	0	0	0	0
205	Noctuidae	Xyleninae	*Athetis correpta*	22	0	0	0	0	0	0
206	Noctuidae	Xyleninae	*Blepharita amica*	0	0	0	9	0	0	0
207	Noctuidae	Xyleninae	*Caradrina* sp.	0	0	0	0	0	0	15
208	Noctuidae	Xyleninae	*Caradrina vicina*	0	0	0	0	0	0	13
209	Noctuidae	Xyleninae	*Dasypolia templi*	0	0	0	0	0	2	0
210	Noctuidae	Xyleninae	*Enargia paleacea*	18	0	0	1	0	0	0
211	Noctuidae	Xyleninae	*Eremobia deccerti*	0	2	0	0	0	0	8
212	Noctuidae	Xyleninae	*Eremobia sajanus*	0	2	0	2	0	0	0
213	Noctuidae	Xyleninae	*Eupsilia transversa*	5	0	0	0	0	0	0
214	Noctuidae	Xyleninae	*Hoplodrina octogenaria*	0	0	1	0	0	3	0
215	Noctuidae	Xyleninae	*Hydraecia micacea*	0	10	0	5	0	0	0
216	Noctuidae	Xyleninae	*Hydraecia petasitis*	26	0	0	0	0	0	0
217	Noctuidae	Xyleninae	*Hypoceana stigmatica*	0	0	0	0	1	0	0
218	Noctuidae	Xyleninae	*Ipimorpha retusa*	0	0	0	0	0	0	1
219	Noctuidae	Xyleninae	*Lithophane socia*	0	0	0	0	0	2	0
220	Noctuidae	Xyleninae	*Lithomoia solidaginis*	0	0	0	2	0	0	0
221	Noctuidae	Xyleninae	*Photedes extrema*	0	0	0	0	0	1	0
222	Noctuidae	Xyleninae	*Risapamea hedeni*	0	0	1	0	0	0	0
223	Noctuidae	Xyleninae	*Staurophora celsia*	13	0	0	19	0	0	0
224	Noctuidae	Plusiinae	*Autographa buraetica*	18	0	33	0	0	0	0
225	Noctuidae	Plusiinae	*Autographa excelsa*	0	0	3	0	1	0	0
226	Noctuidae	Plusiinae	*Autographa macrogamma*	1	0	3	0	4	0	0
227	Noctuidae	Plusiinae	*Diachrysia chrysitis*	0	0	0	0	1	8	0
228	Noctuidae	Plusiinae	*Diachryisa stenochrysis*	0	0	3	0	1	5	1
229	Noctuidae	Plusiinae	*Diachrysia zosimi*	0	0	17	0	0	1	0
230	Noctuidae	Plusiinae	*Euchalcia variabilis*	0	0	20	0	2	14	0
231	Noctuidae	Plusiinae	*Panchrysia dives*	25	0	10	0	6	8	1
232	Noctuidae	Plusiinae	*Panchrysia ornata*	3	15	0	0	0	0	4

233	Noctuidae	Plusiinae	*Polychrysia esmeralda*	0	2	0	0	0	0	0
234	Noctuidae	Plusiinae	*Plusia putnami*	0	0	5	0	2	0	0
235	Noctuidae	Plusiinae	*Plusidia cheiranthi*	0	0	2	0	0	21	0
236	Noctuidae	Plusiinae	*Syngrapha ain*	30	0	1	0	1	9	0
237	Noctuidae	Plusiinae	*Syngrapha diasema*	0	0	1	0	0	3	0
238	Noctuidae	Plusiinae	*Syngrapha interrogationis*	0	0	0	0	0	0	1
239	Noctuidae		*Noctuidae sp* 1	0	0	0	0	0	0	2
240	Noctuidae		*Noctuidae sp* 2	1	0	0	0	0	0	0
241	Noctuidae		*Noctuidae sp* 3	0	2	0	0	0	0	0
242	Noctuidae	Psaphidinae	*Brachionycta nubeculosa*	0	0	0	0	0	3	0
243	Notodontidae	Notodontinae	*Notodonta dromedarius*	0	0	2	0	0	2	0
244	Notodontidae	Pygaerinae	*Clostera albosigma*	0	0	0	0	0	1	0
245	Notodontidae	Pygaerinae	*Clostera anastomosis*	0	0	5	0	0	6	0
246	Oecophoridae	Amphisbatinae	*Hypercallis citrinalis*	0	0	0	0	0	1	0
247	Pterophoridae	Pterophorinae	*Paraplatyptilia gonodactyla*	2	0	0	0	0	0	0
248	Pterophoridae	Pterophorinae	*Platyptilia gonodactyla*	34	0	0	0	0	0	0
249	Pterophoridae		*Pterophoridae sp 1*	0	0	0	0	0	3	0
250	Pterophoridae		*Pterophoridae sp 2*	0	0	1	0	0	0	0
251	Pyralidae	Phycitinae	*Oncocera semirubella*	0	0	0	0	0	0	9
252	Pyralidae	Phycitinae	*Pempelia geminella*	0	0	0	0	0	0	1
253	Pyralidae	Phycitinae	*Pyla fusca*	2343	0	0	0	0	0	0
254	Pyralidae	Pyralinae	*Pyralis regalis*	0	0	1	0	0	0	0
255	Pyralidae	Phycitinae	*Selagia argyrella*	53	0	1	0	2	1	4
256	Pyralidae		*Pyralidae sp 1.*	535	0	0	0	0	0	18
257	Saturniidae	Saturniinae	*Eudia pavonia*	0	0	0	0	0	1	0
258	Sphingidae	Macroglossinae	*Deilephila pocellus*	0	0	2	0	0	0	0
259	Sphingidae	Macroglossinae	*Hyles gallii*	10	0	0	0	0	1	13
260	Sphingidae	Sphinginae	*Hyloicus morio*	0	0	0	0	1	1	0
261	Sphingidae	Sphinginae	*Sphinx ligustri*	0	0	1	0	0	0	0
262	Tortricidae	Tortricinae	*Archips decretanus*	0	0	2	0	0	0	3
263	Tortricidae	Tortricinae	*Pelochrista arabescana*	129	0	0	0	0	0	11
264	Tortricidae	Tortricinae	*Loxoterma rivulana*	0	0	0	0	0	2	0
265	Tortricidae	Tortricinae	*Metendothenia atropunctana*	0	0	3	0	0	2	0
266	Yponomeutidae	Yponomeutinae	*Yponomeuta evonymella*	23	0	16	0	0	1	0

Appendix fig. 1: Some colourful moths (photos: KHISHIGDELGER ENKHTUR)
(more moth fotos from this link: http://100zero.org/_mbio/moth.html)

		
Prognorisma albifurca	*Scoliopteryx libatrix*	*Agrotis ruta*
		
Feralia sauberi	*Apamea laterita*	*Plusidia cheiranthi*
		
Timandra comae	*Achlya flavicornis*	*Panchrysia dives*
		
Plusia putnami	*Diacrisia sannio*	*Grammia tur*

	
Catocala pacta	*Catocala deuteronympha*
	
Hyles gallii	*Angerona prunaria*
	
Arctia caja	*Hypomecis roboraria*