THE BEGINNING AND THE END OF THE INSECTS' FLIGHT TOWARDS THE LIGHT ACCORDING TO DIFFERENT ENVIRONMENTAL LIGHTINGS

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Abstract. Many news bulletins found in the literature only consent themselves with the description of the night distribution of the trapped species not examining the beginning and the end of the insects' flight towards the light with the measurement of environmental lighting, expressed in lux. For this reason, we had examined the daily appearance of the first and last specimens of the species in the light trap concerning the exact lighting figures. We have used the hourly collection data of the fractionating light trap at the farm of Julianna in Nagykovácsi, belonging to the MTA Crop Protection Research Institute. With the help of our own computer programme we had counted the light coming from the sun, moon and from the starry sky, for every full hour separately and in total. We had given two lighting figures to every trapping data: we had counted the first minute of the first and the next hour of the given hour in lux within which the trapping had happened. Hereby, two lighting figures had become known during which the flight towards lighting had begun and end. The flight of 51 species towards the light happens when the total of the given hour concur in the duration of navigation twilight, of 26 species in the duration of sidereal twilight and of 7 species in the duration of night light. There were 2 species where the first imago was already captured during daylight. In the period of the quick reduction of lighting only the first specimens of the 14 species appear, accordingly: 4 from daylight to civil twilight, 4 from daylight to navigation twilight, 1 from sunset to navigation twilight and 4 species from civil twilight to sidereal twilight. The flight towards light ends in the case of 16 species after midnight during the night light, at 48 species during sidereal twilight and at 28 species at navigation twilight. The flight of only 3 species end when it is clearing up quicker within the given hour, from navigation twilight to daylight. Our results could stop a gap.
Keywords: *Lepidoptera, flying threshold, lux*

Introduction and survey of literature

The majority of researchers do not examine the beginning and the end of the insects' flight towards the light with the measurement of environmental lighting, expressed in lux. Most of the authors were satisfied to describe the night distribution of the trapped insects. We only sporadically find records in the literature in reference to at how much lux lighting we can experience the start of certain insects' flight.

According to Mazorchin-Porsnjakov [1] the species of the chestnut cockchafer (Melolontha hippocastani Fabr.) start flying at 14 lux but can only be collected with light trap when lighting is decreased to 7-8 lux.

Tshernyshev [2] had carried out light-trap collectings and visual observations around Moscow. In reference to many insect classes and many important species, he also

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reported the associated measurement of lighting in lux to the start and maximum of activity.

- Ephemeroptera: *Ordella horaria* L. 4-0.005 lux;
- Homoptera: *Psylla betulae* L. 0.001 lux;
- Heteroptera: *Sigara falleni* Fieb.. *S. striata* L.. *S. praeusta* Fieb. 10 lux;
- Coleoptera: *Amara majuscula* Chd. 1-0.5 lux, *Hybius ater* DeGeer 0.01 lux, *Hydrobius fuscipes* L. 1 lux, *Cercyon quisquillus* L., *C. haemorrhoidalis* Fabr., *C. unipunctatus* L., *C. melanocephalus* L. 5-1 lux, *Serica brunnea* L. 0.001 lux, *Necrophorus vespillo* L. 10-0.1 lux, *Oxytellus rugosus* L. 1 lux, *Bledius opacus* Block. and *Heterocerus hispidulus* Kieff. 100-10 lux, *Aphodius rufus* Müll. *A. distinctus* Müll. 10-1 lux, but these last mentioned species had flew at 10.000 lux as well in May, daytime at 15-17 degrees Celsius.
- Hymenoptera: *Ophion luteus* L. 0.01 lux, *Lasius niger* L. 1000-50 lux;
- Diptera: *Culicoides pulicaris* L. and *C. grisescens* Edw. 10-0.03 lux;
- Trichoptera: *Psychomya pusilla* Fbr., *Leptocerus dissimilis* Steph., *L. nigriversosus* Retz., *Hydropsyche ornatula* McLeach., *Halesus interpunctatus* Zett. 0.1-0.01 lux;
- Lepidoptera: most of the species between 0.01-0.001 lux, but *Hepialus sylvinus* L., H. humuli L. 5-1 lux.

Skuhravý and Zumr [3] had studied the night activities of the black-arches moth (Lymantria monacha L.) in pine tree stand in the Czech Republic. Their flight towards light had began when lighting decreased to 1-3 lux. Through Dreisig's [4] studies in Denmark and Florida he had allocated that the beginning of activities of certain species are specific, usually starts between 1 and 0,003 lux at invariant lighting. If the period of twilight increases, the dispersion of the invariant rate will be higher. This is also influenced by the season besides the geographical latitude. He also gives data about the beginning of the flight of the Macrolepidoptera species related to the environmental lighting. These are the following in Denmark: Plusia gamma L. 1-12 lux, *Agrotis exclamationis* L. 0.4 lux, *Caradrina morpheus* Hfn. 0.15 lux, *Typhena pronuba* L. 0.9 lux, *Monima pulverulenta* Esp. 0.09 lux, *Cerapteryx graminis* L. 0.8 lux, *Deilephia porcellus* L. 1.4 lux, *Malacosoma castrensis* L. 0.5 lux. In Florida: *Plusia gamma* L. 0.8 lux, *Heliothis virescens* Fabr. 0.03 lux, *Spodoptera frugiperda* Smith 0.007 lux, *Anticarsia gemmalis* Hbn. 0.08 lux, *Mocis latipes* Guenee 0.009 lux, *Schinia nubila* Str. 0.15 lux, *Megalopyge opercularis* Abbot & Smith 0.02 lux, *Nystalea* sp. 0.004 lux.

As there are not too many data in literature about the beginning and the end of flight towards the environmental light that is given is lux, we have examined the day-by-day appearance of the first and last specimens of certain species using our domestically collected figures.

Materials

At the Crop Protection Research Institute near Budapest, we had operated a fractionating light trap between 1976-1979 at the research plant of Julianna, in Nagykovácsi and the insects collected there had been separated into different flasks. The light trap had operated with a 125-watt HGL bulb. However, this light trap did not operate every night, only periodically, 57 times altogether but that time for 12 hours, in the spring and summer time, early in the autumn from 5 p.m. to 5 a.m. and in the second

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half of October from 4 p.m. to 4 a.m. (UT). These years the daylight saving time was not applied. Mészáros had defined and journalized from the collected insects the insect pests from all Macrolepidoptera and Microlepidoptera species. We had used the records of 160 Lepidoptera- and 1 Coleoptera species for our work.

The operation had taken part on the following days:

1976: 08. 26-27, 10. 06-07;

1977. 03.10-11, 03.14-15, 03.16-17, 03.17-18, 03.18-19, 03.19-20, 03.21-22, 03.22-23, 03.24-25, 03.28-29, 04.14-15, 04.18-19, 04.19-20, 04.20-21, 04.22-23, 04.26-27, 04.28-29, 05.04-05, 05.09-10, 05.12-13, 05.16-17, 05.19-20, 05.28-29, 05.30-31, 06.02-03, 06.06-07, 06.09-10, 06.13-14, 06.16-17, 06.21-22, 06.24-25, 06.28-29, 07.04-05, 07.12-13, 07.26-27, 07.27-28, 08.08-09, 09.06-07, 09.15-16, 09.22-23, 10.06-07, 10.13-14, 10.20-21, 10.2-28

1978. 09.18-19, 09.26-27, 11.02-03

1979. 03.22-23, 03.28-29, 05.10-11, 05.17-18, 05.25-26, 06.20-21, 06.22-23, 07.23-24.

We had counted the lighting data required for our examinations with the help of our own computer programme. György Tóth, astronomer – who unfortunately cannot be with us any longer – for a TI 59, established this programme. Computer, to be used in our common researches (Nowinszky and Tóth, [5]). This programme was adapted to a modern computer by Miklós Kiss, associate professor, for which hereby we would like to express our thanks.

The programme counts the daytime and twilight lighting from the sun to optional geographical place, day and time separately and in total, the light of the moon if it is over the horizon and the lighting coming from the starry sky, all these data in lux. It also takes the number of clouds into consideration when counting.

We had collected every data concerning all clouds from the yearbooks of the National Meteorological Organization. In these, data is recorded every 3 hours with causal explanation. We had applied the data to the related given hour and to the next 2 hours.

Methods

We have collected the hour of the capture of the first and last specimens of the trapped species from the light trap journal in reference to every night. We have counted the full lighting figures of these time periods. As, of course, the exact trapping time is unknown the lighting figures were counted in reference to a whole hour. We had given two lighting figures to every trapping data: we had counted the first minute of the first and the next hour of the given hour in lux, within which the trapping had happened. Hereby, two lighting figures had become known during which the flight towards lighting had begun and end.

By species, we had put the lux value pairs into order according to the first and last figures of trapping. Our figures were put into a table. We had placed those lighting value pairs into this table, in which the first specimen is already, the last still flew, also separated accordingly whether the trapping had happened before or after midnight.

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Results

Table 1. contains the figures of 161 species. We had also aspired to include as many information as possible. To achieve this we had also given to every lux value the period of twilight or night, it belonged to. The abbreviations of these are the following: the numbers in italics show the trappings after midnight, * = only one figure apply to a given specimen, T/N = twilight or night hour, D = daylight, S = sunset, C = civil twilight, A = sidereal twilight, NS = the light of the night sky

Discussion

The beginning of flight towards the light at night happens at distinct lighting conditions in the case of certain species. These do not indicate lawfulness that should be linked to taxonomical rating. The flight of 50 species towards the light happens when the total of the given hour concur in the duration of navigation twilight, of 26 species in the duration of sidereal twilight and of 7 species in the duration of night light. There were 2 species where the first imago was already captured during daylight. In the period of the quick reduction of lighting only the first specimens of the 14 species appear, accordingly: 4 from daylight to civil twilight, 4 from daylight to navigation twilight, 1 from sunset to navigation twilight and 4 species from civil twilight to sidereal twilight.

The flight towards light ends in the case of 16 species after midnight during the night light, at 48 species during sidereal twilight and at 28 species at navigation twilight. The flight of only 3 species end when it is clearing up quicker within the given hour, from navigation twilight to daylight.

Although we only have a few results, many of these are often from one collection figure, we believe it is worth to share with our readers. On the one hand because we could not find any researches like this in the literature, which publish the flight peculiarities of so many species, on the other hand because those are also not from mass collection figures. Of course, our published results will be altered by our continuous observations but until then with their informative nature can stop a gap. We could get interesting informations for example from entomologists who should journalize the exact arrival time of the insects into the capturing sheet and should also measure the lighting related to it. The measuring instrument needed for this is fairly easy to access nowadays and although they are not occupied with, researches like this could help the entomological studies with very important and precise data.

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Table 1. *Beginning and ending of flight of Lepidoptera species before and after midnight in connection with the twilights*

Species	***Beginning and ending of flight (before midnight)***				***Ending of flight (before or after midnight)***			
	between				***between***			
Lepidoptera	***Lux***	***T/N***	***Lux***	***T/N***	***Lux***	***T/N***	***Lux***	***T/N***
Plutellidae								
Plutella maculipennis Curt.	79.22	C	0.1450	N	0.0019	A	0.0071	A
Gelechiidae								
Anarsia lineatella Zeller *	0.0384	N	0.0388	N				
Recurvaria leucatella Clerck.	0.0028	A	0.0031	A	*0.0987*	*N*	*1.821*	*C*
Recurvaria nanella Hbn.	0.0388	N	0.0391	N	0.0039	A	0.0029	A
Sitochroga verticalis L.	0.1450	N	0.1003	N	*0.0203*	*N*	*1.999*	*N*
Tortricidae								
Pandemis heparana Schiff.	1386.2	D	30.338	C	0.0017	A	0.0017	A
Pandemis ribeana Hbn.	1386.20	D	41.614	C	0.0717	N	0.0714	N
Argyrotaenia pulchellana Haw. *					*0.0396*	*N*	*0.0472*	*N*
Adoxophyes reticulana Hbn.	0.0388	N	0.0391	N	*0.0039*	*A*	*1.001*	*N*
Hedya nubiferana Haw.	649.680	D	2.5273	N	*0.0422*	*N*	*90.57*	*C*
Spilonota ocellana F.	12.6161	C	0.0114	N	*0.0019*	*A*	*0.0071*	*A*
Cydia pomonella L.	737.302	D	0.3745	N	*0.0276*	*N*	*186.47*	*C*
Tortrix viridana L. *	0.0604	N	0.0216	N				
Phycitidae								
Oncocera semirubella Scop.	0.0495	N	0.0453	N	*0.0012*	*A*	*0.0039*	*A*
Etiella zinckenella Tr.	0.0195	N	0.0178	N	0.0022	A	0.0031	A
Pyraustidae								
Ostrinia nubilalis Hbn.	0.0021	A	0.0021	A	*0.0045*	*A*	*0.0067*	*A*
Loxostege sticticalis L. *	0.0029	A	0.0028	A				
Evergestis extimalis Scop.	0.0708	N	0.0717	N	*0.0104*	*N*	*0.0086*	*A*
Evergestis frumentalis L.	0.0960	N	0.0495	N	0.0195	N	0.0178	N
Geometridae								
Alsophila aescularia Schiff.	346.480	C	0.0451	N	0.0005	NS	0.0005	NS
Aplocera plagiata L.	0.0101	A	0.0094	A	*0.0012*	*A*	*0.0012*	*A*
Operophthera brumata L.	0.0014	A	0.0014	A	*0.0368*	*N*	*0.0357*	*N*
Philereme vetulata Schiff.	30.3375	C	0.0279	N	0.0363	N	0.0165	N
Lygris pyraliata Schiff.	0.0495	N	0.0453	N	0.0111	N	0.0111	N
Cidaria fulvata L.	0.0165	N	0.0111	N	0.0021	A	0.0021	A
Xanthorrhoe fluctuata L. *	0.0008	NS	0.0004	NS				
Hydrelia flammeolaria Hfn. *	0.0025	A	0.0021	A				
Eupithecia centaureata Schiff. *	0.0717	N	0.0714	N				
Bapta temerata Schiff. *	0.0034	A	0.0008	NS				
Ennomos erosaria Schiff. *	0.1808	N	0.1385	N				
Colotois pennaria L. *					*0.0014*	*A*	*0.0012*	*A*

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Species	***Beginning and ending of flight (before midnight)***				***Ending of flight (before or after midnight)***			
	between				***between***			
Lepidoptera	***Lux***	***T/N***	***Lux***	***T/N***	***Lux***	***T/N***	***Lux***	***T/N***
Crocallis elinguaria L. *	0.0008	NS	0.0008	NS				
Plagodis dolabraria L. *	0.0321	N	0.0346	N				
Macaria alternaria Hbn. *	0.0178	N	0.0164	N				
Chiasmia clathrata L.	0.8153	N	0.0004	NS	*0.8153*	*N*	*611.76*	
Erannis leucophaearia Schiff. *	0.0211	N	0.0026	A				
Erannis marginaria Bkh.	0.0332	N	0.0238	N	0.0005	NS	0.0005	NS
Apocheima hispidaria Schiff.	346.480	C	0.0451	N	0.0006	NS	0.0006	NS
Nyssia zonaria Schiff.	346.480	C	0.0451	N	*0.0010*	*A*	*0.0010*	*A*
Lycia hirtaria Cl.	2853.20	D	17.124	C	*0.0010*	*A*	*0.0010*	*A*
Biston stratarius Hfn.	346.480	C	0.0451	N	0.0008	NS	0.0008	NS
Biston betularius L.	0.0631	N	0.0009	NS	0.0425	N	110.41	C
Boarmia rhomboidaria Schiff.	32.504	C	0.0311	N	*0.0031*	*A*	*0.0048*	*A*
Boarmia cinctaria Schiff. *	0.1389	N	0.1569	N				
Biston arenaria Hfn.	0.0014	A	0.0006	NS	0.0007	NS	0.0007	NS
Ascotis selenaria Schiff. *	0.0128	N	0.0118	N				
Ectropis bistortata Goeze *					*0.0054*	*A*	*0.0063*	*A*
Ematurga atomaria L. *	0.0363	N	0.0040	A				
Siona lineata L.	0.0008	NS	0.0004	NS	0.0717	N	0.0714	N
Noctuidae								
Colocasia coryli L. *					*0.0840*	*N*	*0.0888*	*N*
Apatele rumicis L.	0.5266	N	0.0086	A	0.0006	NS	0.0003	NS
Euxoa temera Hb. *	0.1258	N	0.0228	A				
Euxoa obelisca Schiff.	0.0029	A	0.0028	A	*0.0070*	*A*	*0.0055*	*A*
Agrotis ypsilon Rott.	0.0960	N	0.0495	N	0.0015	A	0.0015	A
Scotia segetum Schiff.	32.5042	C	0.0311	N	*0.0086*	*A*	*0.0088*	*A*
Scotia exclamationis L.	2.5273	N	0.0034	A	*0.0857*	*N*	*0.5864*	*N*
Eugnorisma depuncta L. *	0.0134	N	0.0106	N				
Diarsia rubi View. *	0.0604	N	0.0216	N				
Xestia c-nigrum L.	46.006	C	0.0604	N	0.0007	NS	0.0007	NS
Epipsilia grisescens F. *					*0.0004*	*NS*	*0.0008*	*NS*
Ochropleura plecta L.	0.0063	A	0.0061	A	0.0013	A	0.0007	NS
Diarsia rhomboidea Schiff.	0.0028	A	0.0026	A	0.0009	NS	0.0009	NS
Diarsia xanthographa Schiff. *	0.0057	A	0.0045	A				
Cerastis rubricosa Schiff.	17.1235	C	0.0049	A	*0.0124*	*N*	*1.6583*	*N*
Ammoconia caecimacula Schiff.	18.092	C	0.1921	N	*0.0037*	*A*	*0.0029*	*A*
Noctua pronuba L.	16.6122	C	0.0134	N	0.0009	NS	0.0012	A
Triphaena orbona Hfn.	0.0057	A	0.0045	A	*0.0012*	*A*	*0.0012*	*A*
Mamestra brassicae Hfn.	0.0142	N	0.0128	N	0.0007	NS	0.0007	NS
Mamestra suasa Schiff.	0.0128	N	0.0118	N	*0.0054*	*A*	*0.0063*	*A*

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Species	***Beginning and ending of flight (before midnight)***				***Ending of flight (before or after midnight)***			
	between				***between***			
Lepidoptera	***Lux***	***T/N***	***Lux***	***T/N***	***Lux***	***T/N***	***Lux***	***T/N***
Discestra trifolii Hfn.	0.0279	N	0.0025	A	0.0118	N	0.0104	N
Polia contigua Schiff. *	0.0021	A	0.0021	A				
Harmodia luteago Schiff.	0.0484	N	0.0039	A	0.0216	N	0.0195	N
Tholera decimalis Poda *					*0.0019*	*A*	*0.0012*	*A*
Aplecta advena Schiff.	0.0054	A	0.0045	A	*0.0019*	*A*	*0.0071*	*A*
Xylomania conspicillaris L.	0.1693	N	0.0912	N	*0.0224*	*N*	*0.0257*	N
Perigrapha i-cinctum Schiff.	221.151	C	0.0211	N	0.0089	A	0.0088	A
Orthosia incerta Hfn.	8507.98	D	676.8	D	*0.0010*	*A*	*0.0010*	*A*
Orthosia gothica L.	206.548	C	0.0163	N	*0.0010*	*A*	*0.0010*	*A*
Orthosia munda Schiff.	206.548	C	0.0163	N	0.0018	A	0.0019	A
Orthosia stabilis Schiff.	2853.20	D	17.124	C	0.0207	N	0.0209	N
Orthosia miniosa F. *	0.0005	NS	0.0005	NS				
Orthosia cruda Schiff.	206.548	C	0.0163	N	*0.0084*	*A*	*0.0083*	*A*
Mythimna ferrago F. *	0.0279	N	0.0008	NS				
Mythimna albipuncta Schiff.	0.1450	N	0.1003	N	0.0072	A	0.0080	A
Mythimna l-album Esp.	*0.0070*	*A*	*0.0055*	*A*	*0.0041*	*A*	*0.0062*	*A*
Mythimna pallens L.	0.3745	N	0.0126	N	0.0021	A	0.0021	A
Cucullia argentea Hfn.	0.5654	N	0.0014	A	0.3745	N	0.0126	N
Phlogophora meticulosa L. *	0.0065	A	0.0065	A				
Omphalophana antirrhini Hbn. *	0.0604	N	0.0216	N				
Calophasia lunula Hfn. *	0.0717	N	0.0717	N				
Brachinochia sphinx Hfn.	2.5005	N	0.0024	A	*0.0016*	*A*	*0.0016*	*A*
Lithophane ornitopus Hfn.	221.151	C	0.0211	N	*0.0010*	*A*	*0.0010*	*A*
Meganephria oxyacanthe L. *	0.0015	A	0.0015	A				
Valeria oleagina Schiff.	113.473	C	0.0139	N	*0.0017*	*A*	*0.1383*	*N*
Crino satura Schiff. *	16.6122	C	0.0134	N				
Agriopis convergens F. *	0.0075	A	0.0046	A				
Drybotodes protea Bkh.	0.0075	A	0.0046	A	*0.0302*	*N*	*0.0900*	*N*
Antitype nigrocincta Tr. *	0.1258	N	0.0228	A				
Eupsilia transversa Hfn.	0.0228	N	0.0234	N	*0.0014*	*A*	*0.0012*	*A*
Eupsilia satellitia L.	60.7056	C	0.0073	A	*0.0014*	*A*	*0.0014*	*A*
Conistra erythrocephala F.	0.0234	N	0.0292	N	0.0005	NS	0.0005	NS
Conistra vau-punctatum Esp.	0.0013	A	0.0014	A	*0.0087*	*A*	*0.0089*	*A*
Conistra vaccinii L.	8507.98	D	676.80	D	0.0014	A	0.0014	A
Agrochola humilis Schiff.	0.3661	N	0.0083	A	0.0234	N	0.0260	N
Agrochola lychnidis Schiff. *	0.0134	N	0.0106	N				
Agrochola macilenta Hbn.	0.0228	N	0.0234	N	0.0024	A	0.0014	A
Agrochola helvola L. *	100.105	C	0.0369	N				
Agrochola litura L.	0.0369	N	0.0292	N	0.0105	N	0.0101	N

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Species	***Beginning and ending of flight (before midnight)***				***Ending of flight (before or after midnight)***			
	between				***between***			
Lepidoptera	***Lux***	***T/N***	***Lux***	***T/N***	***Lux***	***T/N***	***Lux***	***T/N***
Cosmia aurago F. *	0.0165	N	0.0017	A				
Amphipyra pyramidea L. *					*0.0076*	*A*	*0.0276*	*N*
Procus strigilis Cl.	0.0960	N	0.0495	N	0.0384	N	0.0388	N
Luperina testacea Schiff.	0.0094	A	0.0083	A	0.0057	A	0.0045	A
Charanyca trigrammica Hfn.	0.0976	N	0.0178	N	0.0029	A	0.0028	A
Cosmia trapezina L.	0.0128	N	0.0118	N	0.0021	A	0.0021	A
Apamea anceps Schiff.	164.304	C	0.0738	N	*0.0203*	*N*	*1.9993*	*N*
Dicycla oo L.	0.0165	N	0.0111	N	0.0021	A	0.0021	A
Heliothis maritima Grasl. *	0.0008	NS	0.0009	NS				
Chariclea delphinii L. *	0.0484	N	0.0039	A				
Lithacodia deceptoria Scop. *					*0.0229*	*N*	*0.0468*	*N*
Erastria trabealis Scop.	649.68	D	2.5273	N	0.0495	N	0.0453	N
Tarache luctuosa Esp.	0.0074	A	0.0057	A	0.0018	A	0.0012	A
Hylophila prasinana L. *	0.0008	NS	0.0009	NS				
Minucia lunaris Schiff.	0.0738	N	0.0065	A	*0.0381*	*N*	*0.1394*	*N*
Plusia chrysitis L.	0.0105	N	0.0101	N	0.0006	NS	0.0003	NS
Abrostola trigemina Wern. *					*0.0207*	*N*	*0.0229*	*N*
Autographa gamma L.	0.0801	N	0.0840	N	*0.0086*	*A*	*0.0126*	*N*
Hadena confusa Hfn. *	16.6122	C	0.0134	N				
Episema coeruleocephala L.	18.0918	C	0.1921	N	*0.0320*	*N*	*0.3020*	*N*
Toxocampa craccae F. *	0.0057	A	0.0045	A				
Lymantriidae								
Dasychira fascelina L. *					*0.0010*	*A*	*0.0026*	*A*
Dasyhira pudibunda L.	0.0321	N	0.0346	N	*0.0054*	*A*	*0.0063*	*A*
Lymantria dispar L.	15.1900	C	0.0042	A	*0.0048*	*A*	*0.3514*	*N*
Arctiidae								
Gnophria rubricollis L. *	0.0037	A	0.0006	NS				
Ocnogyna parasita Hbn.	0.0017	A	0.0020	A	*0.0005*	*NS*	*0.0005*	*NS*
Phragmatobia fuliginosa L.	15.1900	C	0.0042	A	0.0090	A	0.0074	A
Spilosoma menthastri Esp.	0.0363	N	0.0165	N	0.0034	A	0.0008	NS
Eucharia costa Esp.	0.0072	A	0.0080	A	*0.6542*	*N*	*650.07*	*D*
Hyphantria cunea Drury *	0.0034	A	0.0008	NS				
Arctia villica L.	0.0691	N	0.0681	N	0.0216	N	0.0195	N
Notodontidae								
Stauropus fagi L. *	0.0021	A	0.0023	A				
Dicranura ulmi Schiff.	0.5168	N	0.0016	A	*0.0224*	*N*	*0.0257*	*N*
Drymonia querna Schiff. *					*0.0840*	*N*	*0.0888*	*N*
Drymonia chaonia Hbn.	11.9237	C	0.0037	A	0.0028	A	0.0006	NS
Pheosia tremula Clerck *	0.0237	N	0.0229	N				

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Species	***Beginning and ending of flight (before midnight)***				***Ending of flight (before or after midnight)***			
	between				***between***			
Lepidoptera	***Lux***	***T/N***	***Lux***	***T/N***	***Lux***	***T/N***	***Lux***	***T/N***
Notodonta phoebe Sieb. *	0.0321	N	0.0346	N				
Ptilophora plumigera Esp. *	0.0024	A	0.0014	A				
Phalera bucephala L.	*0.0008*	*NS*	*0.0422*	*N*	*0.8153*	*N*	*611.76*	*D*
Sphingidae								
Marumba quercus Schiff. *	0.0976	N	0.0950					
Mimas tiliae L.	1.3611	C	0.0295	N				
Celerio euphorbiae L. *	0.0018	A	0.0012	A				
Deilephila elpenor L. *	0.0003	NS	0.0004	NS				
Pergesa porcellus L.	0.0476	N	0.0237	N	0.0012	A	0.0019	A
Thyatiridae								
Polyploca diluta F.	0.0075	A	0.0046	A	*0.0076*	*A*	*0.0276*	N
Polyploca flavicornis L. *	0.0067	A	0.0006	NS				
Polyploca ridens Hbn.	0.1693	N	0.0912	N	0.0371	N	0.0381	*N*
Drepanidae								
Cylix glaucata Scop. *	0.0009	NS	0.0009	NS				
Drepana binaria Hfn.	0.0295	N	0.0321	N	0.0010	A	0.0010	A
Asphalia ruficollis Schiff.	500.670	S	0.0652	N	0.0020	A	0.0140	N
Synthomidae								
Amata phegea L. *	0.0165	N	0.0111	N				
Dysauxes ancilla L. *					*0.0012*	*A*	*0.0039*	*A*
Coleoptera								
Melolonthidae	676.8	D	0.4073	N				
Melolontha melolontha L. *	676.8	D	0.4073	N				

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