

Supplementary material to: Riyaz M. et al. 2023: Comparative analysis of the mitochondrial genome of *Hypospila bolinoides* and *Lygephila dorsigera* (Lepidoptera: Noctuoidea: Erebidae), with implications for their phylogeny. — *Eur. J. Entomol.* 120: 187–198. Tables S1–S3.

Table S1. List of the accession numbers of the complete mitogenomes for species of the superfamily Noctuoidea, including the two newly sequenced mitogenomes and two outgroups presented in this study.

Family	Subfamily	Species	Accession
Notodontidae	Phalerinae	<i>Phalera flavescens</i>	JF440342
	Thaumetopoeinae	<i>Ochrogaster lunifer</i>	AM946601
		<i>Thaumetopoea pityocampa</i>	MH286070
	Pygaerinae	<i>Clostera anachoreta</i>	KX108766
		<i>Clostera anastomosis</i>	MH286069
	Notodontinae	<i>Peridea elzet</i>	OK235306
		<i>Pheosia rimosa</i>	OK149237
	Cerurinae	<i>Syntypistis chambae</i>	MZ779034
Erebidae	Stauropinae	<i>Neocerura liturata</i>	OK094456
	Dudusinae	<i>Dudusa sphingiformis</i>	MW788876
	Calpinae	<i>Eudocima salamina</i>	MW683337
		<i>Eudocima phalonia</i>	KY196412
		<i>Calyptra minuticornis</i>	MZ944874
		<i>Oraesia emarginata</i>	MW648382
		<i>Chrysopera combinans</i>	MZ964413.1
	Erebinae	<i>Chilkasa falcata</i>	MZ959073
		<i>Grammodes geometrica</i>	KY888135
		<i>Catocala sp. XY-2014</i>	KJ432280
		<i>Spirama retorta</i>	MT013356
		<i>Parallelia stuposa</i>	MK262707
		<i>Catocala electa</i>	MN698265
		<i>Calyptra minuticornis</i>	MZ944874
		<i>Ischyja manlia</i>	OP973858
		<i>Ischyja marapok</i>	ON165249.1
		<i>Chrysopera combinans</i>	MZ964413
		<i>Oxyodes scrobiculata</i>	MW865753
		<i>Lacera noctilio</i>	MW846301
		<i>Sympis rufibasis</i>	MW846302
		<i>Erebus caprimulgus</i>	MZ959074
		<i>Mocis ancilla</i>	OK149232
		<i>Mocis undata</i>	MW802208
		<i>Daddala lucilla</i>	MZ959069
		<i>Daddala brevicauda</i>	ON109239.1
		<i>Thyas honesta</i>	MZ562561
		<i>Artena dotata</i>	MW697902
		<i>Hypospila bolinoides</i>	This study
	Toxocampinae	<i>Lygephila dorsigera</i>	This study
	Scoliopteryginae	<i>Anomis mesogona</i>	OK011995
		<i>Rusicada privata</i>	OP474142

	Aganainae	<i>Asota plana lacteata</i>	KJ173908
		<i>Asota paliura</i>	MZ944876
		<i>Asota caricae</i>	MZ779033
	Herminiinae	<i>Hydrillodes lentalis</i>	MH013484
		<i>Simplicia niphona</i>	OK235310
		<i>Simplicia rectalis</i>	OK053110
		<i>Polypogon tarsicrinata</i>	MN635736.1
	Hypeninae	<i>Paragabara curvicornuta</i>	KT362742
	Arctiinae	<i>Hyphantria cunea</i>	GU592049
		<i>Amerila alberti</i>	MZ927092
		<i>Phragmatobia fuliginosa</i>	OK094457
		<i>Amata formosae</i>	KC513737
		<i>Pareuchaetes insulata</i>	MZ964412
		<i>Vamuna virilis</i>	KJ364659
		<i>Callimorpha dominula</i>	KP973953
		<i>Nyctemera arctata albofasciata</i>	KM244681
		<i>Nyctemera adversata</i>	MZ562560
		<i>Paraona staudingeri</i>	KY827330
		<i>Spilosoma lubricipeda</i>	MT591568
		<i>Arctia plantaginis</i>	MW394229
		<i>Lemyra melli</i>	KP307017
		<i>Spilarctia subcarnea</i>	KT258909
		<i>Spilarctia casigneta</i>	MZ959068
		<i>Cyana</i> sp. MT-2014	KM244679
		<i>Eilema ussuricum</i>	MN696172
		<i>Aglaomorpha histrio</i>	KY800518
		<i>Asura megala</i>	MZ545409.1
		<i>Brunia dorsalis</i>	MN635735.1
	Lymantriinae	<i>Lymantria dispar</i>	FJ617240
		<i>Lymantria sinica</i>	MZ087938
		<i>Lymantria mathura</i>	MZ073359
		<i>Lymantria dispar asiatica</i>	KY923067
		<i>Lymantria dispar japonica</i>	KY923060
		<i>Lymantria umbrosa</i>	KY923066
		<i>Lymantria sugii</i>	MT265380
		<i>Gynaephora minora</i>	KY688086
		<i>Gynaephora menyanensis</i>	KC185412
		<i>Gynaephora jiuzhiensis</i>	KY688085
		<i>Gynaephora ruoergensis</i>	KY688083
		<i>Gynaephora qumalaiensis</i>	KJ507134
		<i>Gynaephora qinghaiensis</i>	KJ507133
		<i>Gynaephora aureata</i>	KY688084
		<i>Gynaephora rossii</i>	MW678846.1
		<i>Gynaephora ruoergensis</i>	KY688083.1
		<i>Euproctis pseudoconspersa</i>	KJ716847
		<i>Euproctis similis</i>	KT258910
		<i>Euproctis cryptosticta</i>	KY996558
		<i>Euproctis seitzi</i>	MN916588

		<i>Somena scintillans</i>	MH051839
		<i>Lachana alpherakii</i>	KJ957168
		<i>Orgyia postica</i>	MW355619
		<i>Laelia suffusa</i>	MN908152
		<i>Olene inclusa</i>	OK011992
		<i>Leucoma chrysoscela</i>	MW030505
		<i>Pida apicalis</i>	ON109243
		<i>Dasychira tristis</i>	MZ520324
		<i>Calliteara horishanella</i>	MZ571364
Euteliidae	Euteliinae	<i>Eutelia adulatricoides</i>	KJ185131
	Stictopterinae	<i>Odontodes seranensis</i>	MW719565
Noctuidae		<i>Spodoptera exigua</i>	JX316220
		<i>Spodoptera litura</i>	KF543065
		<i>Spodoptera frugiperda</i>	KU877172
		<i>Spodoptera littoralis</i>	MT816470
		<i>Spodoptera exempta</i>	MT906792
		<i>Spodoptera depravata</i>	OK053108
		<i>Agrotis ipsilon</i>	KF163965
		<i>Agrotis segetum</i>	KC894725
		<i>Agrotis munda</i>	MZ397914
		<i>Agrotis trifurca</i>	OK235311
		<i>Agrotis exclamationis</i>	MZ397982.1
		<i>Agrotis tokionis</i>	MZ397981.1
		<i>Athetis lepigone</i>	MF152842
		<i>Athetis pallidipennis</i>	MT040606
		<i>Athetis thoracica</i>	MZ571409
		<i>Striacosta albicosta</i>	KM488268
		<i>Noctua pronuba</i>	KJ508057
		<i>Actebia praecox</i>	MZ853167
		<i>Anaplectoides virens</i>	MZ707539
		<i>Actinotia intermediata</i>	OK011997
		<i>Actinotia polyodon</i>	MW697903
		<i>Mythimna separata</i>	KM099034
		<i>Mythimna pallidicosta</i>	MH027985
		<i>Mythimna loreyi</i>	MT506351
		<i>Mythimna unipuncta</i>	MW802209
		<i>Protegira songi</i>	KY379907
		<i>Mamestra configurata</i>	NDFZ01086780
		<i>Mamestra brassicae</i>	OK053109
		<i>Anarta trifolii</i>	MN715147
		<i>Tiracola aureata</i>	OK011993
		<i>Tiracola plagiata</i>	MZ964414
		<i>Melanchra persicariae</i>	OK235309
		<i>Xestia c nigrum</i>	MZ397980.1
		<i>Cosmia restituta</i>	OK235307.1
	Bagisarinae	<i>Imosca coreana</i>	OK053111
		<i>Xanthodes intersepta</i>	MZ571408
		<i>Xanthodes albago</i>	MW813975

		<i>Sphragifera sigillata</i>	OK149231
	Heliothinae	<i>Helicoverpa zea</i>	KJ930516
		<i>Helicoverpa punctigera</i>	KF977797
		<i>Helicoverpa armigera</i>	GU188273
		<i>Helicoverpa assulta</i>	MG437198
		<i>Helicoverpa gelotopoeon</i>	MG437199
		<i>Chloridea subflexa</i>	KT598688
		<i>Pyrrhia umbra</i>	OK053112
	Acronictinae	<i>Acronicta psi</i>	KJ508060
		<i>Acronicta major</i>	MZ562565
		<i>Acronicta rumicis</i>	OK235313
	Cuculliinae	<i>Cucullia pustulata</i>	OK094455
	Condicinae	<i>Eucarta virgo</i>	OK235305
		<i>Condica capensis</i>	MZ571410
		<i>Condica illecta</i>	MZ562566
	Plusiinae	<i>Ctenoplusia agnata</i>	KC414791
		<i>Ctenoplusia limbirena</i>	KM244665
		<i>Ctenoplusia albostrata</i>	MN495624
		<i>Trichoplusia ni</i>	MK714850
		<i>Macdunnoughia hybrida</i>	MW924384
		<i>Diachrysia nadeja</i>	MT916722
		<i>Abrostola triplasia</i>	OK235316
		<i>Chrysodeixis acuta</i>	OL892047.1
Nolidae	Chloephorinae	<i>Gabala argentata</i>	KJ410747
		<i>Sinna extrema</i>	MG872330
		<i>Pseudoips prasinana</i>	NC_062184
		<i>Pseudoips prasinanus</i>	OK094458
		<i>Camptoloma kishidai</i>	MW435591
		<i>Camptoloma vanata</i>	MZ032042
		<i>Carea varipes</i>	ON939555
		<i>Earias clorana</i>	OK235312
	Eligminae	<i>Eliqma narcissus</i>	OK011994
	Risobinae	<i>Risoba prominens</i>	KJ396197
		<i>Risoba obstructa</i>	MW879211
	Nolinae	<i>Nola angustipennis</i>	ON462330
Outgroups	Papilionidae	<i>Papilio polytes</i>	NC_024742
		<i>Trogonoptera brookiana</i>	NC_037875

Table S2. Nucleotide compositions and skewness of the mitogenomes of the superfamily Noctuoidea.

Species	Size (bp)	A %	G%	T%	C%	A+T%	AT skew	GC skew
<i>Hypospila bolinoides</i>	15640	39.28	7.33	42.49	10.89	81.77	-0.039	-0.176
<i>Lygephila dorsigera</i>	15567	39.47	7.73	4.37	12.42	80.17	-0.011	-0.232
<i>Eudocima salaminia</i>	15,597	42.02	9.39	38.41	10.16	80.44	0.044	0.039
<i>E. phalonia</i>	15,575	39.83	7.54	40.84	11.76	80.67	-0.012	-0.218
<i>P. flavescens</i>	15,659	40.07	7.86	40.80	11.25	80.87	-0.009	-0.177
<i>O. lunifer</i>	15,593	40.09	7.43	37.74	14.59	77.83	0.030	-0.325
<i>A. formosae</i>	15,463	38.66	7.52	40.82	12.97	79.48	-0.027	-0.267
<i>Doa</i> sp.	15,228	40.41	7.76	40.01	11.64	80.42	0.004	-0.2
<i>N. arctata albofasciata</i>	15,431	39.27	7.34	40.37	11.66	79.64	-0.013	-0.227
<i>Lymantria dispar</i>	15,569	40.58	7.57	39.29	12.55	79.87	0.016	-0.247
<i>Lymantria</i> sp. AN-2017	15,651	39.46	12.42	40.72	7.39	80.18	-0.015	0.253
<i>L. umbrosa</i>	15,635	39.39	12.52	40.58	7.49	79.97	-0.014	0.251
<i>Helicoverpa zea</i>	15,343	40.59	7.58	40.40	11.41	80.99	0.002	-0.020
<i>H. gelatopoeon</i>	15,229	40.35	7.59	40.44	11.60	80.80	-0.001	-0.208
<i>H. armigera</i>	15,347	40.54	7.68	40.43	11.33	80.97	0.001	-0.192
<i>H. cunea</i>	15,481	40.57	7.55	39.81	12.05	80.38	0.009	-0.229
<i>H. puntigera</i>	15,382	40.69	7.58	40.65	11.06	81.34	0.000	-0.186
<i>H. assulta</i>	15,351	40.59	7.73	40.42	11.31	81.01	0.002	-0.188
<i>Heliothis subflexa</i>	15,323	40.44	7.81	40.29	11.45	80.72	0.002	-0.189
<i>A. ipsilon</i>	15,377	40.38	7.71	40.86	11.03	81.24	-0.005	-0.177
<i>A. segetum</i>	15,378	40.20	7.79	40.49	11.50	80.69	-0.003	-0.192
<i>Spodoptera litura</i>	15,374	41.03	7.60	40.00	11.36	81.03	0.012	-0.198
<i>S. frugiperda</i>	16,346	40.38	7.97	40.35	11.29	80.73	0.000	-0.172
<i>S. exigua</i>	15,365	40.87	7.67	40.05	11.38	80.92	0.010	-0.194
<i>C. agnata</i>	15,261	39.57	7.70	41.51	11.19	81.08	-0.030	-0.184
<i>C. limbirena</i>	15,306	39.06	7.84	41.95	11.15	81.01	-0.035	-0.174
<i>E. adaltricoides</i>	15,360	40.20	7.80	40.65	11.32	80.85	-0.005	-0.184
<i>S. inferens</i>	15,413	40.06	7.61	40.17	12.15	80.23	-0.001	-0.229
<i>N. pronuba</i>	15,315	39.79	7.80	41.27	11.00	81.06	-0.018	-0.170
<i>A. psi</i>	15,350	40.89	7.82	38.19	12.92	79.08	0.034	-0.168
<i>Striacosta albicosta</i>	15,553	40.14	7.87	39.18	12.79	79.32	0.012	-0.238
<i>Mythimna separata</i>	15,329	40.02	7.66	40.98	11.33	81.00	-0.011	0.193
<i>M. pallidicosta</i>	15,320	39.86	7.84	40.34	11.94	80.20	-0.006	-0.207
<i>R. prominens</i>	15,343	40.24	7.80	40.81	11.13	81.05	-0.007	-0.175
<i>Catocala deuteronympha</i>	15,671	39.68	7.26	41.43	11.61	81.11	-0.021	-0.230
<i>Grammodes geometrica</i>	15,728	40.10	7.61	40.38	11.89	80.49	-0.003	-0.219
<i>Asota plana</i>	15,416	40.08	7.49	40.26	12.16	80.34	-0.002	-0.237
<i>Athetis lepidone</i>	15,589	39.68	7.57	41.65	11.08	81.33	-0.024	-0.188
<i>Hydrillodes lentalis</i>	15,570	39.72	7.50	41.35	11.41	81.07	-0.020	-0.207

Species	Size (bp)	A %	G%	T%	C%	A+T%	AT skew	GC skew
<i>Protegira songi</i>	15,410	40.10	7.85	40.11	11.93	80.21	-8.08	-0.20
<i>Mamestra configurata</i>	15,347	40.54	7.59	40.83	11.02	81.38	-0.003	-0.184
<i>Paragabara curvicornuta</i>	15,531	39.89	7.57	40.55	11.98	80.44	-0.008	-0.225
<i>Gabala argentata</i>	15,337	39.64	7.56	42.04	10.74	81.69	-0.029	-0.173
<i>Gynaephora minora</i>	15,801	40.96	6.76	40.51	11.75	81.48	0.005	-0.269
<i>G. menyuanensis</i>	15,770	40.87	6.88	40.60	11.75	81.47	0.003	-0.261
<i>G. jiuzhiensis</i>	15,859	40.91	6.72	40.63	11.73	81.54	0.003	0.271
<i>G. aureata</i>	15,761	40.94	6.77	40.51	11.76	81.45	0.005	-0.269
<i>G. ruoergensis</i>	15,803	41.03	6.71	41.03	11.76	81.52	0.006	-0.273
<i>G. qumalaiensis</i>	15,753	40.96	6.82	40.39	11.81	81.35	0.007	-0.267
<i>G. qinghaiensis</i>	15,747	40.82	6.82	40.45	11.89	81.28	0.004	-0.271
<i>Euproctis similis</i>	15,437	40.09	7.50	40.07	12.32	80.16	0.000	-0.242
<i>E. pseudoconspersa</i>	15,461	40.41	7.60	39.51	12.46	79.93	0.011	-0.242
<i>E. cryptosticta</i>	15,462	40.38	7.60	39.47	12.53	79.86	0.011	-0.244
<i>Somena scintillans</i>	15,410	40.05	7.20	40.76	11.97	80.81	-0.008	-0.248
<i>Lachana alpherakii</i>	15,755	40.88	6.84	40.55	11.71	81.44	0.003	-0.262
<i>Vamuna virilis</i>	15,417	40.17	7.55	40.21	12.05	80.39	-0.000	-0.229
<i>Callimorpha dominula</i>	15,496	40.07	7.58	40.94	11.39	81.02	-0.010	-0.200
<i>Lemyra melli</i>	15,418	39.38	8.26	39.28	13.06	78.66	0.001	-0.224
<i>Spilarctia alba</i>	15,447	39.76	7.64	41.14	11.44	80.90	-0.017	-0.199
<i>Spilarctia subcarnea</i>	15,441	39.97	7.95	39.78	12.29	79.75	0.002	-0.214
<i>Cyana</i> sp. MT-2014	15,494	40.02	7.29	41.17	11.50	81.19	-0.014	-0.223
<i>Eilema ussuricum</i>	15,344	40.21	7.55	40.25	11.97	80.46	-0.002	-0.226
<i>Aglaomorpha histrio</i>	15,470	39.83	7.49	40.07	12.59	79.90	-0.002	-0.254
<i>Clostera anachoreta</i>	15,456	39.58	7.55	41.13	11.73	80.71	-0.019	-0.216
<i>Clostera anastomosis</i>	15,390	39.66	7.79	40.38	12.15	80.04	-0.009	-0.218
PCGs								
<i>Hypospila bolinoides</i>	11192	38.76	8.2	41.35	11.71	80.08	0.031	-0.186
<i>Lygephila dorsigera</i>	11159	38.71	8.65	39.32	13.32	78.03	-0.007	-0.212
<i>Eudocima salaminia</i>	11,172	41.87	10.74	36.67	10.71	78.54	0.066	0.001
<i>E. phalonia</i>	10,809	38.90	8.55	39.49	13.04	78.39	-0.007	-0.207
<i>P. flavescens</i>	11,211	33.73	10.95	45.23	10.08	78.07	-0.146	-0.041
<i>O. lunifer</i>	11,266	32.47	12.08	43.26	12.19	75.73	-0.142	-0.004
<i>H. cunea</i>	11,205	33.59	8.10	45.00	10.42	79.59	-0.145	0.027
<i>A. formosae</i>	10,782	37.92	8.51	39.39	14.16	77.31	-0.019	0.249
<i>Doa</i> sp.	10,747	39.70	8.73	38.55	12.60	78.65	0.009	-0.181
<i>N. arctata albofasciata</i>	10,761	39.07	8.33	39.86	12.72	78.93	-0.010	-0.208
<i>L. dispar</i>	11,236	33.22	11.26	44.62	10.90	77.84	-0.146	0.016
<i>G. menyuanensis</i>	11,228	34.63	10.18	45.15	10.04	79.78	-0.132	0.007
<i>H. armigera</i>	10,791	39.79	8.64	39.20	12.38	78.95	0.006	0.177
<i>H. puntigera</i>	10,788	39.84	8.53	39.58	12.04	79.42	0.003	0.170
<i>H. assulta</i>	10,791	39.76	8.64	39.20	12.38	78.96	0.007	-0.177

Species	Size (bp)	A %	G%	T%	C%	A+T%	AT skew	GC skew
<i>A. ipsilon</i>	10,822	39.53	8.66	39.86	11.93	79.39	-0.004	-0.158
<i>A. segetum</i>	10,785	39.29	8.87	39.25	12.57	78.54	0.004	0.172
<i>S. litura</i>	11,206	40.30	8.38	39.26	12.06	79.56	0.012	-0.180
<i>S. exigua</i>	10,766	40.08	8.69	38.92	12.28	79.00	0.014	-0.171
<i>C. agnata</i>	10,782	38.81	8.58	40.60	11.99	79.41	-0.022	-0.165
<i>C. limbirena</i>	10,764	38.19	8.83	40.90	12.06	79.09	-0.034	-0.154
<i>E. adulatricoides</i>	10,800	39.25	8.82	39.74	12.18	78.99	-0.006	-0.159
<i>S. inferens</i>	10,905	39.35	8.50	38.96	13.17	78.31	0.005	-0.215
<i>N. pronuba</i>	10,744	39.08	8.78	40.28	11.84	79.36	-0.015	-0.148
<i>A. psi</i>	10,725	40.22	8.86	36.69	14.20	76.91	0.045	-0.231
<i>Striacosta albicosta</i>	11,210	39.46	8.79	37.99	13.76	77.46	0.019	-0.220
<i>M. separata</i>	11,211	39.43	8.38	40.17	12.03	79.59	-0.009	-0.179
<i>R. prominens</i>	10,506	38.97	8.84	40.15	12.02	79.12	-0.102	-0.152
<i>Catocala deuteronympha</i>	10,884	38.80	8.23	40.28	12.66	79.08	-0.187	-0.212
<i>Asota plana</i>	10,626	39.18	8.59	38.78	13.43	77.96	0.005	-0.219
<i>P. curvicornata</i>	11,196	39.29	8.42	39.40	12.87	78.69	-0.001	-0.20
<i>P. songi</i>	11,215	39.52	8.67	38.97	12.82	78.49	0.007	-0.19
<i>S. scintillans</i>	11,201	39.46	8.04	39.38	13.11	78.84	0.001	-0.23
<i>S. subcarnea</i>	11,214	39.73	8.58	38.71	12.96	78.44	0.01	-0.20
<i>S. frugiperda</i>	11,197	39.81	8.45	39.53	11.94	79.34	0.006	-0.17
<i>V. virilis</i>	11,203	39.64	8.39	38.92	13.03	78.56	0.008	-0.21
<i>A. lepigone</i>	11,218	39.12	8.46	40.63	11.79	79.75	-0.01	-0.45
<i>C. dominula</i>	11,215	39.64	8.02	40.56	11.77	80.2	-0.01	-0.18
<i>C. anachoreta</i>	11,189	39.06	8.27	40.16	12.52	79.22	-0.01	-0.20
<i>C. anastomosis</i>	11,186	39.04	8.64	39.2	13.12	78.24	-0.001	-0.20
<i>Cyana</i> sp.	11,230	39.47	8.1	40.05	12.37	79.52	-0.006	-0.20
<i>E. cryptosticta</i>	11,187	39.64	8.45	38.26	13.66	77.9	0.017	-0.23
<i>E. psuedoconspersa</i>	11,187	39.69	8.43	38.3	13.58	77.99	0.017	-0.23
<i>E. similis</i>	11,202	39.5	8.37	38.83	13.29	78.33	0.008	-0.22
<i>G. argentata</i>	11,203	39.05	8.29	41.27	11.38	80.32	-0.02	-0.15
<i>G. geometrica</i>	11,197	39.23	8.54	39.26	12.97	78.49	0	0
<i>G. aureata</i>	11,237	40.42	7.49	39.31	12.78	79.73	0.013	-0.26
<i>G. jiuzhiensis</i>	11,246	40.41	7.51	39.39	12.68	79.80	0.012	-0.25
<i>H. gelotopoeon</i>	11,209	39.87	8.30	39.57	12.27	79.44	0.003	-0.193
<i>G. minora</i>	11,237	40.42	7.50	39.27	12.79	79.69	0.014	-0.260
<i>G. qinghaiensis</i>	11,228	40.32	7.50	39.29	12.79	79.61	0.012	-0.256
<i>G. qumalensis</i>	11,225	40.45	7.55	39.22	12.76	79.67	0.015	-0.256
<i>G. ruorgensis</i>	11,237	40.47	7.44	39.28	12.78	79.75	0.014	-0.263
<i>H. lentalis</i>	11,163	39.17	8.43	40.19	12.19	79.36	-0.012	-0.181
<i>L. alpherakii</i>	11,122	40.63	7.70	39.76	12.79	80.39	0.010	-0.248
<i>L. melli</i>	11,200	38.47	9.16	38.16	14.18	76.63	0.003	-0.201
<i>M. pallidicosta</i>	11,205	39.25	8.67	39.29	12.78	78.54	0.000	-0.191
tRNA								

Species	Size (bp)	A %	G%	T%	C%	A+T%	AT skew	GC skew
<i>Hypospila bolinoides</i>	1463	40.05	8.07	41.49	10.39	81.54	-0.017	-0.125
<i>Lygephila dorsigera</i>	1484	40.3	8.29	40.16	11.25	80.46	0.001	-0.151
<i>Eudocima salaminia</i>	1459	40.64	9.25	40.99	9.12	81.63	-0.004	0.007
<i>E. phalonia</i>	1462	40.90	8.27	40.49	10.32	81.39	0.005	-0.110
<i>P. flavescens</i>	1485	41.62	7.81	40.61	9.97	82.22	0.012	-0.121
<i>O. lunifer</i>	1666	41.78	7.33	39.86	11.04	81.63	0.023	-0.202
<i>H. cunea</i>	1474	41.86	7.87	39.89	10.38	81.75	0.024	-0.138
<i>A. formosae</i>	1466	40.45	7.98	40.24	11.32	80.69	0.002	-0.173
<i>Doa</i> sp.	1456	41.55	8.17	39.62	10.64	81.18	0.023	-0.131
<i>N. arctata albofasciata</i>	1440	40.90	8.05	40.48	10.55	81.38	0.005	-0.134
<i>L. dispar</i>	1469	41.66	7.96	39.35	11.03	81.01	0.029	-0.162
<i>G. menyuanensis</i>	1504	41.29	7.38	41.76	9.57	83.05	-0.006	-0.129
<i>H. armigera</i>	1471	41.40	8.15	40.38	10.06	81.78	0.012	-0.104
<i>H. puntigera</i>	1478	41.67	8.18	40.18	9.94	81.85	0.018	-0.097
<i>H. assulta</i>	1471	41.33	8.29	40.31	10.06	81.64	0.012	-0.096
<i>A. ipsilon</i>	1475	41.15	8.13	40.47	10.23	81.62	0.008	-0.114
<i>A. segetum</i>	1471	40.72	8.22	40.85	10.19	81.57	-0.001	-0.107
<i>S. litura</i>	1473	42.23	7.94	39.58	10.25	81.81	0.032	-0.127
<i>S. exigua</i>	1468	41.62	8.03	40.05	10.28	81.67	0.019	-0.122
<i>C. agnata</i>	1472	41.10	8.22	40.28	10.39	81.38	0.010	-0.116
<i>C. limbirena</i>	1466	40.38	8.18	41.33	10.09	81.71	-0.011	-0.104
<i>E. adulatricoides</i>	1475	41.35	8.06	40.47	10.10	81.82	0.010	-0.111
<i>S. inferens</i>	1478	40.86	8.25	40.66	10.21	81.52	0.002	-0.106
<i>N. pronuba</i>	1468	40.53	8.51	40.66	10.28	81.19	0.001	-0.094
<i>A. psi</i>	1402	42.22	7.98	39.37	8.27	81.59	0.034	-0.131
<i>Striacosta albicosta</i>	1486	40.58	8.48	40.44	10.50	81.02	0.002	-0.106
<i>M. separata</i>	1473	41.07	8.15	40.73	10.05	81.81	0.004	-0.104
<i>R. prominens</i>	1464	40.77	8.26	41.12	9.83	81.89	-0.004	-0.086
<i>Catocala deuteronympha</i>	1478	41.27	7.84	40.52	10.35	81.79	0.009	-0.137
<i>Asota plana</i>	1457	40.28	8.23	40.70	10.77	80.98	-0.005	-0.133
<i>P. curvicornata</i>	1460	40.41	8.15	40.95	10.47	81.36	-0.006	-0.125
<i>P. songi</i>	1469	41.10	8.23	40.09	10.48	81.19	0.013	-0.120
<i>S. scintillans</i>	1475	40.74	7.59	41.76	9.89	82.50	-0.012	-0.131
<i>S. subcarnea</i>	1458	40.53	8.71	39.71	11.04	80.24	0.010	-0.118
<i>S. frugiperda</i>	1482	41.76	7.82	40.62	9.78	82.38	0.013	-0.011
<i>V. virilis</i>	1456	41.00	8.10	40.52	10.37	81.52	0.005	-0.122
<i>A lepigone</i>	1465	40.0	8.19	41.43	10.38	81.43	-0.017	-0.117
<i>C dominula</i>	1462	41.04	8.0	41.04	9.92	82.08	0	-0.10
<i>C. anachoreta</i>	1469	40.7	8.11	40.57	10.62	81.27	0.001	-0.13
<i>C. anastomosis</i>	1490	40.87	8.05	40.74	10.34	81.61	0.001	-0.124
<i>Gyana</i> sp.	1476	40.79	7.93	40.92	10.37	81.71	-0.001	-0.133
<i>E. cryptosticta</i>	1467	41.58	8.11	39.88	10.43	81.46	0.020	-0.125

Species	Size (bp)	A %	G%	T%	C%	A+T%	AT skew	GC skew
<i>E. pseudoconsersa</i>	1466	41.41	8.19	40.18	10.23	81.59	0.015	-0.11
<i>E. similis</i>	1480	41.69	7.7	40.54	10.07	82.23	0.013	-0.133
<i>G. argentata</i>	1469	41.32	8.24	40.23	10.21	81.55	0.013	-0.107
<i>G. geometrica</i>	1481	41.19	8.24	40.24	10.33	81.43	0.011	-0.112
<i>G. aureata</i>	1511	41.23	7.48	41.96	9.33	83.19	-0.008	-0.110
<i>G. juizhiensis</i>	1493	41.33	7.43	41.53	9.71	82.86	-0.002	-0.132
<i>H. gelotopoen</i>	1474	41.59	8.14	40.09	10.18	81.68	0.018	-0.111
<i>G. minora</i>	1509	41.15	7.36	42.15	9.34	83.3	-0.011	-0.119
<i>G. qinghaiensis</i>	1495	41.27	7.29	41.74	9.7	83.01	-0.005	-0.417
<i>G. qumalensis</i>	1498	41.19	7.34	41.52	9.95	82.71	-0.004	-0.150
<i>G. ruorgensis</i>	1510	41.39	7.35	41.85	9.4	83.24	-0.005	-0.122
<i>H. lentalis</i>	1540	40.16	8.05	41.42	10.37	81.58	-0.015	-0.126
<i>L. alpherakii</i>	1520	41.41	7.39	41.61	9.59	83.02	-0.002	-0.129
<i>L. melli</i>	1486	40.58	8.55	40.24	10.63	80.82	0.004	-0.108
<i>M. pallidicosta</i>	1473	40.94	8.01	40.39	10.66	81.33	0.006	-0.418
rRNA								
<i>Hypospila bolinoides</i>	2139	40.11	4.86	45.02	10.0	85.13	-0.057	-0.330
<i>Lygephila dorsigera</i>	2047	41.62	4.98	42.7	10.7	84.32	-0.012	-0.364
<i>Eudocima salaminia</i>	2036	41.26	4.91	42.90	10.05	84.24	-0.020	-0.376
<i>E. phalonia</i>	2212	41.50	4.74	43.49	10.26	84.99	-0.023	-0.367
<i>P. flavescens</i>	2198	41.31	4.73	44.04	9.92	85.35	-0.032	-0.354
<i>O. lunifer</i>	2157	41.96	4.82	40.19	13.03	82.15	0.022	-0.460
<i>H. cunea</i>	2234	42.08	4.92	42.75	10.25	84.83	-0.008	-0.351
<i>A. formosae</i>	2163	38.93	4.72	44.85	11.51	83.77	-0.071	-0.418
<i>Doa</i> sp.	2146	41.61	4.98	42.54	10.85	84.15	-0.01	-0.370
<i>N. arctata albofasciata</i>	2058	40.91	4.81	43.34	10.93	84.25	-0.028	-0.388
<i>L. dispar</i>	2150	42.79	4.79	41.81	10.60	84.60	0.012	-0.377
<i>G. menyuanensis</i>	2311	41.89	4.28	42.84	10.99	84.73	-0.011	-0.439
<i>H. armigera</i>	2155	41.62	4.91	43.34	10.11	84.96	-0.020	-0.345
<i>H. puntigera</i>	2161	41.87	4.81	43.35	9.94	85.22	-0.017	-0.347
<i>H. assulta</i>	2156	41.46	5.19	43.36	9.97	84.82	-0.022	-0.314
<i>A. ipsilon</i>	2133	41.49	5.06	43.45	9.98	84.94	-0.023	-0.327
<i>A. segetum</i>	2155	41.48	4.91	43.57	10.02	85.05	-0.024	-0.341
<i>S. litura</i>	2218	42.65	4.73	42.34	10.28	84.99	0.004	-0.370
<i>S. exigua</i>	2165	42.35	4.66	42.63	10.34	84.98	-0.003	-0.378
<i>C. agnata</i>	2156	39.93	5.10	44.57	10.38	84.50	-0.054	-0.341
<i>C. limbirena</i>	2089	39.39	5.12	45.28	10.19	84.67	-0.069	-0.331
<i>E. adulatricoides</i>	2169	41.53	4.97	42.87	10.60	84.40	-0.015	-0.360
<i>S. inferens</i>	2146	41.51	4.75	42.45	11.27	83.96	-0.011	0.406
<i>N. pronuba</i>	2144	40.95	4.89	44.12	10.02	85.07	-0.037	-0.347
<i>A. psi</i>	2143	41.62	4.99	41.90	11.47	83.52	-0.003	-0.393
<i>Striacosta albicosta</i>	2147	42.06	4.84	41.92	11.18	83.98	0.002	-0.396

Species	Size (bp)	A %	G%	T%	C%	A+T%	AT skew	GC skew
<i>M. separata</i>	2198	41.31	4.73	44.04	9.92	85.35	-0.032	-0.354
<i>R. prominens</i>	2178	42.51	4.77	42.88	9.82	85.39	-0.004	-0.345
<i>Catocala deuteronympha</i>	2193	40.08	4.69	44.64	10.57	84.72	-0.053	-0.385
<i>Asota plana</i>	2172	41.43	4.83	43.18	10.54	84.61	-0.020	-0.371
<i>P. curvicornata</i>	2274	41.68	4.66	43.40	10.24	85.08	-0.020	-0.37
<i>P. songi</i>	2135	41.21	4.87	43.32	10.58	84.53	-0.024	-0.369
<i>S. scinitillans</i>	2080	41.58	4.85	43.99	9.56	85.57	-0.028	-0.326
<i>S. subcarnea</i>	2213	40.89	6.14	41.97	11.43	82.86	-0.013	-0.335
<i>S. frugiperda</i>	2125	41.92	4.84	42.40	10.82	84.32	-0.005	-0.381
<i>V. virilis</i>	2172	41.02	4.74	43.78	10.45	84.80	-0.030	-0.37
<i>Athetis lepigone</i>	2159	40.57	4.82	44.37	10.24	84.94	0.044	-0.36
<i>C. dominula</i>	2154	41.23	4.87	43.31	10.58	84.54	-0.024	-0.36
<i>C. anachoreta</i>	2259	40.50	4.83	44.67	10.0	85.17	-0.048	-0.34
<i>C. anastomosis</i>	2186	41.26	4.76	43.78	10.20	85.04	-0.02	-0.36
<i>Cyana</i> sp.	2192	40.37	4.74	44.3	10.58	84.67	-0.046	-0.38
<i>E. cryptosticta</i>	2225	42.56	4.49	42.25	10.7	84.81	0.003	-0.40
<i>E. pseudoconspersa</i>	2225	42.56	4.54	42.11	10.79	84.67	0.005	-0.40
<i>E. similis</i>	2185	41.42	4.53	43.3	10.76	84.72	-0.02	-0.40
<i>G. argentata</i>	2165	40.60	4.76	45.13	9.52	85.73	-0.05	-0.33
<i>G. geometrica</i>	2147	42.29	4.94	42.2	10.57	84.49	0.001	-0.36
<i>G. aureata</i>	2367	42.25	4.18	42.92	10.65	85.17	-0.007	-0.43
<i>G. juizhiensis</i>	2329	42.29	4.21	42.64	10.86	84.93	-0.004	-0.44
<i>H. gelotopoeon</i>	2167	41.49	4.80	43.29	10.43	84.78	-0.021	-0.36
<i>G. minora</i>	2384	42.32	4.19	42.95	10.53	85.27	-0.021	-0.43
<i>G. qinghaiensis</i>	2315	42.16	4.23	42.59	11.02	84.75	-0.005	-0.44
<i>G. qumalensis</i>	2388	42.00	4.23	43.59	10.18	85.59	-0.018	-0.41
<i>G. ruorgensis</i>	2390	42.34	4.10	42.97	10.59	85.31	-0.007	-0.44
<i>H. lentalis</i>	2207	40.55	4.58	44.04	10.83	84.59	-0.041	-0.40
<i>L. alpherakii</i>	2334	42.29	4.20	42.89	10.63	85.18	-0.007	-0.43
<i>L. melli</i>	2233	42.23	4.93	41.96	10.88	84.19	0.003	-0.37
<i>M. pallidicosta</i>	2160	41.39	4.77	43.56	10.28	84.95	0.025	-0.36
A+T-rich region								
<i>Hypospila bolinoides</i>	287	49.9	1.74	80.87	3.48	94.77	-0.073	-0.33
<i>Lygephila dorsigera</i>	383	44.13	2.35	47.0	6.53	91.13	-0.031	-0.470
<i>Eudocima salaminia</i>	436	47.94	5.04	44.95	2.06	92.89	0.032	0.420
<i>E. phalonia</i>	336	43.45	2.97	49.70	3.86	93.15	-0.067	-0.130
<i>P. flavescens</i>	541	42.14	2.22	49.72	5.91	91.86	-0.083	-0.454
<i>O. lunifer</i>	319	44.50	1.60	48.90	5.00	93.40	-0.047	-0.524
<i>H. cunea</i>	357	45.66	1.12	49.30	3.92	94.96	-0.038	-0.556
<i>A. formosae</i>	484	42.97	2.89	49.79	4.33	92.76	-0.073	-0.2
<i>Doa</i> sp.	332	43.07	0.60	53.61	2.71	96.68	-0.109	-0.636
<i>N. arctata albofasciata</i>	401	43.39	1.99	50.37	4.23	93.76	-0.074	-0.36

Species	Size (bp)	A %	G%	T%	C%	A+T%	AT skew	GC skew
<i>L. dispar</i>	435	45.29	1.61	50.80	2.30	96.09	-0.057	-0.176
<i>G. menyuanensis</i>	449	43.65	2.45	49.67	4.23	93.32	-0.065	-0.266
<i>H. armigera</i>	329	44.37	1.21	50.75	3.64	95.12	-0.067	-0.5
<i>H. puntigera</i>	328	45.12	1.21	51.21	2.43	96.33	-0.063	-0.333
<i>H. assulta</i>	329	44.37	1.21	50.45	3.95	94.82	0.064	-0.529
<i>A. ipsilon</i>	344	46.22	1.45	48.83	3.48	95.05	-0.027	0.411
<i>A. segetum</i>	345	46.08	0.86	48.40	4.63	94.48	-0.024	-0.684
<i>S. litura</i>	326	46.63	2.15	47.24	3.99	93.87	-0.006	-0.300
<i>S. exigua</i>	335	42.98	2.68	50.44	3.88	93.42	-0.079	-0.181
<i>C. agnata</i>	334	46.70	1.49	46.70	5.08	93.4	0	-0.545
<i>C. limbirena</i>	422	46.91	2.36	46.20	4.50	93.11	0.007	-0.473
<i>E. adulatricoides</i>	341	46.04	2.63	46.62	4.69	92.66	-0.006	-0.28
<i>S. inferens</i>	314	43.31	1.27	52.54	2.86	95.85	-0.095	-0.384
<i>N. pronuba</i>	330	44.24	2.12	49.09	4.54	93.33	-0.051	-0.363
<i>A. psi</i>	354	44.63	2.54	47.74	5.08	92.37	-0.033	-0.333
<i>Striacosta albicosta</i>	385	43.12	1.30	49.87	5.71	92.99	-0.073	-0.629
<i>M. separata</i>	372	44.62	2.42	49.73	3.23	94.35	-0.054	-0.143
<i>R. prominens</i>	343	44.02	2.33	49.59	1.11	93.58	-0.059	0.333
<i>Catocala deuteronympha</i>	390	42.30	2.82	47.94	6.92	90.24	-0.062	-0.421
<i>Asota plana</i>	331	45.61	1.20	48.94	4.22	94.55	-0.035	-0.55
<i>M. separata</i>	372	44.62	2.41	49.73	3.24	94.35	-0.05	-0.14
<i>O. lunifer</i>	319	44.51	1.56	48.90	5.01	93.41	-0.04	-0.52
<i>P. curvicornata</i>	340	40.29	2.05	51.17	6.47	91.46	-0.11	-0.51
<i>P. flavescens</i>	541	42.14	2.21	49.72	5.91	91.86	-0.08	-0.45
<i>P. songi</i>	340	42.35	2.94	50.88	3.82	93.23	-0.09	-0.13
<i>S. scintillans</i>	445	42.47	0.89	50.33	6.29	92.80	-0.08	-0.75
<i>S. subcarnea</i>	355	43.94	1.12	49.57	5.35	93.51	-0.06	-0.65
<i>S. frugiperda</i>	330	45.75	1.51	47.57	5.15	93.32	-0.01	-0.54
<i>S. litura</i>	326	46.93	2.12	46.93	3.93	93.86	0	-0.30
<i>V. virilis</i>	362	44.47	1.10	50.55	3.86	95.02	-0.06	-0.55
<i>A. lepigone</i>	542	44.46	1.11	49.63	4.8	94.09	-0.05	-0.625
<i>C. dominula</i>	486	39.92	10.7	35.19	14.2	75.11	0.063	-0.80
<i>C. anachoreta</i>	347	42.94	2.88	48.99	5.19	91.93	-0.065	-0.28
<i>C. anastomosis</i>	325	41.54	1.85	51.69	4.92	93.23	-0.108	-0.454
<i>E. cryptosticta</i>	389	43.44	2.31	50.64	3.6	94.08	-0.076	-0.208
<i>E. pseudoconspersa</i>	388	43.56	2.32	50.26	3.87	93.82	-0.07	-0.25
<i>E. similis</i>	236	43.64	2.12	49.58	4.66	93.22	-0.063	-0.375
<i>G. argentata</i>	340	43.24	1.47	52.06	3.24	95.3	-0.092	-0.375
<i>G. geometrica</i>	407	46.19	2.7	45.95	5.16	92.14	0.002	-0.312
<i>G. aureata</i>	446	43.50	2.69	49.1	4.71	92.6	-0.060	-0.27
<i>G. juizhiensis</i>	450	43.33	2.67	48.44	5.56	91.77	-0.05	-0.35
<i>G. minora</i>	449	43.20	2.67	49.44	4.67	92.64	-0.06	-0.272
<i>G. qinghaiensis</i>	449	42.76	3.11	48.55	5.56	91.31	-0.06	-0.282

Species	Size (bp)	A %	G%	T%	C%	A+T%	AT skew	GC skew
<i>G. qumalensis</i>	373	46.11	2.14	46.64	5.09	92.75	-0.01	-0.407
<i>G. ruorgensis</i>	449	43.42	2.67	48.99	4.89	92.41	-0.60	-0.294
<i>H. lentalis</i>	331	44.41	1.20	50.75	3.62	95.16	-0.06	-0.500
<i>L. alpherakii</i>	449	44.76	2.22	55.00	4.67	99.76	-0.03	-0.034
<i>L. melli</i>	338	43.19	1.47	51.18	4.14	94.37	-0.08	-0.47
<i>M. pallidicosta</i>	328	45.12	1.82	48.47	4.57	93.59	-0.03	-0.42

Table S3. Codon usage of the Protein-coding genes of *Hypospila bolinoides* and *Lygephila dorsigera*.

Codon	N (RSCU)	Codon	N (RSCU)	Codon	N (RSCU)
UUU(F)	257.0(1.69)/298.0(1.52)	CCA(P)	40.0(1.27)/32.0(1.31)	GAU(D)	43.0(1.72)/36.0(1.41)
UUC(F)	48.0(0.31)/95.0(0.48)	CCG(P)	1.0(0.03)/7.0(0.29)	GAC(D)	7.0(0.28)/15.0(0.59)
UUA(L)	368.0(4.26)/217.0(2.72)	ACU(T)	71.0(1.76)/38.0(1.25)	GAA(E)	72.0(1.87)/50.0(1.49)
UUG(L)	18.0(0.21)/59.0(0.74)	ACC(T)	22.0(0.55)/39.0(1.28)	GAG(E)	5.0(0.13)/17.0(0.51)
CUU(L)	52.0(0.60)/68.0(0.85)	ACA(T)	61.0(1.52)/33.0(1.08)	UGU(C)	18.0(1.50)/28.0(1.12)
CUC(L)	12.0(0.14)/42.0(0.53)	ACG(T)	7.0(0.17)/12.0(0.39)	UGC(C)	6.0(0.50)/22.0(0.88)
CUA(L)	60.0(0.69)/77.0(0.97)	GCU(A)	66.0(2.84)/16.0(1.64)	UGA (*)	81.0(1.03)/46.0(0.41)
CUG(L)	8.0(0.09)/15.0(0.19)	GCC(A)	0.0(0.00)/10.0(1.03)	UGG(W)	3.0(1.00)/35.0(1.00)
AUU(I)	372.0(1.67)/240.0(1.44)	GCA(A)	25.0(1.08)/11.0(1.13)	CGU(R)	19.0(1.36)/2.0(0.12)
AUC(I)	47.0(0.21)/84.0(0.51)	GCG(A)	2.0(0.09)/2.0(0.21)	CGC(R)	4.0(0.29)/4.0(0.24)
AUA(I)	249.0(1.12)/175.0(1.05)	UAU(Y)	153.0(1.76)/221.0(1.61)	CGA(R)	19.0(1.36)/9.0(0.53)
AUG(M)	11.0(1.00)/37.0(1.00)	UAC(Y)	21.0(0.24)/53.0(0.39)	CGG(R)	0.0(0.00)/1.0(0.06)
GUU(V)	40.0(1.80)/28.0(1.81)	UAA (*)	142.0(1.81)/246.0(2.20)	AGU(S)	24.0(0.63)/25.0(0.68)
GUC(V)	6.0(0.27)/4.0(0.26)	UAG (*)	13.0(0.17)/43.0(0.39)	AGC(S)	9.0(0.24)/36.0(0.97)
GUA(V)	43.0(1.93)/24.0(1.55)	CAU(H)	76.0(1.81)/61.0(1.53)	AGA(R)	37.0(2.64)/29.0(1.71)
GUG(V)	0.0(0.00)/6.0(0.39)	CAC(H)	8.0(0.19)/19.0(0.48)	AGG(R)	5.0(0.36)/57.0(3.35)
UCU(S)	103.0(2.71)/45.0(1.22)	CAA(Q)	69.0(1.70)/61.0(1.39)	GGU(G)	42.0(1.25)/2.0(0.32)
UCC(S)	19.0(0.50)/36.0(0.97)	CAG(Q)	12.0(0.30)/27.0(0.61)	GGC(G)	1.0(0.03)/9.0(1.44)
UCA(S)	72.0(1.89)/64.0(1.73)	AAU(N)	302.0(1.73)/264.0(1.55)	GGA(G)	87.0(2.60)/8.0(1.28)
UCG(S)	1.0(0.03)/16.0(0.43)	AAC(N)	48.0(0.27)/77.0(0.45)	GGG(G)	4.0(0.12)/6.0(0.96)
CCU(P)	72.0(2.29)/22.0(0.90)	AAA(K)	208.0(1.78)/259.0(1.61)		
CCC(P)	13.0(0.41)/37.0(1.51)	AAG(K)	26.0(0.22)/62.0(0.39)		

Hypospila bolinoides Average# codons= 3730, *Lygephila dorsigera* Average# codons= 3719