

**Table S1.** Organization of the three Satyrinae species (*Hipparchia autonoe* (Hip)), *Paroeneis palaeartica* (Par), and *Oeneis buddha* (Oen)) mitochondrial genomes.

Gene	Direction	Location			Size			Intergenic nucleotides			Start/stop codon		
		Hip	Par	Oen	Hip	Par	Oen	Hip	Par	Oen	Hip	Par	Oen
<b>tRN<sup>Met</sup></b>	J	1~67	1~68	1~69	67	68	69	0	0	0			
tRNA <sup>Ile</sup>	J	68~132	69~133	70~134	65	65	65	-3	-3	-3			
tRNA <sup>Gln</sup>	N	130~198	131~199	132~200	69	69	69	49	48	51			
ND2	J	248~1261	248~1261	252~1265	1014	1014	1014	-2	-2	-2	ATT/TAA	ATT/TAA	ATT/TAA
tRNA <sup>Trp</sup>	J	1260~1326	1260~1326	1264~1330	67	67	67	-8	-8	-8			
tRNA <sup>Cys</sup>	N	1319~1389	1319~1383	1323~1386	65	65	64	0	0	0			
tRNA <sup>Tyr</sup>	N	1384~1447	1384~1451	1387~1451	64	68	65	8	8	6			
COX1	J	1456~2991	1460~2995	1458~2993	1536	1536	1536	-5	-5	-5	CGA/TAA	CGA /TAA	CGA /TAA
tRNA <sup>Leu</sup>	J	2987~3053	2991~3057	2989~3055	67	67	67	0	0	0			
COX2	J	3054~3729	3058~3733	3056~3731	676	676	676	0	0	0	ATG/T	ATG/T	ATG/T
tRNA <sup>Lys</sup>	J	3730~3800	3734~3804	3732~3802	71	71	71	1	1	1			
tRNA <sup>Asp</sup>	J	3802~3867	3806~3871	3804~3871	66	66	68	0	0	0			
ATP8	J	3868~4032	3872~4036	3872~4033	165	165	162	-7	-7	-7	ATT/TAA	ATT/TAA	ATT/TAA
ATP6	J	4026~4703	4030~4707	4027~4704	678	678	678	-1	-1	-1	ATG/TAA	ATG/TAA	ATG/TAA
COX3	J	4703~5491	4707~5495	4704~5492	789	789	789	2	2	2	ATG/TAA	ATG/TAA	ATG/TAA
tRNA <sup>Gly</sup>	J	5494~5559	5498~5564	5495~5560	66	67	66	0	0	0			
ND3	J	5560~5913	5565~5919	5561~5914	354	355	354	0	0	-1	ATC/TAA	ATT/T	ATT/TAA
tRNA <sup>Ala</sup>	J	5914~5979	5920~5983	5914~5978	66	64	65	0	1	1			
tRNA <sup>Arg</sup>	J	5980~6041	5985~6046	5980~6041	62	62	62	0	4	2			
tRNA <sup>Asn</sup>	J	6042~6105	6051~6116	6044~6110	64	66	67	0	-3	-3			
tRNA <sup>Ser</sup>	J	6106~6165	6114~6173	6108~6169	60	60	62	2	2	5			
tRNA <sup>Glu</sup>	J	6168~6232	6176~6243	6175~6239	65	68	65	-2	0	-2			
tRNA <sup>Phe</sup>	N	6231~6294	6244~6308	6238~6303	64	65	66	0	0	3			
ND5	N	6295~8029	6309~8046	6307~8041	1735	1738	1735	0	-3	0	ATC/T	ATT/T	ATT/T
tRNA <sup>His</sup>	N	8030~8095	8044~8110	8042~8107	66	67	66	0	0	0			
ND4	N	8096~9434	8111~9119	8108~9446	1339	1339	1339	-1	-1	-1	ATG/T	ATG/T	ATG/T
ND4L	N	9434~9724	9449~9739	9446~9736	291	291	29	2	2	2	ATG/TAA	ATG/TAA	ATG/TAA
tRNA <sup>Thr</sup>	J	9727~9790	9742~9806	9739~9802	64	64	64	0	0	0			
tRNA <sup>Pro</sup>	N	9791~9855	9806~9870	9803~9867	65	65	65	5	5	2			
ND6	J	9861~10385	9876~10400	9870~10394	525	525	525	-1	-1	-1	ATT/TAA	ATA/TAA	ATT/TAA
CYTB	J	10385~11536	10400~11551	10394~11545	1152	1152	1152	8	8	8	ATG/TAA	ATG/TAA	ATG/TAA
tRNA <sup>Ser</sup>	J	11545~11612	11560~11625	11554~11619	68	66	66	-2	-2	-2			
ND1	N	11611~12564	11624~12577	11618~12571	954	954	954	4	4	4	ATA/TAA	ATA/TAA	ATA/TAA

tRNA <sup>Leu</sup>	N	12569~12635	12582~12649	12576~12642	67	68	67	-24	-25	-29
16S rRNA	N	12612~13969	12625~13986	12614~13975	1358	1362	1362	1	1	0
tRNA <sup>Val</sup>	N	13971~14034	13988~14051	13976~14039	64	64	64	7	0	0
12S rRNA	N	14042~14539	14052~14903	14040~14807	498	852	768	0	0	0
A+T rich		14540~15435	14904~15942	14808~15259	896	1039	452			

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**Table S2.** Summarized mitogenomic characteristics of the 51 Satyrinae species investigated in this study.

Species	Whole genome			PCGs				16S rRNA		12S rRNA		A+T-rich	
	Size(bp)	A+T(%)	AT-skew	Size(bp)	No.of codons	A+T(%)	AT-skew	Size(bp)	A+T(%)	Size(bp)	A+T(%)	Size(bp)	A+T(%)
<i>Callerebia suroia</i>	15,208	77.5	-0.042	11,195	3730	77.9	-0.166	1347	84.4	753	85.4	417	94.3
<i>Coenonympha amaryllis</i>	15,125	79.5	-0.039	11,228	3741	77.9	-0.166	1337	84.3	759	85.0	308	88.6
<i>Coenonympha arcania</i>	15,189	80.1	-0.044	11,232	3744	78.4	-0.161	1359	84.7	756	84.6	353	91.8
<i>Coenonympha tullia</i> *	15,316	78.9	-0.039	11,214	3736	77.8	-0.167	1361	85.0	759	85.5		
<i>Davidina armandi</i>	15,214	79.7	-0.023	11,188	3727	78.2	-0.155	1344	83.9	773	85.0	368	92.9
<i>Elymnias hypermnestra</i>	15,167	80.5	-0.044	11,186	3727	79.1	-0.156	1311	84.7	768	85.0	404	90.6
<i>Hipparchia autonoe</i>	15,435	93.3	-0.017	11,208	3735	76.8	-0.156	1358	83.4	498	83.7	896	94.6
<i>Lasiommata deidamia</i>	15,244	81.1	-0.034	11,191	3729	79.8	-0.156	1321	85.1	762	85.5	417	93.0
<i>Lasiommata maera</i>	15,192	80.2	-0.027	11,190	3729	78.1	-0.153	1370	84.4	769	87.0	537	92.0
<i>Lasiommata majuscula</i>	15,263	81.7	-0.038	11,185	3727	80.3	-0.153	1384	85.1	772	85.6	416	93.3
<i>Lasiommata megera</i>	15,328	81.3	-0.037	11,190	3729	79.8	-0.150	1391	85.2	760	85.7	539	87.9
<i>Lethe albolineata</i>	15,248	79.2	-0.034	11,188	3727	77.6	-0.160	1339	84.0	772	85.2	413	92.0
<i>Lethe baileyi</i>	15,225	79.0	-0.023	11,208	3735	77.4	-0.155	1345	83.4	769	85.0	410	91.9
<i>Lethe baucis</i>	15,251	78.7	-0.031	11,209	3735	76.7	-0.155	1343	84.2	773	85.5	410	92.9
<i>Lethe confusa</i> *	14,945	80.4	-0.055	11,200	3732	79.2	-0.169	1361	84.7	772	85.3		
<i>Lethe dura</i>	15,259	79.2	-0.035	11,233	3743	77.5	-0.169	1341	83.8	752	85.3	432	92.3
<i>Lethe hayashii</i>	15,246	79.0	-0.036	11,206	3734	77.4	-0.160	1337	85.0	763	85.2	416	93.3
<i>Lethe helle</i>	15,253	78.6	-0.019	11,205	3734	76.8	-0.159	1340	84.2	769	85.1	411	91
<i>Lethe marginalis</i>	15,229	80.2	-0.042	11,209	3735	78.6	-0.171	1320	84.5	771	85.9	409	94.4
<i>Lethe nigrifascia</i>	15,239	79.4	-0.023	11,208	3735	77.6	-0.157	1355	83.3	769	85.1	413	92.5
<i>Lethe oculatissima</i>	15,243	79.3	-0.037	11,206	3734	77.4	-0.163	1338	84.6	770	85.1	415	93
<i>Lethe satyrina</i>	15,271	78.8	-0.041	11,209	3735	76.8	-0.165	1338	83.8	769	85	416	93.5
<i>Lethe syrcis</i>	15,252	79.2	-0.038	11,212	3736	77.4	-0.166	1356	84.4	754	84.4	431	93.9
<i>Lethe titania</i>	15,257	78.4	-0.028	11,206	3734	76.7	-0.163	1341	83.0	774	85.0	408	93.1
<i>Lethe uemurai</i>	15,272	78.5	-0.022	11,205	3734	76.6	-0.162	1348	83.6	769	84.9	411	91
<i>Lethe verma</i>	15,239	79.3	-0.042	11,212	3736	77.6	-0.163	1338	83.7	770	86.0	412	93.6
<i>Maniola bathseba</i>	14,675	78.7	-0.020	10,867	3621	76.4	-0.154	1110	80.6	701	84.9	595	89.3
<i>Maniola cecilia</i>	15,555	78.6	-0.028	11,200	3733	76.2	-0.166	1360	83.5	770	85.4	795	91.2
<i>Maniola hyperantus</i> *	15,240	80.0	-0.030	11,216	3737	78.5	-0.157	1357	84.1	777	85.4		
<i>Maniola jurtina</i>	15,258	79.7	-0.038	11,185	3727	78.2	-0.165	1377	82.8	766	85.4	404	93.8
<i>Melanargia asiatica</i>	15,142	79.0	-0.036	11,190	3728	77.5	-0.169	1336	84.4	775	85.6	319	81.9
<i>Melanargia cao</i>	15,469	79.8	-0.028	11,191	3729	77.6	-0.167	1360	84.1	774	86.0	644	94.8
<i>Melanargia galathea</i>	15,047	79.2	-0.049	11,074	3690	78.6	-0.173	1365	85.3	784	83.1	343	97.3
<i>Melanargia ines</i>	15,032	80.8	-0.054	11,189	3729	79.2	-0.169	1358	85.1	735	87.1	344	91.6
<i>Melanitis leda</i>	15,122	89.5	-0.037	11,194	3730	78.4	-0.166	1332	84.0	774	85.0	314	89.5
<i>Melanitis phedima</i>	15,142	89.7	-0.037	11,179	3725	78.4	-0.166	1329	84.0	780	85.1	183	89.7
<i>Minois dryas</i>	15,194	80.2	-0.028	11,200	3732	78.7	-0.161	1332	84.5	773	85.7	381	94.0
<i>Mycalesis francisca</i>	15,279	79.9	-0.037	11,203	3733	78.1	-0.160	1341	84.9	775	86.2	410	92.7

<i>Mycalesis intermedia</i>	15,386	80.8	-0.029	11,077	3691	79.0	-0.163	1352	85.7	770	85.5	512	93.3
<i>Mycalesis mineus</i> *	15,267	80.8	-0.030	11,140	3712	79.2	-0.163	1080	84.2	770	85.1		
<i>Neope muirheadii</i>	15,217	80.0	-0.055	11,206	3734	78.5	-0.157	1333	83.9	772	85.9	413	93.0
<i>Neope pulaha</i>	15,209	79.1	-0.039	11,194	3730	77.5	-0.161	1329	83.9	781	85.6	127	89.2
<i>Ninguta schrenckii</i>	15,261	80.2	-0.053	11,185	3726	78.6	-0.165	1342	84.8	772	84.6	403	92.2
<i>Oeneis buddha</i>	15,259	79.6	-0.029	11,205	3734	78.1	-0.157	1362	83.6	768	84.6	452	91.4
<i>Oeneis urda</i>	15,248	80.0	-0.022	11,179	3724	78.3	-0.159	1346	84.6	774	85.3	415	94.0
<i>Pararge aegeria</i>	15,239	80.5	-0.034	11,185	3727	78.9	-0.160	1340	84.8	772	85.7	420	94.3
<i>Paroeneis palaeartica</i>	15,942	78.2	-0.022	11,212	3736	78.8	-0.157	1362	83.1	852	78.5	1039	61.8
<i>Triphysa phryne</i>	15,143	80.0	-0.036	11,185	3727	77.3	-0.171	1343	84.3	775	84.9	316	83.5
<i>Ypthima akragas</i> *	15,227	81.9	-0.054	11,206	3734	78.9	-0.160	1326	85.7	546	84.8		
<i>Ypthima motschulskyi</i>	15,232	81.8	-0.051	11,169	3722	80.5	-0.152	1274	85.2	813	86.8	360	93.9
<i>Ypthima baldus</i>	15,304	80.8	-0.045	11,181	3726	80.5	-0.151	1384	84.6	779	85.9	369	91.6

Note: \* the mitochondrial genome of the indicated species is incomplete.

**Table S3.** List of taxon used for the phylogenetic analyses in this study.

<b>Taxon</b>	<b>Mitogenome size(bp)</b>	<b>GenBank accession no.</b>	<b>Reference</b>
Satyrinae			
Elymniini			
<i>Elymnias hypermnestra</i>	15,167	KF906484	Shi et al.[31]
Melanitini			
<i>Melanitis phedima</i>	15,142	KF590538	Wu et al.[33]
<i>Melanitis leda</i>	15,122	JF905446	Shi et al [34]
Satyrini			
<i>Callerebia suroia</i>	15,208	NC026060	Unpublished
<i>Coenonympha amaryllis</i>	15,125	NC046491	Zhou et al.[32]
<i>Coenonympha arcania</i>	15,189	ERR3169554	
<i>Coenonympha tullia</i>	15,316	KM592972	Unpublished
<i>Davidina armandi</i>	15,214	KF881046	Unpublished
<i>Hipparchia autonoe</i>	15,489	OK094488	This study
<i>Lasiommata deidamia</i>	15,244	MG880214	Unpublished
<i>Lasiommata maera</i>	15,192	ERR3169666	
<i>Lasiommata majuscula</i>	15,263	MN012997	Unpublished
<i>Lasiommata megera</i>	15,328	ERR3169678	
<i>Lethe albolineata</i>	15,248	NC028507	Li et al.[35]
<i>Lethe baileyi</i>	15,225	NC050905	Lu et al.[29]
<i>Lethe baucis</i>	15,251	NC050906	Lu et al.[29]
<i>Lethe confusa</i>	14,945	MT654529	Unpublished
<i>Lethe dura</i>	15,259	KF906485	Shi et al.[31]
<i>Lethe hayashii</i>	15,246	NC050907	Lu et al.[29]
<i>Lethe helle</i>	15,253	NC050908	Lu et al.[29]
<i>Lethe marginalis</i>	15,229	NC050909	Lu et al.[29]
<i>Lethe nigrifascia</i>	15,239	NC050910	Lu et al.[29]

<i>Lethe oculatissima</i>	15,243	NC050911	Lu et al.[29]
<i>Lethe satyrina</i>	15,271	NC050912	Lu et al.[29]
<i>Lethe syrcis</i>	15,252	NC050913	Lu et al.[29]
<i>Lethe titania</i>	15,257	NC050914	Lu et al.[29]
<i>Lethe uemurai</i>	15,272	NC050915	Lu et al.[29]
<i>Lethe verma</i>	15,239	NC050916	Lu et al.[29]
<i>Maniola bathseba</i>	14,675	SRR8850746	
<i>Maniola cecilia</i>	15,555	ERR3169794	
<i>Maniola hyperantus</i>	15,240	KM592969	Unpublished
<i>Maniola jurtina</i>	15,258	HG995237	Unpublished
<i>Melanargia asiatica</i>	15,142	NC024550	Huang et al.[36]
<i>Melanargia cao</i>	15,469	MN012999	Unpublished
<i>Melanargia galathea</i>	15,047	SRR885066	
<i>Melanargia ines</i>	15,032	ERR3169723	
<i>Minois dryas</i>	15,194	NC046591	Yang et al.[37]
<i>Mycalesis francisca</i>	15,279	MN242790	Yang et al.[37]
<i>Mycalesis intermedia</i>	15,386	MN610565	Wu et al.[38]
<i>Mycalesis mineus</i>	15,267	KM244676	Tang et al.[39]
<i>Neope muirheadii</i>	15,217	MN242789	Yang et al.[37]
<i>Neope pulaha</i>	15,209	KF590543	Wu et al.[33]
<i>Ninguta schrenckii</i>	15,261	KF881052	Fan et al.[40]
<i>Oeneis buddha</i>	15,259	OK094489	This study
<i>Oeneis urda</i>	15,248	NC046889	Zhou et al.[41]
<i>Pararge aegeria</i>	15,239	KJ547676	da Costa. [42]
<i>Paroeneis palaeartica</i>	15,942	OK094490	This study
<i>Triphysa phryne</i>	15,143	KF906487	Zhang et al.[43]
<i>Ypthima akragas*</i>	15,227	KF590553	Wu et al.[33]
<i>Ypthima motschulskyi</i>	15,232	MN242788	Yang et al.[37]
<i>Ypthima baldus</i>	15,304	MN708051	Li et al.[44]