Supplementals

Luminescent characteristics and mitochondrial COI barcodes of nine cohabitated Taiwanese fireflies

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Table S1. 161 mitochondrial COI sequences used in this study.

Table S2. Luminescent spectrum (λ_{max}) and luminescent intensity (nW/cm^2) of nine cohabitated species from two habitats.

Table S3. Morphological measurements of eight adult fireflies. (TL: body length, PL: pronotum length, PW: pronotum width, EL: front wing length, and EW: front wing width)

Fig. S1. Luminescent spectrum of nine cohabitated fireflies.

Fig. S2. NJ tree

Fig. S3. ML tree

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Genus	Species	Accession number	literature
Abscondita	*anceyi*	MH020192	(Hu & Fu 2018a)
Abscondita	*cerata**	MT534192	this study
Abscondita	*cerata**	MT534199	this study
Abscondita	*chinensis*	MK122952	(Wang & Fu 2019)
Abscondita	*chinensis**	BF8	this study
Abscondita	*chinensis**	MT534196	this study
Abscondita	*terminalis*	MK292092	(Chen et al. 2019)
Aquatica	*ficta*	NC035060	(Wang et al. 2017)
Aquatica	*ficta**	MT534197	this study
Aquatica	*lateralis*	LC306678	(Maeda et al. 2017)
Aquatica	*lateralis*	MK779000	(Kim et al. 2021)
Aquatica	*leii*	KF667531	(Jiao et al. 2015)
Aquatica	*wuhana*	KX758086	(Wang et al. 2017)
Aspisoma	*sp.*	EU009322	(Stanger-Hall et al. 2007)
Aspisoma	*sp.*	MZ394518	(Martin et al. 2021)
Asymmetricata	*circumdata*	MK292113	(Chen et al. 2019)
Asymmetricata	*circumdata*	NC032062	(Luan & Fu 2016)
Bicellonycha	*wickershamorum*	EU009302	(Stanger-Hall et al. 2007)
Bicellonychia	*lividipeis*	NC030060	(Amaral et al. 2016)
Caenia	*amplicornis*	EU009289	(Stanger-Hall et al. 2007)
Curtos	*costipennis*	AB608764	(Oba et al. 2011)
Curtos	*costipennis*	MK609965	Zhang and Fu 2019 Direct submission
Curtos	*fulvocapitalis*	NC058281	(Li et al. 2022)
Curtos	*okinawanus*	AB608765	(Oba et al. 2011)
Curtos	*sauteri**	MT534198	this study
Cyphonocerus	*marginatus*	AB608754	(Oba et al. 2011)
Cyphonocerus	*ruficollis*	AB608755	(Oba et al. 2011)
Cyphonocerus	*sanguineus*	MW365445	(Yuan et al. 2021)
Diaphanes	*citrinus*	MK292103	(Chen et al. 2019)
Diaphanes	*citrinus*	NC051869	(Yang & Fu 2019)
Diaphanes	*mendax*	NC044791	(Chen et al. 2019)
Diaphanes	*nubilus*	NC044787	(Chen et al. 2019)
Diaphanes	*pectinealis*	NC044793	(Chen et al. 2019)
Diaphanes	*sp.*	MK292095	(Chen et al. 2019)
Drilaster	*axillaris*	AB608756	(Oba et al. 2011)
Drilaster	*ohbayashii*	AB608757	(Oba et al. 2011)
Drilaster	*okinawensis*	AB608758	(Oba et al. 2011)

Drilaster	*sp.*	MK292100	(Chen et al. 2019)
Ellychnia	*corrusca*	KM845872	Hebert et al. 2014 Direct Submission
Ellychnia	*corrusca*	KR483038	(Hebert et al. 2016)
Ellychnia	*corrusca*	MG242622	Fallon et al. 2017 Direct Submission
Emeia	*pseudosauteri*	MK292112	(Chen et al. 2019)
Emeia	*pseudosauteri*	MN722654	(Liu & Fu 2020)
Lamprigera	*luquanensis sp. nov.*	MK292091	(Chen et al. 2019)
Lamprigera	*yunnana*	KX758087	(Wang et al. 2017)
Lamprohiza	*splendidula*	KM439947	(Hendrich et al. 2015)
Lamprohiza	*splendidula*	KU919134	Rulik and Ahrens 2016 Direct Submission
Lampyris	*noctiluca*	KJ965576	(Pentinsaari et al. 2014)
Lampyris	*noctiluca*	KM450587	(Hendrich et al. 2015)
Lampyris	*noctiluca*	MN122858	Margaryan 2019 Direct submission
Lucidina	*accensa*	AB608771	(Oba et al. 2011)
Lucidina	*biplagiata*	AB608772	(Oba et al. 2011)
Lucidina	*kotbandia*	FJ462784	Kang et al. 2008 Direct Submission
Lucidina	*sp.*	MK292098	(Chen et al. 2019)
Lucidota	*atra*	KM845124	Hebert et al. 2014 Direct Submission
Lucidota	*atra*	KM847871	Hebert et al. 2014 Direct Submission
Lucidota	*atra*	KR128152	Hebert et al. 2015 Direct Submission
Luciola	*cruciata*	AB608760	(Oba et al. 2011)
Luciola	*cruciata*	AB608783	(Oba et al. 2011)
Luciola	*cruciata*	NC022472	Matsui 2013 Direct submission
Luciola	*curtithorax*	NC038225	(Hu & Fu 2018b)
Luciola	*curtithorax**	MT534191	this study
Luciola	*curtithorax**	MT534193	this study
Luciola	*curtithorax**	MT534195	this study
Luciola	*filiformis yayeyamana*	AB608761	(Oba et al. 2011)
Luciola	*filiformis**	MT534201	this study
Luciola	*italica*	KM448530	(Hendrich et al. 2015)
Luciola	*italica*	KM448734	(Hendrich et al. 2015)
Luciola	*kagiana**	MT534200	this study
Luciola	*papariensis*	MK778992	(Kim et al. 2021)
Luciola	*papariensis*	MK778999	(Kim et al. 2021)
Luciola	*parvula*	AB608763	(Oba et al. 2011)
Luciola	*parvula*	LC222417	Oba et al. 2017 Direct submission
Luciola	*singapura*	MW620432	(Jusoh et al. 2021)
Luciola	*sp.*	EU009318	(Stanger-Hall et al. 2007)
Luciola	*sp.*	MK292105	(Chen et al. 2019)

Luciola	*sp.*	MK292108	(Chen et al. 2019)
Luciola(Hotaria)	*unmunsana*	MK778938	(Kim et al. 2021)
Luciola(Hotaria)	*unmunsana*	MK778977	(Kim et al. 2021)
Luciola(Hotaria)	*unmunsana*	NC050947	(Kim et al. 2020)
Micronaspis	*floridana*	EU009314	(Stanger-Hall et al. 2007)
Microphotus	*angustus*	EU009301	(Stanger-Hall et al. 2007)
Phausis	*reticulata*	EU009311	(Stanger-Hall et al. 2007)
Phausis	*rhombica*	KM850440	Hebert et al. 2014 Direct Submission
Phausis	*rhombica*	KR914931	(Hebert et al. 2016)
Phosphaenus	*hemipterus*	KM452081	(Hendrich et al. 2015)
Phosphaenus	*hemipterus*	MW259939	Koehler et al. 2020 Direct submission
Photinus	*australis*	EU009298	(Stanger-Hall et al. 2007)
Photinus	*floridanus*	EU009306	(Stanger-Hall et al. 2007)
Photinus	*ignitus*	KR483936	(Hebert et al. 2016)
Photinus	*ignitus*	KR490880	(Hebert et al. 2016)
Photinus	*indictus*	MG054195	Dewaard 2017 Direct Submission
Photinus	*marginellus*	JF888957	International Barcode of Life (iBOL) Direct Submission
Photinus	*marginellus*	KM845360	Hebert et al. 2014 Direct Submission
Photinus	*marginellus*	KM848322	Hebert et al. 2014 Direct Submission
Photinus	*punctulatus*	EU009312	(Stanger-Hall et al. 2007)
Photinus	*pyralis*	HM433332	International Barcode of Life (iBOL) Direct Submission
Photinus	*pyralis*	KY778696	(Fallon et al. 2018)
Photinus	*tanytoxis*	EU009315	(Stanger-Hall et al. 2007)
Photuris	*aff lucicrescens*	KR490457	(Hebert et al. 2016)
Photuris	*lucicrescens*	EU009290	(Stanger-Hall et al. 2007)
Photuris	*pensylvanica*	AY165656	(Hebert et al. 2003)
Photuris	*pensylvanica*	KM844740	Hebert et al. 2014 Direct Submission
Photuris	*pensylvanica*	MF637320	Dewaard 2017 Direct Submission
Photuris	*quadrifulgens*	HM433520	International Barcode of Life (iBOL) Direct Submission
Photuris	*quadrifulgens*	KJ166508	Dewaard et al. 2014 Direct Submission
Photuris	*quadrifulgens*	KM845417	Hebert et al. 2014 Direct Submission
Photuris	*tremulans*	EU009308	(Stanger-Hall et al. 2007)
Photuris	*tremulans*	KR480659	(Hebert et al. 2016)
Pleotomodes	*needhami*	EU009305	(Stanger-Hall et al. 2007)
Pollaclasis	*bifaria*	KM846040	Hebert et al. 2014 Direct Submission
Pollaclassis	*bifaria*	EU009295	(Stanger-Hall et al. 2007)
Pristolycus	*sagulatus*	AB608773	(Oba et al. 2011)
Pristolycus	*sp.*	MK292099	(Chen et al. 2019)
Pteroptyx	*asymmetria*	KY572920	(Jusoh et al. 2014)

Pteroptyx	*asymmetria*	KY572923	(Jusoh et al. 2014)
Pteroptyx	*bearni*	KY572954	(Jusoh et al. 2014)
Pteroptyx	*bearni*	KY572955	(Jusoh et al. 2014)
Pteroptyx	*maipo*	NC036353	(Fan & Fu 2017)
Pteroptyx	*malaccae*	KY572958	(Jusoh et al. 2014)
Pteroptyx	*malaccae*	KY572961	(Jusoh et al. 2014)
Pteroptyx	*tener*	MT140361	(Cheng et al. 2021)
Pteroptyx	*valida*	KY573051	(Jusoh et al. 2014)
Pteroptyx	*valida*	MW620447	(Jusoh et al. 2021)
Pterotus	*obscuripennis*	EU009303	(Stanger-Hall et al. 2007)
Pygoluciola	*qingyu*	MK292093	(Chen et al. 2019)
Pygoluciola	*qingyu*	NC057261	(Liu & Fu 2020)
Pygoluciola	*sp.*	MK292102	(Chen et al. 2019)
Pyractomena	*angulata*	EU009307	(Stanger-Hall et al. 2007)
Pyractomena	*angulata*	HM433326	International Barcode of Life (iBOL) Direct Submission
Pyractomena	*angulata*	KR482095	(Hebert et al. 2016)
Pyractomena	*borealis*	KM842107	Hebert et al. 2014 Direct Submission
Pyractomena	*palustris*	EU009309	(Stanger-Hall et al. 2007)
Pyractomena	*palustris*	KR488871	(Hebert et al. 2016)
Pyrocoelia	*abdominalis*	AB608766	(Oba et al. 2011)
Pyrocoelia	*analis*	OK323960	Guo 2021 Direct submission
Pyrocoelia	*atripennis*	AB608767	(Oba et al. 2011)
Pyrocoelia	*discicollis*	AB608768	(Oba et al. 2011)
Pyrocoelia	*fumosa*	AB608769	(Oba et al. 2011)
Pyrocoelia	*matsumurai*	AB608770	(Oba et al. 2011)
Pyrocoelia	*pectoralis*	KP763467	Fu and Luan 2015 Direct Submission
Pyrocoelia	*praetexta Yunnan*	MK292115	(Chen et al. 2019)
Pyrocoelia	*praetexta**	MT534194	this study
Pyrocoelia	*pygidialis*	MK292097	(Chen et al. 2019)
Pyrocoelia	*rufa*	AF452048	(Bae et al. 2004)
Pyrocoelia	*thibetana*	MK292117	(Chen et al. 2019)
Pyropyga	*decipiens*	EU009300	(Stanger-Hall et al. 2007)
Pyropyga	*nigricans*	EU009294	(Stanger-Hall et al. 2007)
Pyropyga	*nigricans*	HM433335	International Barcode of Life (iBOL) Direct Submission
Pyropyga	*nigricans*	KM847886	Hebert et al. 2014 Direct Submission
Pyropyga	*nigricans*	KR490073	(Hebert et al. 2016)
Rhagophthalmus	*lufengensis*	NC010969	(Li et al. 2007)
Rhagophthalmus	*ohbai*	AB608775	(Oba et al. 2011)
Rhagophthalmus	*ohbai*	NC010964	(Li et al. 2007)

Sclerotia	*aquatilis*	KP763466	Fu and Luan 2015 Direct Submission
Sclerotia	*flavida*	KP763458	Fu and Luan 2015 Direct Submission
Sclerotia	*fui*	KP763465	Fu and Luan 2015 Direct Submission
Sclerotia	*substriata*	NC027176	(Mu et al. 2016)
Stenocladius	*sp.*	MK292101	(Chen et al. 2019)
Stenocladius	*yoshikawai*	AB608759	(Oba et al. 2011)
Vesta	*saturnalis*	NC044788	(Chen et al. 2019)

Table S2. Light spectrum (λ_{max}) and luminescent intensity (nW/cm²) of nine cohabitated species from two habitats.

Species	Sex	Individuals (n)	λ_{max} (nm)	Luminescent intensity (nW/cm²)	
				Mean	Maximum
A. Nankang, Taipei:					
Abscondita cerata	female	9	562.3 ± 0.4	164.6 ± 40.6	282.2
	male	14	563.2 ± 0.5	333.4 ± 91.3	1065
Aquatica ficta	female	-	-	-	-
	male	1	567	807.0	
Luciola kagiana	female	3	574.3 ± 0.3	NA	NA
	male	2	575.0 ± 0.0	5.4 ± 4.8	10.2
Luciola curtithorax	female	12	566.3 ± 0.4	157.9 ± 30.4	301.3
	male	26	572.5 ± 0.2	356.1 ± 48.0	814.1
Luciola filiformis	female	-	-	-	-
	male	12	567.3 ± 0.2	182.1 ± 31.2	323.8
B. Nanzhuang, Miaoli:					
Abscondita cerata	female	8	561.8 ± 0.8	102.0 ± 18.5	187
	male	14	564.1 ± 0.4	512.4 ± 198.3	2048
Abscondita chinensis	female	3	571.3 ± 0.3	245.7 ± 83.9	329.7
	male	2	572.0 ± 0.0	332.1	332.1
Aquatica ficta	female	5	564.0 ± 0.5	569.4 ± 101.1	850
	male	16	564.3 ± 0.2	508.1 ± 73.3	1102
Luciola kagiana	female	-	-	-	-
	male	1	572	NA	NA
Curtos sauteri	female	5	554.0 ± 0.3	187.7 ± 55.7	349.3
	male	3	552.7 ± 0.9	347.3 ± 95.9	536.7
Curtos costipennis	female	1	554	462	
	male	-	-	-	-
Pyrocoelia praetexta	larva*	3	552.7 ± 0.9	NA	NA

* light spectra were only successfully recorded from larvae.

Table S3. Morphological measurements of eight adult fireflies. (TL: body length, PL: pronotum length, PW: pronotum width, EL: front wing length, and EW: front wing width)

Species	Specimen number	TL (mm)	PL (mm)	PW (mm)	EL (mm)	EW (mm)
Abscondita chinensis						
Female	3	10.49±0.26	2.03±0.1	3.1±0.2	8.12±0.49	3.88±0.10
Male	2	9.58±0.15	2.05±0.04	2.83±0.04	7.4±0.09	3.29±0.02
Total	5	10.12±0.5	2.03±0.08	2.99±0.21	7.83±0.52	3.64±0.30*
Abscondita cerata						
Female	28	10.01±0.7	2.02±0.18	3.14±0.28	7.77±0.56	4.05±0.32
Male	30	9.37±0.32	1.94±0.19	2.76±0.23	7.41±0.36	3.55±0.23
Total	68	9.69±0.63	1.98±0.19***	2.95±0.32	7.58±0.5	3.79±0.37
Aquatica ficta						
Female	5	9.5±1.04	2.03±0.11	3.03±0.34	7.46±0.85	3.67±0.41
Male	15	8.6±0.64	1.79±0.16	2.63±0.26	6.6±0.56	3.18±0.28
Total	20	8.83±0.85	1.85±0.18**	2.73±0.33	6.81±0.74	3.3±0.38
Luciola kagiana						
Female	1	10.52±0	2.08±0	3.06±0	8.65±0	3.85±0
Male	6	9.68±0.63	1.94±0.13	2.89±0.19	7.8±0.46	3.46±0.17
Total	7	9.8±0.65	1.96±0.13	2.91±0.19	7.92±0.52	3.52±0.21
Luciola curtithorax						
Female	2	6.67±0.11	1.28±0.19	2.08±0.03	5.02±0.02	2.61±0.1
Male	3	6.10±0.19	0.94±0.2	1.83±0.18	4.51±0.35	2.15±0.08
Total	5	6.33±0.32*	1.07±0.26	1.93±0.19	4.71±0.37	2.33±0.24
Luciola filiformis						
Female	0					
Male	1	5.93	1.26	1.53	4.63	2.07
Total	1	5.93	1.26	1.53	4.63	2.07
Curtos sauteri						
Female	4	6.43±0.58	1.28±0.2	1.88±0.28	5.07±0.57	2.47±0.19
Male	1	6.13	1.13	1.83	4.87	2.09
Total	5	6.37±0.53	1.25±0.19	1.87±0.26	5.03±0.51	2.39±0.23
Curtos costipennis						
Female	1	7.32	1.68	2.26	5.72	2.54
Male	0					
Total	1	7.32	1.68	2.26	5.72	2.54

* *p-value < 0.05*, ** p-value < 0.01, *** p-value < 0.001

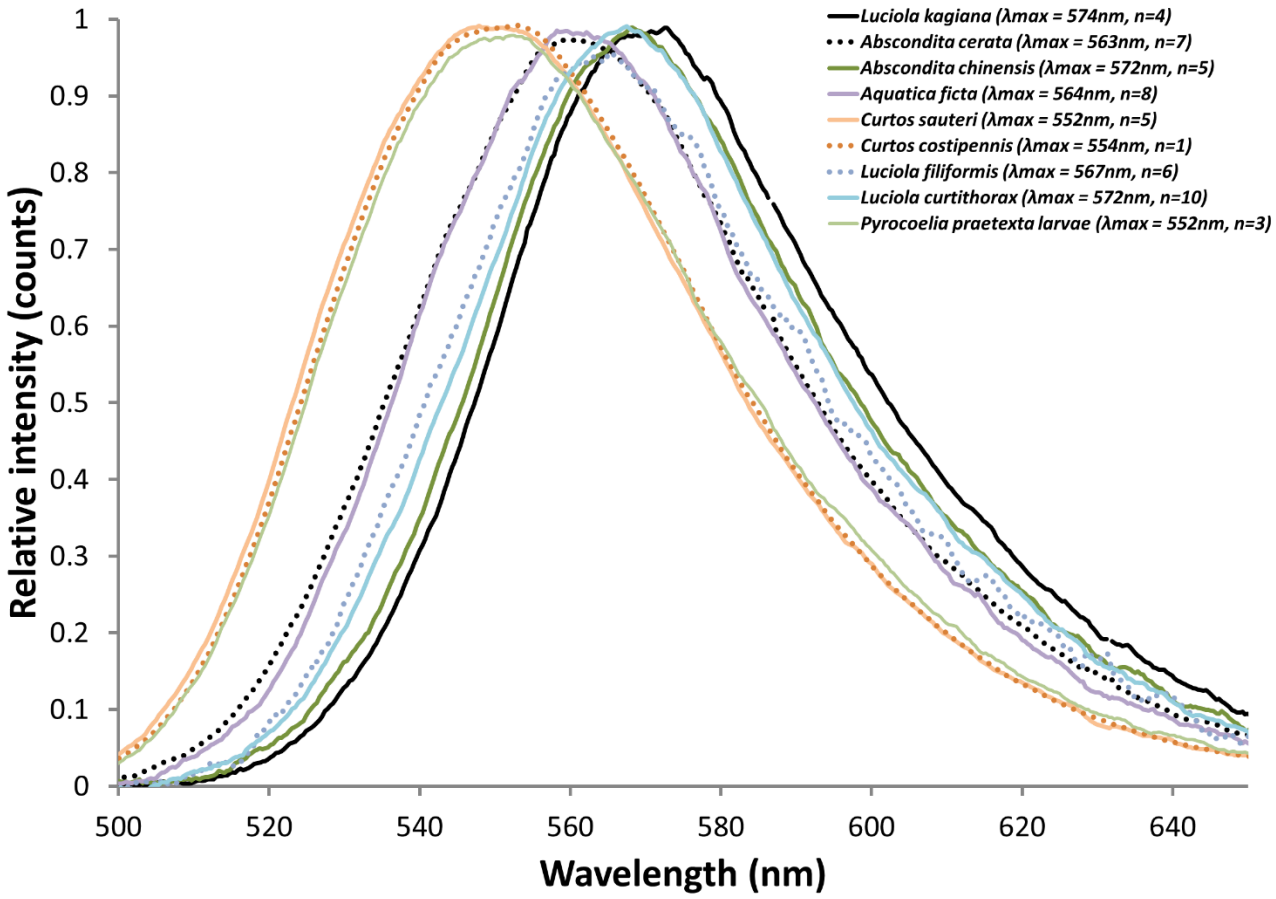

Fig. S1. Luminescent spectrum of nine cohabitated fireflies.

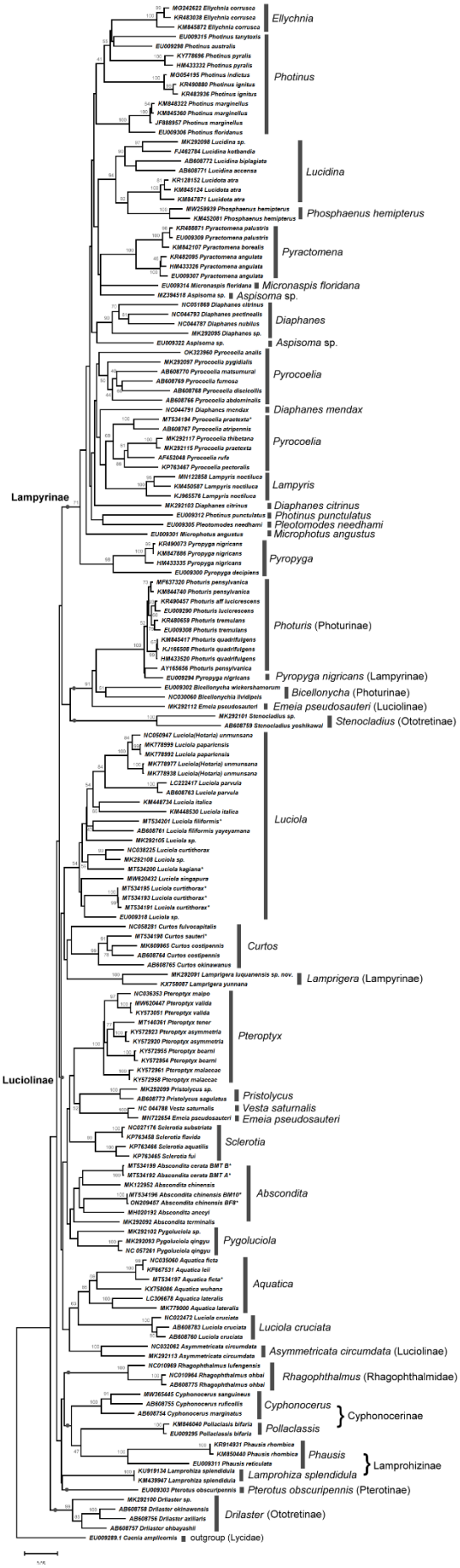

Fig. S2. NJ tree.

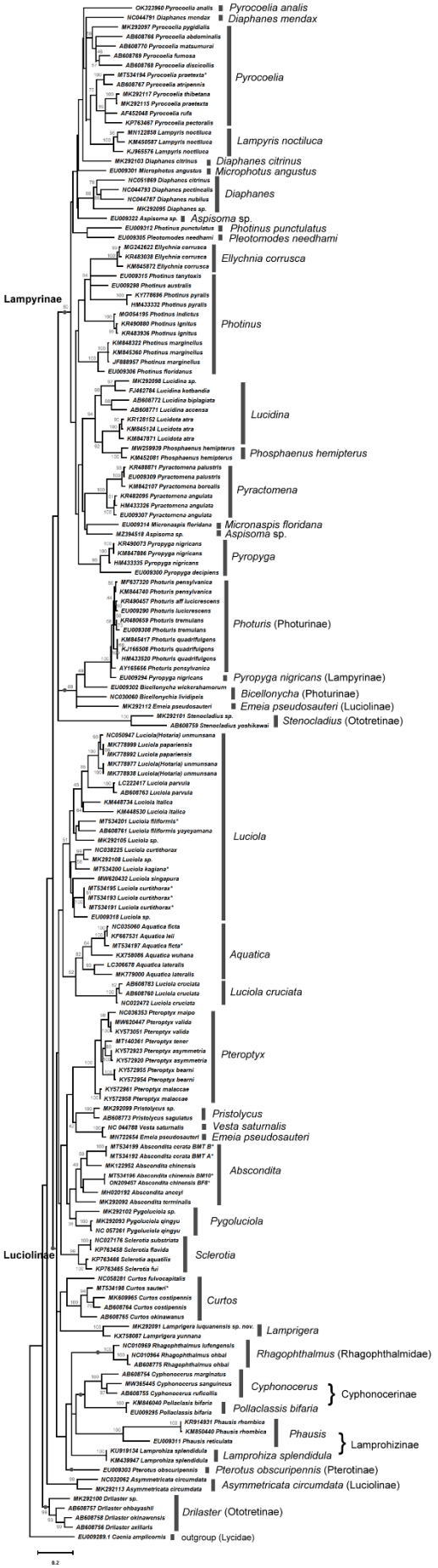

Fig. S3 ML tree

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