

**Genetic support for the morphological identification of
larvae of Myctophidae, Gonostomatidae,
Sternoptychidae and Phosichthyidae (Pisces)
from the western Mediterranean**

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Supplementary material

Table S1. – Literature containing information on larvae and adult identification characteristics of the mesopelagic fishes analysed in this study.

	Larvae	Adults
O. Myctophiformes		
F. Myctophidae		
SF. Lampanyctinae		
<i>Ceratoscopelus maderensis</i>	Tåning 1918	Lowe 1839, Tåning 1918, Hulley 1984
<i>Diaphus holti</i>	Tåning 1918	Tåning 1918, Hulley 1984
<i>Lampanyctus crocodilus</i>	Tåning 1918	Risso 1810, Tåning 1918, Hulley 1984
<i>Lampanyctus pusillus</i>	Tåning 1918, Olivar et al. 1999	Johnson 1890, Tåning 1918, Hulley 1984
<i>Lobianchia dofleini</i>	Tåning 1918, Berdar and Cavaliere 1975	Zugmayer 1911, Tåning 1918, Hulley 1984
<i>Notoscopelus bolini</i>	Palomera 1983	Nafpaktitis 1975, Hulley 1984
<i>Notoscopelus elongatus</i>	Tåning 1918, Palomera 1983	Costa 1844, Tåning 1918, Hulley 1984
SF. Myctophinae		
<i>Benthoosema glaciale</i>	Tåning 1918	Reinhardt 1837, Tåning 1918, Hulley 1984
<i>Electrona risso</i>	Tåning 1918	Cocco 1829, Tåning 1918, Hulley 1984
<i>Hygophum benoiti</i>	Tåning 1918, Olivar and Palomera 1994	Cocco 1838, Tåning 1918, Hulley 1984
<i>Hygophum hygomii</i>	Tåning 1918, Olivar and Palomera 1994	Lütken 1892, Tåning 1918, Hulley 1984
<i>Myctophum punctatum</i>	Tåning 1918	Rafinesque 1810, Tåning 1918, Hulley 1984
<i>Symbolophorus veranyi</i>	Tåning 1918	Moreau 1888, Tåning 1918, Hulley 1984
O. Stomiiformes		
F. Sternoptychidae		
<i>Argyroleucus hemigygnus</i>	Jespersen and Tåning 1926	Cocco 1829, Badcock 1984
<i>Maurolucus muelleri</i>	Jespersen and Tåning 1926, Sanzo 1931	Gmelin 1789, Jespersen and Tåning 1926, Sanzo 1931
F. Gonostomatidae		
<i>Cyclothone braueri</i>	Jespersen and Tåning 1926	Jespersen and Tåning 1926
<i>Cyclothone pygmaea</i>	Jespersen and Tåning 1926	Jespersen and Tåning 1926
F. Phosichthyidae		
<i>Vinciguerria attenuata</i>	Jespersen and Tåning 1926, Sanzo 1931	Cocco 1838, Jespersen and Tåning 1926, Sanzo 1931

Table S2. – List of sequences of myctophids and stomiiforms used in the present study. Codes for the sequences from our lab are shown on the right part of the table. Apart from our results, the sequences that were used in this study and selected from GenBank (<http://www.ncbi.nlm.nih.gov/genbank>) are listed with the corresponding accession number and source. The outgroup species *Bathylagus euryps* was included.

Family	Species / Genus	No. Nucleotides	Genetic marker	Source Identifier	Accession number	Abbreviation
Sternoptychidae	<i>Argyropeltecus hemigymnus</i>	565	cytochrome oxidase subunit I (COI) gene	This study	KC616410	AhA2
	<i>Argyropeltecus hemigymnus</i>	650	cytochrome oxidase subunit I (COI) gene	Zhang et al. 2007	EU148085	
	<i>Argyropeltecus hemigymnus</i>	651	cytochrome oxidase subunit I (COI) gene	Zhang et al. 2007	EU148086	
	<i>Argyropeltecus hemigymnus</i>	651	cytochrome oxidase subunit I (COI) gene	Zhang et al. 2007	EU148087	
	<i>Argyropeltecus hemigymnus</i>	652	cytochrome oxidase subunit I (COI) gene	Hastings and Burton 2010	GU440233	
	<i>Argyropeltecus affinis</i>	391	mitochondrial gene for subunit 12S rRNA	Miya and Nishida 1998	D89749	
	<i>Argyropeltecus sladeni</i>	391	mitochondrial gene for subunit 12S rRNA	Miya and Nishida 1998	D89748	
	<i>Argyropeltecus aculeatus</i>	391	mitochondrial gene for subunit 12S rRNA	Miya and Nishida 1998	D89744	
	<i>Argyropeltecus aculeatus</i>	391	mitochondrial gene for subunit 12S rRNA	Miya and Nishida 1998	D89735	
	<i>Benthosema glaciale</i>	565	cytochrome oxidase subunit I (COI) gene	This study	KC616365	BgL1
	<i>Benthosema glaciale</i>	565	cytochrome oxidase subunit I (COI) gene	This study	KC616366	BgA2
	<i>Benthosema glaciale</i>	566	cytochrome oxidase subunit I (COI) gene	This study	KC616367	BgT3
	<i>Benthosema glaciale</i>	565	cytochrome oxidase subunit I (COI) gene	This study	KC616368	BgA4
	<i>Benthosema glaciale</i>	565	cytochrome oxidase subunit I (COI) gene	This study	KC616369	BgA5
	<i>Benthosema glaciale</i>	648	cytochrome oxidase subunit I (COI) gene	Zhang et al. 2007	EU148097	
<i>Benthosema glaciale</i>	624	cytochrome oxidase subunit I (COI) gene	Keskin, E., 2010	HQ167646		
<i>Benthosema glaciale</i>	624	cytochrome oxidase subunit I (COI) gene	Sweetman, C. J., 2009	EU148098		
Gonostomatidae	<i>Cyclothone braueri</i>	348	mitochondrial gene for subunit 12S rRNA	Miya and Nishida 1996	D84032	
	<i>Cyclothone braueri</i>	372	mitochondrial gene for subunit 12S rRNA	This study	KC616355	ChL1
	<i>Cyclothone braueri</i>	372	mitochondrial gene for subunit 12S rRNA	This study	KC616353	ChL2
	<i>Cyclothone braueri</i>	372	mitochondrial gene for subunit 12S rRNA	This study	KC616356	ChL4
	<i>Cyclothone braueri</i>	372	mitochondrial gene for subunit 12S rRNA	This study	KC616354	Chf6
	<i>Cyclothone pygmaea</i>	372	mitochondrial gene for subunit 12S rRNA	This study	KC616357	CpA2
	<i>Cyclothone pallida</i>	372	mitochondrial gene for subunit 12S rRNA	This study	KC616358	CpA3
	<i>Cyclothone alba</i>	349	mitochondrial gene for subunit 12S rRNA	This study	D84040	
	<i>Cyclothone pygmaea</i>	349	mitochondrial gene for subunit 12S rRNA	Miya and Nishida 1996	AB026030	
	<i>Cyclothone alba</i>	349	mitochondrial gene for subunit 12S rRNA	Miya and Nishida 1996	D84043	
	<i>Ceratoscopus maderensis</i>	565	cytochrome oxidase subunit I (COI) gene	This study	KC616359	CmL1
	<i>Ceratoscopus maderensis</i>	565	cytochrome oxidase subunit I (COI) gene	This study	KC616360	CmL2
	<i>Ceratoscopus maderensis</i>	565	cytochrome oxidase subunit I (COI) gene	This study	KC616361	CmL3
	<i>Ceratoscopus maderensis</i>	565	cytochrome oxidase subunit I (COI) gene	This study	KC616362	CmL4
	<i>Ceratoscopus maderensis</i>	565	cytochrome oxidase subunit I (COI) gene	This study	KC616363	CmA5
<i>Ceratoscopus maderensis</i>	565	cytochrome oxidase subunit I (COI) gene	This study	KC616364	CmA6	
<i>Ceratoscopus maderensis</i>	630	cytochrome oxidase subunit I (COI) gene	Zhang et al. 2007	EU148109		
<i>Ceratoscopus maderensis</i>	494	cytochrome oxidase subunit I (COI) gene	Zhang et al. 2007	EU148110		
<i>Ceratoscopus maderensis</i>	494	cytochrome oxidase subunit I (COI) gene	Zhang et al. 2007	EU148111		
<i>Diaphus holti</i>	565	cytochrome oxidase subunit I (COI) gene	This study	KC616388	DhL1	
<i>Diaphus holti</i>	565	cytochrome oxidase subunit I (COI) gene	This study	KC616389	DhA2	
<i>Diaphus holti</i>	565	cytochrome oxidase subunit I (COI) gene	This study	KC616390	DhA5	
<i>Diaphus holti</i>	565	cytochrome oxidase subunit I (COI) gene	This study	KC616391	DhA6	
<i>Diaphus theta</i>	652	cytochrome oxidase subunit I (COI) gene	Steinke et al. 2008	FI164561		
<i>Diaphus rafinesquii</i>	652	cytochrome oxidase subunit I (COI) gene	Zhang et al. 2007	EU148154		
<i>Diaphus metopoclampus</i>	652	cytochrome oxidase subunit I (COI) gene	Zhang et al. 2007	EU148151		
<i>Electrona risso</i>	565	cytochrome oxidase subunit I (COI) gene	This study	KC616411	Ert1	
<i>Hygophum benoitii</i>	565	cytochrome oxidase subunit I (COI) gene	This study	KC616370	HbL1	
<i>Hygophum benoitii</i>	565	cytochrome oxidase subunit I (COI) gene	This study	KC616371	HbL2	
<i>Hygophum benoitii</i>	565	cytochrome oxidase subunit I (COI) gene	This study	KC616372	HbT4	
<i>Hygophum benoitii</i>	565	cytochrome oxidase subunit I (COI) gene	This study	KC616373	HbA5	
<i>Hygophum benoitii</i>	565	cytochrome oxidase subunit I (COI) gene	This study	KC616374	HbA6	

Table S2 (cont.). – List of sequences of myctophids and stomiiforms used in the present study. Codes for the sequences from our lab are shown on the right part of the table. Apart from our results, the sequences that were used in this study and selected from GenBank (<http://www.ncbi.nlm.nih.gov/genbank>) are listed with the corresponding accession number and source. The outgroup species *Bathylagus euryps* was included.

Family	Species / Genus	No. Nucleotides	Genetic marker	Source Identifier	Accession number	Abbreviation
	<i>Hygophum benoiti</i>	565	cytochrome oxidase subunit I (COI) gene	This study	KC616375	HbA7
	<i>Hygophum benoiti</i>	648	cytochrome oxidase subunit I (COI) gene	Keskin 2010	HQ167651	
	<i>Hygophum benoiti</i>	652	cytochrome oxidase subunit I (COI) gene	Zhang et al. 2007	EU148200	
	<i>Hygophum benoiti</i>	652	cytochrome oxidase subunit I (COI) gene	Zhang et al. 2007	EU148201	
	<i>Hygophum benoiti</i>	652	cytochrome oxidase subunit I (COI) gene	Zhang et al. 2007	EU148202	
	<i>Hygophum hygonii</i>	565	cytochrome oxidase subunit I (COI) gene	This study	KC616376	HhA1
	<i>Hygophum hygonii</i>	565	cytochrome oxidase subunit I (COI) gene	This study	KC616377	HhA2
	<i>Hygophum hygonii</i>	565	cytochrome oxidase subunit I (COI) gene	This study	KC616378	HhA3
	<i>Hygophum hygonii</i>	652	cytochrome oxidase subunit I (COI) gene	Zhang et al. 2007	EU148204	
	<i>Hygophum hygonii</i>	652	cytochrome oxidase subunit I (COI) gene	Zhang et al. 2007	EU148205	
	<i>Hygophum hygonii</i>	831	cytochrome oxidase subunit I (COI) gene	DeVaney 2009	FJ918945	
	<i>Lamparyctus alatus</i>	594	cytochrome oxidase subunit I (COI) gene	Bucklin, A. et al., 2009	GU071738	
	<i>Lamparyctus festivus</i>	613	cytochrome oxidase subunit I (COI) gene	Gleason et al. 2010	GU441539	
	<i>Lamparyctus photonotus</i>	623	cytochrome oxidase subunit I (COI) gene	Bucklin et al. 2009	GU071732	
	<i>Lamparyctus tenuiformis</i>	595	cytochrome oxidase subunit I (COI) gene	Gruenthal et al. 2008	EU489716	
	<i>Lamparyctus tenuiformis</i>	652	cytochrome oxidase subunit I (COI) gene	Hastings and Burton 2009	GU440365	
	<i>Lamparyctus tenuiformis</i>	652	cytochrome oxidase subunit I (COI) gene	Hastings and Burton 2009	GU440366	
	<i>Lamparyctus crocodilus</i>	565	cytochrome oxidase subunit I (COI) gene	This study	KC616379	LcL1
	<i>Lamparyctus crocodilus</i>	565	cytochrome oxidase subunit I (COI) gene	This study	KC616380	LcA2
	<i>Lamparyctus crocodilus</i>	565	cytochrome oxidase subunit I (COI) gene	This study	KC616381	LcA3
	<i>Lamparyctus crocodilus</i>	565	cytochrome oxidase subunit I (COI) gene	This study	KC616382	LcA5
	<i>Lamparyctus pusillus</i>	565	cytochrome oxidase subunit I (COI) gene	This study	KC616383	LpL1
	<i>Lamparyctus pusillus</i>	565	cytochrome oxidase subunit I (COI) gene	This study	KC616384	LpL2
	<i>Lamparyctus pusillus</i>	565	cytochrome oxidase subunit I (COI) gene	This study	KC616385	LpA3
	<i>Lamparyctus pusillus</i>	565	cytochrome oxidase subunit I (COI) gene	This study	KC616386	LpA4
	<i>Lamparyctus pusillus</i>	565	cytochrome oxidase subunit I (COI) gene	This study	KC616387	LpL6
	<i>Lobianchia dofleini</i>	564	cytochrome oxidase subunit I (COI) gene	This study	KF143896	LdL1
	<i>Lobianchia dofleini</i>	565	cytochrome oxidase subunit I (COI) gene	This study	KC616404	LdL2
	<i>Lobianchia dofleini</i>	565	cytochrome oxidase subunit I (COI) gene	This study	KC616405	LdA3
	<i>Lobianchia dofleini</i>	565	cytochrome oxidase subunit I (COI) gene	This study	KC616406	LdA4
	<i>Lobianchia dofleini</i>	565	cytochrome oxidase subunit I (COI) gene	This study	KC616407	LdA5
	<i>Lobianchia sp. → Diaphus dumerilii</i>	652	cytochrome oxidase subunit I (COI) gene	Valdez-Moreno et al. 2009	GU224892	
	<i>Lobianchia sp. → Diaphus dumerilii</i>	652	cytochrome oxidase subunit I (COI) gene	Valdez-Moreno et al. 2009	GU224894	
	<i>Lobianchia sp. → Diaphus dumerilii</i>	652	cytochrome oxidase subunit I (COI) gene	Valdez-Moreno et al. 2009	GU224895	
Sternoptychidae	<i>Maurolicus muelleri</i>	565	cytochrome oxidase subunit I (COI) gene	This study	KC616401	MmL1
	<i>Maurolicus muelleri</i>	565	cytochrome oxidase subunit I (COI) gene	This study	KC616398	MmA2
	<i>Maurolicus muelleri</i>	565	cytochrome oxidase subunit I (COI) gene	This study	KC616399	MmA3
	<i>Maurolicus muelleri</i>	565	cytochrome oxidase subunit I (COI) gene	This study	KC616402	MmL4
	<i>Maurolicus muelleri</i>	565	cytochrome oxidase subunit I (COI) gene	This study	KC616403	MmL5
	<i>Maurolicus muelleri</i>	565	cytochrome oxidase subunit I (COI) gene	This study	KC616400	MmA6
	<i>Maurolicus muelleri</i>	652	cytochrome oxidase subunit I (COI) gene	Zhang et al. 2007	EU148245	
	<i>Maurolicus muelleri</i>	652	cytochrome oxidase subunit I (COI) gene	Zhang et al. 2007	EU148246	
	<i>Maurolicus muelleri</i>	652	cytochrome oxidase subunit I (COI) gene	Zhang et al. 2007	EU148247	
Myctophidae	<i>Myctophum punctatum</i>	565	cytochrome oxidase subunit I (COI) gene	This study	KC616392	MpL1
	<i>Myctophum punctatum</i>	565	cytochrome oxidase subunit I (COI) gene	This study	KC616393	MpA2
	<i>Myctophum punctatum</i>	565	cytochrome oxidase subunit I (COI) gene	This study	KC616394	MpL3
	<i>Myctophum punctatum</i>	565	cytochrome oxidase subunit I (COI) gene	This study	KC616395	MpL4
	<i>Myctophum punctatum</i>	565	cytochrome oxidase subunit I (COI) gene	This study	KC616396	MpA5
	<i>Myctophum punctatum</i>	565	cytochrome oxidase subunit I (COI) gene	This study	KC616397	MpA6

Table S2 (cont.). – List of sequences of myctophids and stomiiforms used in the present study. Codes for the sequences from our lab are shown on the right part of the table. Apart from our results, the sequences that were used in this study and selected from GenBank (<http://www.ncbi.nlm.nih.gov/genbank>) are listed with the corresponding accession number and source. The outgroup species *Bathylagus euryps* was included.

Family	Species / Genus	No. Nucleotides	Genetic marker	Source Identifier	Accession number	Abbreviation
Phosichthyidae	<i>Myctophum punctatum</i>	652	cytochrome oxidase subunit I (COI) gene	Zhang et al. 2007	EU148251	
	<i>Myctophum punctatum</i>	652	cytochrome oxidase subunit I (COI) gene	Zhang et al. 2007	EU148252	
	<i>Myctophum punctatum</i>	652	cytochrome oxidase subunit I (COI) gene	Zhang et al. 2007	EU148253	NbA1
	<i>Notoscopelus bolini</i>	565	cytochrome oxidase subunit I (COI) gene	This study	KC616408	
	<i>Notoscopelus bolini</i>	652	cytochrome oxidase subunit I (COI) gene	Zhang et al. 2007	EU148275	
	<i>Notoscopelus bolini</i>	652	cytochrome oxidase subunit I (COI) gene	Zhang et al. 2007	EU148276	
	<i>Notoscopelus bolini</i>	648	cytochrome oxidase subunit I (COI) gene	Keskin, E., 2010	HQ167653	
	<i>Notoscopelus elongatus</i>	565	cytochrome oxidase subunit I (COI) gene	This study	KC616409	NeA1
	<i>Symbolophorus veranyi</i>	565	cytochrome oxidase subunit I (COI) gene	This study	KF143897	SvA3
	<i>Symbolophorus veranyi</i>	652	cytochrome oxidase subunit I (COI) gene	Zhang et al. 2007	EU148338	
	<i>Symbolophorus veranyi</i>	652	cytochrome oxidase subunit I (COI) gene	Zhang et al. 2007	EU148339	
	<i>Symbolophorus veranyi</i>	652	cytochrome oxidase subunit I (COI) gene	Zhang et al. 2007	EU148340	
	<i>Vinciguerria attenuata</i>	565	cytochrome oxidase subunit I (COI) gene	This study	KC616412	VaA1
	<i>Vinciguerria attenuata</i>	565	cytochrome oxidase subunit I (COI) gene	This study	KC616413	VaA2
	<i>Vinciguerria attenuata</i>	565	cytochrome oxidase subunit I (COI) gene	This study	KC616414	VaA3
	<i>Vinciguerria attenuata</i>	565	cytochrome oxidase subunit I (COI) gene	This study	KC616415	VaA4
	<i>Vinciguerria attenuata</i>	565	cytochrome oxidase subunit I (COI) gene	This study	KC616416	VaA5
<i>Vinciguerria attenuata</i>	565	cytochrome oxidase subunit I (COI) gene	This study	KC616417	VaA6	
<i>Vinciguerria attenuata</i>	565	cytochrome oxidase subunit I (COI) gene	This study	KC616418	VaA7	
Microstomatidae	<i>Vinciguerria</i> sp.	307	mitochondrial gene for subunit 12S rRNA	Lopez et al. 2004	AY438704	
	<i>Bathylagus euryps</i>	652	cytochrome oxidase subunit I (COI) gene	Bentley et al. 2013	KF929651	

Table S3. – Distinctive features of larvae of the most abundant and frequent mesopelagic species occurring in the western Mediterranean. Sources of larval descriptions stated in Table S1.

	EYES SHAPE		HEAD Conspicuous morphology	BODY SHAPE		GUT LENGTH ¹		PECTORAL FIN Conspicuous features
	Narrow	Ovalate-Round		Deep	Slender	Short	Moderately long	
O. Myctophiformes								
F. Myctophidae								
SF. Lampanyctinae								
<i>Ceratospindel maderensis</i>		+		+			+	
<i>Diaphus holti</i>		+		+			+	
<i>Lampanyctus crocodilus</i>		+	moderately deep					
<i>Lampanyctus pusillus</i>		+	deep, snout blunt	+				
<i>Lobianchia dofleini</i>		+	broad with large snout	+				large, base wing-shaped with upper rays longer
<i>Notospindel bolini</i>		+	moderately deep	+				
<i>Notospindel elongatus</i>		+	moderately deep	+				
SF. Myctophictinae								
<i>Benthosema glaciale</i>			moderately deep	+				
<i>Electrona risso</i>	+		large, broad	+				
<i>Hygophum benoiti</i>	+			+				
<i>Hygophum tygomii</i>	+			+				
<i>Myctophum punctatum</i>	+		broad and flat	+				large
<i>Symblophorus veranyi</i>	+		broad and flat	+				large, base wing-shaped
O. Stomifformes								
F. Sternoptychidae								
<i>Argyroleucus hemigymnus</i>			moderately deep, snout blunt	+			+	
<i>Maurolucus muelleri</i>		+		+				
F. Gonostomatidae								
<i>Cyclothone braueri</i>		+		+				
<i>Cyclothone pygmaea</i>		+		+				
F. Phosichthyidae								
<i>Vinciguerria attenuata</i>	+		flat	+				

Table S3 (cont.). – Distinctive features of larvae of the most abundant and frequent mesopelagic species occurring in the western Mediterranean. Sources of larval descriptions stated in Table S1.

	DISTINCTIVE PIGMENTATION LOCATION							
	Above head	Snout or Jaws	Gut	Ventral tail	Dorsal tail	Hypaxial	Caudal base	Pectoral fin
O. Myctophiformes								
F. Myctophidae								
SF. Lampanyctinae								
<i>Ceratospopelus maderensis</i>	-	-	anus	series of spots	+	-	-	-
<i>Diaphus holti</i>	-	-	lateral, swim bladder, anus	series of spots (preflexion)	-	-	+	-
<i>Lampanyctus crocodilus</i>	+	+	anus	-	+	+	-	+
<i>Lampanyctus pusillus</i>	+	+	anus	-	+	+	-	+
<i>Lobianchia dofleini</i>	-	-	anus, dorsal surface	1 melanophore at anal fin	-	-	+	+
<i>Notoscopelus bolini</i>	+	+	anus, swim bladder	several spots	+	+	-	-
<i>Notoscopelus elongatus</i>	+	+	anus, swim bladder	one spot	+	-	-	-
SF. Myctophictinae								
<i>Benthosema glaciale</i>	+	+	anus	-	-	-	-	-
<i>Electrona risso</i>	-	+	-	-	-	-	-	+
<i>Hygophum benoiti</i>	-	+	lateral and anus	2-3 spots (preflexion)	-	-	+	-
<i>Hygophum hygomii</i>	-	+	lateral wall in reflexion, anus	1 conspicuous spot (preflexion)	-	-	-	+
<i>Myctophum punctatum</i>	+	+	ventral wall, anus	series of spots (preflexion)	+	+	+	+
<i>Symbolophorus veranyi</i>	+	+	lateral wall in reflexion, anus	series of spots (preflexion)	-	-	-	+
O. Stomiiformes								
F. Sternoptychidae								
<i>Argyropelecus hemigymmus</i>	-	-	-	-	-	-	-	-
<i>Maurolicus muelleri</i>	-	-	-	-	-	-	-	-
F. Gonostomatidae								
<i>Cyclothone braueri</i>	-	-	anus, swim bladder	11-12 melanophores	-	-	+	-
<i>Cyclothone pygmaea</i>	-	-	anus, swim bladder	<8 melanophores	-	-	+	-
F. Phosichthyidae								
<i>Vinciguerria attenuata</i>	-	-	-	-	+	-	+	-

Table S4. – Estimates of the net evolutionary divergence between species, considering larval and adult sequences and GenBank. The number of base substitutions per site by estimating the net average between groups of sequences is shown. Standard error estimates are shown above the diagonal. Analyses were conducted using the maximum composite likelihood model. The rate variation among sites was modeled using gamma distribution (shape parameter=5). The analysis involved 110 nucleotide sequences. The codon positions that were included were 1st+2nd+3rd+non-coding. All ambiguous positions were removed for each sequence pair and 570 positions were included in the final dataset. Abbreviated names: AH, *Argyropeleclus hemigymnus*; BG, *Benthosema glaciale*; CM, *Ceratospiculus maderensis*; DH, *Diaphus holti*; ER, *Electrona risso*; HB, *Hygophum benoitii*; HH, *Hygophum lygomi*; LA, *Lampanyctus alatus*; LC, *Lampanyctus crocodilus*; LD, *Lobianchia dofleini*; LP, *Lampanyctus pusillus*; Lph, *Lampanyctus photonotus*; LT, *Lampanyctus tenuiformis*; MM, *Maurolicus muelleri*; MP, *Myctophum punctatum*; NB, *Notoscopelus bolini*; NE, *Notoscopelus elongatus*; SV, *Symbiolophorus veranyi*; VA, *Vinciguerria attenuata*; VP, *Vinciguerria powertiae*.

	AH	BG	CM	DH	ER	VA	HB	HH	LA	LC	LD	LP	Lph	LT	MM	MP	NB	NE	SV	VP					
AH																									
BG	0.216																								
CM	0.249	0.197																							
DH	0.209	0.195	0.197																						
ER	0.248	0.153	0.207	0.194																					
VA	0.257	0.269	0.254	0.281	0.266																				
HB	0.233	0.195	0.228	0.187	0.182	0.284																			
HH	0.257	0.205	0.218	0.215	0.193	0.280	0.137																		
LA	0.248	0.230	0.176	0.216	0.242	0.289	0.228	0.242																	
LC	0.227	0.218	0.170	0.201	0.203	0.285	0.232	0.235	0.127																
LD	0.266	0.228	0.193	0.186	0.231	0.255	0.242	0.194	0.246	0.235															
LP	0.240	0.221	0.189	0.206	0.208	0.297	0.222	0.213	0.111	0.135	0.232														
Lph	0.247	0.222	0.174	0.195	0.218	0.281	0.220	0.249	0.127	0.108	0.251	0.148													
LT	0.231	0.214	0.187	0.218	0.211	0.283	0.223	0.232	0.100	0.107	0.230	0.125	0.118												
MM	0.204	0.244	0.236	0.233	0.234	0.255	0.221	0.235	0.234	0.253	0.232	0.253	0.268	0.219											
MP	0.270	0.201	0.228	0.214	0.195	0.269	0.204	0.187	0.250	0.229	0.215	0.218	0.234	0.239	0.240										
NB	0.251	0.173	0.196	0.206	0.187	0.246	0.182	0.219	0.189	0.206	0.231	0.209	0.184	0.177	0.247	0.211									
NE	0.237	0.179	0.207	0.193	0.185	0.258	0.181	0.211	0.200	0.206	0.228	0.218	0.187	0.176	0.249	0.205	0.062								
SV	0.234	0.184	0.207	0.201	0.173	0.267	0.188	0.196	0.241	0.222	0.208	0.220	0.213	0.219	0.233	0.170	0.213	0.220							
VP	0.152	0.143	0.103	0.113	0.137	0.093	0.146	0.135	0.161	0.143	0.124	0.150	0.145	0.135	0.127	0.135	0.133	0.132	0.122						