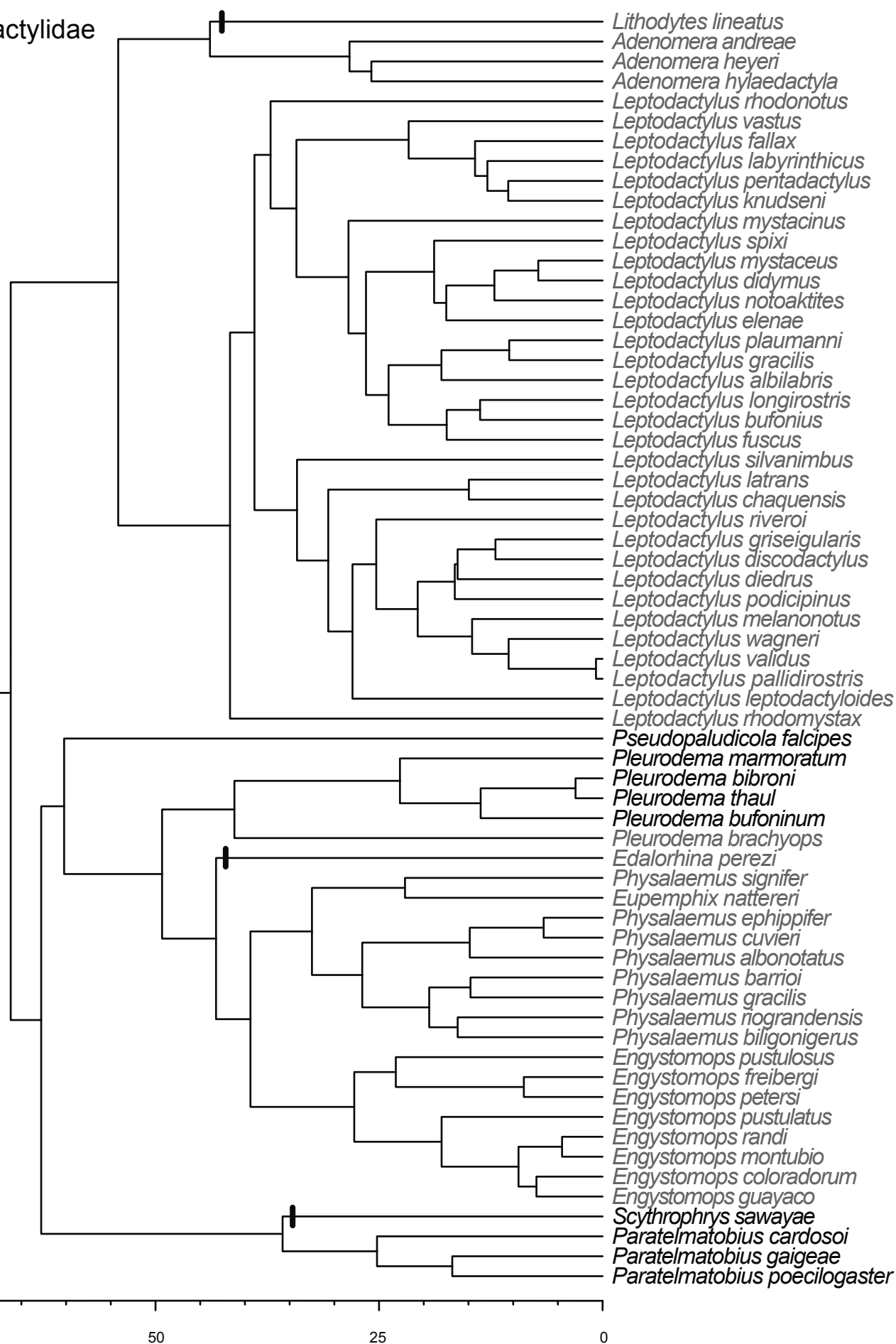


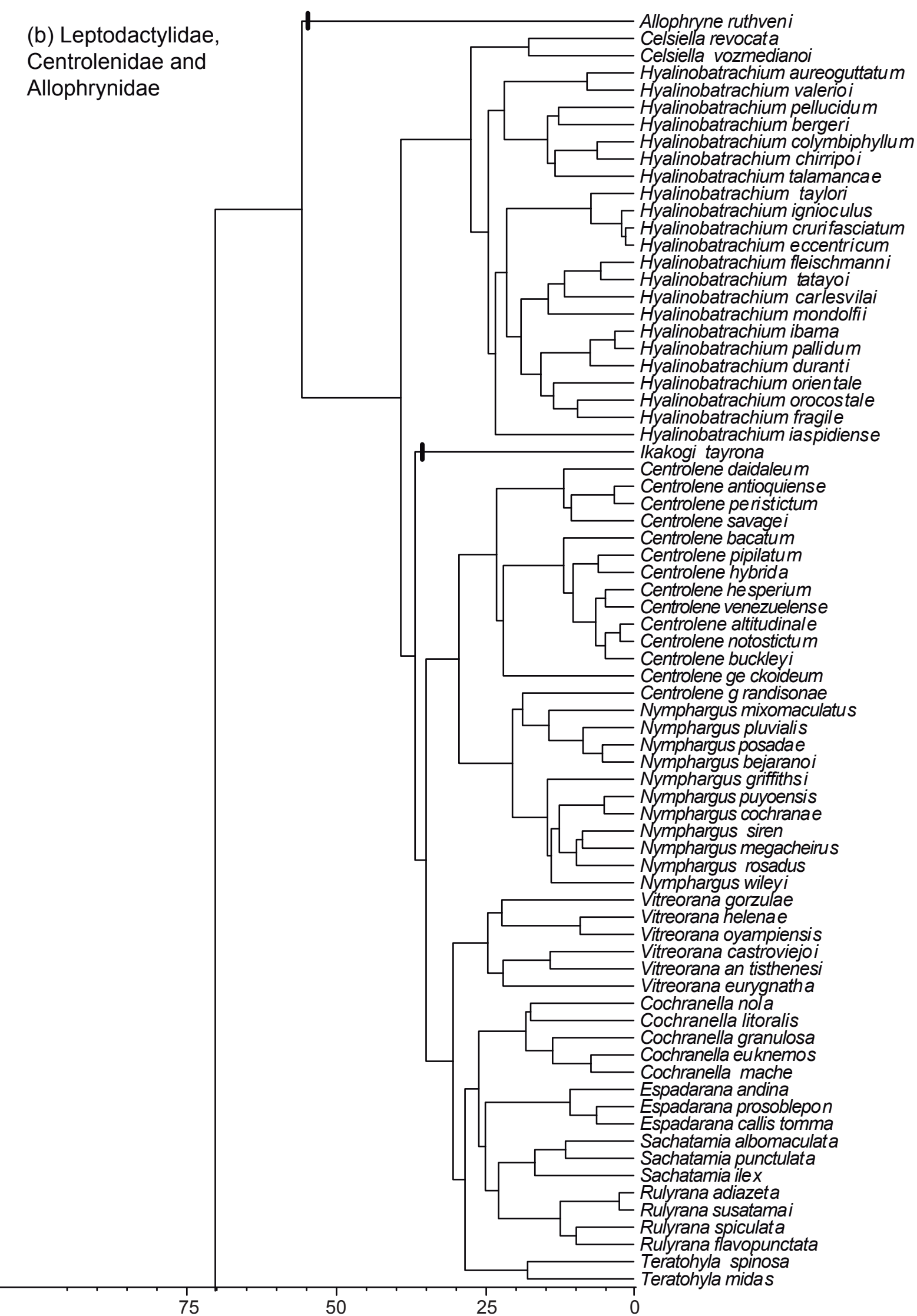
Supporting information

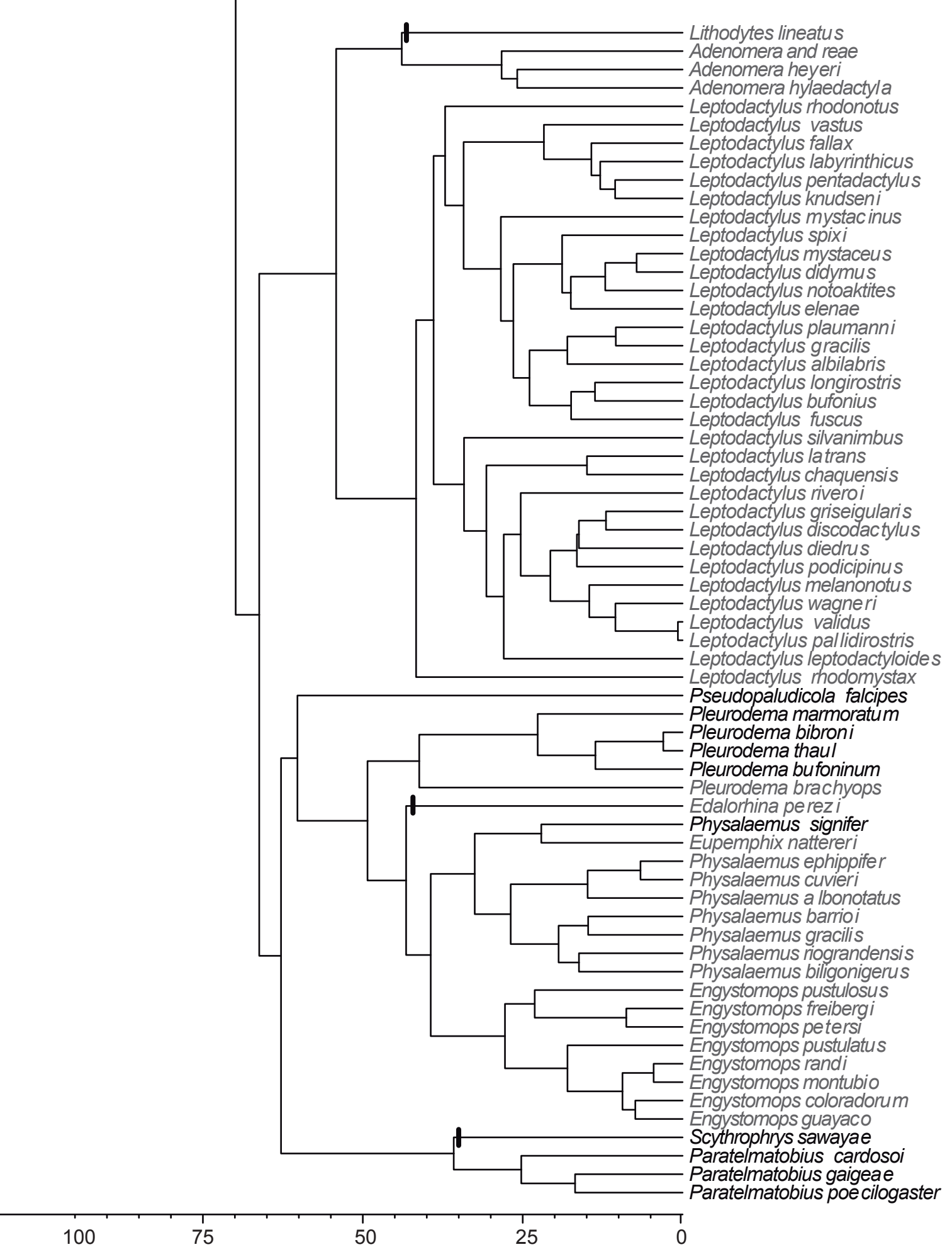
Figure S1 - Phylogenetic information used to evaluate shifts in diversification rates and search for distinct speciation and extinction rates between foaming and non-foaming lineages. Foaming species are indicated in grey, while non-foaming are black. Tick marks indicate lineages where shifts were detected by MEDUSA.

(a) Leptodactylidae

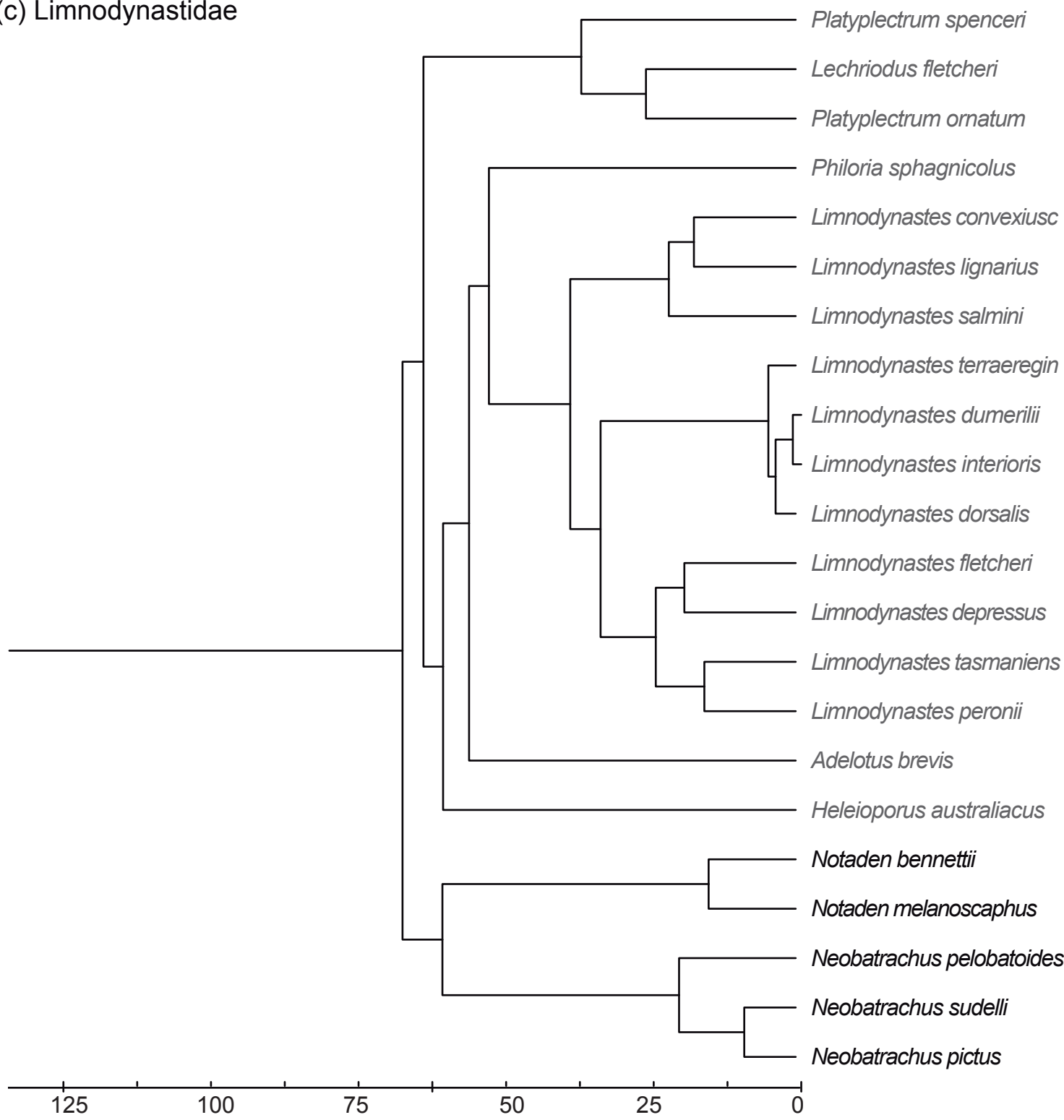


(b) Leptodactylidae,
Centrolenidae and
Allophrynidae

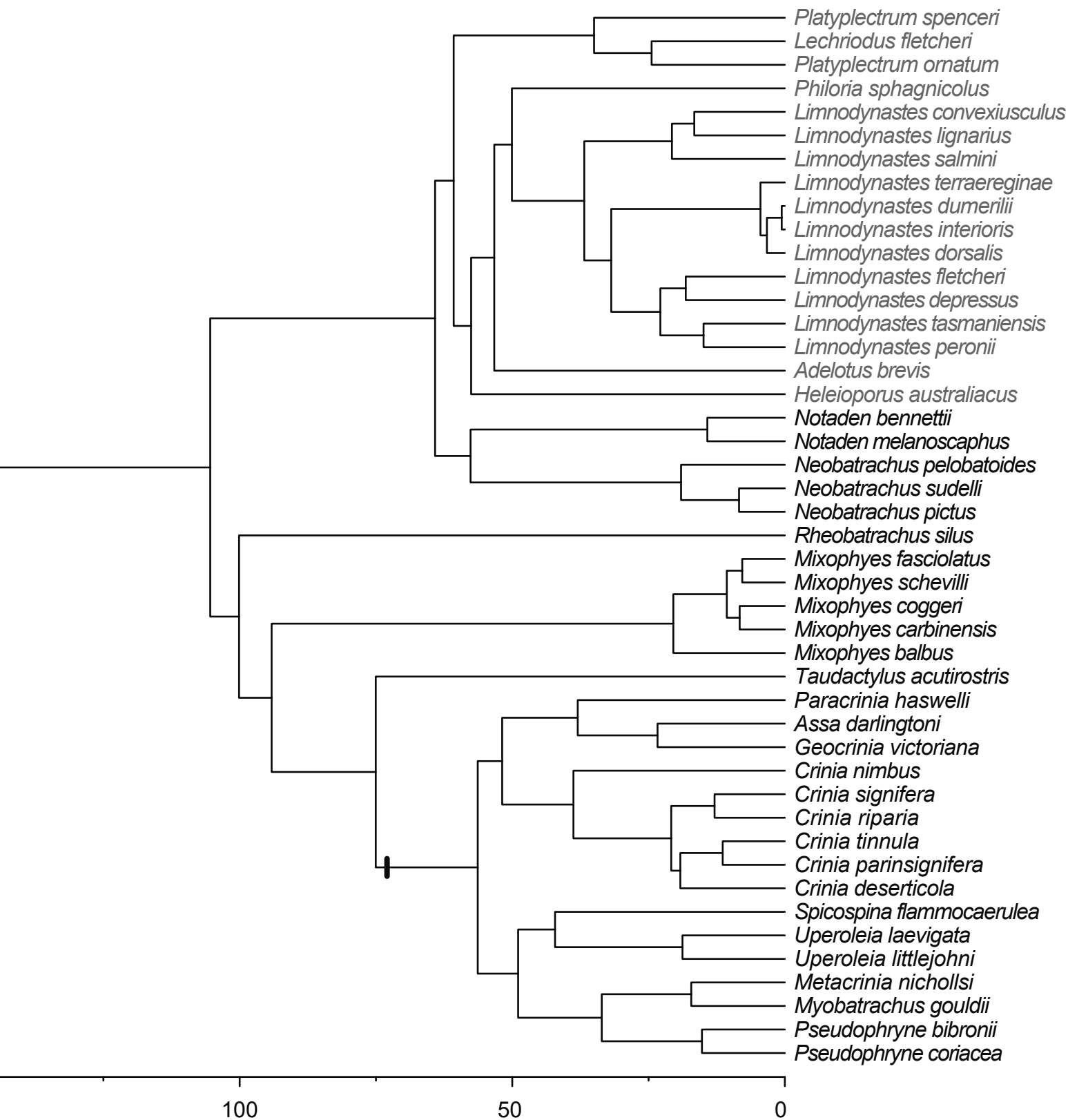




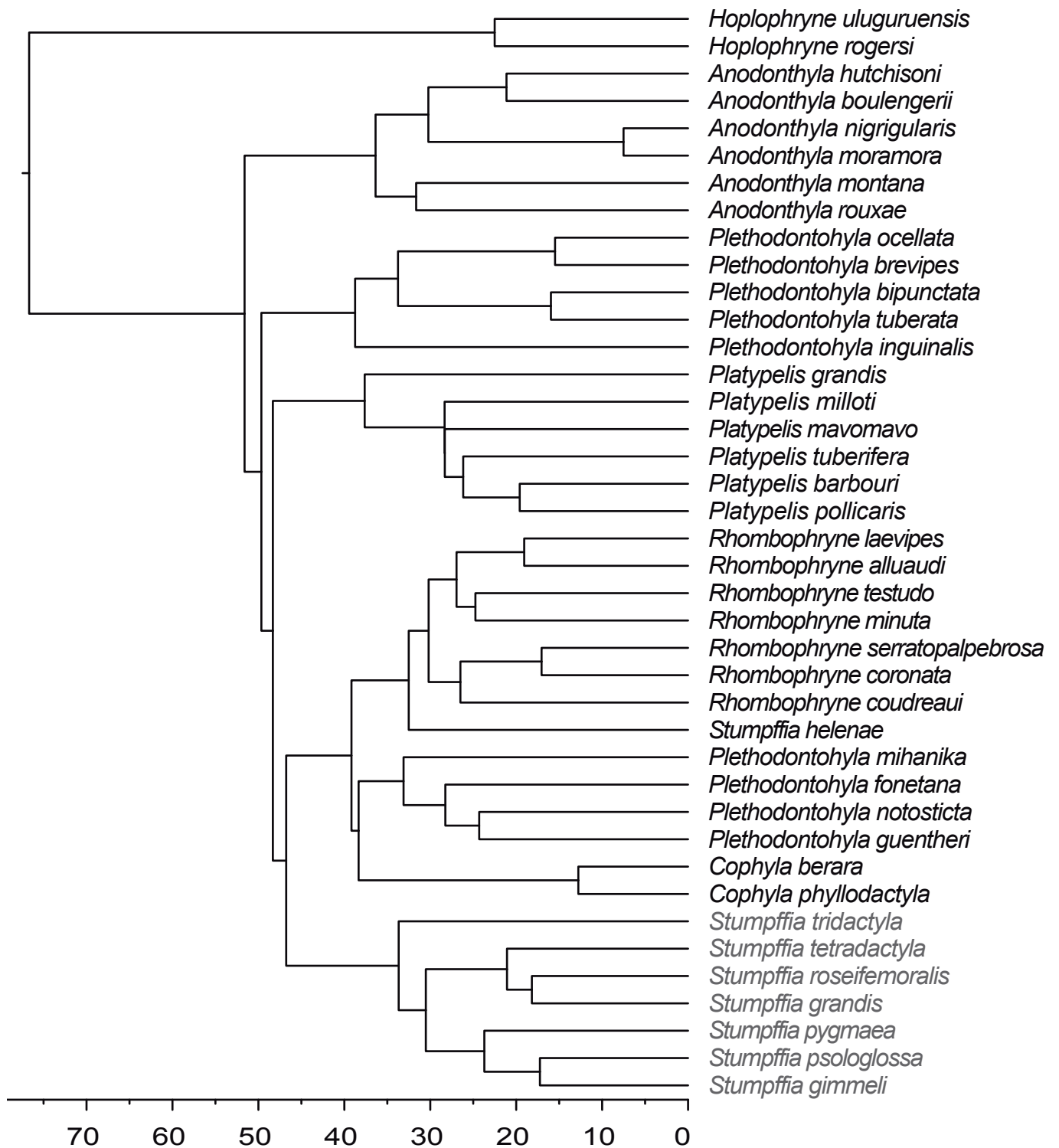
(c) Limnodynastidae



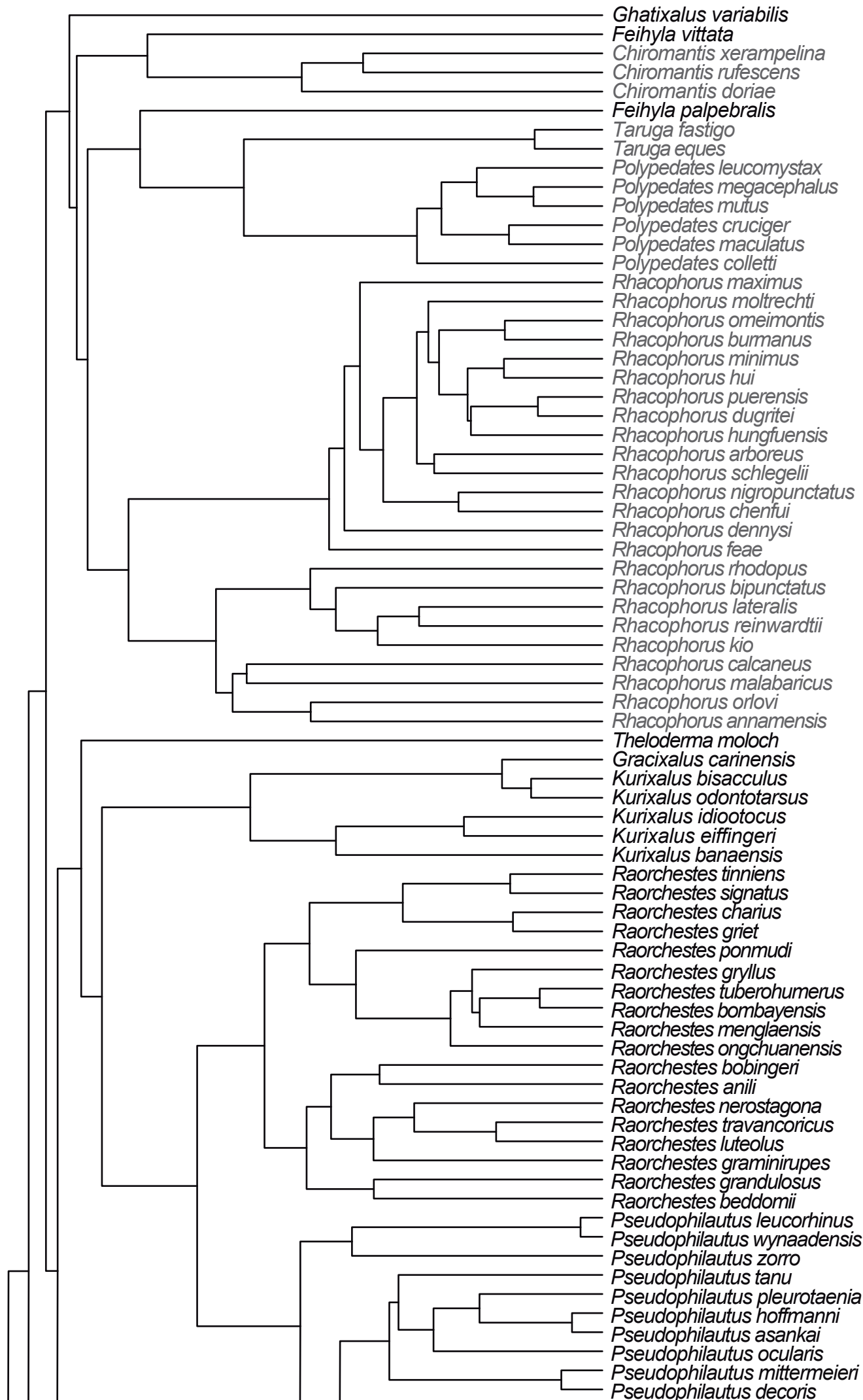
(d) Limnodynastidae and Myobatrachidae



(e) Stumpffia (Cophylinae: Microhylidae)



(f) Rhacophorinae



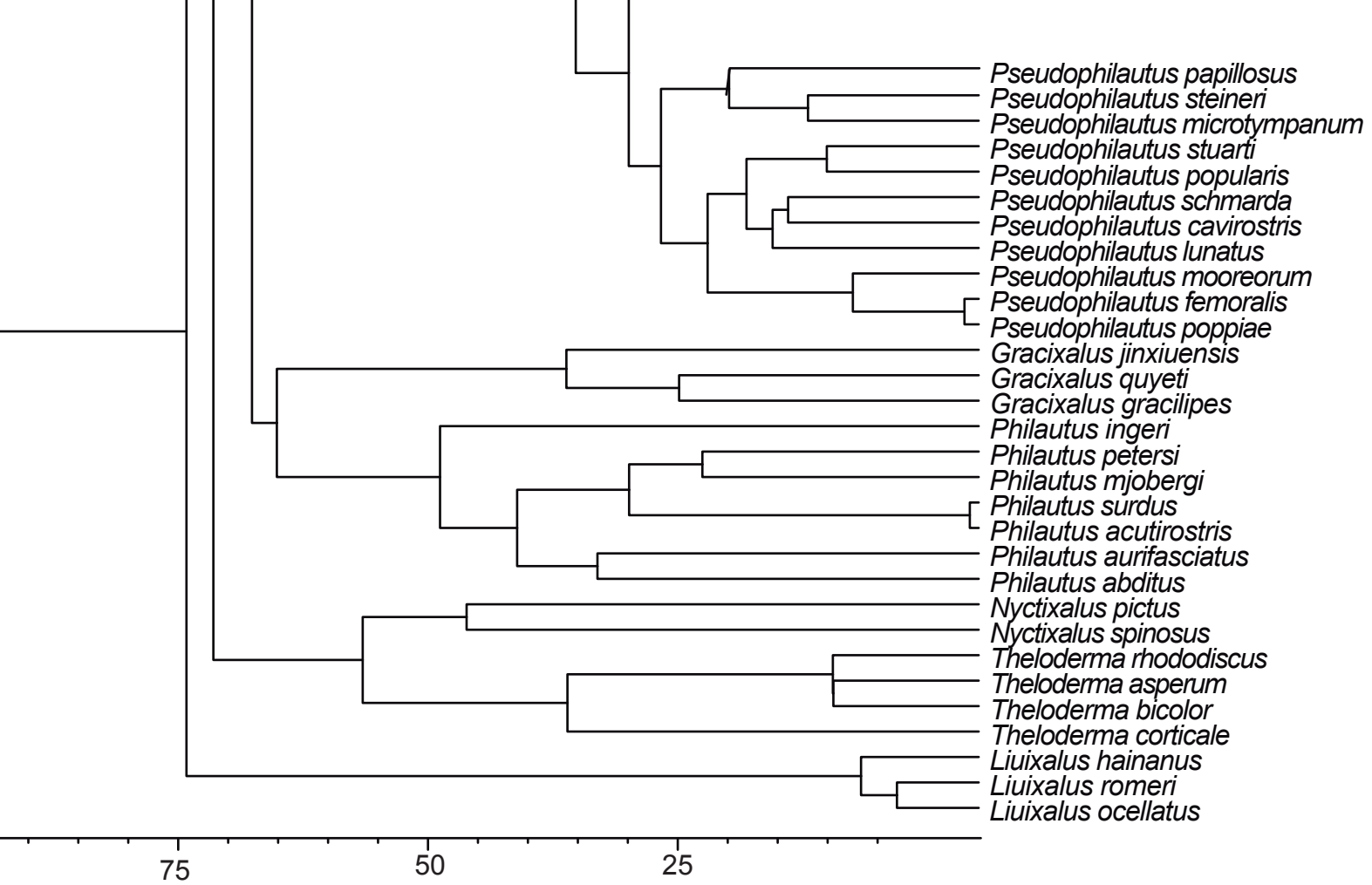


Table S1 - List of all foaming nest species.

Family	Species
Hylidae	<i>Scinax rizibilis</i>
Hyperoliidae	<i>Opisthothylax immaculatus</i>
Leptodactylidae	<i>Adenomera ajurauna</i>
	<i>Adenomera andreae</i>
	<i>Adenomera araucaria</i>
	<i>Adenomera bokermanni</i>
	<i>Adenomera coca</i>
	<i>Adenomera diptyx</i>
	<i>Adenomera engelsi</i>
	<i>Adenomera heyeri</i>
	<i>Adenomera hylaedactyla</i>
	<i>Adenomera juikitam</i>
	<i>Adenomera lutzi</i>
	<i>Adenomera marmorata</i>
	<i>Adenomera martinezi</i>
	<i>Adenomera nana</i>
	<i>Adenomera saci</i>
	<i>Adenomera simonstuarti</i>
	<i>Adenomera thomei</i>
	<i>Edalorhina nasuta</i>
	<i>Edalorhina perezi</i>
	<i>Engystomops coloradum</i>
	<i>Engystomops freibergi</i>
	<i>Engystomops guayaco</i>
	<i>Engystomops montubio</i>
	<i>Engystomops petersi</i>
	<i>Engystomops pustulatus</i>
	<i>Engystomops pustulosus</i>
	<i>Engystomops puyango</i>
	<i>Engystomops randi</i>
	<i>Eupemphix nattereri</i>
	<i>Leptodactylus albilabris</i>
	<i>Leptodactylus bolivianus</i>
	<i>Leptodactylus bufonius</i>
	<i>Leptodactylus caatingae</i>
	<i>Leptodactylus camaquara</i>
	<i>Leptodactylus chaquensis</i>
	<i>Leptodactylus colombiensis</i>
	<i>Leptodactylus cunicularius</i>
	<i>Leptodactylus cupreus</i>
	<i>Leptodactylus didymus</i>

Family	Species
	<i>Leptodactylus diedrus</i>
	<i>Leptodactylus discodactylus</i>
	<i>Leptodactylus elenae</i>
	<i>Leptodactylus fallax</i>
	<i>Leptodactylus flavopictus</i>
	<i>Leptodactylus fragilis</i>
	<i>Leptodactylus furnarius</i>
	<i>Leptodactylus fuscus</i>
	<i>Leptodactylus gracilis</i>
	<i>Leptodactylus griseigularis</i>
	<i>Leptodactylus guianensis</i>
	<i>Leptodactylus hylodes</i>
	<i>Leptodactylus insularum</i>
	<i>Leptodactylus jolyi</i>
	<i>Leptodactylus knudseni</i>
	<i>Leptodactylus labrosus</i>
	<i>Leptodactylus labyrinthicus</i>
	<i>Leptodactylus laticeps</i>
	<i>Leptodactylus latinasus</i>
	<i>Leptodactylus latrans</i>
	<i>Leptodactylus lauramiriamae</i>
	<i>Leptodactylus leptodactyloides</i>
	<i>Leptodactylus lithonaetes</i>
	<i>Leptodactylus longirostris</i>
	<i>Leptodactylus macrosternum</i>
	<i>Leptodactylus magistris</i>
	<i>Leptodactylus marambaiae</i>
	<i>Leptodactylus melanonotus</i>
	<i>Leptodactylus myersi</i>
	<i>Leptodactylus mystaceus</i>
	<i>Leptodactylus mystacinus</i>
	<i>Leptodactylus natalensis</i>
	<i>Leptodactylus nesiotus</i>
	<i>Leptodactylus notoaktites</i>
	<i>Leptodactylus ochraceus</i>
	<i>Leptodactylus paraensis</i>
	<i>Leptodactylus pascoensis</i>
	<i>Leptodactylus pentadactylus</i>
	<i>Leptodactylus peritoaktites</i>
	<i>Leptodactylus petersii</i>
	<i>Leptodactylus plaumanni</i>
	<i>Leptodactylus podicipinus</i>
	<i>Leptodactylus poecilochilus</i>

Family	Species
	<i>Leptodactylus pustulatus</i>
	<i>Leptodactylus rhodomerus</i>
	<i>Leptodactylus rhodomystax</i>
	<i>Leptodactylus rhodonotus</i>
	<i>Leptodactylus rhodostima</i>
	<i>Leptodactylus riveroi</i>
	<i>Leptodactylus rugosus</i>
	<i>Leptodactylus sabanensis</i>
	<i>Leptodactylus savagei</i>
	<i>Leptodactylus sertanejo</i>
	<i>Leptodactylus silvanimbus</i>
	<i>Leptodactylus spixi</i>
	<i>Leptodactylus stenodema</i>
	<i>Leptodactylus syphax</i>
	<i>Leptodactylus tapiti</i>
	<i>Leptodactylus troglodytes</i>
	<i>Leptodactylus turimiquensis</i>
	<i>Leptodactylus validus</i>
	<i>Leptodactylus vastus</i>
	<i>Leptodactylus ventrimaculatus</i>
	<i>Leptodactylus viridis</i>
	<i>Leptodactylus wagneri</i>
	<i>Lithotydes lineatus</i>
	<i>Physalaemus aguirrei</i>
	<i>Physalaemus albifrons</i>
	<i>Physalaemus albonotatus</i>
	<i>Physalaemus angrensis</i>
	<i>Physalaemus atlanticus</i>
	<i>Physalaemus barrioi</i>
	<i>Physalaemus biligonigerus</i>
	<i>Physalaemus bokermanni</i>
	<i>Physalaemus caete</i>
	<i>Physalaemus camacan</i>
	<i>Physalaemus centralis</i>
	<i>Physalaemus cicada</i>
	<i>Physalaemus crombiei</i>
	<i>Physalaemus cuqui</i>
	<i>Physalaemus cuvieri</i>
	<i>Physalaemus deimaticus</i>
	<i>Physalaemus ephippifer</i>
	<i>Physalaemus erikae</i>
	<i>Physalaemus erythros</i>
	<i>Physalaemus evangelistai</i>

Family	Species
	<i>Physalaemus feioi</i>
	<i>Physalaemus fernandezae</i>
	<i>Physalaemus fischeri</i>
	<i>Physalaemus gracilis</i>
	<i>Physalaemus henselii</i>
	<i>Physalaemus insperatus</i>
	<i>Physalaemus irroratus</i>
	<i>Physalaemus jordanensis</i>
	<i>Physalaemus kroyeri</i>
	<i>Physalaemus lateristriga</i>
	<i>Physalaemus lisei</i>
	<i>Physalaemus maculiventris</i>
	<i>Physalaemus marmoratus</i>
	<i>Physalaemus maximus</i>
	<i>Physalaemus moreirae</i>
	<i>Physalaemus nanus</i>
	<i>Physalaemus obtectus</i>
	<i>Physalaemus olfersii</i>
	<i>Physalaemus orophilus</i>
	<i>Physalaemus riograndensis</i>
	<i>Physalaemus rupestris</i>
	<i>Physalaemus santafecinus</i>
	<i>Physalaemus signifer</i>
	<i>Physalaemus soaresi</i>
	<i>Physalaemus spiniger</i>
	<i>Pleurodema borellii</i>
	<i>Pleurodema brachyops</i>
	<i>Pleurodema cinereum</i>
	<i>Pleurodema diplolister</i>
	<i>Pleurodema guayapae</i>
	<i>Pleurodema nebulosum</i>
Limnodynastidae	<i>Adelotus brevis</i>
	<i>Heleioporus albopunctatus</i>
	<i>Heleioporus australiacus</i>
	<i>Heleioporus barycragus</i>
	<i>Heleioporus eyrei</i>
	<i>Heleioporus inornatus</i>
	<i>Heleioporus psammophilus</i>
	<i>Lechriodus aganoposis</i>
	<i>Lechriodus fletcheri</i>
	<i>Lechriodus melanopyga</i>
	<i>Lechriodus platyceps</i>
	<i>Limnodynastes convexiusculus</i>

Family	Species
	<i>Limnodynastes depressus</i>
	<i>Limnodynastes dorsalis</i>
	<i>Limnodynastes dumerilii</i>
	<i>Limnodynastes fletcheri</i>
	<i>Limnodynastes interioris</i>
	<i>Limnodynastes lignarius</i>
	<i>Limnodynastes peronii</i>
	<i>Limnodynastes salmini</i>
	<i>Limnodynastes tasmaniensis</i>
	<i>Limnodynastes terraereginae</i>
	<i>Philoria frosti</i>
	<i>Philoria kundagungan</i>
	<i>Philoria pughi</i>
	<i>Philoria richmondensis</i>
	<i>Philoria sphagnicolus</i>
	<i>Platyplectrum ornatum</i>
	<i>Platyplectrum spenceri</i>
Microhylidae	<i>Stumpffia be</i>
	<i>Stumpffia gimmeli</i>
	<i>Stumpffia grandis</i>
	<i>Stumpffia hara</i>
	<i>Stumpffia helenae</i>
	<i>Stumpffia madagascariensis</i>
	<i>Stumpffia megsoni</i>
	<i>Stumpffia psologlossa</i>
	<i>Stumpffia pygmaea</i>
	<i>Stumpffia roseifemoralis</i>
	<i>Stumpffia staffordi</i>
	<i>Stumpffia tetradactyla</i>
	<i>Stumpffia tridactyla</i>
Rhacophoridae	<i>Chiromantis cherrapunjiae</i>
	<i>Chiromantis doriae</i>
	<i>Chiromantis dudhwaensis</i>
	<i>Chiromantis inexpectatus</i>
	<i>Chiromantis kelleri</i>
	<i>Chiromantis nongkhorensis</i>
	<i>Chiromantis petersii</i>
	<i>Chiromantis punctatus</i>
	<i>Chiromantis rufescens</i>
	<i>Chiromantis samkosensis</i>
	<i>Chiromantis senapatiensis</i>
	<i>Chiromantis shyamrupus</i>
	<i>Chiromantis simus</i>

Family	Species
	<i>Chiromantis xerampelina</i>
	<i>Ghatixalus variabilis</i>
	<i>Ghatixalus asterops</i>
	<i>Polypedates assamensis</i>
	<i>Polypedates braueri</i>
	<i>Polypedates chlorophthalmus</i>
	<i>Polypedates colletti</i>
	<i>Polypedates cruciger</i>
	<i>Polypedates discantus</i>
	<i>Polypedates hecticus</i>
	<i>Polypedates impresus</i>
	<i>Polypedates insularis</i>
	<i>Polypedates iskandari</i>
	<i>Polypedates leucomystax</i>
	<i>Polypedates macrotis</i>
	<i>Polypedates maculatus</i>
	<i>Polypedates megacephalus</i>
	<i>Polypedates mutus</i>
	<i>Polypedates occidentalis</i>
	<i>Polypedates otilophus</i>
	<i>Polypedates pseudocruciger</i>
	<i>Polypedates ranwellai</i>
	<i>Polypedates subansiriensis</i>
	<i>Polypedates taeniatus</i>
	<i>Polypedates teraiensis</i>
	<i>Polypedates zed</i>
	<i>Rhacophorus achantharrhena</i>
	<i>Rhacophorus angulirostris</i>
	<i>Rhacophorus annamensis</i>
	<i>Rhacophorus arboreus</i>
	<i>Rhacophorus arvalis</i>
	<i>Rhacophorus aurantiventris</i>
	<i>Rhacophorus baluensis</i>
	<i>Rhacophorus barisani</i>
	<i>Rhacophorus belalongensis</i>
	<i>Rhacophorus bifasciatus</i>
	<i>Rhacophorus bimaculatus</i>
	<i>Rhacophorus bipunctatus</i>
	<i>Rhacophorus burmanus</i>
	<i>Rhacophorus calcadensis</i>
	<i>Rhacophorus calcaneus</i>
	<i>Rhacophorus catamitus</i>
	<i>Rhacophorus chenfui</i>

Family	Species
	<i>Rhacophorus cyanopunctatus</i>
	<i>Rhacophorus dennysi</i>
	<i>Rhacophorus dorsovireidis</i>
	<i>Rhacophorus duboisi</i>
	<i>Rhacophorus dugritei</i>
	<i>Rhacophorus dulitensis</i>
	<i>Rhacophorus edentulus</i>
	<i>Rhacophorus exechopygus</i>
	<i>Rhacophorus fasciatus</i>
	<i>Rhacophorus feae</i>
	<i>Rhacophorus gadingensis</i>
	<i>Rhacophorus gauni</i>
	<i>Rhacophorus georgii</i>
	<i>Rhacophorus harrissoni</i>
	<i>Rhacophorus helenae</i>
	<i>Rhacophorus hoanglienensis</i>
	<i>Rhacophorus hongchibaensis</i>
	<i>Rhacophorus hui</i>
	<i>Rhacophorus hungfuensis</i>
	<i>Rhacophorus jarujini</i>
	<i>Rhacophorus kio</i>
	<i>Rhacophorus laoshan</i>
	<i>Rhacophorus lateralis</i>
	<i>Rhacophorus leucofasciatus</i>
	<i>Rhacophorus malabaricus</i>
	<i>Rhacophorus margaritifer</i>
	<i>Rhacophorus marmoridorsum</i>
	<i>Rhacophorus maximus</i>
	<i>Rhacophorus minimus</i>
	<i>Rhacophorus modestus</i>
	<i>Rhacophorus moltrechti</i>
	<i>Rhacophorus monticola</i>
	<i>Rhacophorus nigropalmatus</i>
	<i>Rhacophorus nigropunctatus</i>
	<i>Rhacophorus norhayatii</i>
	<i>Rhacophorus omeimontis</i>
	<i>Rhacophorus orlovi</i>
	<i>Rhacophorus owstoni</i>
	<i>Rhacophorus pardalis</i>
	<i>Rhacophorus penanorum</i>
	<i>Rhacophorus poecilonotus</i>
	<i>Rhacophorus prasinatus</i>
	<i>Rhacophorus prominanus</i>

Family	Species
	<i>Rhacophorus pseudacutirostris</i>
	<i>Rhacophorus pseudomalabaricus</i>
	<i>Rhacophorus puerensis</i>
	<i>Rhacophorus reinwardtii</i>
	<i>Rhacophorus rhodopus</i>
	<i>Rhacophorus robertingeri</i>
	<i>Rhacophorus robinsonii</i>
	<i>Rhacophorus rufipes</i>
	<i>Rhacophorus schlegelii</i>
	<i>Rhacophorus spelaeus</i>
	<i>Rhacophorus subansiriensis</i>
	<i>Rhacophorus suffry</i>
	<i>Rhacophorus taipeianus</i>
	<i>Rhacophorus translineatus</i>
	<i>Rhacophorus tuberculatus</i>
	<i>Rhacophorus turpes</i>
	<i>Rhacophorus vampyrus</i>
	<i>Rhacophorus verrucopus</i>
	<i>Rhacophorus viridis</i>
	<i>Rhacophorus wui</i>
	<i>Rhacophorus yaoshanensis</i>
	<i>Rhacophorus yinggelingsensis</i>
	<i>Taruga eques</i>
	<i>Taruga fastigo</i>
	<i>Taruga longinasus</i>

Table S2 - List of genera included in each group. Numbers represent the amount of species we have sampled in the phylogeny in comparison to the total species currently described for the genus. Grey indicates foaming lineages, while in white are non-foaming.

Leptodactylidae	Leptodactylidae + Sister	Limnodynastidae	Limnodynastidae + Sister	Stumpffia	Rhacophorinae
<i>Adenomera</i> (3/18)	<i>Adenomera</i> (3/18)	<i>Adelotus</i> (1/1)	<i>Adelotus</i> (1/1)	<i>Anodonthyla</i> (6/11)	<i>Beddomixalus</i> (0/1)
<i>Crossodactylodes</i> (0/5)	<i>Allophryne</i> (1/3)	<i>Heleioporus</i> (1/6)	<i>Arenophryne</i> (0/2)	<i>Cophyla</i> (2/3)	<i>Chiromantis</i> (3/15)
<i>Edalorhina</i> (1/2)	<i>Celsiella</i> (2/2)	<i>Lechriodus</i> (1/4)	<i>Assa</i> (1/1)	<i>Hoplophryne</i> (2/2)	<i>Feihyla</i> (2/5)
<i>Engystomops</i> (8/9)	<i>Centrolene</i> (14/26)	<i>Limnodynastes</i> (11/11)	<i>Crinia</i> (6/17)	<i>Madecassophryne</i> (0/1)	<i>Ghatixalus</i> (1/2)
<i>Eupemphix</i> (1/1)	<i>Chimerella</i> (0/1)	<i>Neobatrachus</i> (3/9)	<i>Geocrinia</i> (1/7)	<i>Parhoplophryne</i> (0/1)	<i>Gracixalus</i> (4/9)
<i>Hydrolaetare</i> (0/3)	<i>Cochranella</i> (5/7)	<i>Notaden</i> (2/4)	<i>Heleioporus</i> (1/6)	<i>Platypelis</i> (6/12)	<i>Kurixalus</i> (5/10)
<i>Leptodactylus</i> (32/76)	<i>Crossodactylodes</i> (0/5)	<i>Philoria</i> (1/6)	<i>Lechriodus</i> (1/4)	<i>Plethodontohyla</i> (9/9)	<i>Liuixalus</i> (3/3)
<i>Lithodytes</i> (1/1)	<i>Edalorhina</i> (1/2)	<i>Platyplectrum</i> (2/2)	<i>Limnodynastes</i> (11/11)	<i>Rhombophryne</i> (7/10)	<i>Mercurana</i> (0/1)
<i>Paratelmatobius</i> (3/6)	<i>Engystomops</i> (8/9)		<i>Metacrinia</i> (1/1)	<i>Stumpffia</i> (8/15)	<i>Nyctixalus</i> (2/3)
<i>Physalaemus</i> (8/45)	<i>Espadarana</i> (3/3)		<i>Mixophyes</i> (5/8)		<i>Philautus</i> (7/51)
<i>Pleurodema</i> (5/15)	<i>Eupemphix</i> (1/1)		<i>Myobatrachus</i> (1/1)		<i>Polypedates</i> (6/23)
<i>Pseudopaludicola</i> (1/17)	<i>Hyalinobatrachium</i> (22/28)		<i>Neobatrachus</i> (3/9)		<i>Pseudophilautus</i> (21/78)
<i>Rupirana</i> (0/1)	<i>Hydrolaetare</i> (0/3)		<i>Notaden</i> (2/4)		<i>Raorchestes</i> (19/50)
<i>Scythrophrys</i> (1/1)	<i>Ikakogi</i> (1/1)		<i>Paracrinia</i> (1/1)		<i>Rhacophorus</i> (24/83)
	<i>Leptodactylus</i> (32/76)		<i>Philoria</i> (1/6)		<i>Taruga</i> (2/3)
	<i>Lithodytes</i> (1/1)		<i>Platyplectrum</i> (2/2)		<i>Theloderma</i> (5/23)
	<i>Nymphargus</i> (11/36)		<i>Pseudophryne</i> (2/14)		

Leptodactylidae	Leptodactylidae + Sister	Limnodynastidae	Limnodynastidae + Sister	Stumpffia	Rhacophorinae
	<i>Paratelmatobius</i> (3/6)		<i>Rheobatrachus</i> (1/2)		
	<i>Physalaemus</i> (8/45)		<i>Spicospina</i> (1/1)		
	<i>Pleurodema</i> (5/15)		<i>Taudactylus</i> (1/6)		
	<i>Pseudopaludicola</i> (1/17)		<i>Uperoleia</i> (2/28)		
	<i>Rulyrana</i> (4/9)				
	<i>Rupirana</i> (0/1)				
	<i>Sachatamia</i> (3/3)				
	<i>Scythrophrys</i> (1/1)				
	<i>Teratohyla</i> (2/4)				
	<i>Vitreorana</i> (6/8)				

Table S3 - Proportion of species included in the phylogenetic hypothesis in relation to species which that are known to be in these clades but positioning information are unknown.

	Leptodactylidae	Leptodactylidae + Sister	Limnodynastidae	Limnodynastidae + Sister	<i>Stumpffia</i>	Rhacophorinae
Total sampled species	64	138	22	45	40	104
Total species currently described	200	331	43	132	65	360
Proportion of sampled species	0.320	0.417	0.512	0.341	0.615	0.289
Total sampled species with foam	55	55	17	17	8	35
Total species currently described with foam	158	158	30	30	15	124
Proportion of foaming species sampled	0.348	0.348	0.567	0.567	0.533	0.282
Total sampled species without foam	7	81	5	28	32	69
Total species currently described without foam	39	170	13	102	50	236
Proportion of non-foaming sampled species	0.179	0.476	0.385	0.275	0.640	0.292

