Appendix B from A. de Queiroz and J. A. Rodríguez-Robles, "Historical Contingency and Animal Diets: The Origins of Egg Eating in Snakes"

(Am. Nat., vol. 167, no. 5, p. 682)

Supertree Construction

Lineages and Relationships

This appendix gives details for the construction of the snake supertree, associated references, and a Nexus file with the character data and the trees used in the concentrated-changes analyses. For relationships among major lineages of snakes, we followed Lee and Scanlon's (2002) morphological study (fig. 11*A*) and, for alternative analyses to which we refer but do not present the full results, Vidal and Hedges's (2002*a*) molecular study. Lee and Scanlon's analysis included characters from previous analyses and also included fossils; thus, we consider it more reliable than previous morphological studies. Slowinski and Lawson's (2002) molecular study used a substantially greater number of taxa than and about the same number of characters as Vidal and Hedges. However, the number of major lineages sampled was similar in the two studies. Furthermore, Slowinski and Lawson did not present a combined analysis of all their data, and the separate trees they presented are based on fewer characters than Vidal and Hedges's tree. Thus, we prefer Vidal and Hedges's tree over those of Slowinski and Lawson. Finally, although Vidal and Hedges used slightly more taxa and many more characters than Lee and Scanlon, the latter produced a tree with generally higher bootstrap values. Thus, one could make an argument for preferring either study; this is why we used both topologies (although we only report those using the Lee and Scanlon tree).

In the list that follows, indentations indicate position in the phylogenetic hierarchy. For example, Elapidae is indented relative to Colubroidea because Elapidae is a subgroup of Colubroidea. Taxa indented to the same degree are not necessarily sister taxa or in any other way equivalent; they simply do not form a nested relationship.

Erycinae. The relationships are from Kluge (1993*b*), although for our purposes the tree can be obtained by simply assuming the monophyly of Erycinae, *Charina*, and *Eryx*.

Boinae. The relationships are from Kluge (1991) and Austin (2000). These studies gave different trees, but the trees are perfectly concordant for the taxa included in our study.

Pythoninae. The relationships are from Kluge (1993*a*), in particular his figure 22, except that relationships within *Antaresia* are resolved as in his figure 23. This resolution has no effect on our analyses. Kluge (1993*a*) considered *Liasis fuscus* to be a part of *Liasis mackloti*; thus, we have placed *L. fuscus* in the position of *L. mackloti*. Kluge's study relies on and adds to previous studies of pythonines.

Colubroidea (major groups). The relationships are from the maximum likelihood (ML) C-mos tree of R. Lawson, J. B. Slowinski, F. T. Burbrink, and B. I. Crother (unpublished data [hereafter, Lawson et al.]; this tree is much better supported at this level than their cyt *b* tree and much better resolved than their consensus tree); the combined C-mos, 12S and 16S rRNA, and ND4 tree of Vidal and Hedges (2002*a*); and the ML combined cyt *b*, 12S and 16S rRNA, and ND4 tree of Kelly et al. (2003). We could not choose just one of these studies because the Lawson et al. study contained the most taxa and the Kelly et al. study used the greatest number of informative characters; and it can be argued that the Vidal and Hedges study is superior to that of Lawson et al. because it used more characters and superior to that of Kelly et al. because it used the C-mos gene rather than the less informative cyt *b*. Kraus and Brown (1998) and Gravlund (2001) used a subset of the genes used by Kelly et al. (2003) and far fewer taxa; thus, the two earlier studies were not used. For our purposes, the only conflict in the trees is that Vidal and Hedges place homalopsines as the sister group of all other nonviperid colubroids, whereas Kelly et al. place them more deeply nested in the tree (Lawson et al. are equivocal on this point). However, this latter position is weakly supported (e.g., the branch in question is very short in Kelly et al.'s [2003] ML tree and does not appear at all in their maximum parsimony and Bayesian trees). The hypothesis that homalopsines are outside of all nonviperid colubroids in our study is moderately supported by Vidal and Hedges (bootstrap = 78). Thus, we have placed homalopsines in this relatively basal position.

Crotalinae. The relationships generally follow Parkinson et al. (2002, fig. 3*b*), who used the largest number of both informative characters and taxa of any study of this group. Relationships within the rattlesnakes (*Crotalus* and *Sistrurus*) follow Murphy et al. (2002). *Crotalus oreganus* is treated as the sister species (rather than a subspecies) of *Crotalus viridis*, following Ashton and de Queiroz (2001).

Viperinae. Ashe and Marx (1988) place *Bitis* as sister to *Vipera ammodytes* (of the taxa included in our study), but both the mitochondrial DNA sequence study of Lenk et al. (2001) and the Herrmann and Joger (1997) study place *Bitis* outside of *Vipera*, as, apparently, does the morphological data of Groombridge (1980, as analyzed by Hermann and Joger). We have followed the majority of studies in placing *Bitis* outside of *Vipera*.

Vipera. The relationships are from the morphological study of Ashe and Marx (1988) and the albumin immunological distance study of Herrmann and Joger (1997).

Elapidae (major groups). The modern phylogenetic study with the largest number of characters (and probably by far the largest number of informative characters, although this information is not given) is that of Slowinski and Keogh (2000; we used their fig. 2). For our purposes, the important results are the monophyly of the Australo-Papuan clade and the African-Asian-American clade (contra Keogh 1998, but supported by other references cited in Slowinski and Keogh 2000). *Aspidelaps* is placed next to *Naja* on the basis of this study as well.

Viviparous Australian elapids. We followed Keogh et al. (2000), who used by far the largest number of characters of any phylogenetic study of this group. The placement of *Enhydrina* is from Slowinski and Keogh (2000).

Austrelaps. There are no phylogenetic studies that resolve relationships within this group; thus, we left it unresolved.

Suta. There are no phylogenetic studies that resolve relationships within this group; thus, we left it unresolved.

Oviparous Australo-Papuan elapids. We followed Keogh et al. (1998, fig. 5), who used the largest number of characters of any phylogenetic study of this group.

Demansia. The relationships are from Mengden (1985).

Pseudechis. The relationships are from Mengden et al. (1986, fig. 5). That study used phenetic methods, but the electrophoretic data very strongly separate *Pseudechis porphyriacus* from *Pseudechis guttatus* and *Pseudechis australis*. The placement of *Laticauda* within *Pseudechis* follows Keogh et al. (1998).

Pseudonaja. Mengden (1985) presented a tree for some of the species in this group based on electrophoretic data. However, this study did not resolve relationships among the taxa included in our study.

Cacophis. There are no phylogenetic studies that resolve relationships within this group; thus, we left it unresolved.

Colubrinae. This is a difficult group. Our main source for relationships was the ML tree of Creer (2001), which included more taxa than any other study of colubrines as a whole. The positions of *Elaphe quadrivirgata*, *Elaphe quatuorlineata*, and *Coronella* are based on Utiger et al. (2002). The placement of *Hemorrhois hippocrepis* and *Hierophis viridiflavus* with *Macroprotodon* is based on the close relationship of the former two taxa to *Spalerosophis* (Creer 2001; Schätti and Utiger 2001), along with the finding of Lawson et al. (unpublished data) that *Spalerosophis* is sister to *Macroprotodon* among the taxa in their data set. The position of *Grayia* is from Vidal et al. (2000) and Kelly et al. (2003). The position of *Dendrelaphis* is from Kelly et al. (2003).

Masticophis. The relationships are from Creer (2001). In addition, we assumed that *Masticophis schotti* and *Masticophis taeniatus* are sister taxa because they were formerly considered to be the same species.

Uromacer. The relationships are from Henderson et al. (1988).

Lampropeltini. We used Rodríguez-Robles and De Jesús-Escobar (1999, fig. 5) rather than Keogh (1996) because the former used a greater number of taxa and informative characters.

Lampropeltis. The relationships are from J. W. Fetzner Jr. and L. R. Miller (unpublished data). The polyphyly of *Lampropeltis triangulum* in Fetzner and Miller's tree required splitting our diet data into *L. triangulum sinaloae* and *L. triangulum syspila* and eliminating data from several studies for which the appropriate clade of *L. triangulum* was unclear.

Pituophis. The relationships are from Rodríguez-Robles and De Jesús-Escobar (2000).

Natricinae. Relationships of non–North American genera to each other and to the Thamnophiini follow Lawson et al. (unpublished data) and R. Lawson and A. de Queiroz (unpublished data). The position of *Tropidonophis* is based on Malnate and Underwood (1988).

Thamnophiini. The relationships are from Alfaro and Arnold (2001).

Thamnophis. The relationships are from de Queiroz et al. (2002).

Xenodontinae. In general, we used Vidal et al. (2000; maximum parsimony tree, their fig. 2) rather than Cadle’s (1984*a*, 1984*b*) studies because the former used more taxa and used individual characters rather than distances. The placement of *Waglerophis* is based on Cadle (1984*a*). The placement of *Diadophis*, *Carphophis*, and *Heterodon* outside the clade of Central American + South American + West Indian xenodontines is based on Cadle (1984*a*) and Lawson et al. (unpublished data). The sister group relationship of *Diaophis* and *Carphophis* is based on Lawson et al. (unpublished data). The placement of *Hypsiglena* with *Coniophanes* is based on R. Lawson, J. B. Slowinski, F. T. Burbrink, and B. I. Crother (unpublished data), in conjunction with Cadle’s (1984*b*) finding that *Rhadinaea flavilata* is closely related to *Coniophanes*. The placement of *Tachymenis* with these latter two is based on Zaher (1999). The sister group relationship of *Hypsiglena* + *Coniophanes* + *Tachymenis* to *Diadophis* + *Carphophis* + *Heterodon* is based on Vidal and Hedges (2002*a*).

Nexus Code

#NEXUS

[*Boiga ceylonensis*, *Boiga cynodon*, and *Boiga dendrophila* were not used in any analyses because records of feeding on bird eggs and squamate eggs were ambiguous for these species. In addition, for the bird egg analyses, *Thamnophis sirtalis* and *Crotalus horridus* were not used because records of feeding on bird eggs were ambiguous for these species.]

```
BEGIN TAXA;
DIMENSIONS NTAX=203;
TAXLABELS
Acrochordus_arafurae
Anilius_scytale
Candoia_aspera
Candoia_bibroni
Candoia_carinata
Charina_bottae
Charina_reinhardtii
Corallus_ruschenbergerii
Epicrates_striatus
Eryx_miliaris
Eryx_tataricus
Alsophis_cantherigerus
Alsophis_portoricensis
Alsophis_vudii
Amphiesma_stolata
Antillophis_parvifrons
Arizona_elegans
Boiga_blandingi
Boiga_ceylonensis
Boiga_cynodon
Boiga_dendrophila
Boiga_irregularis
Bogertophis_subocularis
Bothrophthalmus_lineatus
Carphophis_amoenus
Cemophora_coccinea
Cerberus_rynchops
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Coluber_constrictor
Hemorrhois_hippocrepis
Hierophis_viridiflavus
Coniophanes_fissidens
Coronella_austriaca
Coronella_girondica
Darlingtonia_haetiana
Dendrelaphis_punctulata
Diadophis_punctatus
Drymobius_chloroticus
Drymobius_margaritiferus
Pantherophis_guttatus
Pantherophis_obsoletus
Elaphe_quadrivirgata
Elaphe_quatuorlineata
Pantherophis_vulpinus
Fordonia_leucobalia
Grayia_smythii
Heterodon_platirhinos
Hypsiglena_torquata
Hypsirhynchus_ferox
Lampropeltis_calligaster
Lampropeltis_getula
Lampropeltis_triangulum_syspila
Lampropeltis_triangulum_sinaloae
Lampropeltis_zonata
Liophis_lineatus
Liophis_poecilogyrus
Macroprotodon_cucullatus
Masticophis_bilineatus
Masticophis_flagellum
Masticophis_schotti
Masticophis_taeniatus
Mastigodryas_melanolomus
Natriciteres_fuliginoides
Natriciteres_variegata
Natrix_maura
Natrix_natrix
Natrix_tessellata
Nerodia_clarkii
Nerodia_cyclopion
Nerodia_erythrogaster
Nerodia_fasciata
Nerodia_harteri
Nerodia_rhombifer
Nerodia_sipedon
Nerodia_taxispilota
Opheodrys_aestivus
Oxybelis_aeneus
Philodryas_chamissonis
Philodryas_natterei
Pituophis_catenifer
Pituophis_melanoleucus
Psammodynastes_pulverulentus

Regina_alleni
Regina_grahamii
Regina_rigida
Regina_septemvittata
Rhabdophis_tigrinus
Rhinocheilus_lecontei
Seminatrix_pygaea
Storeria_dekayi
Tachymenis_chilensis
Tantilla_coronata
Tantilla_melanocephala
Tantilla_relicta
Thamnodynastes_strigatus
Thamnophis_atratus
Thamnophis_butleri
Thamnophis_couchii
Thamnophis_cyrtopsis
Thamnophis_elegans
Thamnophis_eques
Thamnophis_hammondii
Thamnophis_ordinoides
Thamnophis_sauritus
Thamnophis_sirtalis
Thamnophis_brachystoma
Thamnophis_chrysocephalus
Thamnophis_errans
Thamnophis_fulvus
Thamnophis_godmani
Thamnophis_melanogaster
Thamnophis_proximus
Thamnophis_radix
Thamnophis_rufipunctatus
Thamnophis_scalaris
Thamnophis_validus
Thelotornis_capensis
Tropidonophis_mairii
Uromacer_catesbyi
Uromacer_frenatus
Uromacer_oxyrhynchus
Virginia_striatula
Waglerophis_merremii
Cylindrophis_ruffus
Acanthophis_antarcticus
Aspidelaps_scutatus
Austrelaps_labialis
Austrelaps_ramsayi
Austrelaps_superbus
Bungarus_caeruleus
Bungarus_ceylonicus
Bungarus_fasciatus
Bungarus_multicinctus
Cacophis_harriettae
Cacophis_krefftii
Cacophis_squamulosus

Demansia_atra
Demansia_psammophis
Dendroaspis_jamesoni
Denisonia_devisi
Drysdalia_coronata
Drysdalia_coronoides
Echiopsis_curta
Enhydrina_schistosa
Furina_diadema
Hemiaspis_damelii
Hemiaspis_signata
Hoplocephalus_bitorquatus
Laticauda_colubrina
Micrurus_corallinus
Micrurus_fulvius
Naja_atra
Notechis_scutatus
Pseudechis_australis
Pseudechis_guttatus
Pseudechis_porphyriacus
Pseudonaja_affinis
Pseudonaja_inframacula
Pseudonaja_modesta
Pseudonaja_nuchalis
Pseudonaja_textilis
Rhinoplocephalus_bicolor
Rhinoplocephalus_nigrescens
Simoselaps_bertholdi
Simoselaps_semifasciatus
Suta_flagellum
Suta_gouldii
Suta_monachus
Suta_nigriceps
Suta_spectabilis
Suta_suta
Toxicocalamus_loriae
Tropidechis_carinatus
Antaresia_childreni
Antaresia_maculosa
Antaresia_stimsoni
Aspidites_melanocephalus
Aspidites_ramsayi
Liasis_fuscus
Morelia_spilota
Python_regius
Python_reticulatus
Agkistrodon_contortrix
Agkistrodon_piscivorus
Bitis_caudalis
Bitis_gabonica
Bothrops_neuwiedi
Cerrophidium_godmani
Crotalus_atrox
Crotalus_cerastes

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Crotalus_enyo
Crotalus_horridus
Crotalus_scutulatus
Crotalus_viridis_oreganus
Crotalus_viridis_viridis
Porthidium_yucatanicum
Sistrurus_catenatus
Sistrurus_miliarius
Trimeresurus_mucrosquamatus
Trimeresurus_stejnegeri
Vipera_ammodytes
Vipera_aspis
Vipera_berus
Vipera_ursinii;
END;
BEGIN CHARACTERS;
DIMENSIONS NCHAR=4;
FORMAT MISSING=? GAP=- ;
CHARSTATELABELS
1 SquamatesPresent, 2 SqEggsPresent, 3 BirdsPresent, 4 BirdEggsPresent
;
MATRIX
Acrochordus_arafurae 0000
Anilius_scytale 1000
Candoia_aspera 1000
Candoia_bibroni 1000
Candoia_carinata 1000
Charina_bottae 1110
Charina_reinhardtii 1000
Corallus_ruschenbergerii 1010
Epicrates_striatus 1010
Eryx_miliaris 1010
Eryx_tataricus 1010
Alsophis_cantherigerus 1010
Alsophis_portoricensis 1000
Alsophis_vudii 1010
Amphiesma_stolata 1000
Antillophis_parvifrons 1000
Arizona_elegans 1010
Boiga_blandingi 1010
Boiga_ceylonensis 1?1?
Boiga_cynodon 1?1?
Boiga_dendrophila 1?1?
Boiga_irregularis 1011
Bogertophis_subocularis 0110
Bothrophthalmus_lineatus 1000
Carphophis_amoenus 0000
Cemophora_coccinea 0100
Cerberus_rynchops 0000
Coluber_constrictor 1011
Hemorrhois_hippocrepis 1010
Hierophis_viridiflavus 1010
Coniophanes_fissidens 1100
Coronella_austriaca 1000
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Coronella_girondica 1100
Darlingtonia_haetiana 1000
Dendrelaphis_punctulata 1000
Diadophis_punctatus 1000
Drymobius_chloroticus 1000
Drymobius_margaritiferus 1100
Pantherophis_guttatus 1011
Pantherophis_obsoletus 1111
Elaphe_quadrivirgata 1111
Elaphe_quatuorlineata 1010
Pantherophis_vulpinus 0011
Fordonia_leucobalia 0000
Grayia_smythii 0000
Heterodon_platirhinos 1100
Hypsiglena_torquata 1100
Hypsirhynchus_ferox 1000
Lampropeltis_calligaster 1011
Lampropeltis_getula 1111
Lampropeltis_triangulum_syspila 1100
Lampropeltis_triangulum_sinaloae 1110
Lampropeltis_zonata 1110
Liophis_lineatus 0000
Liophis_poecilogyrus 0000
Macroprotodon_cucullatus 1000
Masticophis_bilineatus 1000
Masticophis_flagellum 1111
Masticophis_schotti 1000
Masticophis_taeniatus 1000
Mastigodryas_melanolomus 1100
Natriciteres_fuliginoides 0000
Natriciteres_variegata 0000
Natrix_maura 0000
Natrix_natrix 1010
Natrix_tessellata 0000
Nerodia_clarkii 0000
Nerodia_cyclopion 0000
Nerodia_erythrogaster 0000
Nerodia_fasciata 0000
Nerodia_harteri 0000
Nerodia_rhombifer 0000
Nerodia_sipedon 1000
Nerodia_taxispilota 0000
Opheodrys_aestivus 0000
Oxybelis_aeneus 1000
Philodryas_chamissonis 1110
Philodryas_natterei 1010
Pituophis_catenifer 1111
Pituophis_melanoleucus 1101
Psammodynastes_pulverulentus 1000
Regina_alleni 0000
Regina_grahamii 0000
Regina_rigida 0000
Regina_septemvittata 0000
Rhabdophis_tigrinus 0000

Rhinocheilus_lecontei 1100
Seminatrix_pygaea 0000
Storeria_dekayi 0000
Tachymenis_chilensis 1100
Tantilla_coronata 0000
Tantilla_melanocephala 0000
Tantilla_relicta 0000
Thamnodynastes_strigatus 1000
Thamnophis_atratus 0000
Thamnophis_butleri 0000
Thamnophis_couchii 0000
Thamnophis_cyrtopsis 1000
Thamnophis_elegans 1010
Thamnophis_eques 1000
Thamnophis_hammondii 0000
Thamnophis_ordinoides 0000
Thamnophis_sauritus 0000
Thamnophis_sirtalis 101?
Thamnophis_brachystoma 0000
Thamnophis_chrysocephalus 0000
Thamnophis_errans 1100
Thamnophis_fulvus 0000
Thamnophis_godmani 1100
Thamnophis_melanogaster 0000
Thamnophis_proximus 1000
Thamnophis_radix 0000
Thamnophis_rufipunctatus 0000
Thamnophis_scalaris 1000
Thamnophis_validus 0000
Thelotornis_capensis 1010
Tropidonophis_mairii 1000
Uromacer_catesbyi 1000
Uromacer_frenatus 1000
Uromacer_oxyrhynchus 1000
Virginia_striatula 0000
Waglerophis_merremii 0000
Cylindrophis_ruffus 1100
Acanthophis_antarcticus 1010
Aspidelaps_scutatus 1100
Austrelaps_labialis 1100
Austrelaps_ramsayi 1000
Austrelaps_superbus 1000
Bungarus_caeruleus 1000
Bungarus_ceylonicus 1000
Bungarus_fasciatus 1101
Bungarus_multicinctus 1000
Cacophis_harriettae 1100
Cacophis_krefftii 1000
Cacophis_squamulosus 1100
Demansia_atra 1000
Demansia_psammophis 1100
Dendroaspis_jamesoni 1010
Denisonia_devisi 1000
Drysdalia_coronata 1000

Drysdalia_coronoides 1100
Echiopsis_curta 1010
Enhydrina_schistosa 0000
Furina_diadema 1000
Hemiaspis_damelii 1000
Hemiaspis_signata 1100
Hoplocephalus_bitorquatus 1000
Laticauda_colubrina 0000
Micrurus_corallinus 1000
Micrurus_fulvius 1000
Naja_atra 1010
Notechis_scutatus 1011
Pseudechis_australis 1111
Pseudechis_guttatus 1000
Pseudechis_porphyriacus 1100
Pseudonaja_affinis 1010
Pseudonaja_inframacula 1100
Pseudonaja_modesta 1100
Pseudonaja_nuchalis 1110
Pseudonaja_textilis 1110
Rhinoplocephalus_bicolor 1000
Rhinoplocephalus_nigrescens 1100
Simoselaps_bertholdi 1000
Simoselaps_semifasciatus 0100
Suta_flagellum 1000
Suta_gouldii 1000
Suta_monachus 1000
Suta_nigriceps 1000
Suta_spectabilis 1100
Suta_suta 1100
Toxicocalamus_loriae 0000
Tropidechis_carinatus 1010
Antaresia_childreni 1010
Antaresia_maculosa 1010
Antaresia_stimsoni 1000
Aspidites_melanocephalus 1110
Aspidites_ramsayi 1110
Liasis_fuscus 1011
Morelia_spilota 1011
Python_regius 0010
Python_reticulatus 1010
Agkistrodon_contortrix 1010
Agkistrodon_piscivorus 1010
Bitis_caudalis 1010
Bitis_gabonica 0010
Bothrops_neuwiedi 1010
Cerrophidium_godmani 1010
Crotalus_atrox 1010
Crotalus_cerastes 1010
Crotalus_enyo 1000
Crotalus_horridus 101?
Crotalus_scutulatus 0000
Crotalus_viridis_oreganus 1010
Crotalus_viridis_viridis 0010

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Porthidium_yucatanicum 1010
Sistrurus_catenatus 1100
Sistrurus_miliarius 1000
Trimeresurus_mucrosquamatus 1010
Trimeresurus_stejnegeri 1000
Vipera_ammodytes 1010
Vipera_aspis 1010
Vipera_berus 1010
Vipera_ursinii 1010
;
END;
BEGIN ASSUMPTIONS;
OPTIONS DEFTYPE=unord PolyTcount=MINSTEPS ;
END;
BEGIN TREES;
TRANSLATE
1 Acrochordus_arafurae,
2 Anilius_scytale,
3 Candoia_aspera,
4 Candoia_bibroni,
5 Candoia_carinata,
6 Charina_bottae,
7 Charina_reinhardtii,
8 Corallus_ruschenbergerii,
9 Epicrates_striatus,
10 Eryx_miliaris,
11 Eryx_tataricus,
12 Alsophis_cantherigerus,
13 Alsophis_portoricensis,
14 Alsophis_vudii,
15 Amphiesma_stolata,
16 Antillophis_parvifrons,
17 Arizona_elegans,
18 Boiga_blandingi,
19 Boiga_ceylonensis,
20 Boiga_cynodon,
21 Boiga_dendrophila,
22 Boiga_irregularis,
23 Bogertophis_subocularis,
24 Bothrophthalmus_lineatus,
25 Carphophis_amoenus,
26 Cemophora_coccinea,
27 Cerberus_rynchops,
28 Coluber_constrictor,
29 Hemorrhois_hippocrepis,
30 Hierophis_viridiflavus,
31 Coniophanes_fissidens,
32 Coronella_austriaca,
33 Coronella_girondica,
34 Darlingtonia_haetiana,
35 Dendrelaphis_punctulata,
36 Diadophis_punctatus,
37 Drymobius_chloroticus,
38 Drymobius_margaritiferus,
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39 Pantherophis_guttatus,
40 Pantherophis_obsoletus,
41 Elaphe_quadrivirgata,
42 Elaphe_quatuorlineata,
43 Pantherophis_vulpinus,
44 Fordonia_leucobalia,
45 Grayia_smythii,
46 Heterodon_platirhinos,
47 Hypsiglena_torquata,
48 Hypsirhynchus_ferox,
49 Lampropeltis_calligaster,
50 Lampropeltis_getula,
51 Lampropeltis_triangulum_syspila,
52 Lampropeltis_triangulum_sinaloae,
53 Lampropeltis_zonata,
54 Liophis_lineatus,
55 Liophis_poecilogyrus,
56 Macroprotodon_cucullatus,
57 Masticophis_bilineatus,
58 Masticophis_flagellum,
59 Masticophis_schotti,
60 Masticophis_taeniatus,
61 Mastigodryas_melanolomus,
62 Natriciteres_fuliginoides,
63 Natriciteres_variegata,
64 Natrix_maura,
65 Natrix_natrix,
66 Natrix_tessellata,
67 Nerodia_clarkii,
68 Nerodia_cyclopion,
69 Nerodia_erythrogaster,
70 Nerodia_fasciata,
71 Nerodia_harteri,
72 Nerodia_rhombifer,
73 Nerodia_sipedon,
74 Nerodia_taxispilota,
75 Opheodrys_aestivus,
76 Oxybelis_aeneus,
77 Philodryas_chamissonis,
78 Philodryas_natterei,
79 Pituophis_catenifer,
80 Pituophis_melanoleucus,
81 Psammodynastes_pulverulentus,
82 Regina_alleni,
83 Regina_grahamii,
84 Regina_rigida,
85 Regina_septemvittata,
86 Rhabdophis_tigrinus,
87 Rhinocheilus_lecontei,
88 Seminatrix_pygaea,
89 Storeria_dekayi,
90 Tachymenis_chilensis,
91 Tantilla_coronata,
92 Tantilla_melanocephala,

93 Tantilla_relicta,
94 Thamnodynastes_strigatus,
95 Thamnophis_atratus,
96 Thamnophis_butleri,
97 Thamnophis_couchii,
98 Thamnophis_cyrtopsis,
99 Thamnophis_elegans,
100 Thamnophis_eques,
101 Thamnophis_hammondii,
102 Thamnophis_ordinoides,
103 Thamnophis_sauritus,
104 Thamnophis_sirtalis,
105 Thamnophis_brachystoma,
106 Thamnophis_chrysocephalus,
107 Thamnophis_errans,
108 Thamnophis_fulvus,
109 Thamnophis_godmani,
110 Thamnophis_melanogaster,
111 Thamnophis_proximus,
112 Thamnophis_radix,
113 Thamnophis_rufipunctatus,
114 Thamnophis_scalaris,
115 Thamnophis_validus,
116 Thelotornis_capensis,
117 Tropidonophis_mairii,
118 Uromacer_catesbyi,
119 Uromacer_frenatus,
120 Uromacer_oxyrhynchus,
121 Virginia_striatula,
122 Waglerophis_merremii,
123 Cylindrophis_ruffus,
124 Acanthophis_antarcticus,
125 Aspidelaps_scutatus,
126 Austrelaps_labialis,
127 Austrelaps_ramsayi,
128 Austrelaps_superbus,
129 Bungarus_caeruleus,
130 Bungarus_ceylonicus,
131 Bungarus_fasciatus,
132 Bungarus_multicinctus,
133 Cacophis_harriettae,
134 Cacophis_krefftii,
135 Cacophis_squamulosus,
136 Demansia_atra,
137 Demansia_psammophis,
138 Dendroaspis_jamesoni,
139 Denisonia_devisi,
140 Drysdalia_coronata,
141 Drysdalia_coronoides,
142 Echiopsis_curta,
143 Enhydrina_schistosa,
144 Furina_diadema,
145 Hemiaspis_damelii,
146 Hemiaspis_signata,

147 Hoplocephalus_bitorquatus,
148 Laticauda_colubrina,
149 Micrurus_corallinus,
150 Micrurus_fulvius,
151 Naja_atra,
152 Notechis_scutatus,
153 Pseudechis_australis,
154 Pseudechis_guttatus,
155 Pseudechis_porphyriacus,
156 Pseudonaja_affinis,
157 Pseudonaja_inframacula,
158 Pseudonaja_modesta,
159 Pseudonaja_nuchalis,
160 Pseudonaja_textilis,
161 Rhinoplocephalus_bicolor,
162 Rhinoplocephalus_nigrescens,
163 Simoselaps_bertholdi,
164 Simoselaps_semifasciatus,
165 Suta_flagellum,
166 Suta_gouldii,
167 Suta_monachus,
168 Suta_nigriceps,
169 Suta_spectabilis,
170 Suta_suta,
171 Toxicocalamus_loriae,
172 Tropidechis_carinatus,
173 Antaresia_childreni,
174 Antaresia_maculosa,
175 Antaresia_stimsoni,
176 Aspidites_melanocephalus,
177 Aspidites_ramsayi,
178 Liasis_fuscus,
179 Morelia_spilota,
180 Python_regius,
181 Python_reticulatus,
182 Agkistrodon_contortrix,
183 Agkistrodon_piscivorus,
184 Bitis_caudalis,
185 Bitis_gabonica,
186 Bothrops_neuwiedi,
187 Cerrophidium_godmani,
188 Crotalus_atrox,
189 Crotalus_cerastes,
190 Crotalus_enyo,
191 Crotalus_horridus,
192 Crotalus_scutulatus,
193 Crotalus_viridis_oreganus,
194 Crotalus_viridis_viridis,
195 Porthidium_yucatanicum,
196 Sistrurus_catenatus,
197 Sistrurus_miliarius,
198 Trimeresurus_mucrosquamatus,
199 Trimeresurus_stejnegeri,
200 Vipera_ammodytes,

201 Vipera_aspis,
202 Vipera_berus,
203 Vipera_ursinii
;
TREE Bird = [&R]
(((((6,7),(10,11)),(((((173,174),175),(178,(179,(180,181)))),(176,177)),(((3,5),4),(8,9)))),(1,(((((((((((12,14),13),34),(48,16)),(118,(119,120))),((77,78),(94,(122,(54,55))))),(((31,47),90),((36,25),46))),((((((((((70,67),(71,73)),69),(72,74)),83),85),68),(((((((((95,99),97),102),101),((96,112),105)),100),98),(106,108)),(113,((107,(109,114)),(110,115))))),(103,111))),((82,(84,88)),(121,89))),(64,(66,65))),(((86,15),117),(62,63)))),((((((((((39,43),40),(79,80)),((17,23),(26,(49,((50,51),(52,53)))))),87),(41,42)),(33,32)),(56,(29,30))),((116,(76,((37,38),(75,(((58,(57,(59,60))),28),(61,((91,92),93))))))),(18,22))),35),45)),((((((((((133,134),135),144),(((((((147,(152,172)),(126,(127,128))),143),(141,(145,146))),142),(139,(((161,162),(((165,((169,170),166)),168),167)),140))),124)),(136,137)),(163,164)),((((153,148),154),155),((((156,158),157),159),160))),171),(((((129,131),130),132),138),((151,125),(149,150)))),81),24)),(27,44)),(((((200,201),202),203),(185,184)),(198,(199,(((182,183),(((((193,194),192),(188,190)),189),(196,197))),((187,195),186)))))))),(2,123));
TREE Squamate = [&R]
(((((6,7),(10,11)),(((((173,174),175),(178,(179,(180,181)))),(176,177)),(((3,5),4),(8,9)))),(1,(((((((((((12,14),13),34),(48,16)),(118,(119,120))),((77,78),(94,(122,(54,55))))),(((31,47),90),((36,25),46))),((((((((((70,67),(71,73)),69),(72,74)),83),85),68),(((((((((95,99),97),102),101),((96,112),105)),100),98),(106,108)),(113,((107,(109,114)),(110,115))))),(104,(103,111)))),((82,(84,88)),(121,89))),((64,66),65)),(((86,15),117),(62,63)))),((((((((((39,43),40),(79,80)),((17,23),(26,(49,((50,51),(52,53)))))),87),(41,42)),(33,32)),(56,(29,30))),((116,(76,((37,38),(75,(((58,(57,(59,60))),28),(61,((91,92),93))))))),(18,22))),35),45)),(((((((((133,(135,134)),(136,137)),144),(((((((147,(152,172)),(126,(127,128))),143),(141,(145,146))),142),(139,(((161,162),((((165,166),167),168),(169,170))),140))),124)),((((((156,159),160),157),158),((153,(148,154)),155)),(163,164))),171),((((129,132),(131,130)),138),((151,125),(149,150)))),81),24)),(27,44)),(((((200,201),202),203),(185,184)),(198,(199,(((182,183),((((((193,194),192),191),(188,190)),189),(196,197))),((187,195),186)))))))),(2,123));
TREE SquamateReduced = [&R]
(((((6,7),(10,11)),(((((173,174),175),(178,(179,(180,181)))),(176,177)),(3,5))),(((((((((12,14),13),(48,16)),((77,78),(94,(122,(54,55))))),(((31,47),90),(36,46))),((((((((((99,102),((96,112),105)),100),98),(106,108)),(107,(109,114))),(104,(103,111))),89),65),((86,15),(62,63)))),(((((((((39,43),40),(79,80)),((17,23),(26,(49,((50,51),(52,53)))))),87),(41,42)),(33,32)),(56,(29,30))),((37,38),(((58,(57,(59,60))),28),61)))),(((((((((133,135),(136,137)),144),((((((152,172),(126,(127,128))),(141,(145,146))),142),(139,(((161,162),((((165,166),167),168),(169,170))),140))),124)),((((((156,159),160),157),158),((153,154),155)),164)),171),((129,(131,130)),((151,125),(149,150)))),81),24)),(((((200,201),202),203),(185,184)),(198,((182,((((((193,194),192),191),(188,190)),189),(196,197))),((187,195),186)))))),(2,123));
TREE BirdReduced1 = [&R]
(((((6,7),(10,11)),(((((173,174),175),(178,(179,(180,181)))),(176,177)),(((3,5),4),(8,9)))),((((((((((12,14),13),(48,16)),(118,(119,120))),((77,78),(94,(122,(54,55))))),((31,47),(36,46))),(((((((((99,102),((96,112),105)),100),98),(106,108)),(107,(109,114))),(103,111)),65),(86,15))),((((((((((39,43),40),(79,80)),((17,23),(26,(49,((50,51),(52,53)))))),87),(41,42)),(33,32)),(56,(29,30))),((116,(76,((37,38),(75,(((58,(57,(59,60))),28),61))))),(18,22))),35)),((((((135,((((((147,(152,172)),(126,(127,128))),(145,146)),142),(139,((162,((170,166),168)),140))),124)),(136,137)),(((153,154),155),((((156,158),157),159),160))),171),((((129,131),130),138),((151,125),(149,150)))),24)),(((((200,201),202),203),(185,184)),(198,(199,((182,(((((193,194),192),(188,190)),189),(196,197))),((187,195),186))))))),(2,123));
TREE BirdReduced2 = [&R]
((((178,(179,(180,181))),(176,177)),(4,(8,9))),((((((12,(118,(119,120))),77),65),((((((((39,43),40),(79,80)),((17,23),(49,50))),(41,42)),(29,30)),((116,(76,(((58,(57,(59,60))),28),61))),(18,22))),35)),(((152,128),(((153,154),155),(((156,157),159),160))),(((129,131),138),151))),(185,188)));
END;

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