

The interplay between environmental filtering and spatial processes in structuring  
communities: the case of Neotropical snake communities

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**S5 File: Construction of snake topology**

The following studies were used to construct the topology. The phylogenies of [1, 2] were used for the relative placement of snake families, subfamilies and tribes. Families Leptotyphlopidae, Typhlopidae, and Anomalepididae were repositioned using the phylogeny of [3]. The phylogenies of [4, 5] were used for relationships within Boidae. Within Viperidae, the phylogeny of [6] was used to determine the relationship of *Bothrops* species (except for *Bothrops lutzi*, which was repositioned using [7]), whereas [8] was used for the relationships of *Crotalus* and *Lachesis*. The relationships of species of Elapidae were determined using the phylogeny of [9]. The overall relationships within Colubridae follow [1], but, within Colubridae, the relative positioning of *Chironius* species was determined according to [10]. Within Dipsadinae, Elapomorphini species had their positions determined according to [11] (*Phalotris bilineatus*), [12] (*Phalotris multipunctatus*), [13] (*Apostolepis* species), [14] (*Apostolepis assimilis* and *A. dimidiata*), and [15] (*Phalotris concolor*). Dipsadini species, specifically the genera *Atractus* and *Dipsas*, were replaced according P. Passos, (pers. com.), and [16, 17], respectively. Placement of Echinantherini species was determined using the phylogeny of [18], whereas placement of Philodryadini, Xenodontini, and Pseudoboini was determined using the phylogeny of [19].

## References

1. Pyron RA, Burbrink FT, Colli GR, Oca ANM, Vitt LJ, Kuczynski CA, Wiens JJ (2011) The phylogeny of advanced snakes (Colubroidea), with discovery of a new subfamily and comparison of support methods of likelihood trees. *Mol Phylogenet Evol.* 58: 329-342. doi: 10.1016/j.ympev.2010.11.006
2. Zaher H, Grazziotin FG, Cadle JE, Murphy RW, Moura-Leite JC, Bonatto SL (2009) Molecular phylogeny of advanced snakes (Serpentes, Caenophidia) with an emphasis on South American Xenodontines: a revised classification and descriptions of new taxa. *Pap Avulsos Zool.* 49 (11): 115-153. doi: 10.1590/S0031-10492009001100001
3. Lee MSY, Scanlon JD (2002) Snake phylogeny based on osteology, soft anatomy and ecology. *Biol Rev.* 77: 333-401. doi: 10.1017/S1464793102005924
4. Kluge AG (1991) Boinae snake phylogeny and research cycles. *Misc Publ - Mus. Zool, Univ Mich.* 158: 1-58.
5. Burbrink FT (2005) Inferring the phylogenetic position of *Boa constrictor* among the Boinae. *Mol Phylogenet Evol* 34: 167-180. doi: 10.1016/j.ympev.2004.08.017
6. Fenwick AM, Gutberlet RL, Evans JA, Parkinson CL (2009) Morphological and molecular evidence for phylogeny and classification of South American pitvipers, genera *Bothrops*, *Bothriopsis*, and *Bothrocophias* (Serpentes: Viperidae). *Zool J Linnean Soc* 156: 617-640. doi: 10.1111/j.1096-3642.2008.00495.x
7. Silva VX, Rodrigues MT (2008) Taxonomic revision of the *Bothrops neuwiedi* complex (Serpentes, Viperidae) with description of a new species. *Phyllomedusa* 7 (1): 45-90. doi: 10.1590/S1519-13972008000100005

8. Wüster W, Peppin L, Pook CE, Walker DE (2008) A nesting of vipers: phylogeny and historical biogeography of the Viperidae (Squamata: Serpentes). *Mol Phylogenet Evol* 49: 445-459. doi: 10.1016/j.ympev.2008.08.019
9. Silva NJ, Sites JW (2001) Phylogeny of South America triad coral snakes (Elapidae: *Micrurus*) based on molecular characters. *Herpetologica* 57 (1): 1-22.
10. Klaczko J (2007) Filogenia do gênero *Chironius* (Serpentes, Colubridae) baseada em dados morfológicos e moleculares. PhD dissertation, Universidade de São Paulo. Available: <http://www.teses.usp.br/teses/disponivei/41/41133/tde-26042007-144952/pt-br.php>. Accessed 20 June 2012.
11. Ferrarezzi H (1993) Nota sobre o gênero *Phalotris* com revisão do grupo *nasutus* e descrição de três novas espécies (Serpentes, Colubridae, Xenodontinae). *Mem Inst Butantan* 55 (1): 21-38.
12. Puerto G, Ferrarezzi H (1993) Uma nova espécie de *Phalotris* Cope, 1862, com comentários sobre o grupo *bilineatus* (Serpentes: Colubridae: Xenodontinae). *Mem Inst Butantan* 55 (1): 39-46.
13. Ferrarezzi H, Barbo FE, Albuquerque CE (2005) Phylogenetic relationships of a new species of *Apostolepis* from Brazilian Cerrado with notes on the *assimilis* group (Serpentes: Colubridae: Xenodontinae: Elapomorphini). *Pap Avulsos Zool.* 45 (16): 215-229. doi: 10.1590/S0031-10492005001600001
14. Giraud AR, Scrocchi GJ (1998) A new species of *Apostolepis* (Serpentes: Colubridae) and comments on the genus in Argentina. *Herpetologica* 54 (4): 470-476.

15. Cacciali P, Carreira S, Scott N (2007) Redescription of *Phalotris nigrilatus* Ferrarezzi, 1993 (Serpentes: Colubridae: Xenodontinae). *Herpetologica* 63 (4): 552-559. doi: 10.1655/00180831(2007)63[552:ROPNFS] 2.0.CO;2
16. Passos P, Fernandes R, Bérnils RS, Moura-Leite JC (2010) Taxonomic revision of the Brazilian Atlantic Forest *Atractus* (Reptilia: Serpentes: Dipsadidae). *Zootaxa* 2364: 1-63.
17. Harvey MB (2008) New and poorly known *Dipsas* (Serpentes: Colubridae) from northern South America. *Herpetologica* 64 (4): 422-451. doi: 10.1655/07-068R1.1
18. Santos Jr. AP (2009) Revisão taxonômica do grupo de *Taeniophallus occipitalis* e o relacionamento filogenético da Tribo Echinantherini (Serpentes, Dipsadidae, Xenodontinae). Phd dissertation, Pontifícia Universidade Católica do Rio Grande do Sul. Available: [http://tede.pucrs.br/tde\\_busca/arquivo.php?codArquivo=2573](http://tede.pucrs.br/tde_busca/arquivo.php?codArquivo=2573). Accessed 20 June 2012.
19. Grazziotin FG, Zaher H, Murphy RW, Scrocchi G, Benavides MA, Zhang YP, Bonatto SL (2012) Molecular phylogeny of the New World Dipsadidae (Serpentes: Colubroidea): a reappraisal. *Cladistics* 28: 437–459. doi: 10.1111/j.1096-0031.2012.00393.x