

# Fossil snakes and the Flood boundary in North America

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The placement of the geological boundary between Flood deposits and post-Flood deposits is a point of debate within creation science. One method for estimating the placement of this boundary utilizes biostratigraphy.<sup>1</sup> Biostratigraphy could be used in conjunction with hybridization data to more firmly pinpoint certain fossil beds as post-Flood deposits. Snakes can be used to illustrate this proposed method with certain North American fossil beds.

Snakes include multiple baraminic kinds.<sup>2</sup> Most are terrestrial, so most kinds would have been present on the Ark. North American snakes number about 48 extant genera<sup>3</sup> (out of about 460 genera worldwide). An extant kind may be represented by a single monotypic genus or by multiple genera (where confirmed by hybridization records).

Fossils of snakes are not uncommon. They can be identified as being an extant species, an extinct species of an extant genus, or a species of an extinct genus. In some cases, a genus may be identifiable but the species indeterminate due to quality of material or other issues. In most cases even an extinct genus can be relegated to identifiable families (which may be extant or extinct). They therefore have the potential to offer insight into whether or not a given fossil assemblage is a Flood or post-Flood deposit.

In order to create a methodology utilizing fossil stratigraphy and hybridization data, two assumptions must be made. First, hybridization between two genera indicates they are in the same kind. This is a well-recognized



**Figure 1.** Three colubrids capable of intergeneric hybridization: (left to right) *Pituophis*, *Lampropeltis*, and *Pantherophis*.

axiom in creation biology (e.g. lions and tigers interbreed, so both species are considered to be in the same kind). Second, if a terrestrial ‘unclean’ vertebrate genus were to be found in both Flood and post-Flood fossil deposits, that genus must have been on the Ark, representing that kind. (Only one pair of each terrestrial ‘unclean’ animal kind was on the Ark.) This is because the distinctive suite of anatomical characteristics that define a genus are unlikely to develop from ancestral stock in exactly the same way twice. Familial traits and convergent ecological adaptations may influence similar morphotypes, but these are distinguishable. (It may be that new post-Flood morphotypic trajectories would distinguish themselves from pre-Flood populations far more in ‘unclean’ kinds as the genetic limitations of a single-pair bottleneck adapted to post-Flood changes in geography, ecological structuring, etc.)

From these two assumptions, a principle can be developed: if two extant genera (of terrestrial ‘unclean’ vertebrates) within the same kind are found in the same fossil deposit, those fossils must represent a post-Flood environment.

## An example with colubrid snakes

The Devil’s Nest Airstrip Site, Knox County, Nebraska, is a fossil deposit dated as Late Miocene (Late Hemphillian).<sup>4</sup> All fossil snakes found at this site are from extant genera, including the cornsnake *Pantherophis guttatus*, the ratsnake *Pantherophis obsoletus*, the kingsnake *Lampropeltis getula*, the milksnake *Lampropeltis triangulum*, and the bullsnake *Pituophis melanoleucus*. We know from hybridization records that *Pantherophis*, *Lampropeltis*, and *Pituophis* (figure 1) are all part of the same kind,<sup>5,6</sup> therefore this differentiation must have taken place after the Flood. So, we can recognize the Devil’s Nest Airstrip site as a post-Flood fossil site.

By looking closely at such relationships not only can we deduce specific post-Flood sites but we can also make inferences (the strength of which may vary but which can’t simply be ignored). One inference would be that all fossil sites with either *Pituophis* or *Lampropeltis* material are post-Flood sites. *Pantherophis* is closest to the Old World *Elaphe* morphotype, so it is far more likely that *Pituophis* and *Lampropeltis* are post-

Flood New World developments from *Pantherophis*-like ancestral stock, which in turn likely dispersed from Old World populations. (*Pantherophis* hybridizes with Old World *Elaphe* in the pet trade.)

A second inference would be that associated non-snake genera at deduced post-Flood fossil sites would then themselves indicate other post-Flood sites even in the absence of snake fossils. So, as the Devil’s Nest site is post-Flood, fossils of the extinct artiodactyl genus *Pediomeryx* found there would also be post-Flood.<sup>7</sup> This genus only had North American distribution, which suggests a post-Flood New World differentiation from Old World artiodactyl ancestry. So, it may be that all fossil sites with *Pediomeryx* are post-Flood sites. Another fossil genus associated with the Devil’s Nest site is the giant marmot *Paenemarmota*. *Paenemarmota* is also found at the Hagerman Fossil Beds in Idaho.<sup>8</sup> What do we find at the Hagerman site? Snake fossils of *Pantherophis* and *Lampropeltis*, again pointing to this site as a post-Flood deposit.

**An example with rattlesnakes**

Another pair of snakes known to have produced an intergeneric hybrid are the rattlesnakes *Crotalus* and *Sistrurus*.<sup>9</sup> *Crotalus* includes the typical rattlesnakes of North and South America, while *Sistrurus* includes the pygmy rattlesnakes and massasaugas, found in North America (one species, *S. ravus*, is endemic to Mexico). *Sistrurus* is considered more ‘primitive’ due to characteristics such as the nine-scale crown pattern on the head (where *Crotalus* shows more variability).<sup>10</sup> *Sistrurus* and *Crotalus* are believed to have diverged from a common ancestral form, with *Sistrurus* retaining more ‘primitive’ traits.<sup>10</sup> *Crotalus* and *Sistrurus* fossils are found only in the New World. The ‘earliest’ *Sistrurus* fossil comes from the late Miocene Pratt Slide (Nebraska) site.<sup>11</sup> The Pratt Slide site includes both *Sistrurus* and *Crotalus* along with numerous other species, including *Lampropeltis* and *Pituophis*, discussed above.<sup>12</sup> So, it should clearly be recognized as a post-Flood site. The rhinoceros *Teleoceras major* has been found at Pratt Slide.<sup>13</sup> This means that *Teleoceras major*

was a post-Flood animal. Even more importantly, it indicates that *Teleoceras* was a post-Flood genus. (*Teleoceras* had several species in North America and France.) Given the large number of fossil rhinoceros genera,<sup>13</sup> it is highly unlikely that *Teleoceras* made up its own kind and was probably a post-Flood derivation.

Holman<sup>4</sup> lists a number of Pleistocene and Pliocene sites where *Elaphe* (*Pantherophis*), *Lampropeltis*, *Pituophis*, and *Sistrurus* fossils have been found. Fairly consistently, these same sites also hold fossils of a wide range of other extant North American snake genera: ringnecks (*Diadophis*), gartersnakes (*Thamnophis*), watersnakes (*Nerodia*), hognoses (*Heterodon*), racers (*Coluber*), copperheads and cottonmouths (*Agkistrodon*). This strongly ties these genera (and a few other genera that are obviously direct ancestors of extant genera, such as *Paleoheterodon* and *Paracoluber*) to post-Flood deposition.

Holman also shows that these extant genera are found in late Miocene (Clarendonian and Hemphillian) sites. A few are found in middle Miocene (Barstovian) sites, along with a few different genera (*Calamagras*,

**Table 1.** Representative snakes found at North American sites.<sup>4,11,14</sup>

Cenozoic	Quaternary	Holocene	Leptotyphlopidae; Boidae (Erycinae); Colubridae ( <i>Heterodon</i> , <i>Diadophis</i> , <i>Farancia</i> , <i>Opheodrys</i> , <i>Coluber</i> , <i>Salvadora</i> , <i>Pantherophis</i> , <i>Lampropeltis</i> , <i>Pituophis</i> , <i>Rhinocheilus</i> , <i>Thamnophis</i> , <i>Nerodia</i> , <i>Storeria</i> ); Viperidae ( <i>Agkistrodon</i> , <i>Crotalus</i> , <i>Sistrurus</i> ); Elapidae ( <i>Micrurus</i> )	
		Pleistocene	Leptotyphlopidae; Boidae (Erycinae; Tropidopneinae); Colubridae ( <i>Heterodon</i> , <i>Diadophis</i> , <i>Farancia</i> , <i>Opheodrys</i> , <i>Coluber</i> , <i>Salvadora</i> , <i>Pantherophis</i> , <i>Lampropeltis</i> , <i>Pituophis</i> , <i>Rhinocheilus</i> , <i>Thamnophis</i> , <i>Nerodia</i> , <i>Storeria</i> ); Viperidae ( <i>Agkistrodon</i> , <i>Crotalus</i> , <i>Sistrurus</i> ); Elapidae ( <i>Micrurus</i> )	
		Neogene	Pliocene	Colubridae ( <i>Heterodon</i> , <i>Coluber</i> , <i>Pantherophis</i> , <i>Lampropeltis</i> , <i>Pituophis</i> , <i>Thamnophis</i> , <i>Nerodia</i> ); Viperidae ( <i>Agkistrodon</i> , <i>Crotalus</i> , <i>Sistrurus</i> )
		Miocene	late	Boidae (Erycinae); Colubridae ( <i>Heterodon</i> , <i>Paleoheterodon</i> , <i>Diadophis</i> , <i>Paracoluber</i> , <i>Coluber</i> , <i>Salvadora</i> , <i>Pantherophis</i> , <i>Lampropeltis</i> , <i>Pituophis</i> , <i>Thamnophis</i> , <i>Nerodia</i> ); Viperidae ( <i>Agkistrodon</i> , <i>Crotalus</i> , <i>Sistrurus</i> ); Elapidae ( <i>Micrurus</i> )
			middle	Boidae (Erycinae, Boinae); Colubridae ( <i>Texasophis</i> , <i>Paracoluber</i> , <i>Paleoheterodon</i> , <i>Salvadora</i> , <i>Pantherophis</i> , <i>Lampropeltis</i> , <i>Nerodia</i> , <i>Thamnophis</i> ); Viperidae; Elapidae ( <i>Micrurus</i> )
			early	Boidae (Erycinae, Boinae); Colubridae ( <i>Texasophis</i> , <i>Paracoluber</i> , <i>Salvadora</i> ); Viperidae
	Paleogene	Oligocene	Boidae (Erycinae, Boinae); Colubridae ( <i>Texasophis</i> )	
		Eocene	Aniliidae ( <i>Coniophis</i> ); Boidae (Erycinae, Tropidopneinae, Boinae); Palaeopneidae; Colubridae ( <i>Nebraskophis</i> )	
		Paleocene	Aniliidae ( <i>Coniophis</i> ); Boidae (Erycinae, Tropidopneinae); Palaeopneidae	
	Mesozoic	Cretaceous	Aniliidae ( <i>Coniophis</i> ); Boidae	

*Ogmophis*) extinct today, though they do have subfamilial relations (small erycine boas like modern North American rubber boas and rosy boas). Looking at early Miocene sites (Arikareean, Hemingfordian) we see *Calamagras*, *Ogmophis*, and others but with few exceptions we don't see extant genera, though there are a few genera that could be ancestral to those.

In Oligocene sites, small boids (like *Calamagras* and *Ogmophis*) are most abundant, along with a few small fossorial colubrids. Eocene sites have small fossorial snakes, a few terrestrial boids, and a number of sometimes very large marine serpents (palaeophids). *Calamagras* and *Ogmophis* are found at a few late Eocene sites. Paleocene sites share a number of genera with early Eocene sites: particularly large marine serpents and small fossorial snakes. Cretaceous snakes include some boids and small fossorial snakes. No snakes are known at 'earlier' fossil sites in North America (see table 1).

A final note, while the fossil snakes are found at sites referred to as Pleistocene, Pliocene, Miocene, etc, the argument presented is essentially taxonomic, as the identification of snake fossils as members of extant genera is independent of stratigraphic placement. Being limited to the question of fossil identity, it should avoid issues that engender more heated debate within the creation model.

### Conclusion

The fossil record of North American snakes indicates that the Flood boundary on this continent is found 'lower' than the late Miocene, where fossil snakes are highly correlated with modern herpetofauna and hybridization records point to post-Flood differentiation. Any argument that a fossil site with, for example, *Lampropeltis* or *Pituophis* fossils, is a Flood deposit must explain the discrepancy.

### References

1. Ross, M.R., Evaluating potential post-Flood boundaries with biostratigraphy—the Pliocene/Pleistocene boundary, *J. Creation* 26(2):82–87, 2012.
2. Hennigan, T., An initial estimate toward identifying and numbering extant tuatara, amphisbaena, and snake kinds, *Answers Research J.* 7:31–47, 2014.
3. The Center for North American Herpetology, 5 June 2014; cnah.org.
4. Holman, J.A., *Fossil Snakes of North America*, Indiana University Press, Bloomington, IN, 2000. There have been a number of recent taxonomic changes in North American herpetofauna, many at the species level, which would not affect the argument here. Genus-level changes have primarily involved splitting New World genera from Old World genera, e.g. most ratsnakes in North America formerly referred to as *Elaphe* are now *Pantherophis*. Older texts will have outdated nomenclature.
5. Hennigan, T., An initial investigation into the baraminology of snakes: Order—Squamata, Suborder Serpentes, *CRSQ* 42(12):153–160, 2005.
6. Fankhauser, G. and Cumming, K.B., Snake hybridization: A case for intrabaraminic diversity; in: Snelling A.A. (Ed.), *Proceedings of the Sixth International Conference on Creationism* (pp. 117–132), Creation Science Fellowship, Pittsburgh, PA, and Institute for Creation Research, Dallas, TX, 2008.
7. Janis, C.M., Scott, K.M. and Jacobs L.L. (Eds), *Evolution of Tertiary Mammals of North America*, vol. 1, Cambridge University Press, Cambridge, UK, 1998.
8. *Hagerman Fossil Beds* (National Park Service), www.nps.gov/hafo/index.htm, 5 June 2014.
9. Bailey, R.M., An intergeneric hybrid rattlesnake, *American Naturalist* 76:376–385, 1942.
10. Klauber, L.M., *Rattlesnakes: Their Habits, Life Stories, and Influences on Mankind*, vol. 1, 2<sup>nd</sup> edn, University of California Press, Berkeley, CA, 1997.
11. Parmley, D. and Holman J.A., Earliest fossil record of a pigmy rattlesnake (Viperidae: *Sistrurus* Garman), *J. Herpetology* 41(1):141–144, 2007.
12. Parmley, D. and Hunter, K.B., Fossil snakes of the Clarendonian (Late Miocene) Pratt Slide local fauna of Nebraska, with the description of a new natricine colubrid, *J. Herpetology* 44(4): 526–543, 2010.
13. Prothero, D.R., *Evolution of North American Rhinoceroses*, Cambridge University Press, Cambridge, UK, 2005.
14. Parmley, D. and Holman J.A., *Nebraskophis* Holman from the Late Eocene of Georgia (USA), the oldest known North American colubrid snake, *Acta Zoologica Cracoviensia* 46(1):1–8, 2003.