

Updates from Panama: recent discoveries from along the canal and elsewhere

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Ma	Time		Stratigraphy	Paleogeography
0	PLIOCENE	PLEISTOCENE	"muck"	Isthmus
		Late		
		Mid.		Peninsula?
5		Early		
	MIOCENE	Late	Chagres Formation	Strait
				Peninsula
			Gatun Formation	
10		Middle		
			Gatun Formation	
			? Pedro Miguel Formation ?	
			? ?	
15		Early	Cucaracha Formation	
			Culebra Formation	Strait
20		Late		Island or Peninsula?
25			Las Cascadas Formation	



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Las Cascadas Qy: Las Cascadas Formation





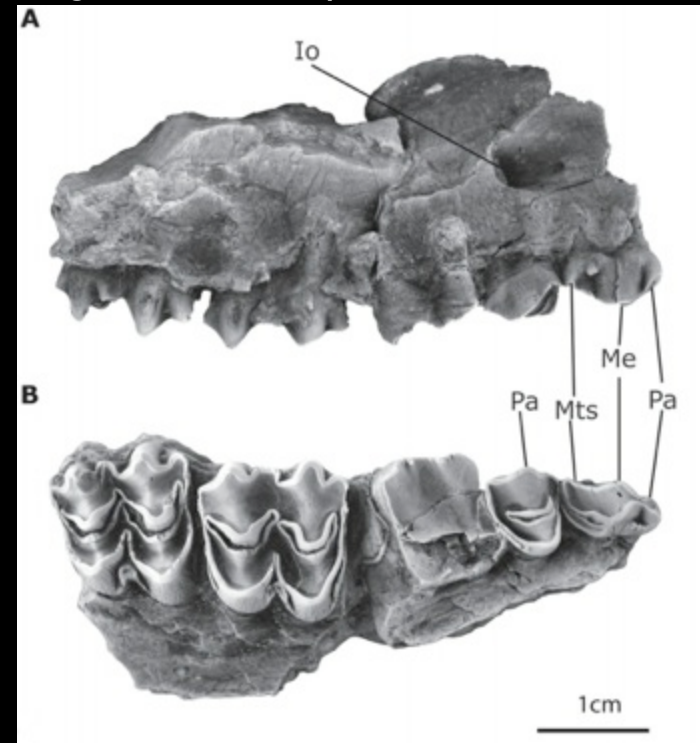
Taphonomy:

Timing of deposition, Environment, etc.



Aguascalientia sp.

Aguascalientia panamensis



From Rincón et al., 2012

Hodges: Cucaracha Formation

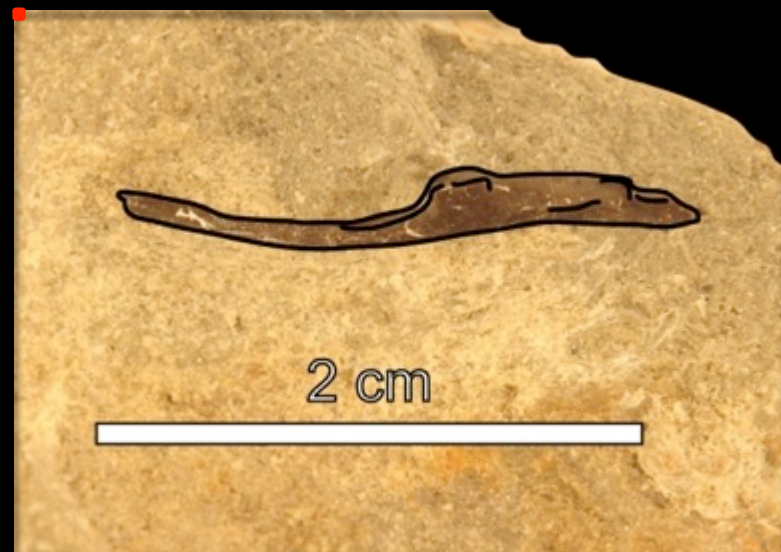
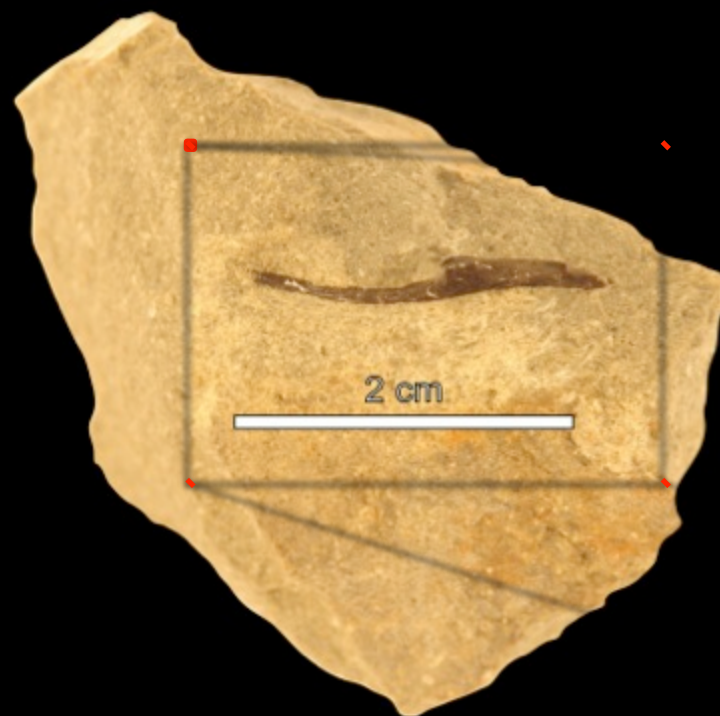
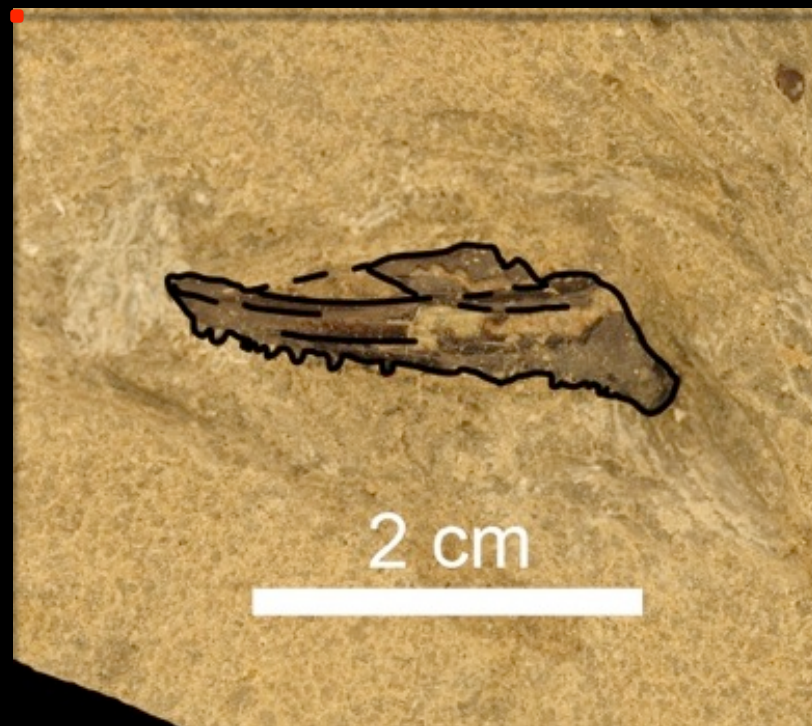




Microvertebrates:

- Fishes, frogs, small reptiles and small mammals
- Additional information on: diversity, environment





Borinquen Dam: Cucaracha Formation



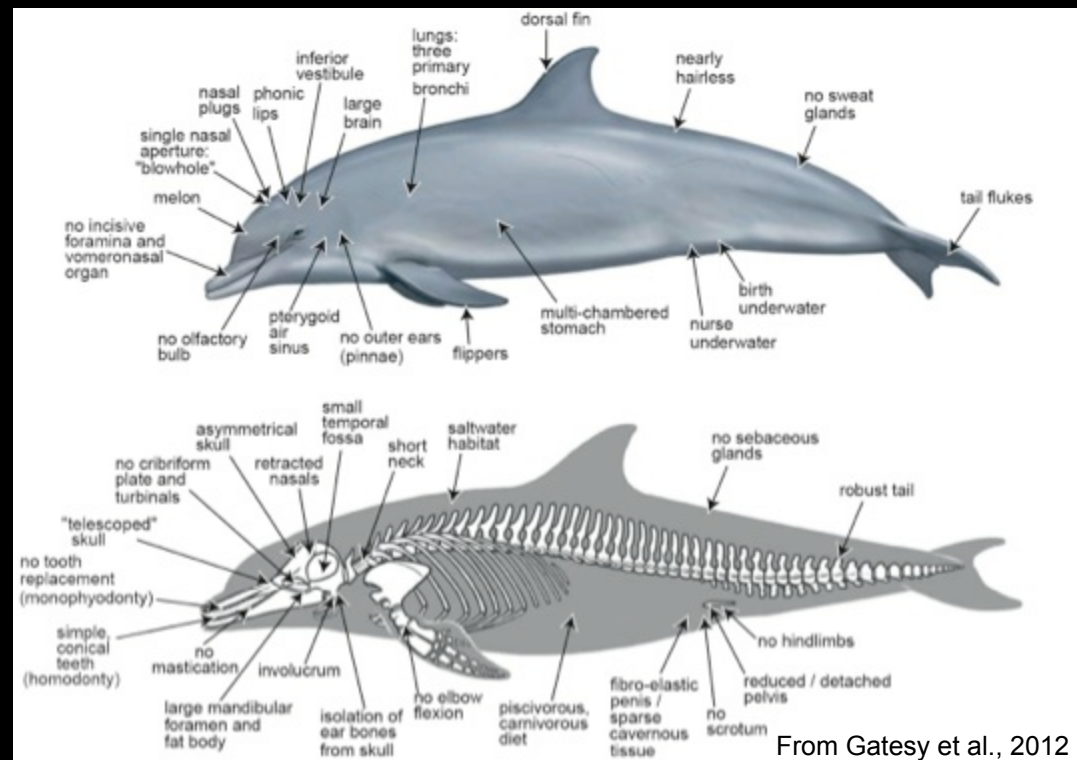
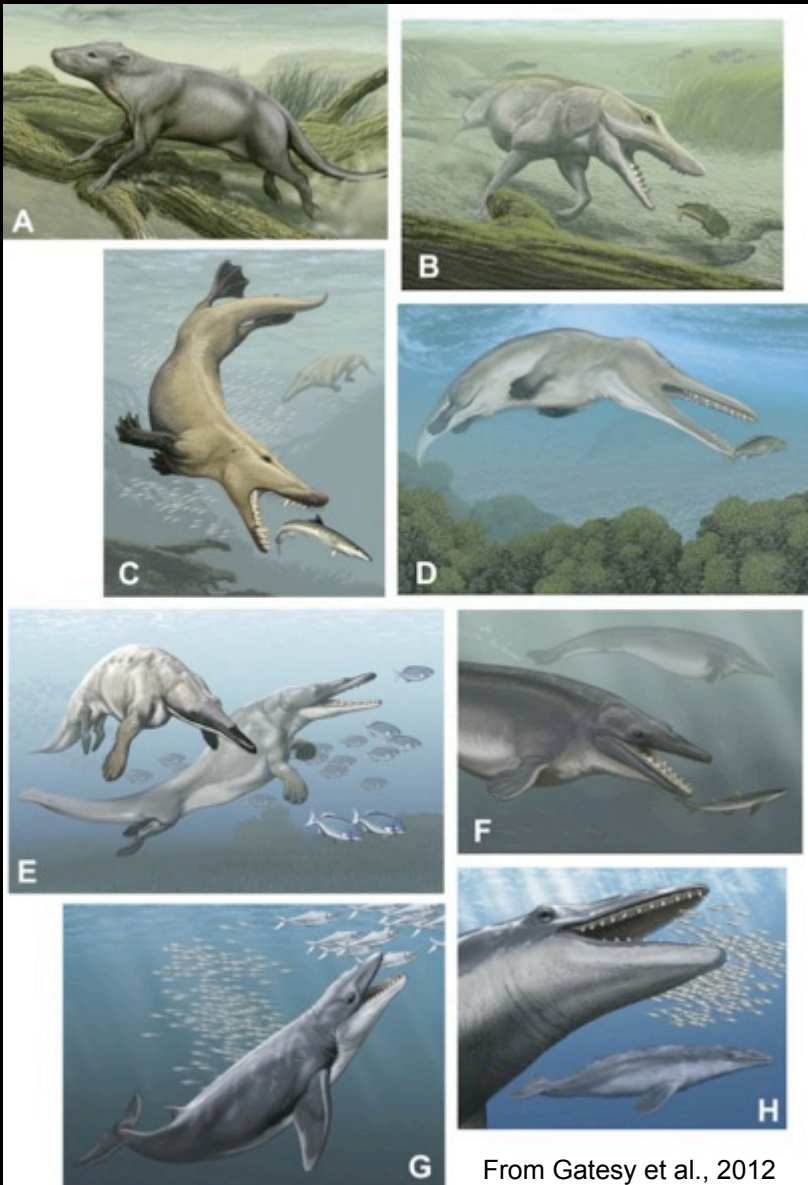
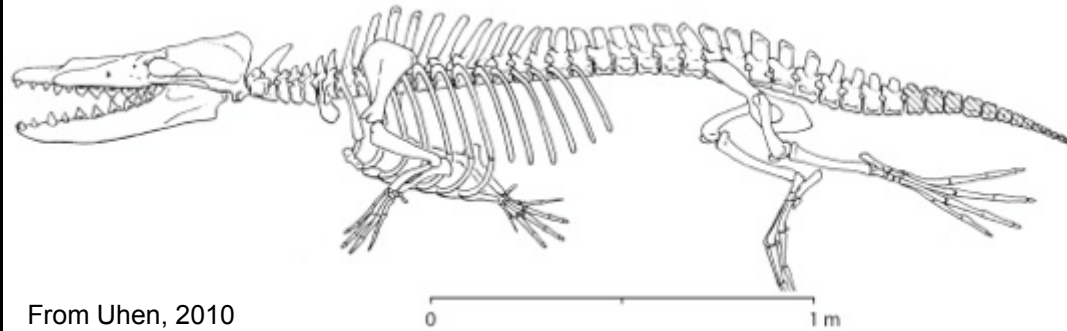
Larger vertebrates:

- Rhinos: *Menoceras* & cf. *Floridaceras*
- Protoceratids: cf. *Paratoceras*
- Three-toed Horses: *Anchitheres*

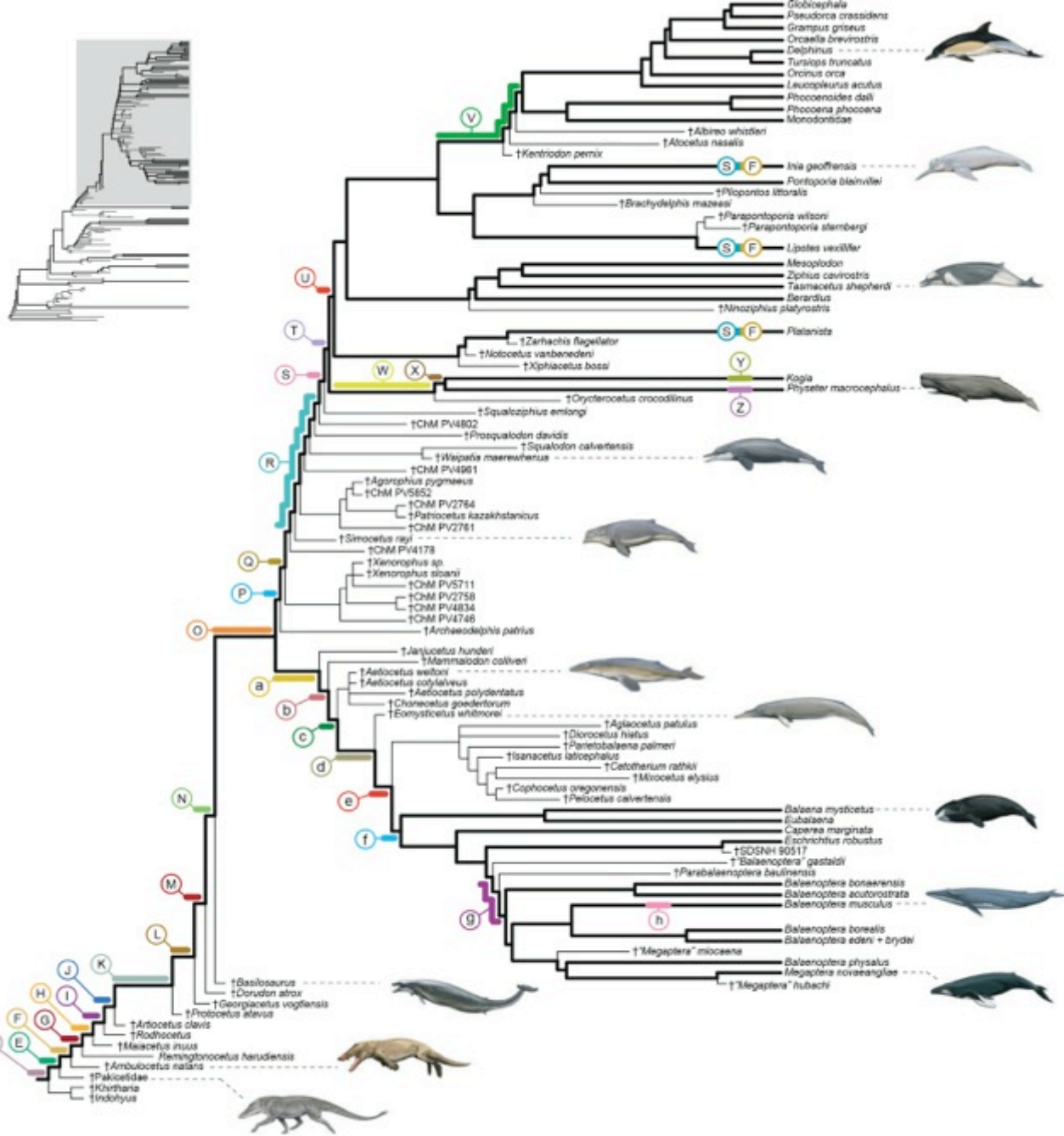




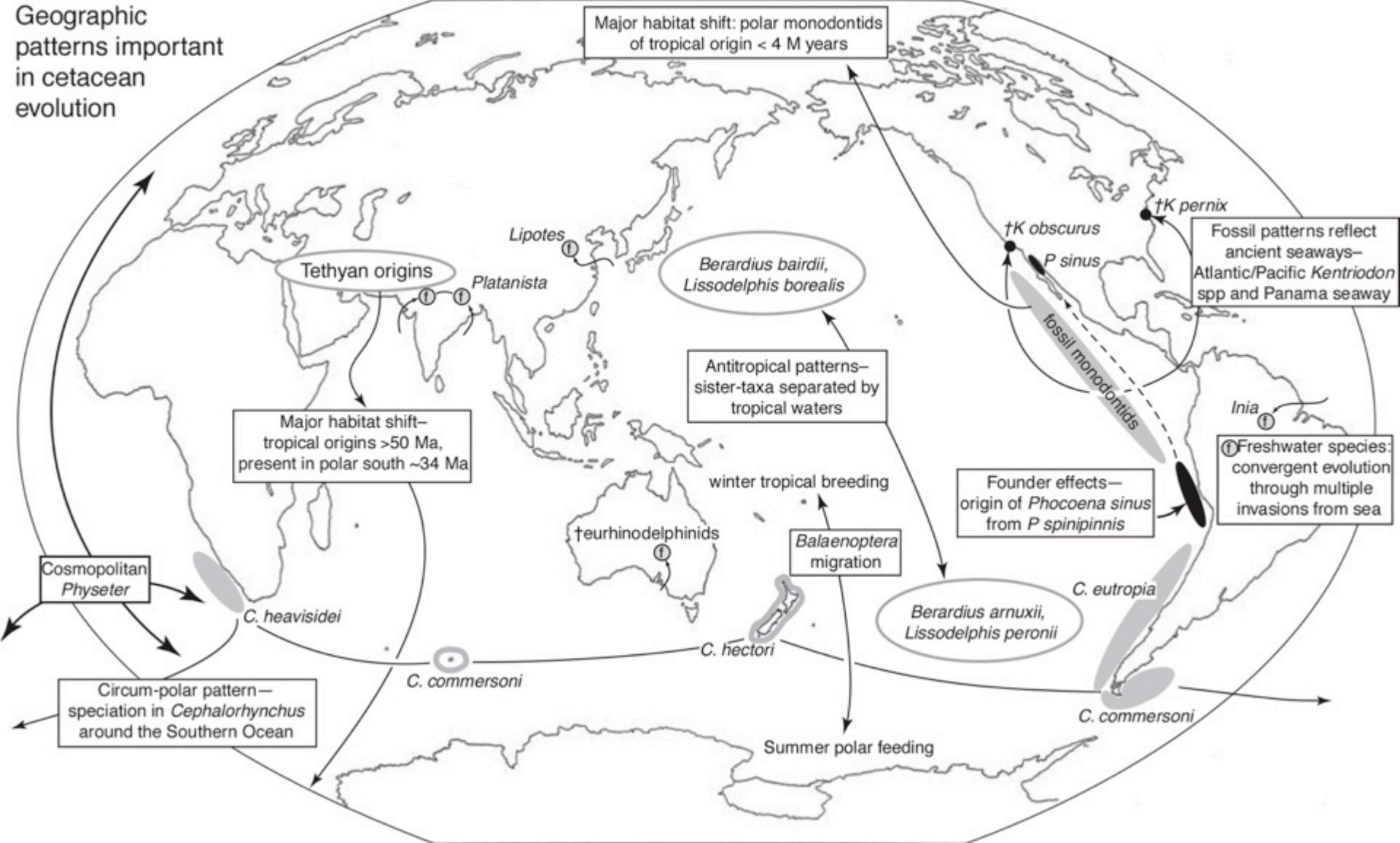
Rodhocetus



Bottlenose dolphin – *Tursiops truncatus*



Geographic patterns important in cetacean evolution



San Judas: Gatun Formation



Gatun Formation:

- Elasmobranchs: shark & rays
- Invertebrates
- Marine mammals







Discovered in 2011

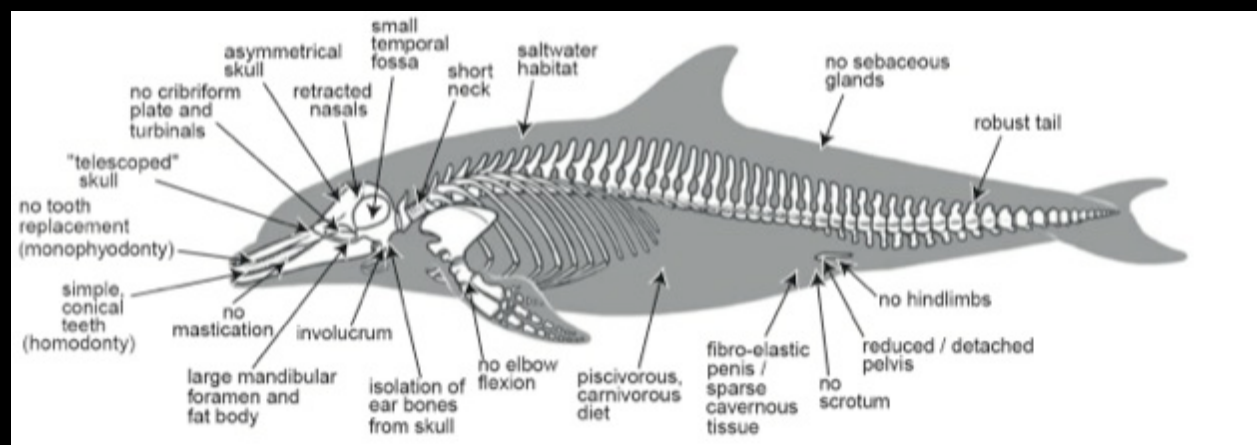
Initial preparation in 2012

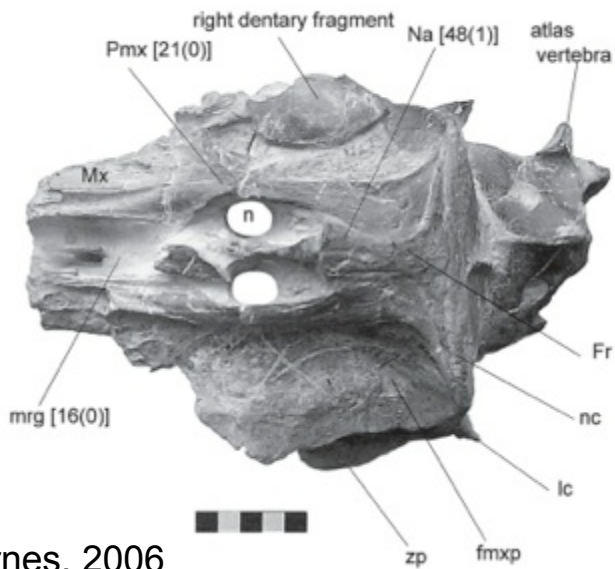
So, what is it?!

- Thick, dense ribs
- Seacow?



Specimen has unusually long cervical vertebrae!





Barnes, 2006

Allodelphis pratti

- Middle Miocene – California (Sharktooth Hill)
- Diagnosis: “cervical vertebrae large and with anteroposteriorly elongated centra” (Barnes & Reynolds, 2009).
- “to envision this animal, one must imagine a body more bulbous and flexible than that of an Arctic beluga, with an elongate neck like a sea lion and a snout that is longer and more slender than that of the Amazon river dolphin.”



Piña: Chagres Formation

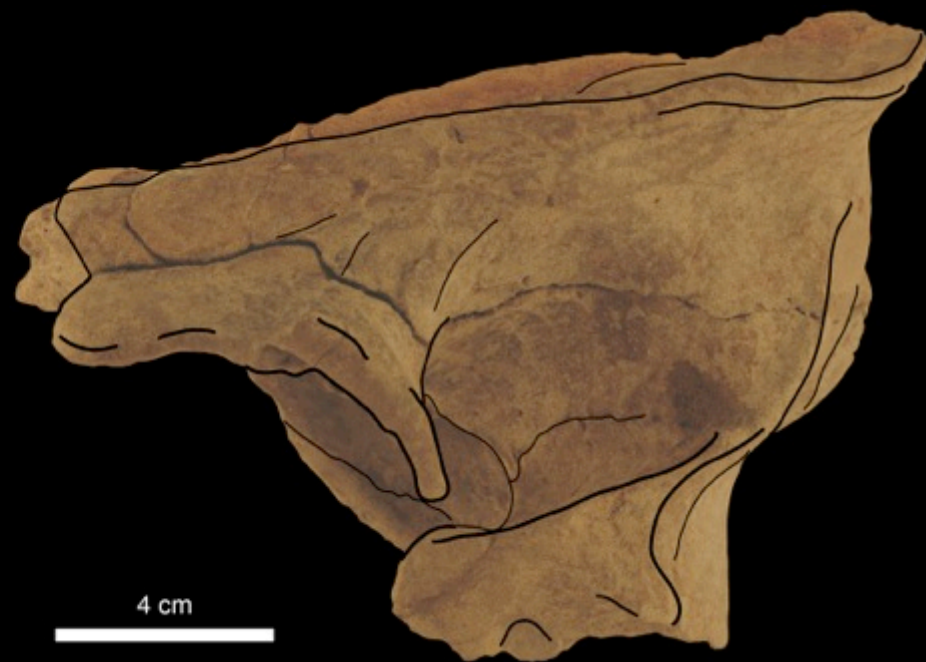
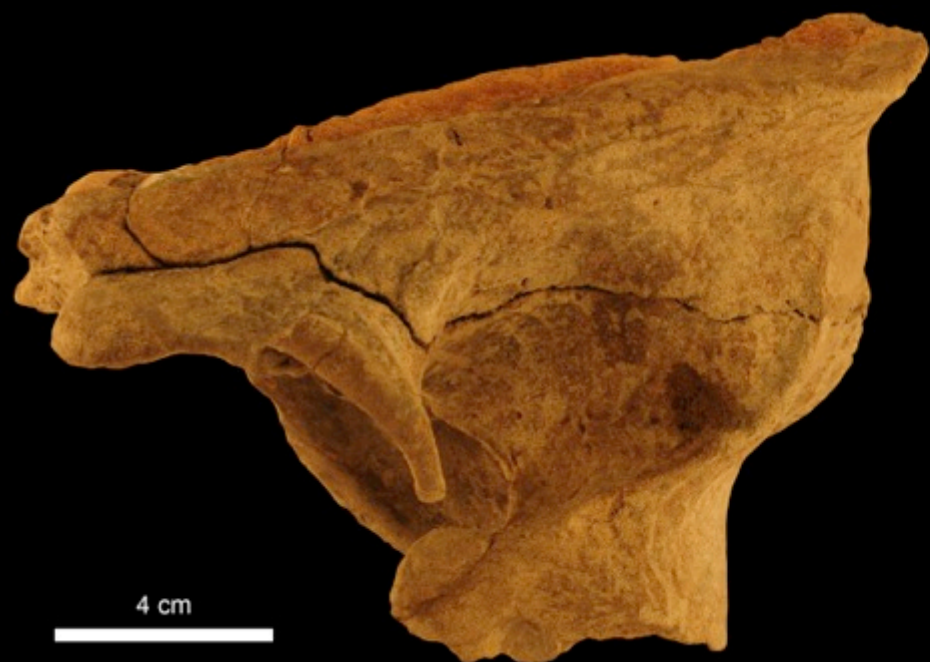




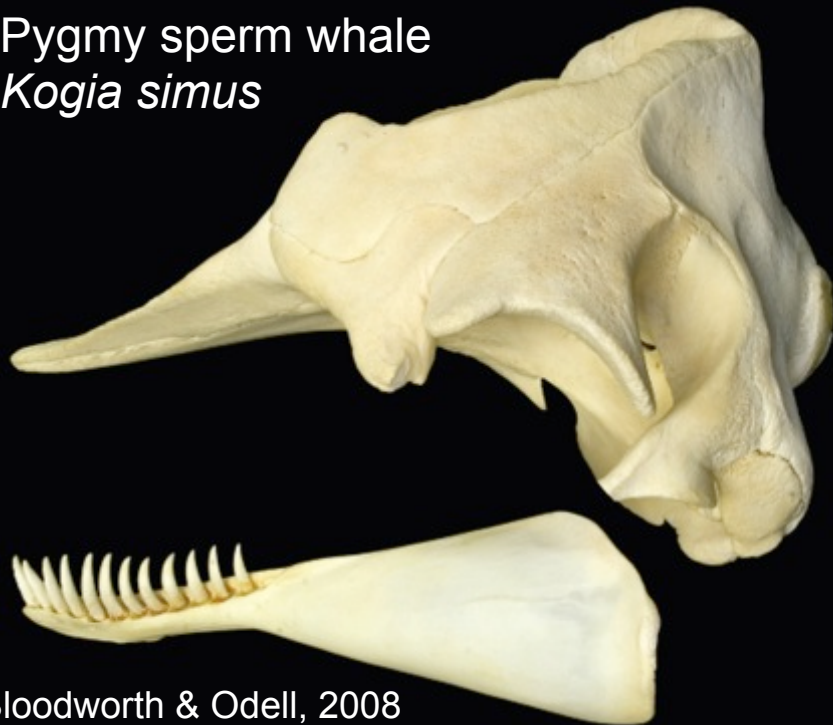


Enameled crown



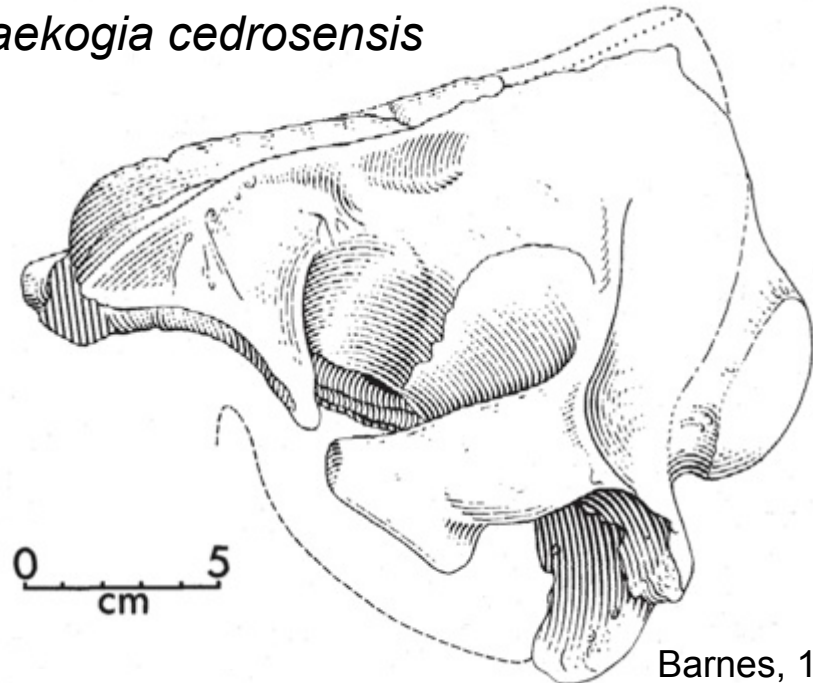


Pygmy sperm whale
Kogia simus

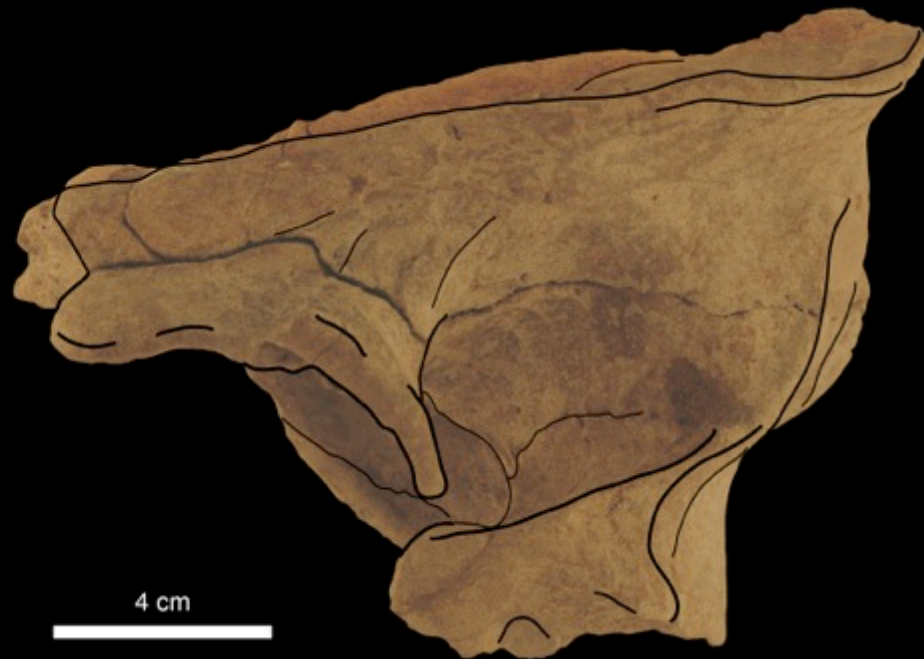
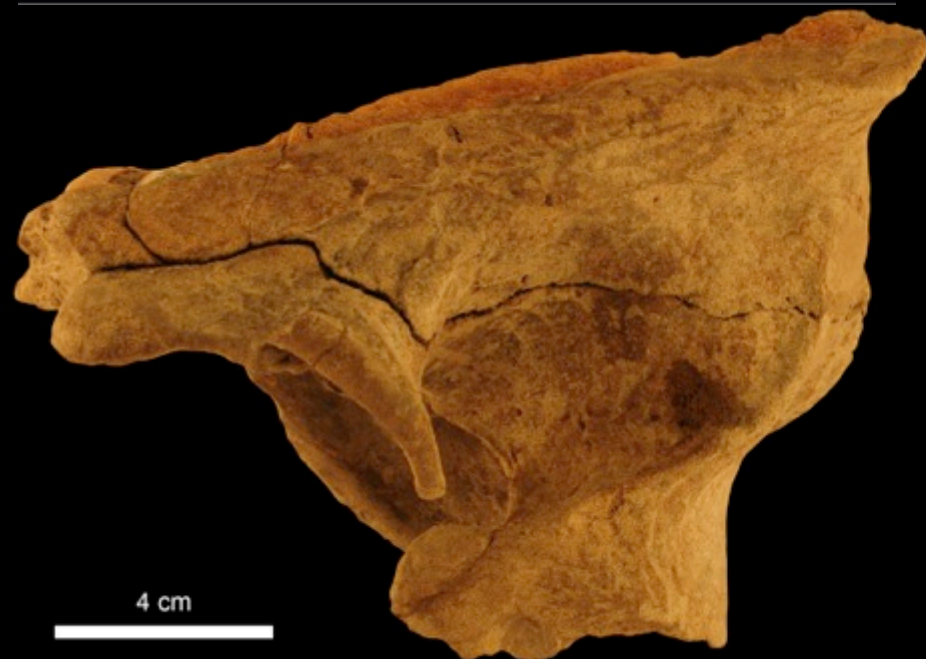


Bloodworth & Odell, 2008

Praekogia cedrosensis



Barnes, 1973



Concluding Remarks

- New Canal discoveries:
 - Morphology of know species
 - New records
 - Insight into the terrestrial environments of ancient Panama
- Marine mammals:
 - Evolution and diversity of Neotropical marine ecosystems
 - Diversity of Neotropical marine mammals

- Acknowledgements:

- ACP

- NSF

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Smithsonian
National Museum of Natural History



Smithsonian Tropical Research Institute