Hot Science Cool Talks

UT Environmental Science Institute

103

Some Like It Hot, Hot, Hot: When Primates Roamed Texas' Rainforests

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Some Like It Hot, Hot, Hot:

When Primates Roamed Texas' Rainforests

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Most people think of science like this:

But most people don't think of science like this:

Welcome to the world of paleontology!

Where the payoffs <u>can</u> be huge, but you're much more likely to get skunked…

Paleo Jargon:

SKUNKED: verb, past tense (skəngkt)
- When you look for fossils all day / week / month (etc.) and don't find anything interesting

What you need to find fossils:

1. <u>Good luck</u>
2. Training
3. Persistence (& money!)
4. Giant shoulders to stand on

John Andrew Wilson

Photo: Sarah Wilson

Big Bend National Park - 1950s

Coryphodon

- Extinct mammal from the Eocene epoch (56-34 MYA)

Big Bend is littered with Eocene fossils…

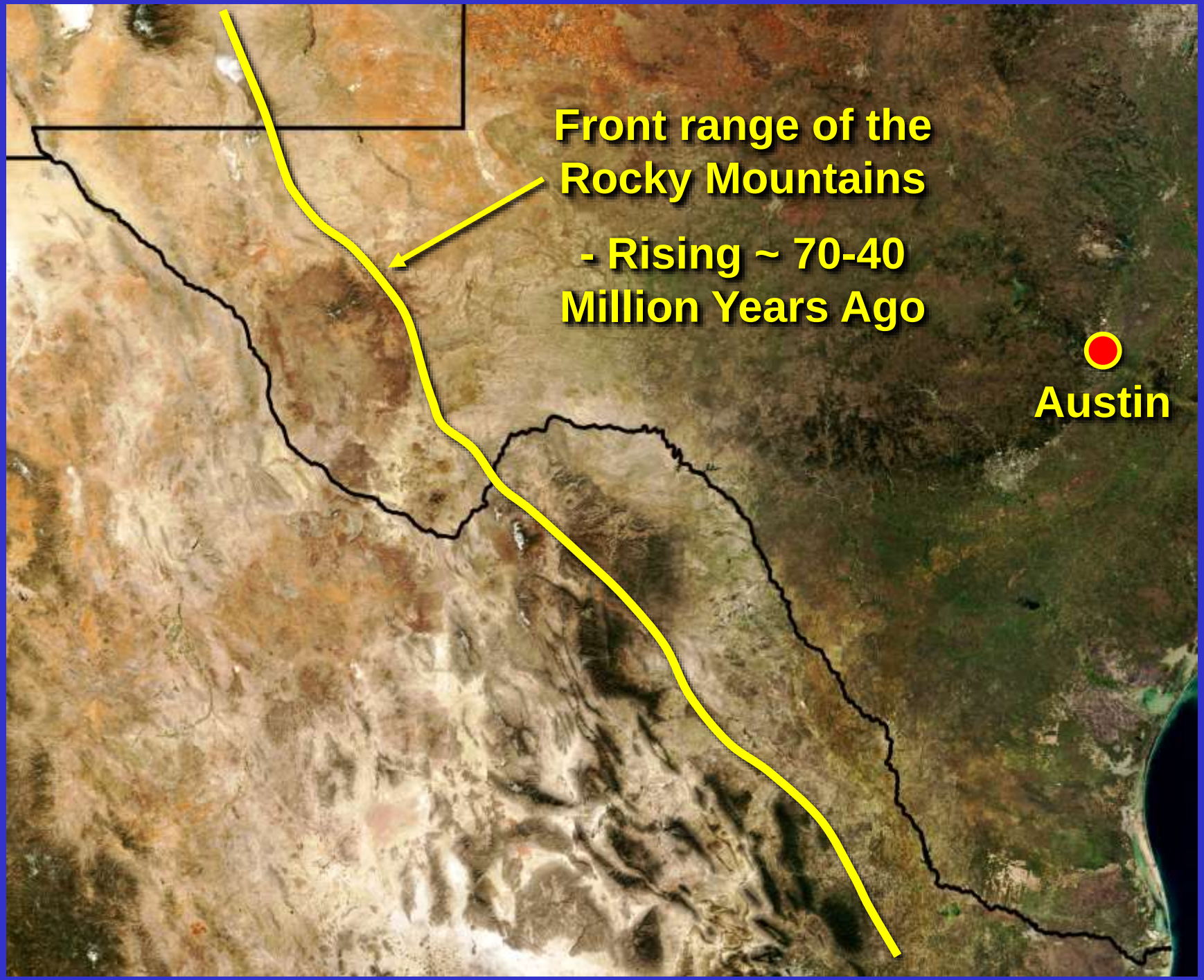
Sierra Vieja - 1960s

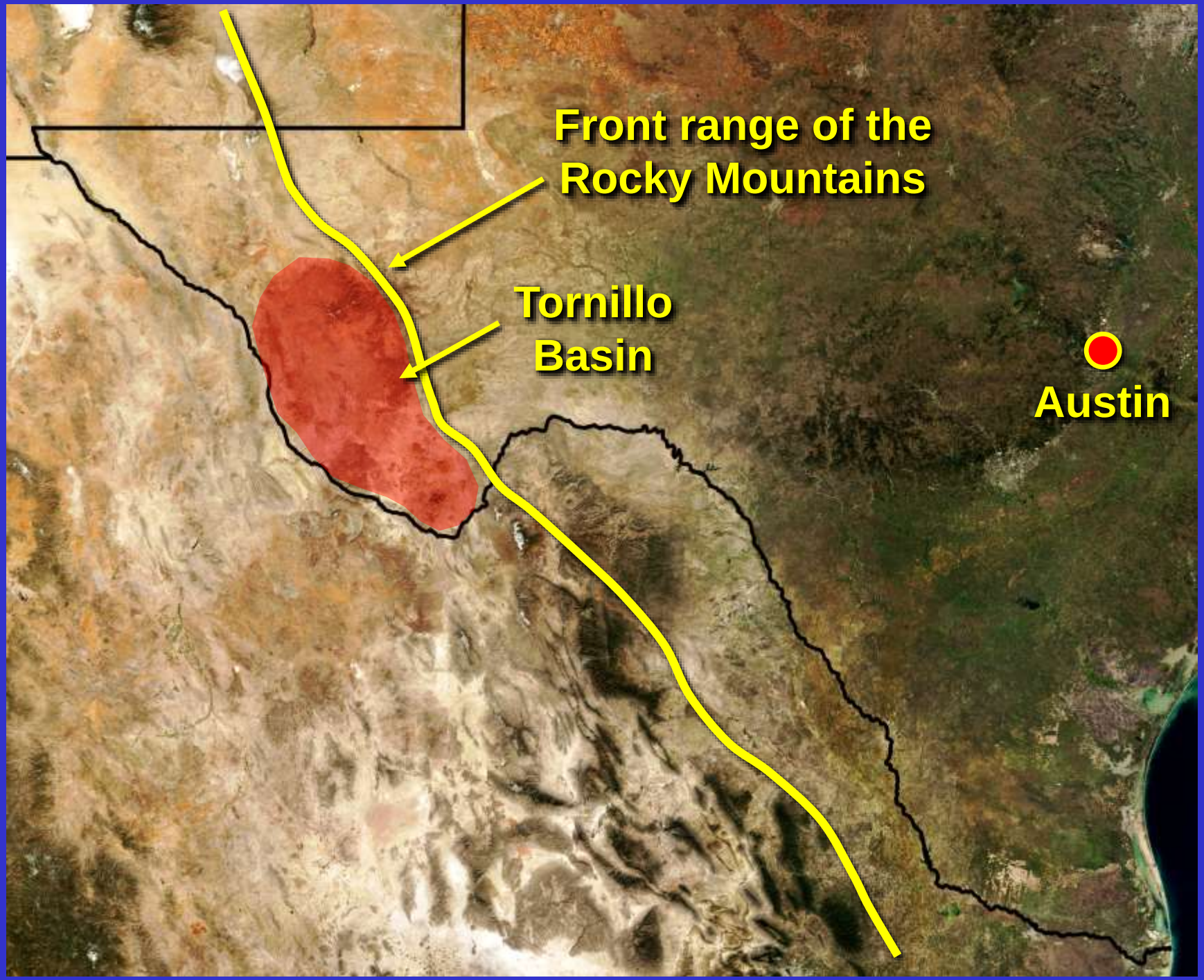
Photo: Paul Chaplo

Devil's Graveyard - 1970s

Photo: Sarah Wilson

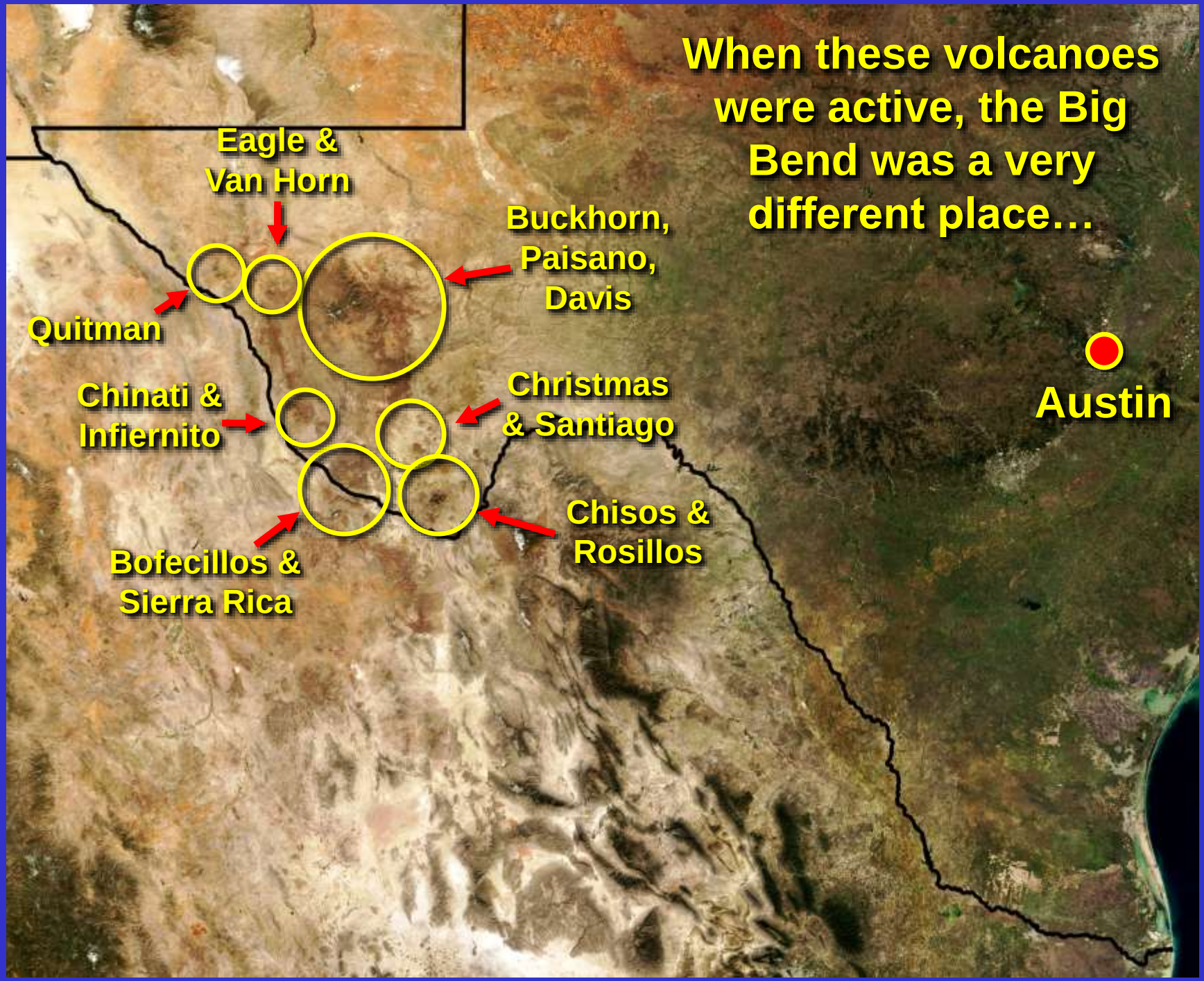

Q: Why are there so many Eocene fossils in the Big Bend?
A: Geology!
Sierra Vieja
Devil's Graveyard
BBNP
Rio Grande
Austin


Front range of the
Rocky Mountains
- Rising ~ 70-40
Million Years Ago
Austin


Front range of the
Rocky Mountains
Tornillo
Basin
Austin


Mountain Building followed by lots of volcanic activity (48-28 MYA)
Eagle & Van Horn
Buckhorn, Paisano, Davis
Quitman
Chinati & Infiernito
Christmas & Santiago
Chisos & Rosillos
Bofecillos & Sierra Rica
Austin

The excellent Eocene fossil record in the Big Bend is tied to the abundance of volcanoes


When these volcanoes were active, the Big Bend was a very different place…
Eagle & Van Horn
Buckhorn, Paisano, Davis
Quitman
Chinati & Infiernito
Christmas & Santiago
Chisos & Rosillos
Bofecillos & Sierra Rica
Austin

Big Bend Today:

Big Bend during the Eocene:

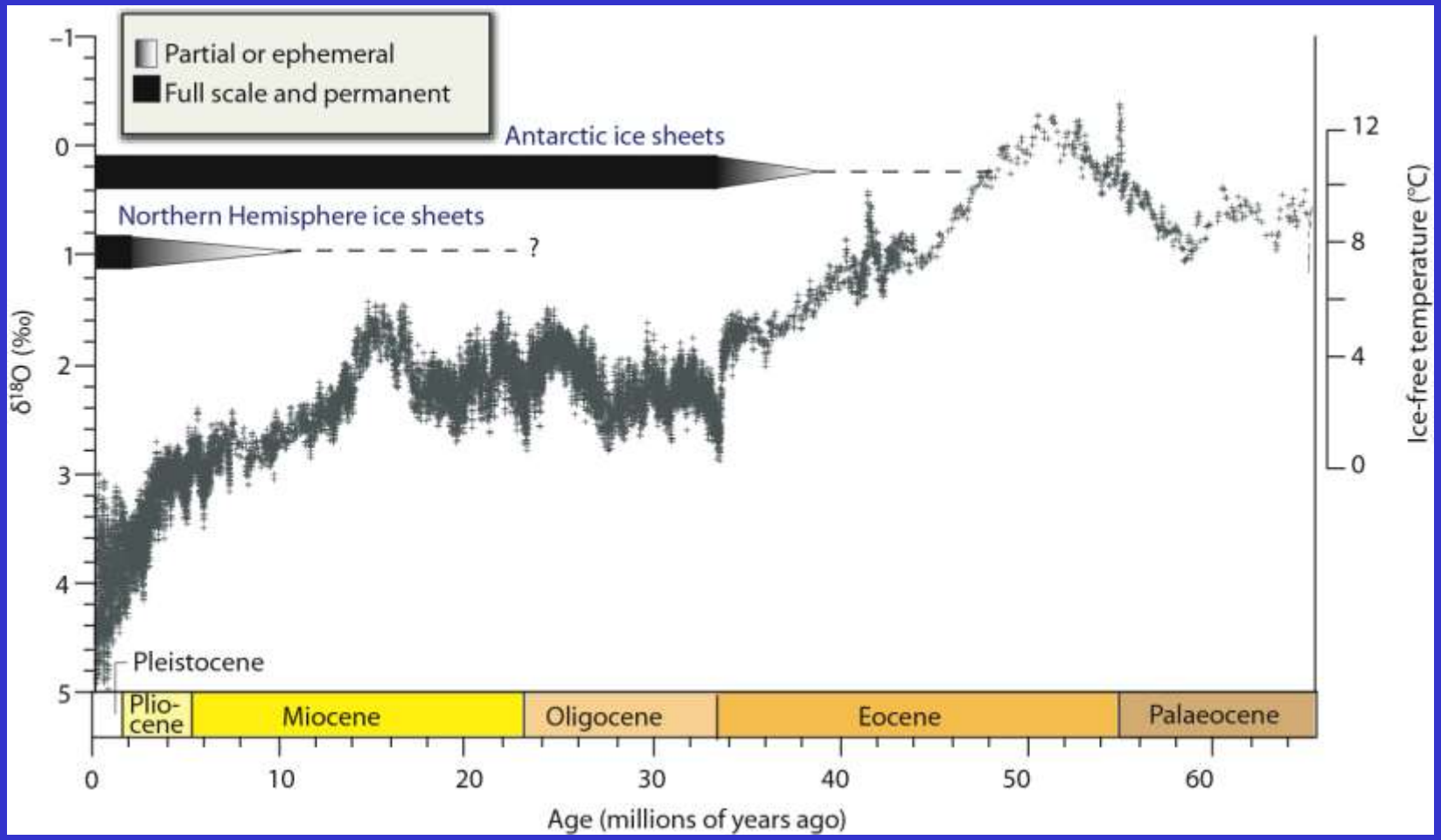
Arenal Volcano, Costa Rica

Q: How could you have tropical rainforests in West Texas?

Arenal Volcano, Costa Rica

A: Global temperatures have changed <u>a lot</u> in the last 66 million years

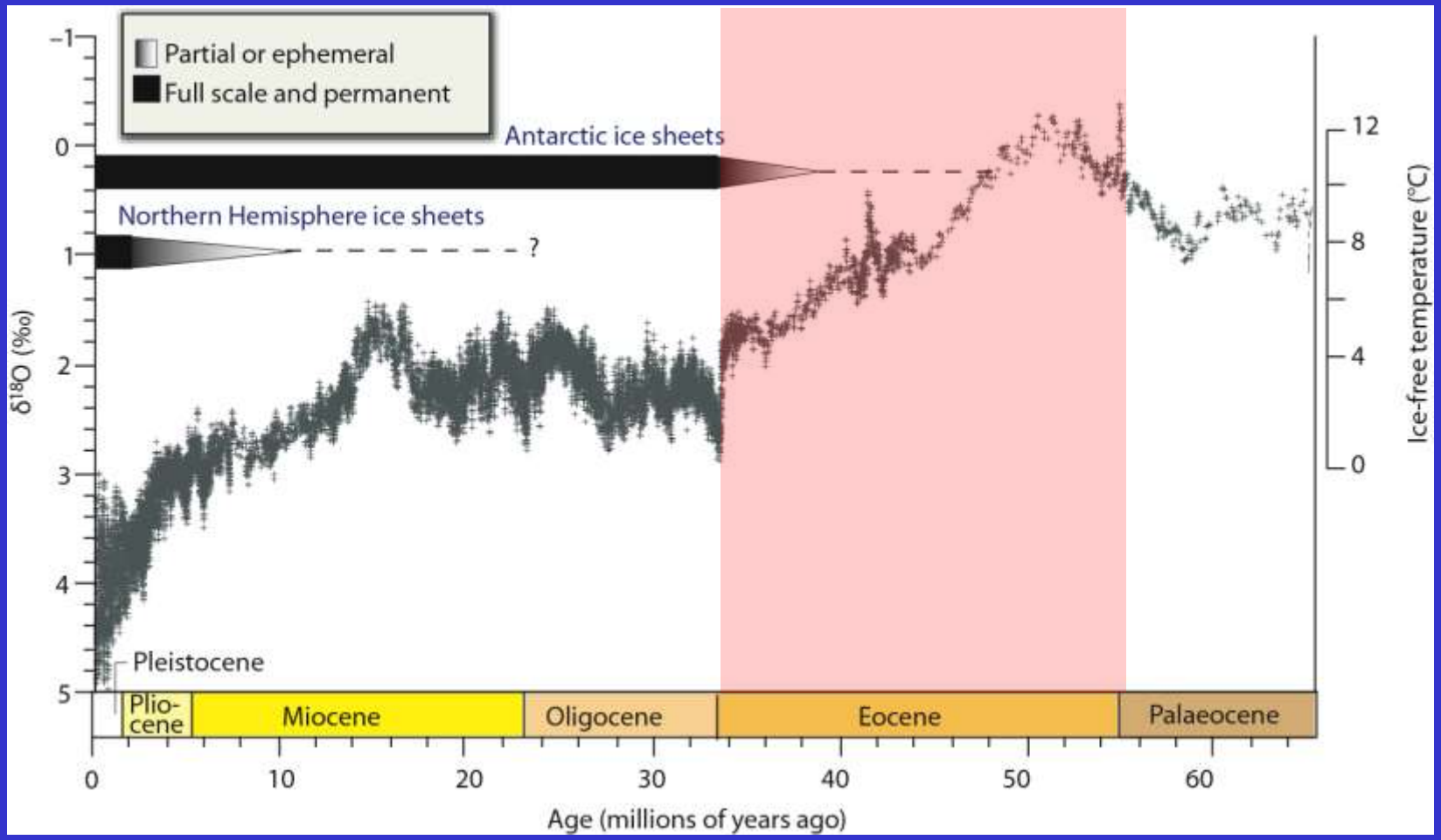
Present



Past

Eocene was much warmer than the present day

Present

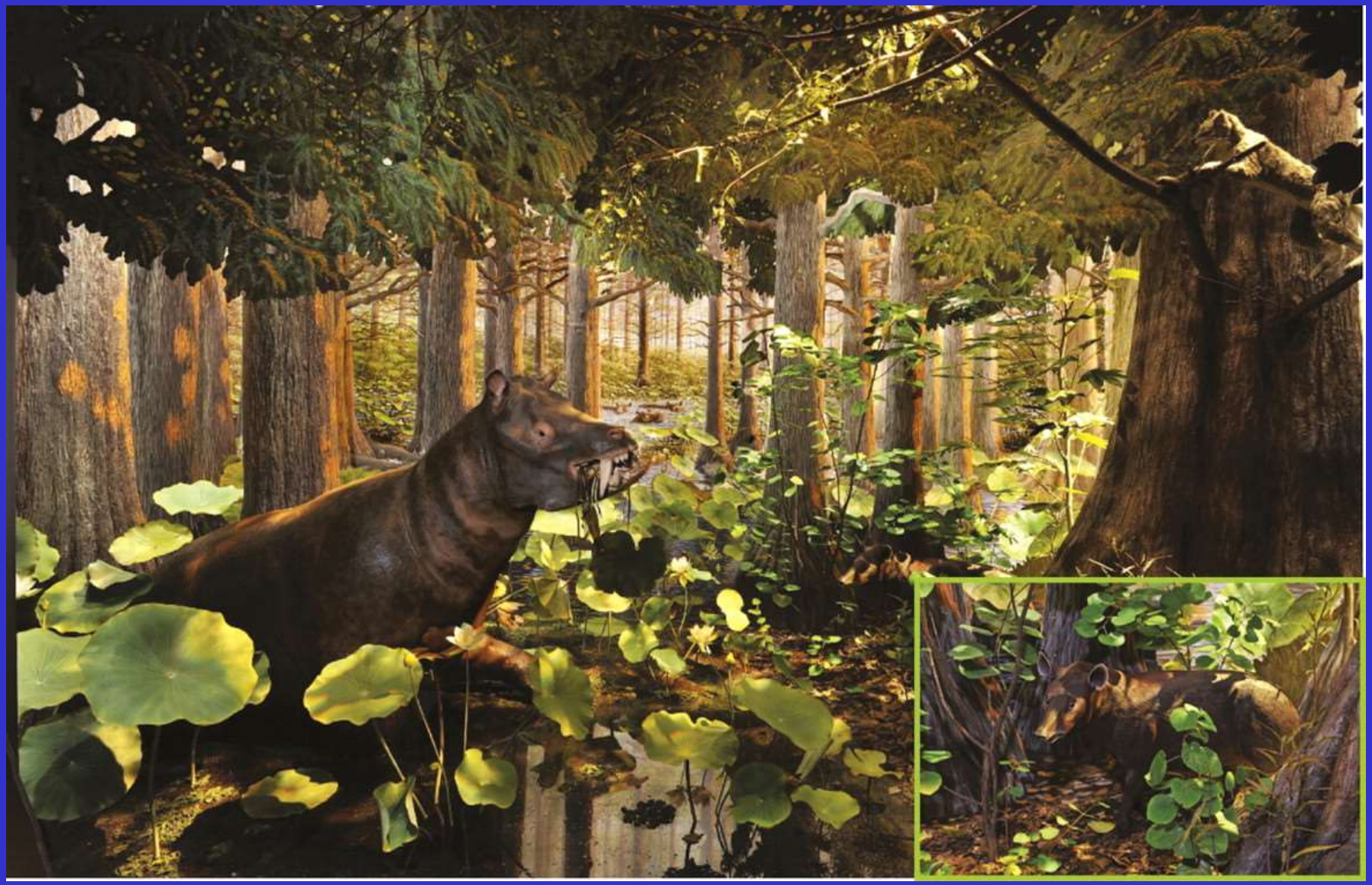


Past

Tropical forests <u>widespread</u> in North America

E.g., Ellesmere Island today

Ellesmere Island 55 MYA



Plenty of evidence of these Eocene tropical forests in the Big Bend:

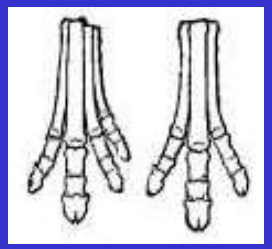
Tornillo Flat, Big Bend National Park

Photo: Sarah Wilson

Paleosols - Ancient Forest Soils

So - what animals lived in these tropical forests?

Tiny forest horses with short legs & multiple toes



...About the size and build of a miniature Doberman

Rhino-sized browsers called Brontotheres

Mesonychids - Large carnivores with bone-crushing teeth like hyenas

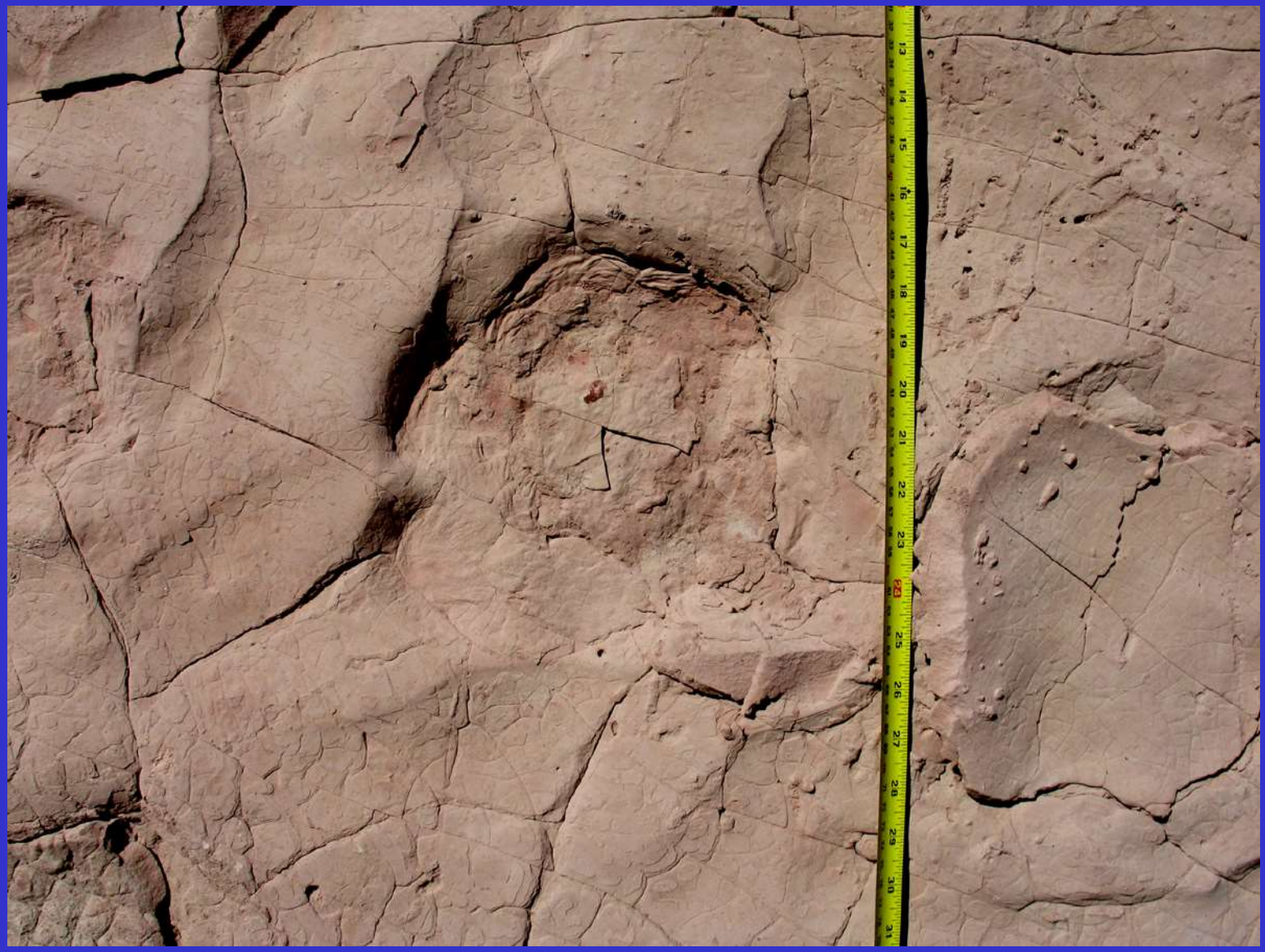
Early Rhinos


Photo: Chris Kirk

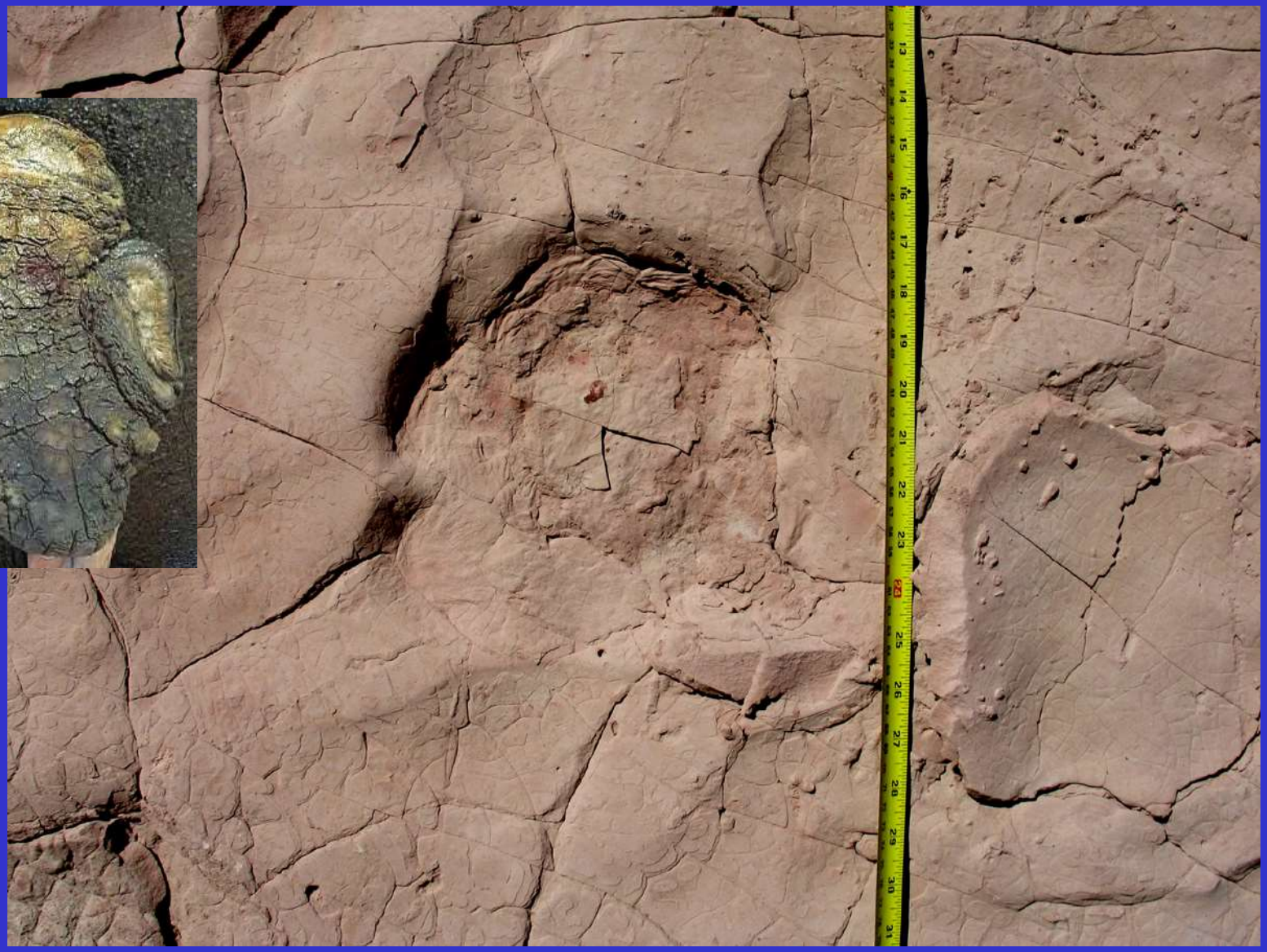
~ 38 Million Year Old Sandstone Boulder

~ 38 Million Year Old Sandstone Boulder

38 Million Year Old Sandstone Boulder



38 Million Year Old Sandstone Boulder



In most tropical forests today, you find primates

So too in the Eocene forests of the Big Bend

Mahgarita stevensi

~ 38 MYA

- 4 known specimens

- Known only from the Devil's Graveyard

Rooneyia viejaensis

- 37-38 MYA
- 1 known specimen
- Known only from the Sierra Vieja

Rooneyia and *Mahgarita* both oddballs

- 5 great specimens, but evolutionary relationships uncertain
- Would be nice to know more…

This is where I come in - Started at UT in 2003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Midwestern State University's Dalquest Research Site

Photo: Sarah Wilson

Let me show you what the fieldwork is like:

Step 1 - Convince people to spend their free time with you in the desert

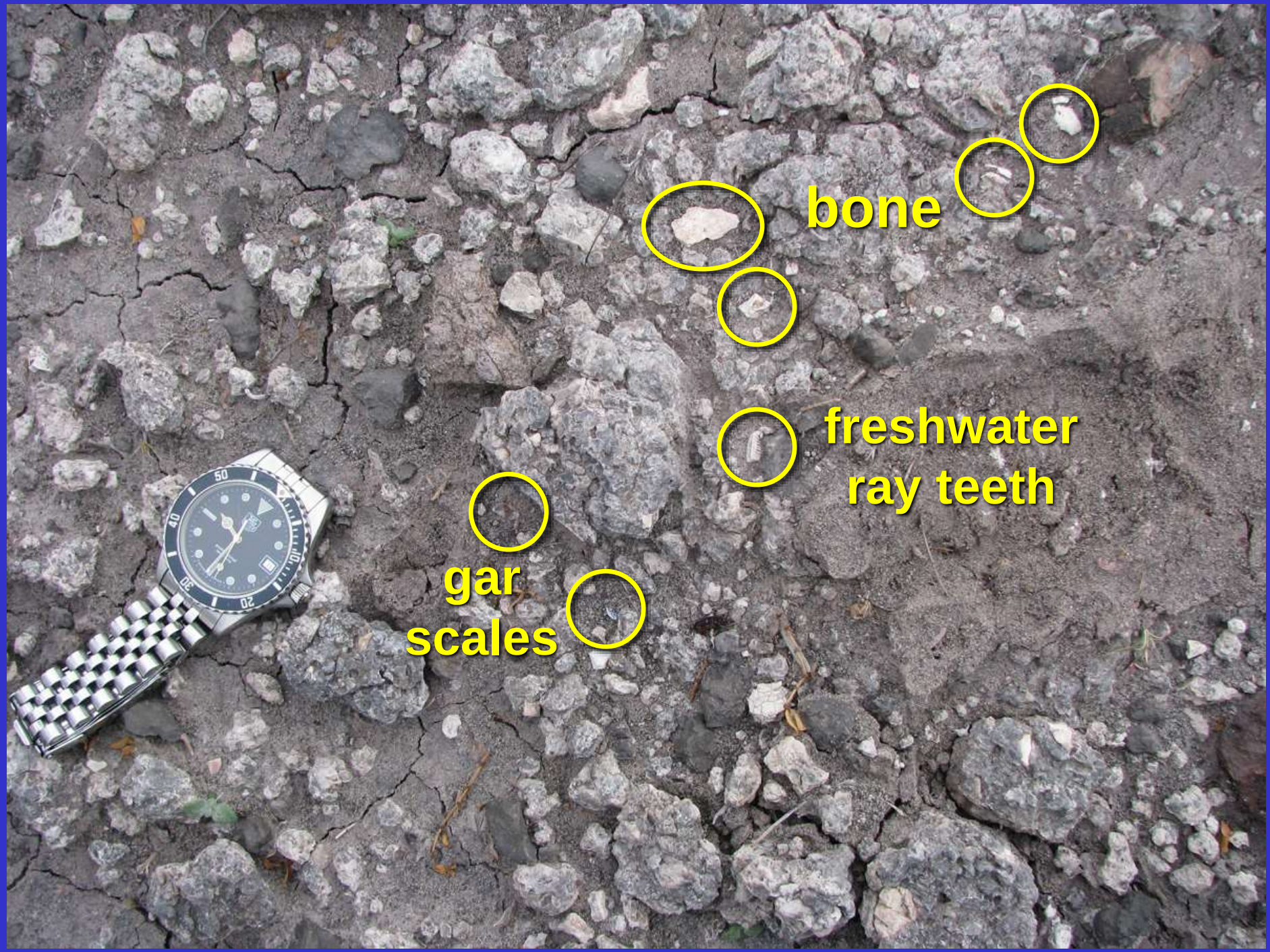
Photo: Sarah Wilson

Step 2 - Hike to exposures

Photo: Sarah Wilson

Step 3 - Prospect

Step 4 - Crawl


bone
freshwater
ray teeth
gar
scales

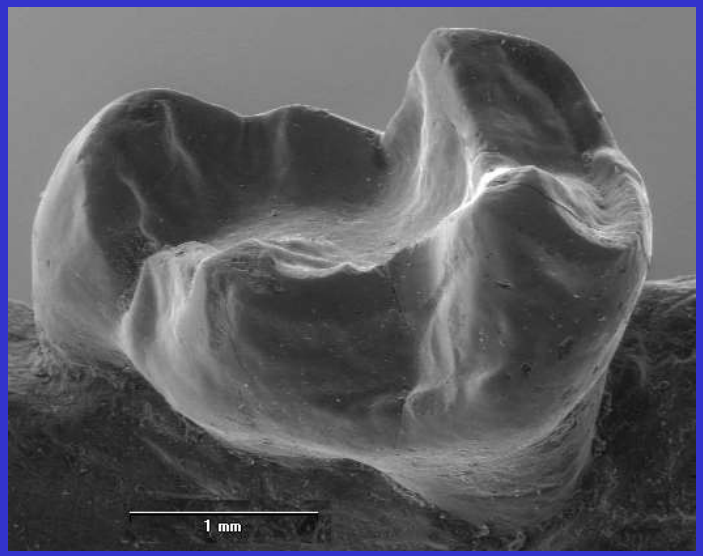
Step 5 - The “plague of locusts” technique

Film: Sarah Wilson

Photos: Sarah Wilson

If you're lucky, you'll find something good

And if you're really lucky, you'll find something like this:



2005: Started finding jaws and teeth of a new primate species closely related to *Mahgarita*

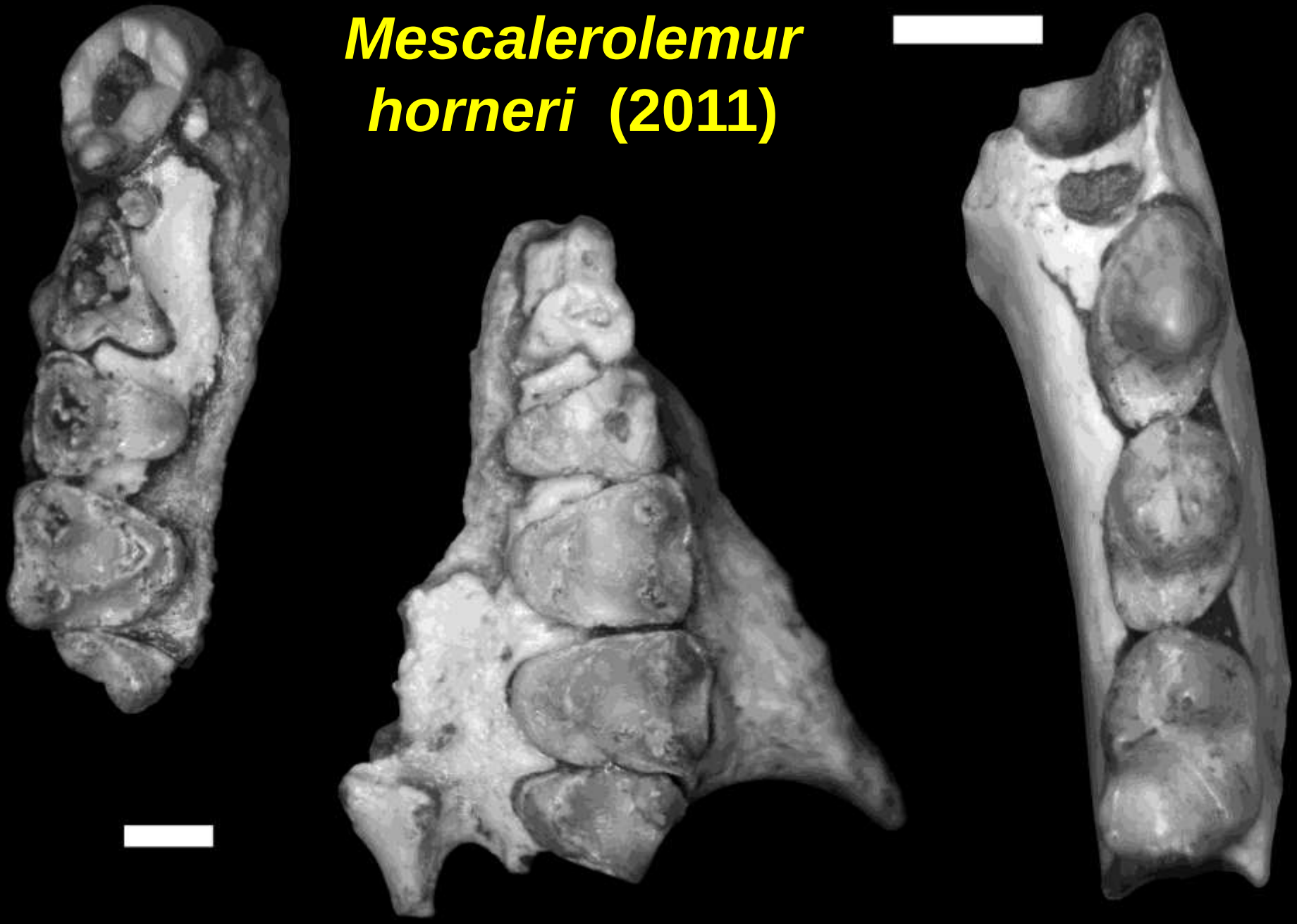
- Older (~ 42 MYA)

- Smaller (325 g)

- Diet fruit + insects

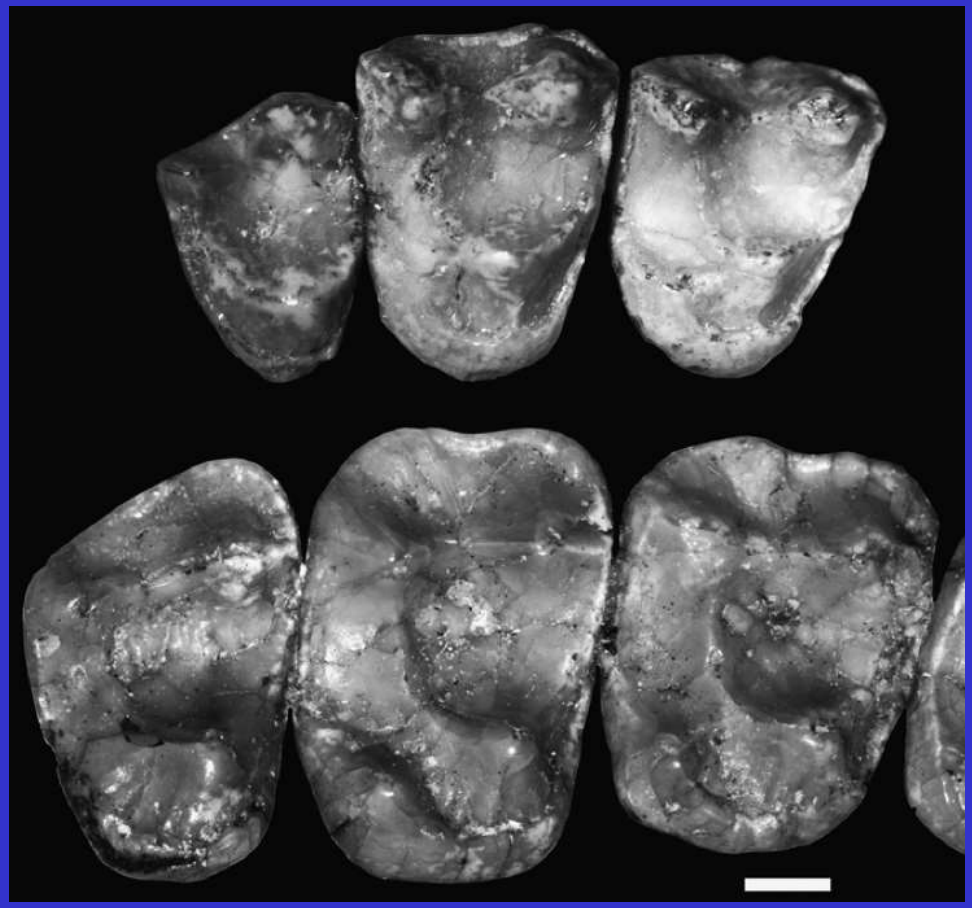
- Also known only from the Devil's Graveyard

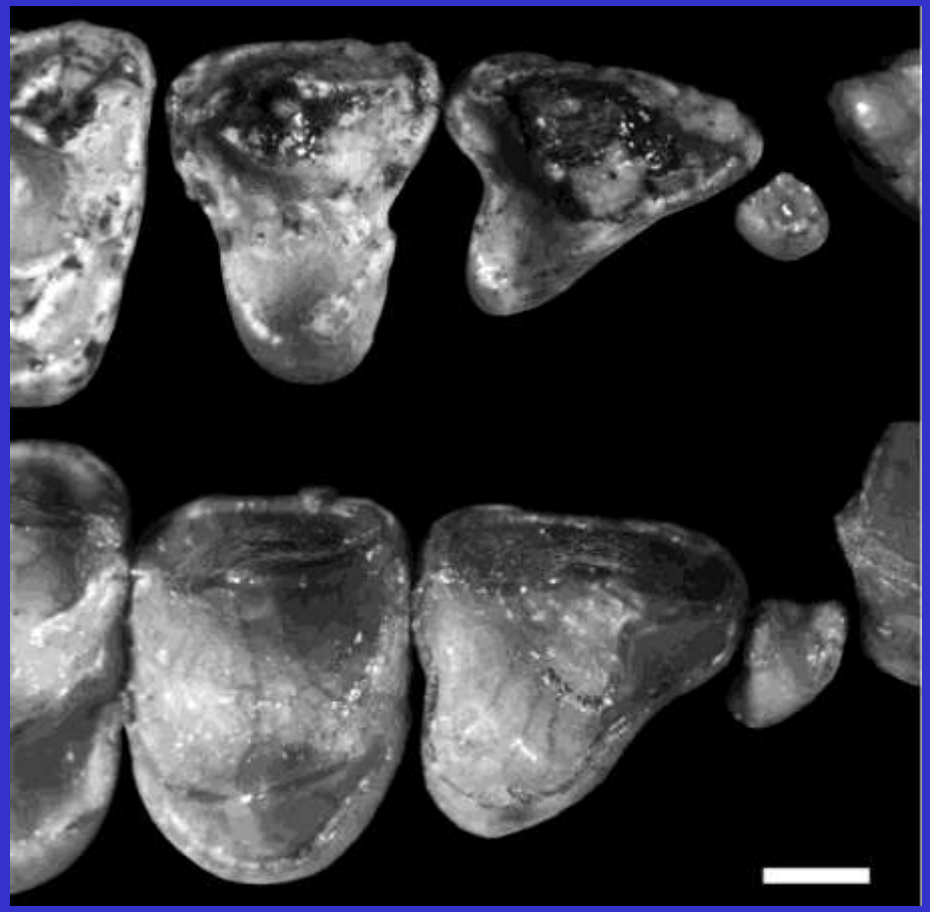
Mescalerolemur horneri (2011)



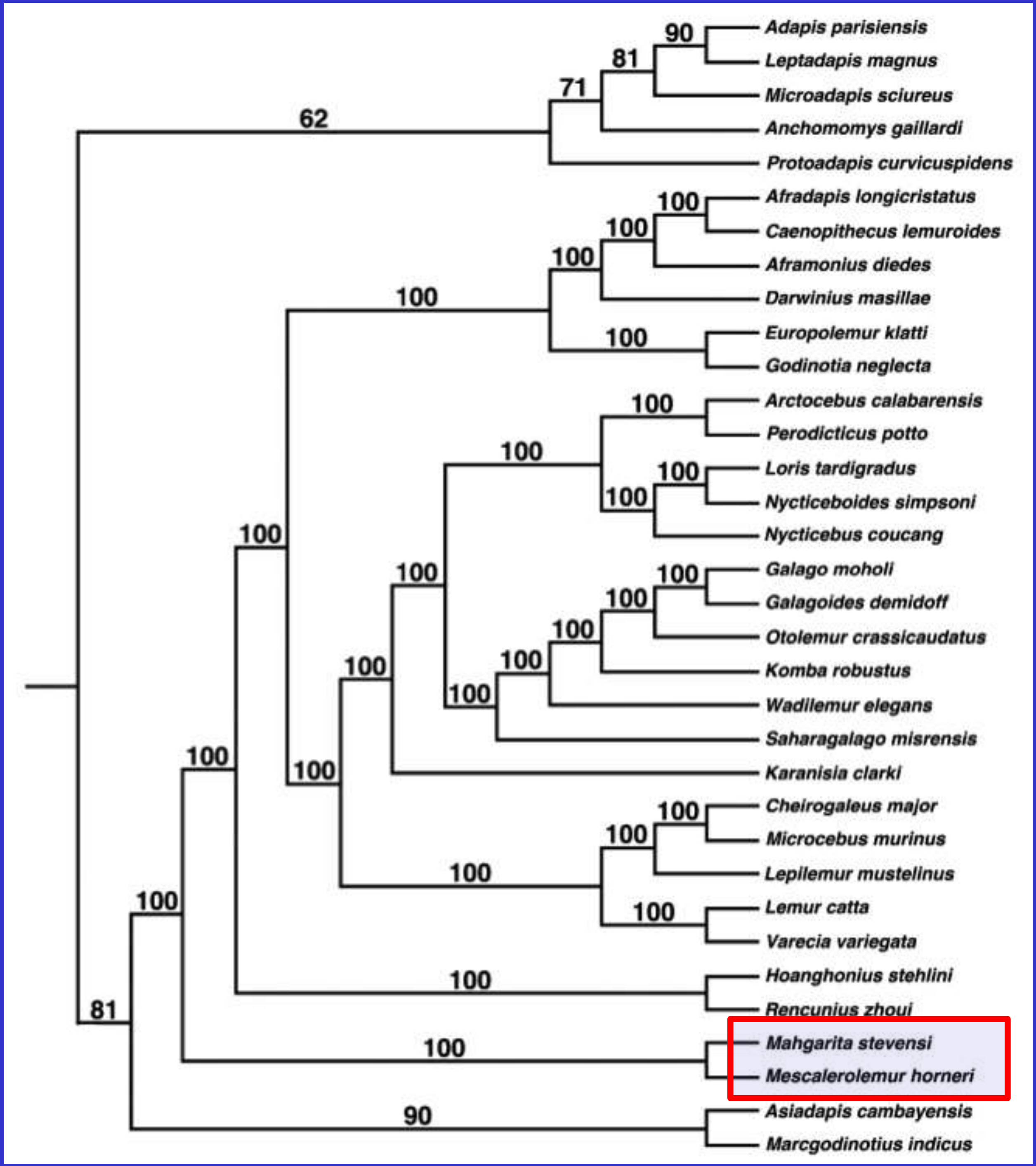
The two species are so distinctive that they probably represent a single evolving lineage

Upper teeth of *Mescalerolemur* (~ 42 MYA)

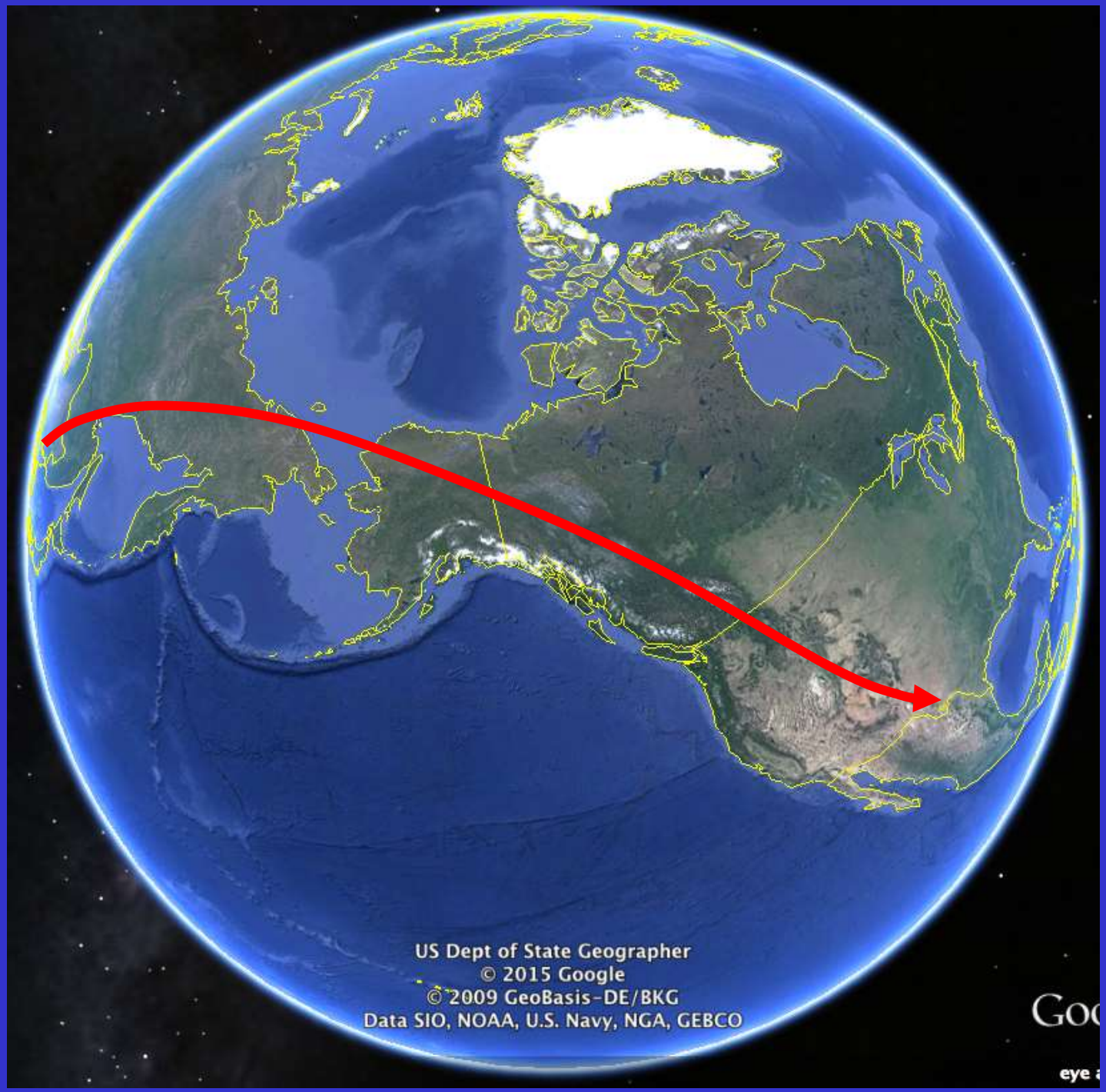




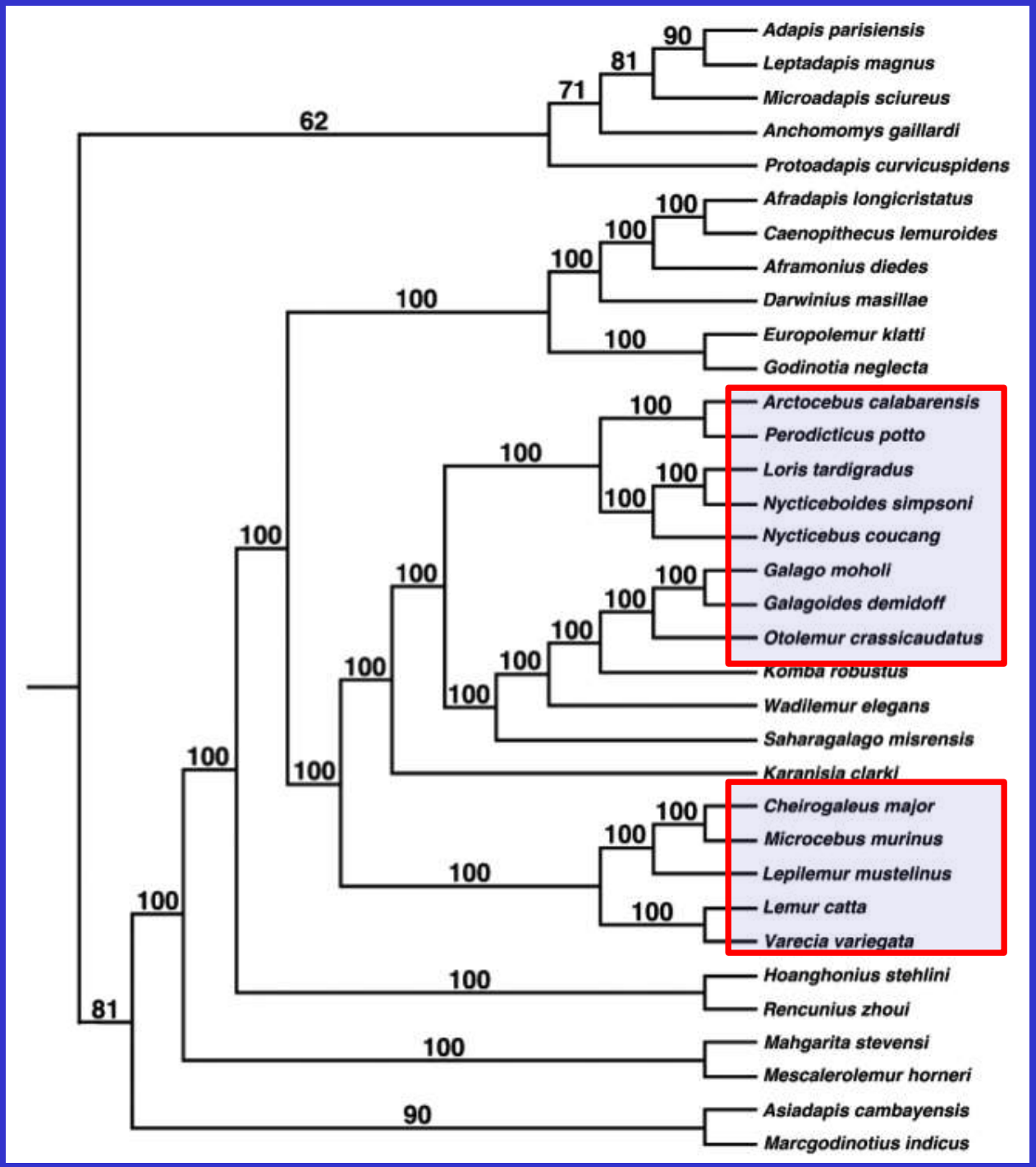
Upper teeth of *Mahgarita* (~ 38 MYA)



Analysis of evolutionary relationships of *Mescalerolemur* and *Mahgarita* show that (1) they're closely related to similar fossil primates from Eurasia and Africa



Tells us that these endemic Texas primates migrated into North America from Asia



Analysis also tells us which living primates *Mescalerolemur* and *Mahgarita* are most closely related to…

Lemurs, Lorises, and Bushbabies!

Indri (Lemur)

In fact, best living ecological analogues for *Mahgarita* and *Mescalerolemur*: modern lemurs of Madagascar

(Add lemurs to your mental image of the West Texas Eocene!)

Other fossil Primates:

***Diablomomys dalquesti* (2008)**

- Body Mass ~ 400 g

- Diet fruit + insects

- Also known only from the Devil's Graveyard

Jaws and teeth of two new species!

- Body Mass ~ 800 g
- Diet mainly fruit
- Currently being described for publication

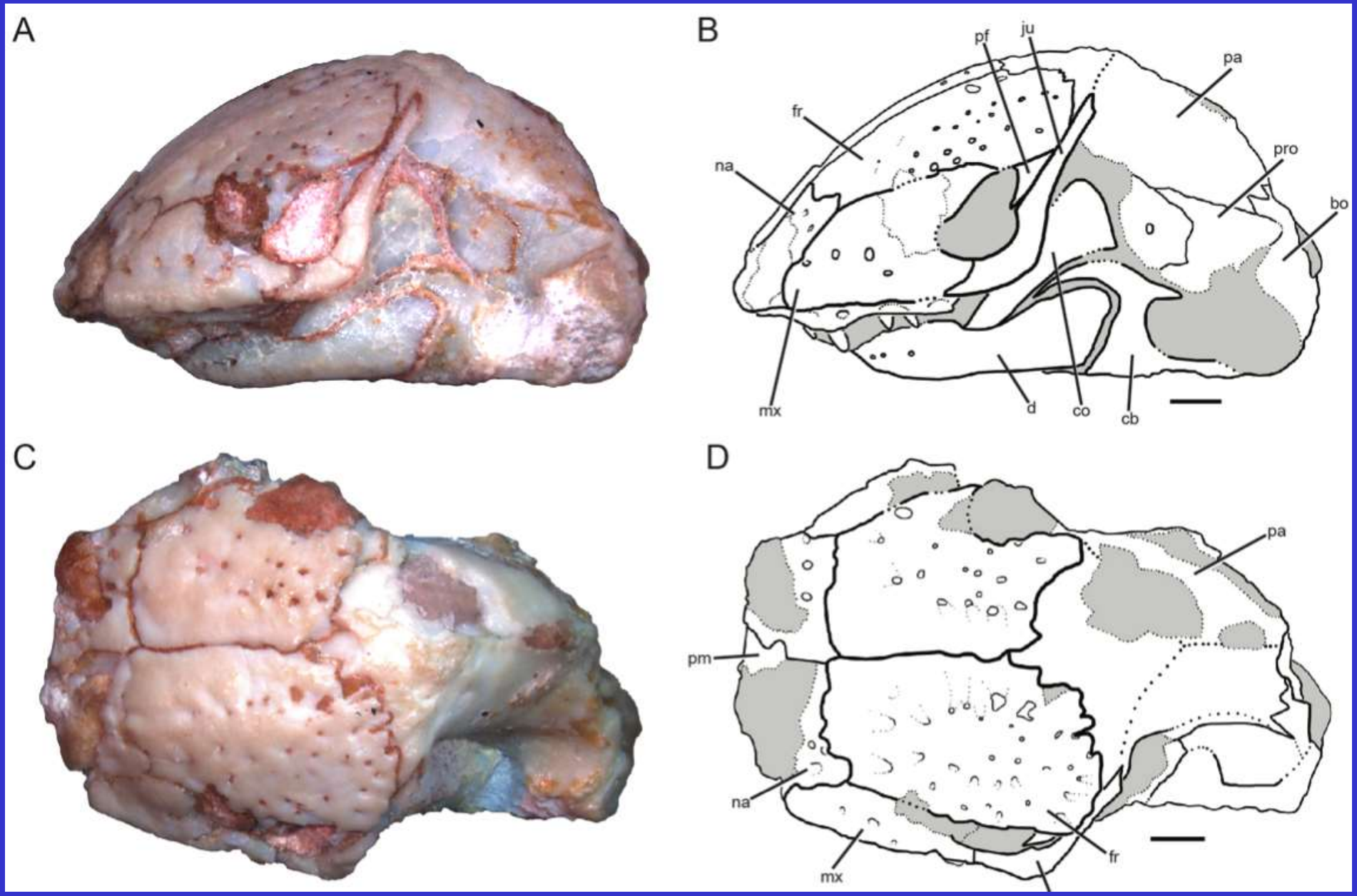
All of these fossil primates probably related to living tarsiers

What exactly is a tarsier, you ask?

Of course, most of what we find isn't a primate

Photo: Sarah Wilson

The Latest: A New Amphisbaenian - *Solastella*



Amphisbaenians might be the coolest animals you've *never* heard of...

March 2015:

Photo: Sarah Wilson

March 2015:

Photo: Sarah Wilson

Primate Frontal Bone

But – no associated teeth (arrg!)

Nevertheless – shares key features with *Rooneyia*

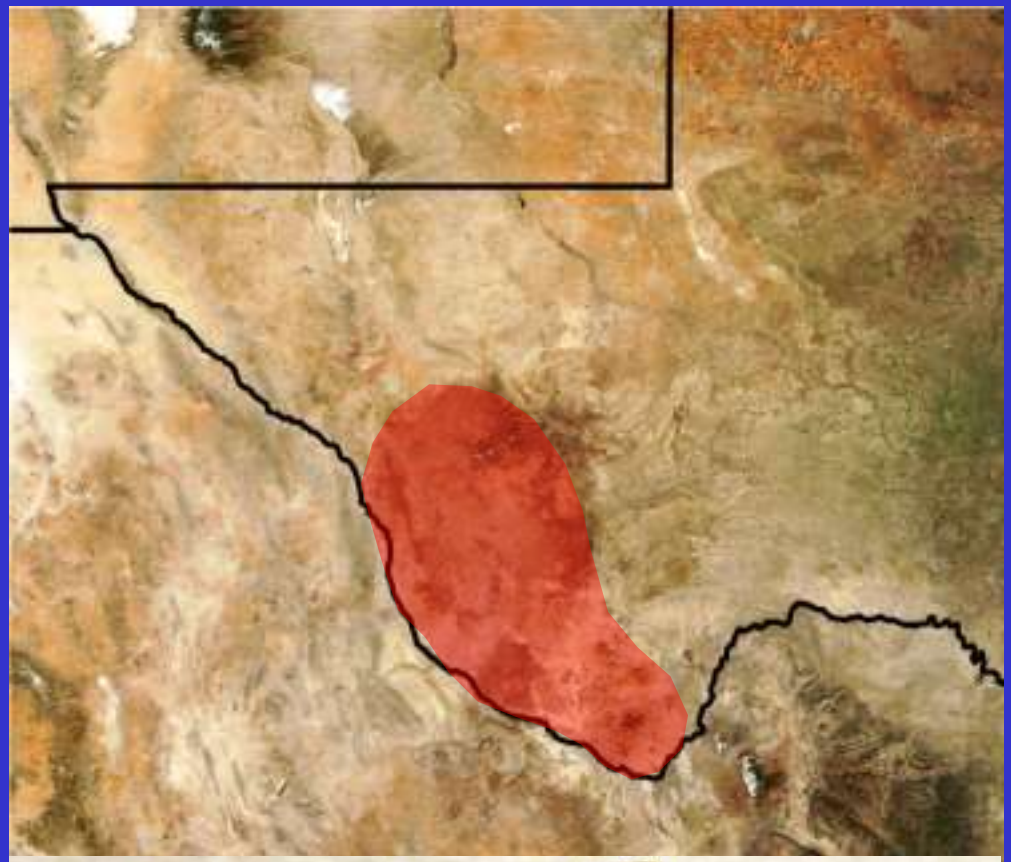
Similarities:

- Flange of bone behind the eye socket

- Foramen (hole) in the flange

Eye sockets deeply recessed under frontal lobes

Stay tuned!

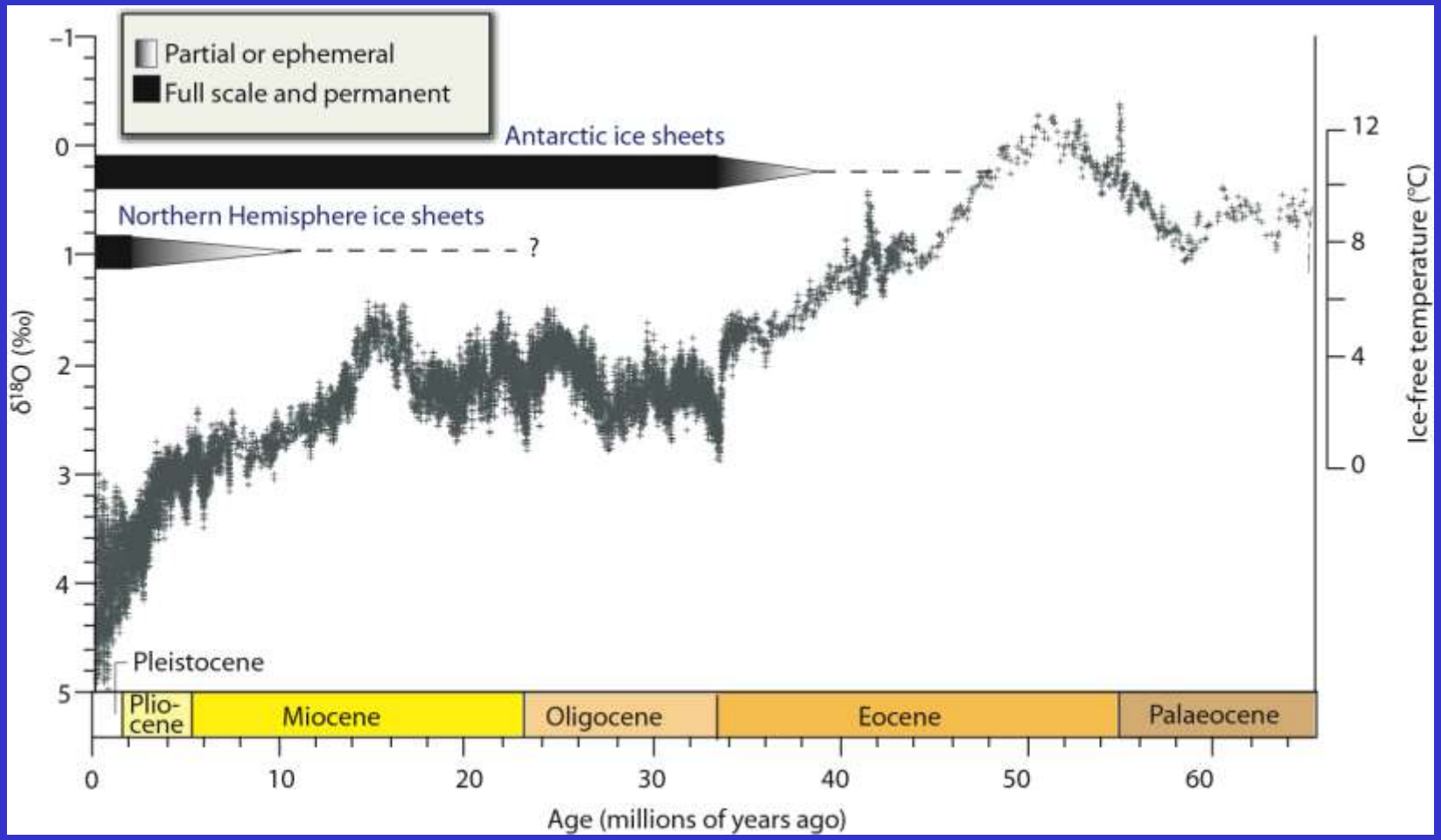


The Big Picture from the Big Bend:

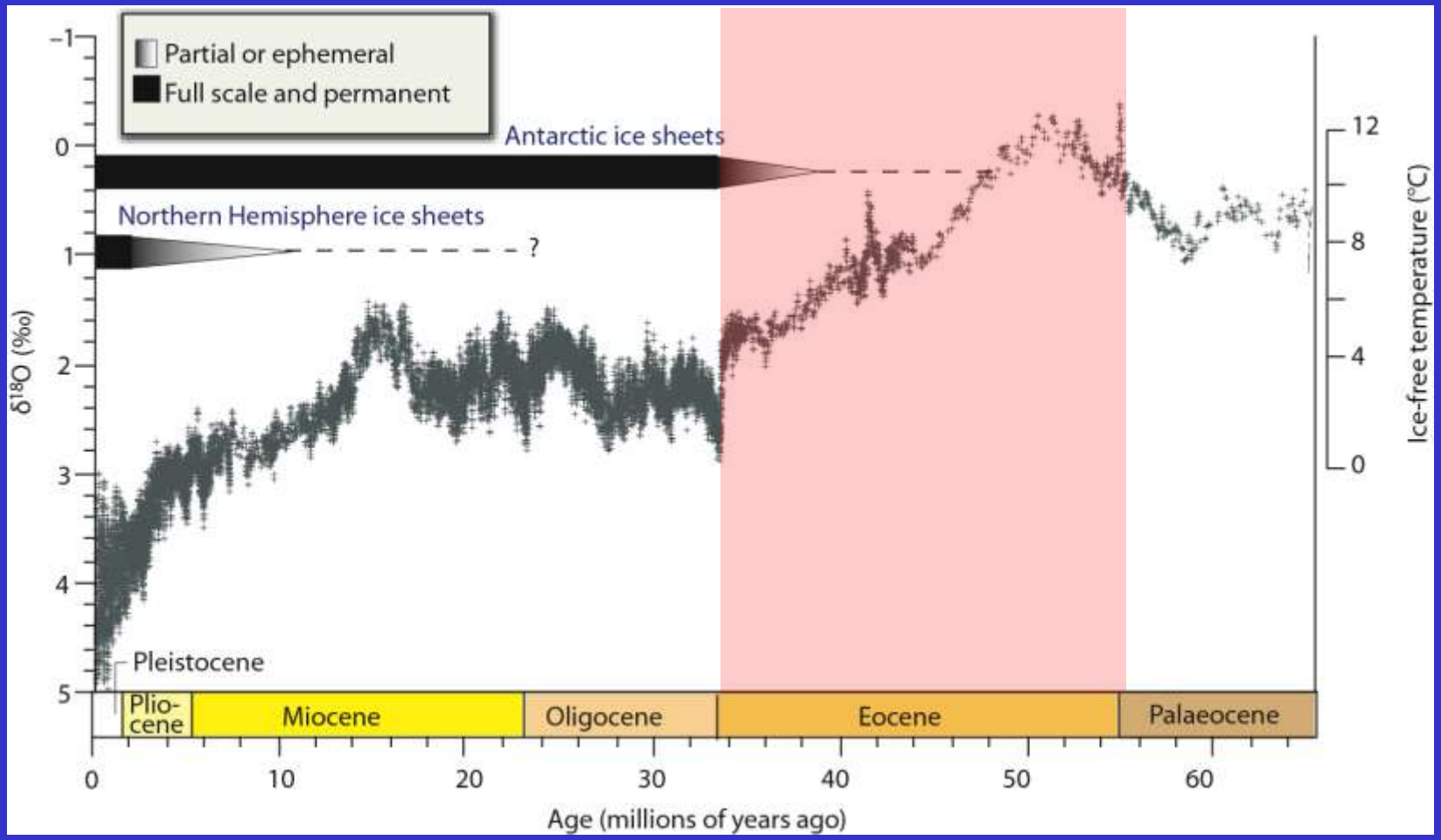
- Where you find the original native Texans

- A group of early fossil primates that are unique to the region and unlike any other in North America…

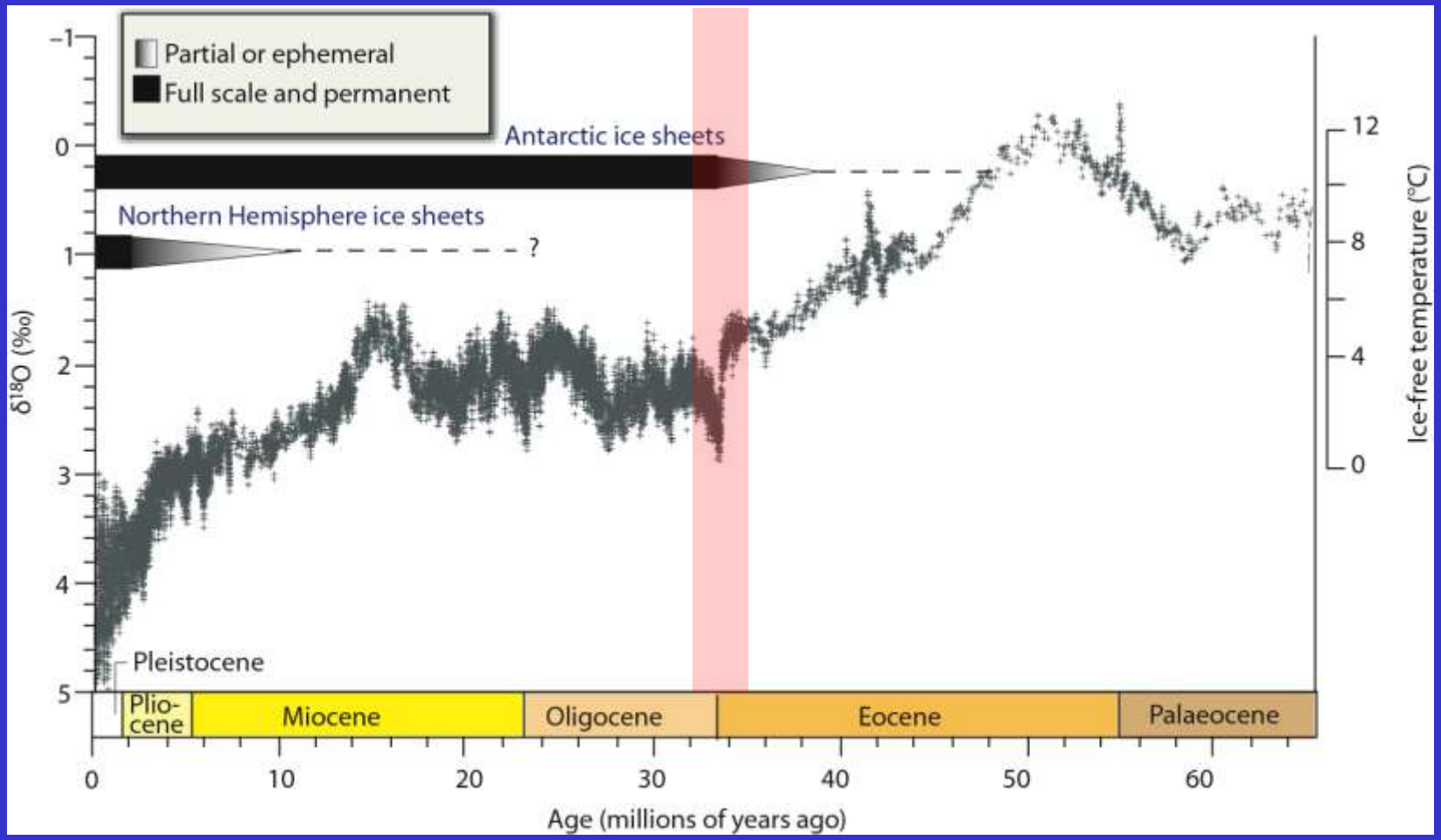
So why no non-human primates in the Big Bend today?



Most of the Eocene very warm, but…



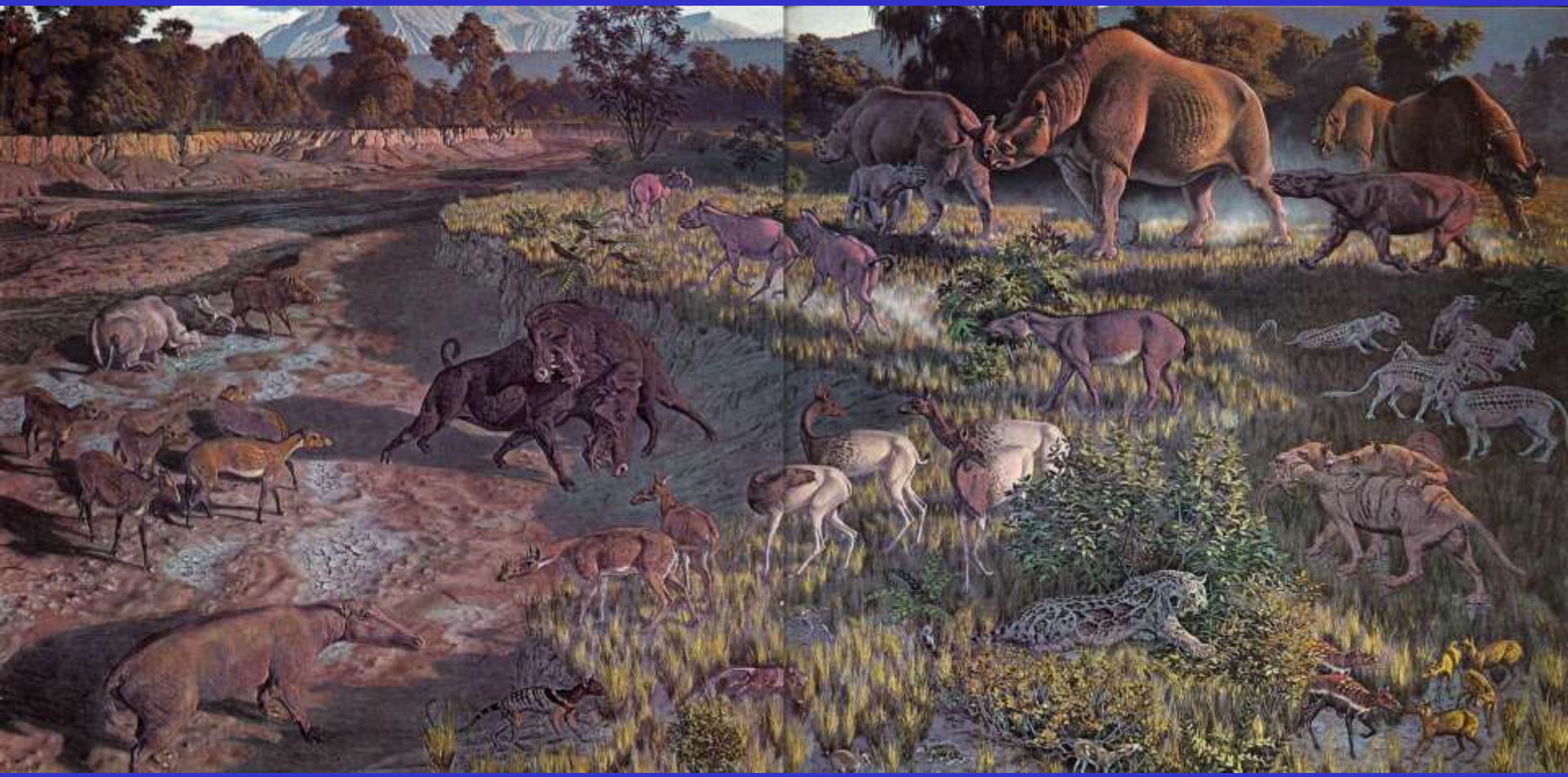
Eocene ends with the most precipitous *drop* in global temperature the last 66 million years



Eocene Epoch

Forests of Big Bend had primates like modern lemurs out by day and primates like tarsiers creeping around at night

Oligocene Epoch



Tropical forests (& primates) gone in N. Am.


Thanks To:
- Jack Wilson, Jim and Margaret Stevens, Sarah Wilson
- Staff of the Jackson School Museum of Earth History's Vertebrate Paleontology Lab
- Midwestern State University; Norman Horner, Bill Cook, Ray Willis
- Walter and Rose Dalquest
- Field Crews!