



Cerrejón Coal Mine, Northeastern Colombia.  
Locality where *Titanoboa* was discovered.

## *Titanoboa cerrejonensis* (58 – 60 Million Years Ago) Northeastern Colombia

*Titanoboa* is the largest snake to have ever slithered the earth. At 42 feet long and 1.27 tons, *Titanoboa* was longer than a school bus and would have had trouble fitting through an office door. This snake lived after the extinction of the dinosaurs during the Paleocene Epoch 58-60 million years ago.

*Titanoboa* extends the range of **body size** for snakes. The longest recorded living snake was a *Python* at 29 feet, and the longest fossil snake prior to this study was around 34 feet.

28 individual *Titanoboas* have been found with varying completeness, all from the Cerrejón coal mine in northeastern Colombia.

*Titanoboa* also has enabled scientists to predict **paleotemperature** using fossil snakes for the first time. Because snakes are cold-blooded, the size they can attain depends on how warm the climate is. For a snake to have grown this large, minimum mean annual temperatures in the area must have been around 90°F, which is 11° warmer than the region is today.

*Titanoboa* was described by Florida Museum scientists Dr. Jonathan Bloch (Assistant Curator of Vertebrate Paleontology), Jason Bourque (Vertebrate Paleontology Collections Assistant), and PhD students Alex Hastings, Edwin Cadena, and Fabiany Herrera in the February 5, 2009 issue of the journal *Nature*.



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### LETTERS

#### Giant boid snake from the Palaeocene neotropics reveals hotter past equatorial temperatures

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The largest extant snakes live in the tropics of South America and southeast Asia<sup>1,2</sup> where high temperatures facilitate the evolution of large body sizes among air-breathing animals whose body temperatures are dependent on ambient environmental temperatures (poikilothermy)<sup>3,4</sup>. Very little is known about ancient tropical terrestrial ecosystems, limiting our understanding of the evolution of giant snakes and their relationship to climate in the past. Here we describe a boid snake from the oldest known neotropical rainforest fauna from the Cerrejón Formation (58–60 Myr ago) in northeastern Colombia. We estimate a body length of 13 m and a mass of 1,135 kg, making it the largest known snake<sup>5</sup>. The maximum size of poikilothermic animals at a given temperature is limited by metabolic rate<sup>6</sup>, and a snake of this size would require a minimum mean annual temperature of 30–34 °C to survive. This estimate is consistent with hypotheses of hot Palaeocene neotropics with high concentrations of atmospheric CO<sub>2</sub> based on climate models<sup>7</sup>. Comparison of palaeotemperature estimates from the equator to those from South American mid-latitudes indicates a relatively steep temperature gradient during the early Palaeocene greenhouse, similar to that of today. Depositional environments and faunal composition of the Cerrejón Formation indicate an anaconda-like

ecology for the giant snake, and an earliest Cenozoic origin of neotropical vertebrate faunas.

Serpentes Linnaeus 1758  
Boidae Gray 1825  
Boidae Gray 1825

*Titanoboa cerrejonensis* gen. et sp. nov.

**Etymology.** The generic name combines 'Titan' (Greek, giant) with 'Boa', type genus for Boidae. The specific name refers to the Cerrejón region, Guajira Department, Colombia. The full translation is 'titanic boid from Cerrejón'.

**Holotype.** UFJ/GCM 1, a single precolossal vertebra (Fig. 1a–d).

**Locality.** La Fuente PZ, Cerrejón Coal Mine, Guajira Peninsula, Colombia (paleolatitude 5.5° N; Supplementary Fig. 1).

**Horizon.** Single claystone layer, middle segment of the Cerrejón Formation (Supplementary Fig. 2); middle-late Palaeocene epoch (58–60 Myr ago), palynological zone Cu-02 (ref. 11).

**Referred material.** UFJ/GCM 2 (paratype), nearly complete precolossal vertebra (Fig. 1g, h); UFJ/GCM 3–UFJ/GCM 28, 164 additional precolossal vertebrae and ribs representing 28 individuals (Supplementary Table 1).