**Back off predators!! Herbivorous dinosaur with spiny neck**

Sauropod dinosaurs, large herbivores with long neck and tail, include the largest terrestrial animals that ever inhabited the Earth such the giant titanosaur *Patagotitan,* or the colossal diplodocid *Diplodocus*. However, some groups of sauropods were not necessarily characterized by their size but by other anatomical features.

All these plant-eaters dinosaurs developed different strategies that allowed to defend themselves against predators. While in some the combination of large size and rapid growth put them safely, others developed creative strategies such as whiplashes, armored skin or bone clubs at the tip of the tail. Most dicraeosaurid sauropods possessed long and pointed double row of spines over their neck and back, whose possible function was object of diverse conjectures in the last decades. These long spines were proposed as a support structure for a sail that would have regulated the body temperature. Other authors suggested that these spines formed a display crest that improved their communication or gave them sex appeal. It was also proposed that they could have had a dorsal hump to store reserves between the row of spines, and even as inner cores of dorsal horns with defensive function.

The first dicraeosaurid known was *Dicraeosaurus* found by Werner Janensch in Tanzania at the beginning of the 20th century, but the most representative was *Amargasaurus*, found by José Bonaparte in the argentinean Patagonia in the 80s. *Amargasaurus*, who lived 120 millions of years ago, is characterized by the presence of extremely long neural spines (around 80 centimeters tall) over its neck that pointed backwards.

Since 2010, we are excavating in a locality called Bajada Colorada from northern Patagonia, Argentina. There, the outcrops rocks date from 140 million of years ago and represent a window to the poorly knowledge of the dinosaur evolution from the southern landmasses. Thus, all findings from there that actually include herbivorous dinosaur and several carnivorous dinosaur from different sizes, result important to understand the dinosaur faunal composition of that period and to analyze the relationships with both preceding Jurassic forms and succeeding upper cretaceous groups.

In 2013, a handful of teeth and other striking bones were collected in a rock block (externally protected with bandages and plaster) and transport to the laboratory of El Chocón Museum. After months of cleaning and preparation by the technical staff, we recognized a nearly complete skull (the most complete skull of this group of sauropods) and few cervical vertebrae of the neck (that show extremely elongate bifid cervical neural spines that point forward) of a new species of dinosaur that we named *Bajadasaurus propuspinax*. The generic name comes from *Bajada* (Spanish for downhill, in reference to the locality Bajada Colorada) and *saurus* (Greek, lizard). The species name from *pronus* (Latin, bent over forward) and *spinax* (Greek, spine), in reference to the anteriorly pointed, curved, neural spines of the cervical vertebrae.

The cranial bones as well as the morphology of the cervical vertebra of *Bajadasaurus* show several features that allow infer the life position of the neck and the head of this sauropod. The narrow and small teeth are restricted to the anterior portion of the jaws and the orbits are dorsally exposed. This added to the head-down natural positon of the head of these sauropod based in previous studies of the inner ear tells us that these animals would spend good part of their life “grazing” over small plants at ground level. In this context, the fence of extremely long pointed neural spines could be successful in deter many predators. However, we think that if they had only been bare bone structures or with only some skin covering, they would have suffered fractures easily with a knock or when attacked by these predators. That is why we think that they would have needed the protection of a keratin sheath (as happens in the horns of many mammals, which are formed by a bone core covered by a horn), giving strength to these delicate spines before any unforeseen.

The finding of *Bajadasaurus pronuspinax* not only permits us to know how the dinosaur fauna was compose in the lowermost Cretaceous of Patagonia but shows that the development of a fence of long bifid neural spines over the neck of these herbivorous dinosaurs was likely adaptive over a long time period not minor than 20 millions of years.