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TWO DINOSAURS FROM AFRICA GIVE CLUES TO CONTINENTS' SPLIT
Fossils support idea of lingering bridges between landmasses

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WASHINGTON—The fossil skull of a wrinkle-faced, meat-eating dinosaur whose cousins lived as far away as South America and India has emerged from the African Sahara, discovered by a team led by National Geographic Explorer-in-Residence Paul Sereno. The find provides fresh information about how and when the ancient southern continents of Africa, South America and India separated.

The new species, which is 95 million years old, and a second new meat-eating species Sereno found on a separate expedition, help fill in critical gaps in the evolution of carnivorous dinosaurs on Africa. The species are described in a paper published online June 2 in the Proceedings of the Royal Society of London, Biological Sciences. The July issue of National Geographic magazine also will include an article on one of the dinosaurs. Sereno's research was funded by National Geographic, the David and Lucile Packard Foundation, the Pritzker Foundation and Nathan Myhrvold.

Sereno, a paleontologist and professor at the University of Chicago, has named the ancient skull *Rugops primus*, meaning "first wrinkle face." Measuring about 30 feet long in life, the animal had a short, round snout and small, delicate teeth, he said. It belongs to a group of southern carnivorous dinosaurs called abelisaurids.

The head of *Rugops* had a tough covering of scales or surface armor and was riddled with arteries and veins, leaving a crisscross of grooves on the skull. "It's not the kind of head designed for fighting or bone-crushing," Sereno said. Instead, he believes *Rugops* was a scavenger, using its head to pick at carrion rather than fighting other animals for food.

(OVER)

DINOSAUR (PAGE 2)

Sereno is puzzled by the presence of two neat rows of seven holes along the dinosaur's snout. He speculates that the holes anchored something ornamental, used by the animal for display. "This may have been a scavenger with head gear," he said. "It's really a beautiful intermediate species of the group that later evolved into the first horned predators."

The authors of the scientific paper describing the two new dinosaur finds are Sereno, Jeffrey Wilson of the University of Michigan and Jack Conrad of the University of Chicago. The second new dinosaur species, named *Spinostropheus gautieri*, was found in Niger in the same 135-million-year-old rocks where Sereno's expeditions excavated the dinosaurs *Jobaria* and *Afrovenator*. The fossil is an articulated, or connected, spine of a dinosaur and represents an ancient relative of *Rugops* and other abelisaurids.

These finds provide fresh evidence about when Africa, Madagascar, South America and India finally split from each other as a result of continental drift. Before these discoveries, abelisaurids were virtually unknown on Africa, leading some to suggest that Africa had split off first from the southern landmass Gondwana, perhaps as early as 120 million years ago. The new fossils indicate that Africa and other southern continents that formed Gondwana separated and drifted apart over a narrow interval of time, about 100 million years ago.

Coauthor and team member Jeffrey Wilson, assistant professor at the University of Michigan, said, "Until the continents fully separated, dinosaurs like *Rugops* and other animals used narrow land bridges to colonize adjacent continents and roam within a few degrees of the South Pole."

The fossils were discovered on two separate expeditions that Sereno led to Niger, one in 1997 and the other in 2000, which have brought to light many new dinosaurs and the 40-foot-long crocodylian *Sarcosuchus*, also known as "SuperCroc."

(MORE)

DINOSAUR (PAGE 3)

Sereno recalls the day in 2000 when team member Hans Larsson, now an assistant professor at McGill University in Montreal, spotted a jawbone — and then, about two feet away, the rest of the skull. “It was hard to see which end was the front, but we quickly realized we were looking at a brain case, and that it was probably an abelisaur — a huge find,” Sereno said.

Both *Rugops* and *Spinostropheus* came from the Cretaceous Period, when this area of Africa featured broad rivers and lush plains. Today it is located in the southern Sahara Desert, part of the Republic of Niger. Expeditions to the Sahara led by Sereno in 1993, 1995, 1997 and 2000 unearthed a gallery of new dinosaurs, including the first from Africa’s Cretaceous Period; they include *Afrovenator*, *Jobaria*, *Deltadromeus*, *Carcharodontosaurus* and *Suchomimus*. A National Geographic Explorer-in-Residence since 2000, Sereno has received 11 research grants from the Society’s Committee for Research and Exploration as well as two grants from the Society’s Expeditions Council.

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