

# ***Rajasaurus narmadensis* – India’s own dinosaur emerges from oblivion**

## **History of research**

The history of research pertaining to *Rajasaurus* began with a significant event, way back in 1981, when two of the mapping duo of GSI, G.N. Dwivedi and D.M. Mohabey, Geologists, came across the workers of ACC Cement quarry at Rahioli, Kheda district, Gujarat. The workers were curious to know from the geologists what the smooth, rounded, ball-like structures (of limestone) that came out of the quarry-face at a certain level of the limestone bed were? The “balls” were dinosaurian eggs.

Interestingly the geologists also found that the fossil-egg containing limestone bed was underlain by a coarse sandstone-conglomerate horizon yielding a bountiful of an assortment of bone fossils that could be assigned to dinosaurs (Dwivedi, Mohabey and Bandopadhyay, 1982).

Suresh Srivastava, Geologist (Sr.) was assigned to collect bone fossils from a suitable site in the field for examination and study during the FSP 1982-83 and 1983-84 under the supervision of S.C.Pant and Dr.U.B.Mathur, the then Directors, Palaeontology Division, Western Region. A large number of bone fragments were collected and the fossil site was precisely mapped. The collected material was housed in the Palaeontology Division, WR, Jaipur for identification. Two research papers resulted from the collection, based on the study of some bones and teeth (Mathur and Pant, 1986; Mathur and Srivastava, 1987). Pressing engagements elsewhere in the Survey kept further study of the dinosaur fossil collection in abeyance.

## ***Rajasaurus* takes form**

With the object to study the whole collection in the totality, which apparently contained a major part of the skeleton of at least one individual dinosaur, further work on the fossil material collected in 1982-84 was activated under a MOU with the Punjab University in the FS 1994-95. An American team of two scientists sponsored by the American Institute of Indian Studies, New Delhi and the National Geographic Society, U.S.A., under the aegis of the Punjab University joined the study group in the winters of 2001.

The reconstruction of *Rajasaurus* is based on about 70% of actual fossil material dug from the site at Rahioli, Kheda district, Gujarat, including bits and pieces already known from the Jabalpur site in Madhya Pradesh.



1	2	3	4
Tail Bone	Pelvic Bone	Vertebra	Braincase

Some fossil bones



Cast of head

## ***Rajasaurus narmadensis***

## Project Members

### **India**

Geological Survey of India

Dr.D.K.Bhatt (project coordination)

Suresh Srivastava (field study and identification)

Punjab University

Prof.Ashok Sahni (coordination of scientific collaboration)

Ashu Khosla (scientific assistance)

### **U.S.A.**

The University of Chicago

Prof. Paul C. Sereno (reconstruction of skeleton and morphology)

University of Michigan

Dr. Jeffrey A. Wilson (reconstruction of skeleton and morphology)

## Brief biodata of *Rajasaurus*

Heavy-bodied and stoutly limbed *Rajasaurus* was a carnivorous abelisaurid (theropod) dinosaur, inhabiting the environs of present Narmada river, 6 crores and 70 lac years ago. It is therefore aptly named as *R.narmadensis*. Its body measured some 9 m in length and 3 m in height. The heighest point in its body was in the pelvic region. It had a somewhat horizontal disposition of the body, unlike the subvertical stance of the well-known *Tyrannosaurus rex*. Possessing a regal body frame, *R.narmadensis* was truly the *Raja* (=King) of dinosaurs of the Narmada region. Like a true *Raja* it had a crown of double-crested horns on the head.



An artist's impression of *Rajasaurus narmadensis*

### Habitat of *Rajasaurus*

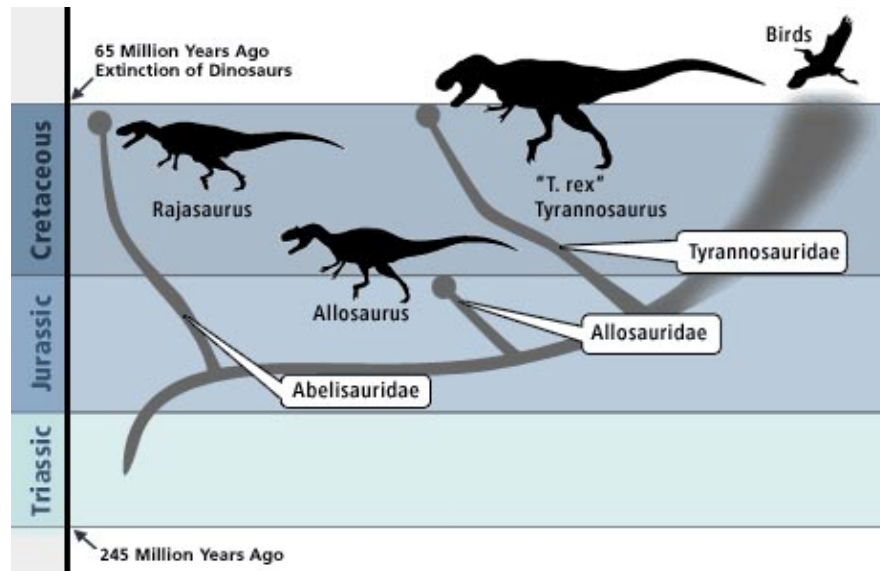
Fossilized bones of *Rajasaurus* typically occur embedded in a coarse sandstone-conglomerate bed that underlies a siliceous limestone horizon yielding fossils of dinosaur eggs and egg clutches at Rahioli, Kheda district, Gujarat. These fossiliferous strata form part of the Lameta Formation. The Lameta Formation has a close field association with the Deccan lava flows or Deccan Trap. The volcanic activity that deposited the different layers of the Deccan Trap was episodic in occurrence and, sometimes, there was a considerable period of quiescence between the eruption of two successive flows. During such quiescent periods the ground surface upon the latest flow developed into usual land scenery with rivers, lakes, ponds, etc., with abundant vegetation. *Rajasaurus* habited such an environ in the quiet phases of the Deccan volcanic activity. On death its skeletal remains were deposited alongwith the depopits of the rivers and the lakes. The contemporaneous dinosaur community of the meat-eating *Rajasaurus* also included some herbivorous sauropod dinosaurs, which are yet to be fully known. The successively next Deccan volcanic eruption quickly burried the dinosaurian remains in the sediments, leading to their good preservation as fossils. The fossil bones of *Rajasaurus* are found at Rahioli (Gujarat) and in the headward region of Narmada at Jabalpur (Madhya Pradesh). In fact a small portion of the upper jaw of *Rajasaurus* in the present skeletal reconstruction comes from the 'Bara Shimla Hill', Jabalpur.



The habitat region of *Rajasaurus narmadensis*  
in the vicinity of Narmada river

## Palaeogeographic attributes of *Rajasaurus*

*Rajasaurus* was living in the Indian Peninsula some 67 million years ago (Upper Cretaceous, Maastrichtian). This was the period when the Gondwana land had broken and the Indian landmass, broken away from Africa and South America, was drifting northwards in isolation, in the form of a big island. The great Himalayan mountain chain was still to be born about 1.5 million years later. This indicates a strong possibility of indigenous features in the precise form and structure of *Rajasaurus*, restricted to the Indian Peninsula. A close ancestral affinity of *Rajasaurus* is discernible with *Majungatholus* of Madagascar and *Carnotaurus* of South America. *Rajasaurus* was in all probability a contemporary of the well-known *Tyrannosaurus rex* of the North American continent, although the two never met



## Age and phylogeny of *Rajasaurus narmadensis*

### Repository of fossils

Repository Unit, Geological Survey of India, 27 Jawaharlal Nehru Road, Kolkata-700 016 under GSI Type Nos. 21141/1.....21141/35.

### Some key references

**Dwivedi, G.N., D.M.Mohabey and S.Bandhopadhyay (1982).** On the discovery of vertebrate fossils from Infratrappean Lameta beds, Kheda district, Gujarat. *Current Trends in Geology*, 7:79-87.

**Mathur, U.B. and S.C.Pant (1986).** Sauropod dinosaur humeri from Lameta Group (Upper Cretaceous-? Palaeocene) of Kheda district, Gujarat. *Journal of Palaeontological Society of India*, 31:22-25.

**Mathur, U.B. and S.Srivastava.1987.** Dinosaur teeth from Lameta Group (Upper Cretaceous) of Kheda district, Gujarat. *Journal of Geological Society of India*, 29:554-566.

**Wilson,JeffreyA., PaulC.Seren, SureshSrivastava, DevendraK.Bhatt, AshuKhosla and Ashok Sahni.2003.**A new abelisaurid (Dinosauria,Theropoda) from the Lameta Formation (Cretaceous,Maastrichtian) of India. *Contrib. Museum of Paleontology,Univ. of Michigan*.