

## Mandro Fossil Park - Where History Comes Alive

This story traces its origin to the year 1946 when Professor Birbal Sahni, FRS- the founder of the Birbal Sahni Institute of Palaeosciences (BSIP), Lucknow first visited the heavily forested area of the Rajmahal Hills in the state of Jharkhand, India. The rich and historically vibrant setting of this region worked like a charm on Sahni who frequently visited the site from 1946-1948. Over time, his visits led to the discovery of numerous specimens of petrified wood. Ever since then, this region has been considered a gold mine for plant fossils dating back to the early Cretaceous period. BSIP scientists hold an opinion that the Rajmahal Hills region may have been a home to early angiosperms (or flowering plants), thus, any significant fossil find from this region could lead to critical understanding of plant evolution on the planet. Meagre is the fossil evidence on early Cretaceous animal life from the Rajmahal Hills region. BSIP scientists are working closely with the forest officials of the Government of Jharkhand and playing a critical role in the preservation and documentation of the region's plant specimens (permineralized fossil woods and leaf impressions). Their efforts will be instrumental in not only spreading nationwide awareness of this region's palaeontological significance but also for documentation and preservation of recovered fossils for posterity.

### Discovering the region

The Mandro Fossil Park is located in Mandro, a community block in the Sahibganj District of Jharkhand lying in the forested hilly area of Gurmiin the Rajmahal Hills. It broadly constitutes the areas of Sahibganj, Pakur, Dhumka and, and Godda districts of Jharkhand. The Rajmahal Basin is characterised by rocks dating to the early Cretaceous period or about 120 million years ago when present day Africa and South America had split from Australia, India, and Antarctica. It was a period when dinosaurs still roamed the earth and the climate was warm with rising sea levels. The rocks in the basin thus belong to the 'Rajmahal Formation' which is characterised by the presence of volcanic-sedimentary deposits and basalt flows.

Owing to its extensive coal and mineral resources along with well-preserved and diversified plant fossils, the Rajmahal Basin is considered a historical and economic repository. Excellent plant fossils of more than 100 million years old are naturally preserved in this area. The Tara village adjacent to Mandro in fact possesses in-situ gymnospermous petrified fossil woods which are indicative of the existence of a well preserved forest about ~120 million years ago. Preliminary research on the plant fossils reveals similarities between early Cretaceous flora discovered in Antarctica and Australia with the Indian fossilised flora (*Ptilophyllum* flora) present in the Rajmahal Hills region. The plant fossils being recovered from this region may also hold significant clues to understand the crucial early evolutionary history of angiosperms (flowering plants) on our planet and the past floral ecology. Thus, continuous palaeontological efforts in the Rajmahal Hills region may be quite rewarding.

### The significance of preserving the region

The geological discoveries that this region promises makes large-scale preservation efforts which would conserve the fossiliferous localities of the Rajmahal Basin, essential. For this purpose, in 2002 leading scientists from the Birbal Sahni Institute of Paleosciences recommended the construction of the Rajmahal Fossil Park- a combined initiative between the State of Jharkhand and the Institute. The potential site was identified as Mandro for the development of the Fossil Park as well as an Eco Tourism complex.

The main objectives behind the construction of the Fossil Park were not limited to preservation purposes but extended to include~

- ❖ Creating widespread awareness in the country about the historical and geological significance of the fossils found in this region.
- ❖ The establishment of a Museum attached to the Park would additionally ensure that retrieved specimens were duly catalogued and systematically displayed for the benefit of all visitors.
- ❖ A long-term plan of this proposal included the establishment of a Research and Development (R&D) Wing within the Park to be heralded by the scientists of BSIP.

### Tracking Preservation Efforts

A recent field visit by scientists from the Birbal Sahni Institute of Palaeosciences, Lucknow to the Mandro Fossil Park in the Sahibganj District of Jharkhand shed light on the efforts underway to protect and preserve the region.

From 9 to 13 March 2021, scientists Dr. S. Suresh Kumar Pillai and Dr. Vivesh Vir Kapur under the authorization of Institute Director, Dr. Vandana Prasad visited the Mandro Fossil Park and adjoining areas of Gilamari, Bascobedo, Bascola, and Tara. At the behest of the Division Forest Officer (DFO) Mr. Manish Tiwari, IFS; the two scientists visited various fossiliferous or fossil-rich localities and the site for the Eco Tourism complex. During the visit, the two-member team of BSIP also demonstrated the extraction, transportation and inventory of the wood fossil or petrified wood to the accompanying forest officials. Interestingly, almost all the petrified fossil woods could be retrieved by surface prospecting or ex-situ. However, a few large specimens that lay partially buried about 1m into the ground demanded in-situ conservation or careful extraction. The BSIP scientists also made

recommendations on the display of the extracted petrified fossil woods within the four erected hutments or galleries constructed within the Mandro Fossil Park and Museum (still under construction).

#### Strengthening Preservation Efforts

An important step in preservation involves cataloguing individual specimen so that the fossil woods are organised location-wise. Care was taken at the Fossil Park to store the wood specimens under sheds to avoid physical damage due to excessive sunlight or rain. Each specimen was carefully catalogued in dedicated registers citing unique identification markers. Once the cataloguing was duly completed, some selected specimens were carefully cut and grinded to expose the internal features such as the tree rings and cortex. This process was prudently demonstrated to the officials as well. The BSIP scientists were quick to recommend the construction of a dedicated 'lathe' or small workshop within the Mandro Fossil Park in order to expedite the process of specimen cutting and grinding.

Additionally, the scientists made several recommendations for the Park development including~

- ❖ Existing hutments or galleries at the Park could be used wisely to showcase retrieved specimens.
- ❖ Small and large-sized prepared (cut and grinded) petrified wood specimens could be considered for display at various open locations within the Mandro Fossil Park for enhanced visitor experience.
- ❖ Each hutment or gallery could be named after an eminent scientist who had contributed extensively to the field of paleobotany and allied aspects within the Rajmahal area of Jharkhand.
- ❖ Additionally, since each hutment would be used to showcase certain specimens, the adjoining landscape of the hutments could be uniquely designed to be in sync with the history of the specimen on display. This could be achieved by installing endemic flora of the Mandro region within the gallery for an enriching experience for the visitors.
- ❖ Lastly, the scientists recommended that showcasing petrified fossil woods specimens at their native habitat(s) itself i.e., in the villages near Mandro where they were discovered would serve as a unique experience for the visitors.

#### The Future of the Mandro Fossil Park

Observing how rich and geologically vibrant the Mandro region allowed the BSIP team to recommend extensive promotion of paleontological studies and allied research aspects in the region. For this purpose, few sediment samples from within the Mandro Fossil Park and adjoining area of Gurmi were collected for further analyses to be carried out at the Institute. Specimens including leaf impressions were also collected from locations such as Bascola and Bascogedo.

Lastly, their enriching visit to the Mandro Fossil Park led the BSIP scientists to commend the construction of the Galleries of the Museum within the Park as an opportunity for the rich geological and paleontological wealth of the region to be exclusively showcased and promoted. At present, preliminary work for the establishment of a Research and Development Wing associated to the Museum at the Mandro Fossil Park is underway, in the development of which, BSIP scientists will play an active role.

The BSIP scientists through their work at the Mandro Fossil Park have brought to light the rich geological history that was cosily nestled in the Rajmahal Hills of Jharkhand and which now warrants adequate coverage as a national geographical heritage site.





