Prospects of Mesozoic and Dinosaur Fossil Preservation in Barapukuria, Dinajpur, Bangladesh

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Abstract

If a dinosaur fossil can be found in Meghalaya-India [27], why not in Barapukuria-Dinajpur of Bangladesh? The study focuses on the possibilities and where the signs of Mesozoic and Dinosaur fossils can be found in that place. Barapukuria is an area of Dinajpur district of Bangladesh, located in the northwestern part of the country. It is mainly a coal mine area [1].

Keywords: Barapukuria-Dinajpur, Bangladesh, Mesozoic, Dinosaur fossils, coal mine.

Introduction and Paleobotanical Context

In an international scientific study published in 2000, Dr. Afia Akhtar from the Geological Survey of Bangladesh and American geologist R. M. Kosanke discovered an ancient plant spore or fossil inside a rock core from the GDH-38 borehole in the Barapukuria coal layers of Dinajpur. The plant is associated with the prehistoric plant genus named *Glossopteris*, which is found in the Gondwana Basin [2]. Additionally, the coal mine is geographically part of that exact same basin [1], which was formed approximately 25 to 29 crore (245–286 million) years ago [3]. Now the question is, does the availability of a single plant confirm the presence of dinosaurs in this region? In fact, the *Glossopteris* fern is a plant from the Permian period [2], when dinosaurs had not yet arrived on Earth [4]. Furthermore, Mesozoic soil layers cannot be found in the mine area either. This is due to long-term natural erosion or non-deposition [5]. Moreover, the available geological and seismic investigations of the Barapukuria basin have documented numerous faults and subsurface structural features, but have not established the presence of Mesozoic fossil-bearing sediment within these structures [1]. The reason was commercial objective limitations and technological execution barriers. The drill bits were intentionally aimed straight at the thick, deep Permian coal layer [6, 1].

Structural Observations and Fracture Networks

However, a Cretaceous igneous dyke was found there [7]. A dyke is primarily a narrow, elongated body of volcanic rock. It forms when magma enters existing rock fractures and solidifies [8]. The Cretaceous period represents the end of the Mesozoic era [9]. Therefore, the host rock in which this dyke formed dates back to that period or is even older. Consequently,

Mesozoic soil and fossils could be deposited within other small and large fractures of the host rock, in places where magma could not enter. Since one Cretaceous dyke has been discovered, more could potentially be found. These could also contain dinosaur bones, teeth, and other remains as fossils. At the same time, the absolute absence of a fault pocket containing Mesozoic fossil-enriched soil is not certain. The subsurface overburden of the Barapukuria coal mine is composed of sandstone and mudstone [10]. Sandstones are aquifers [11] and mudstones are fine-grained [12]. This means there can be less anomalous pressure on fossils buried deep underground. Also the combination should prevent them from being destroyed or burnt by heat and rapid burial, early diagenesis and reduced compaction should ensure better preservation [13, 14]. Given that such old fossils have been discovered in this coal mine, it indicates the area is suitable for preserving ancient fossils.That theory is mainly focused on the erosion context. If the non deposition happened, then it is also possible that fossils were on the surface for a long time. The fossils could be eroded by the time but little parts of them still may be buried under the young soil of the Barapukuria mine area inside a sandstone [15], mudstone [16] or may be under the subsurface overburden of the area.

Taphonomic Conditions and Regional Alignment

Now, the point is that Bangladesh is a delta [17]. Dinosaurs had already gone extinct from Earth long before this delta was formed [18, 17]. Is it then possible to find their fossils in this territory? In reality, the entirety of Bangladesh is not a delta [19]. Barapukuria of Dinajpur is one of the places that is not part of the delta [20]. Located just 118 to 506 meters beneath the surface of this region is the Gondwana sedimentary rock sequence [10]. It bears witness to the history of both the Mesozoic and Permian eras [5]. The same Gondwanic graben extends across large parts of India's Meghalaya and West Bengal [21]. Other Gondwana basins of the Gondwana continent in India preserved Mesozoic fossils previously.Some of those are-

1. Pranhita–Godavari Basin- Late Permian, Middle/Late Triassic and Early Jurassic vertebrates; includes dinosaur-bearing Jurassic strata [22, 23].
2. Damodar Basin- Early Triassic vertebrate assemblages, including the Panchet Formation [22].
3. Satpura Basin- Middle Triassic vertebrate assemblages from the Denwa Formation [22].
4. Son–Mahanadi Basin- Late Triassic vertebrate assemblages [22].

Those were formed before the Mesozoic era [24]. Based on geographic distance, the Barapukuria and Dinajpur region as well as that particular Gondowana basin lies near the Cretaceous Mahadek Basin which was developed on the same broader continental region, the exact same basin from where 100-million-year-old dinosaur bones were discovered in Meghalaya, India, in 2021 [25, 26, 27]. Furthermore, active mining is constantly taking place in this mine [28]. Therefore, it can be highly anticipated to discover any dinosaur fossil from here.

Data availability

No new dataset was generated.

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Author contributions

Sowmmobir Dey: Conceptualization, Investigation, Literature review, Writing – original draft, review & editing.

Conflicts of interest

None.

DECLARATION OF GENERATIVE AI USE

The author formally declares that the underlying geological hypotheses, taphonomic preservation concepts, and regional stratigraphic conclusions presented in this work represent original independent intellectual property. Generative artificial intelligence software (Large Language Models) was utilized as an administrative and collaborative tool for secondary language translation, structural heading optimization, and initial background literature data collection. The final verification, scientific synthesis, and cross-examination of all cited geological records were executed and fully authored by the undersigned.

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