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# Study of the Fossil Flora Currently Available in Salkhan, Sonbhadra, India

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**ABSTRACT:** Salkhan Fossils Park, officially known as Sonbhadra Fossils Park, is a fossil park in Uttar Pradesh, India. It is located 12 km from Robertsganj, near Salkhan village on state highway SH5A in Sonbhadra district. The fossils in the park are estimated to be nearly 1.4 billion years old. The fossils appear as rings on the boulders and are scattered in Fossil rings on boulders in the park which is spread over an area of about 25 hectares in the Kaimoor Wildlife range.<sup>[1]</sup>

**KEYWORDS:** Salkan fossils, Sonbhadra, Uttar Pradesh, rings, Kaimoor wildlife range, state highway, park

## I. INTRODUCTION

The fossils found in the Sonbhadra Fossils Park are algae and stromatolites types of fossils. The park is spread over an area of about 25 hectares in Kaimur Range, adjacent to Kaimoor Wildlife Sanctuary. It comes under jurisdiction of the State forest department.<sup>[1]</sup> Geologists have been aware of the fossils found in the present-day park area since the 1930s. People who have carried out research in the area include Mr. Auden (1933), Mr. Mathur (1958 and 1965), and Professor S. Kumar (1980–81). On 23 August 2001, the area was featured in an article written by journalist Vijay Shankar Chaturvedi for the Hindi newspaper Hindustan. Subsequently, it was formally inaugurated as a fossil park by District Magistrate Bhagawan Shankar on 8 August 2002.<sup>[1]</sup>

An international workshop was organised in December 2002, attracting participation from 42 delegates from India and abroad. Canadian geologist H.J. Hoffman was impressed by the fossils, and remarked that he had not seen such "beautiful and clear fossils" anywhere else in the world.<sup>[2]</sup> In 2004, researcher Mukund Sharma further explored the area.<sup>[1]</sup>

In 2013, the state government sanctioned ₹12.5 million for the development of the Salkhan Fossils Park.<sup>[3]</sup> Salkhan Fossils Park, officially known as Sonbhadra Fossils Park, is a fossil park in Uttar Pradesh, India. It is located 12 km from Robertsganj, near Salkhan village on state highway SH5A in Sonbhadra district. The fossils in the park are estimated to be nearly 1400 million years old. The fossils found in the Sonbhadra Fossils Park are algae and stromatolites types of fossils. [2,3]The park is spread over an area of about 25 hectares in Kaimur Range, adjacent to Kaimur Wildlife Sanctuary. It comes under jurisdiction of the State forest department. Geologists have been aware of the fossils found in the present-day park area since the 1930s. People who have carried out research in the area include Mr. Auden (1933), Mr. Mathur (1958 and 1965), and Professor S. Kumar (1980–81). On 23 August 2001. Subsequently, it was formally inaugurated as a fossil park by District Magistrate Bhagawan Shankar on 8 August 2002. An international workshop was organised in December 2002, attracting participation from 42 delegates from India and abroad. [4,5]Canadian geologist H.J. Hoffman was impressed by the fossils, and remarked that he had not seen such beautiful and clear fossils anywhere else in the world.[2] In 2004, research Mukund Sharma further explored the area[6,7]

## II. DISCUSSION

*Gyrocarpus* species

*Gyrocarpus* specimens (pictured above and to the right) demonstrate the challenge of identifying fossil plant species. This species produces:

- non-lobed specimens
- 2 lobed specimens
- 3 lobed specimens



The same species of tree can produce different looking leaves.[8,9]

Palm - Palmites species

Order Arecales, Family Aracacea

Palm inflorescences (a group of flowers arranged on a stem) and palm fronds (pictured here) are common fossil specimens from the FBM.

- Variation in morphology of specimens indicates Fossil Lake may have been home to several palm species.
- No FBM palm species have been described as of yet.
- Abundance of large and complete palm frond specimens suggests there may have been palm trees near the shores of Fossil Lake.[10,11]

There are over 2,000 living palm species, found naturally in tropical, sub-tropical, and humid environments.

Winged Fruit Species - *Lagokarpos Lacustris*

Order unknown, Family unknown

"Hare-Fruit-Of Lakes"

Lagos - translating "hare" (referencing rabbit-head shape of seed and wings)

Karpos - translating "fruit"

*Lacustris* - translating "of lakes and ponds"[12,13]

- recognizable by its spherical shaped seed body and dual set of wings
- wings characterized by V shape
- wings indicate that fruit was wind dispersed (seeds carried by wind to new growing sites)
- specimen wings range in size from 3 to 9 inches
- known from fossil deposits in Wyoming, Utah, Colorado, Oregon, and British Columbia
- found exclusively in lake deposits, indicating they were a near-shore species

No modern fruits are known to share the specific characteristics of *L. lacustris*, and the *Lagokarpos* genus is thought to be extinct. Species of the living *Gyrocarpus* genus are, however, similar in form. [14,15]

Tree of Heaven - *Ailanthus confucii*

Order Sapindales, Family Simaroubaceae

There are about 100 modern species in the Simaroubaceae family, found primarily in tropical and subtropical regions. The *Ailanthus* genus has a disputed number of living species, somewhere between 5 and 10. They are commonly known as "Trees of Heaven."

*A. confucii* is:

- a winged fruit
- characterized by its centrally located seed
- known from fossil deposits in North America, Asia, and Europe
- found almost exclusively in lake and pond deposits

*A. confucii* specimens from the FBM are the oldest known representation of the Simaroubaceae family in North America, possibly the world.

Staghorn Fern - *Platycerium* species[16,17]

Order Polypodiales, Family Polypodiaceae



almost 20 living species in *Platyserium* genus found primarily in tropical environments of Asia, South America, New Guinea, and Africa

#### Water Fern - *Salvinia preauriculata*

Order Salviniiales, Family Salviniaceae

This aquatic species had 2 floating leaves and 1 root-like leaf which would hang below the water's surface.

Living members of the *Salvinia* genus:

- include 15 modern species
- found in tropical regions of Madagascar, Africa, West Indies, Europe, Asia, North and South America
- only found in freshwater
- spread rapidly in warm water

#### Climbing Fern - *Lygodium kaulfussi*

Order Schizaeales, Family Lygodiaceae

Living members of the *Lygodium* genus:[18,19]

- include 40 modern species
- found primarily in the tropical regions of Asia
- do not have a fixed growing season and will continue to grow throughout their life
- growing cycle lead to common name, "climbing fern"

#### Lotus - *Nelumbo* species

Order Proteales, Family Nelumbonaceae

The modern *Nelumbo* genus:

- contains 2 living species
- aquatic plants restricted to freshwater
- found in Asia, North America, and the Caribbean
- characterized by large flowers and leaves[20,21]

Fossil Lake may have been home to multiple species of the *Nelumbo* genus. FBM specimens include:

- lily pads (ranging from 4 - 20 inches)
- root systems
- characteristic seed pods

#### Flower-Like-Fruit - *Chaneya tenuis*

- characterized by 5 petal-like wings
- although resembling a flower, *C. tenuis* is actually a fruit
- *Chaneya* genus known from fossil deposits in North America, Asia, and Europe

#### Birthwort - species unknown

Order Piperales, Family Aristolochiaceae

Modern members of the Aristolochiaceae family:

- found primarily in tropical regions



- also commonly known as "pipe-vines"
- perennial (lifecycle longer than 2 years)
- woody herbaceous plants (grow as non-woody shrubs or vines)
- include about 400 living species
- primarily pollinated by flies

Soapberry - *Deviacer wolfei*

Order Sapindales, Family Sapindaceae

Living members of the Sapindaceae family:

- are found in temperate to tropical regions
- includes over 1,800 modern species
- modern species include maple and the tropical lychee tree

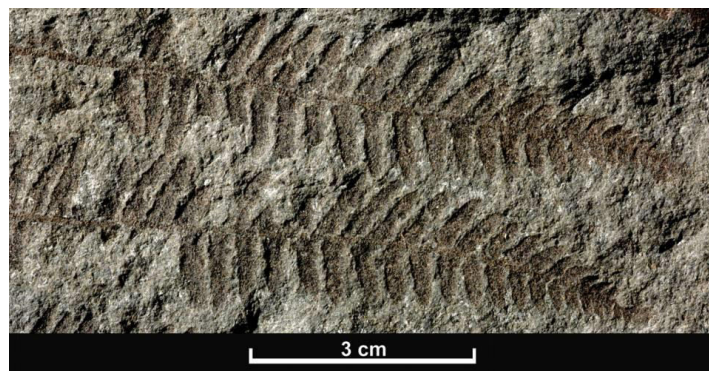
Walnut

This seed has the appearance of a walnut.[22]

### III. RESULTS



The tree stump –petrified tree fossil found here



*Coniopteris*, which is a type of true fern, or pteropsid, fossil found in Salkan



This is mould of an ancient snail or slug called *Bellerophon*, a gastropod. Fossils can form when mould of the interior of the shell is made by water-borne minerals percolating through it, but later the shell material dissolves away in Salkan.



A fly and spider trapped in amber. Many different animals have been fossilised in amber, from flies and mosquitoes to spiders and snails, and, in very rare instances, ostracods seen in Salkan.[21]

#### IV. CONCLUSIONS

Finding fossils is a combination of hard work, chance and knowing where to look! Fossils are mostly found where sedimentary rocks of the right age are exposed, such as river valleys, cliffs and hillsides, and human-made exposures such as quarries and road cuttings. Most of the time, fossils are only partially uncovered on site, then removed individually or in blocks before being taken back to a laboratory. Fossils are mostly found where sedimentary rocks of the right age – which for dinosaurs is the Mesozoic – are exposed. The best places are river valleys, cliffs and hillsides, and human-made exposures such as quarries and road cuttings. Background research enables scientists to locate and excavate suitable sedimentary rocks. Chance also plays a role as many fossils are found accidentally by bushwalkers, construction workers, miners and farmers. Some examples include:Miners digging for opals found many of the fossils. The dinosaur fossil to be found and described by scientists in Salkan. Most of the time, fossils are only partially uncovered on site. They are removed individually or in blocks and often protected by plaster jackets before being taken back to a laboratory. Fieldwork also includes preserving the context of the fossils through mapping, photographing, recording and collecting rock samples. This helps determine how and when the remains were buried, and what other animals and plants lived at the same time. However, fieldwork is rarely as simple as this. Each site is different and requires adaptable and creative techniques![20,21]

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