

# AN ARAUCARIAN CONE FROM UPPER JURASSIC OF ANDRANGORY, MADAGASCAR

GEORGES BARALE\*, JAYASRI BANERJI\*\* & PIERRE-ALAIN BALOGE\*\*\*

\*Palaeobotany Laboratory and U. A. 11, University of Lyon, 43 Bddu 11 Nov. 1918, F-69622, Villeurbanne Cedex, France.

\*\*Birbal Sahni Institute of Palaeobotany, 53 University Road, Lucknow 226 007, India.

\*\*\*Faculty of Science, Geology Laboratory., University of Angers, Bd Lavoisier 49000, Angers, France.

## Abstract

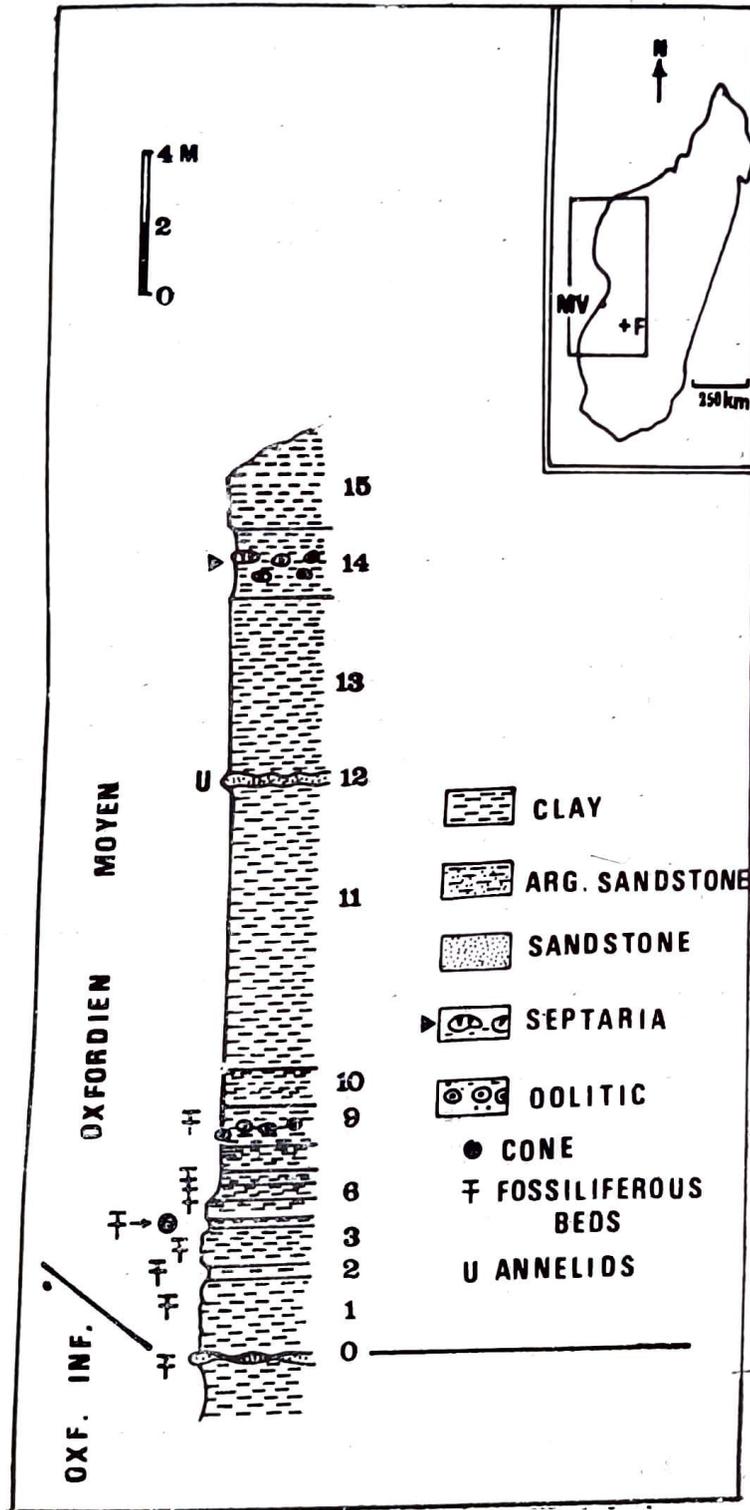
An araucarian cone has been described for the first time from the Upper Jurassic of Andrangory, Madagascar. The cone axis bears spirally attached cone-scales, each cone scale complex consists of a seed deeply embedded between bract scale and ovuliferous scale.

## Introduction

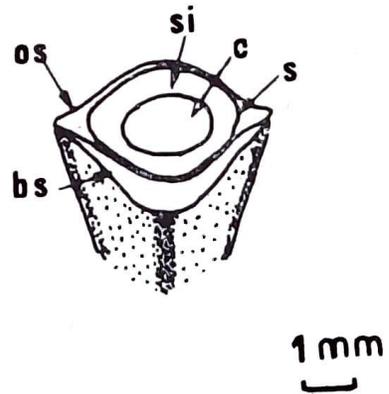
A fossil cone was found at Andrangory, about 100 km south east of Morandava in Madagascar (Map 1). The litholog shown in Text-fig. 1 belongs to the famous section named "Argiles d' Ankilizato" and is dated as Callovian Kimmeridgian in age (Baloge, 1980-1981). It shows the exact position of the bed from where this cone was obtained. In addition to this cone, the fossiliferous beds also yielded small indeterminable plant fragments, ammonites and belemnites. The "O" level in litholog represents the bed with characteristic ammonites—*Euaspidoceras* of Lower Oxfordian age S. S.

Fliche (1905) recorded a fossil wood belonging to *Araucarioxylon mahajambyense* from the Upper Lias. of Mahajamby, Madagascar. Zeiller (1900) described Upper Liassic flora from Madagascar which is represented by Filicales, Bennettitales and Coniferales (with detached cone scales belonging to *Araucarites*). Boureau (1949) has given a first historical review of a few earlier palaeobotanical documents from Madagascar. Appert (1973) described a well preserved fossil assemblage from the Upper Jurassic of the Manamana Massif, south west of Madagascar. The assemblage is characterised by dominance of pteridophytic remains, rare occurrence of conifers and absence of cycadophytes. The specimen described in this paper (ASY- Baloge Collection) is kept in the Geology Laboratory, University of Angers.

*Description*—Cone preserved as cast, ovoid in shape, about 4 cm in length and 2.8 in diameter (Pl. 1, fig. 1). Peduncle not preserved. One surface of cone highly weathered (Pl. 1, fig. 2), showing shallow rhomboidal depressions than the otherside. Rhomboidal depressions show compactly arranged cone scales. Distal portions of cone scales and seeds not preserved, perhaps due to long transportation. Cone probably immature in having portions of cone scales still attached to cone axis. Bract scales attached spirally to axis, about 0.5 mm thick at its middle region and gradually tapering towards sides and forming a wing-like structure. Ovuliferous scales perhaps very thin and represented by a thin



Text-fig. 1—Showing fossiliferous locality in South-east of Morondava (M. V.), Madagascar; the litholog shows rock succession at Andrangory.



Text-fig. 2—Cone scale complex in sectional view **bs**=bract scale, **os**=ovuliferous scale, **c**=cavity for megagametophytic tissue, **si**=seed integument, **s**=seed.

line between bract scale of the above and seed integument. At places, where seeds not preserved, lateral joinings of ovuliferous scales and bract scales could be seen as shown in Pl. 1, fig. 4. Rarely the rhomboidal areas showing well preserved seed integuments, in which the sclerotesta could be seen clearly, about 0.1 mm thick, Sarcotesta and endotesta per-

haps very thin and represented by lines at inner and outer sides of sclerotesta, rarely sclerotesta showing irregularly placed elongated cellular imprints where endotesta not preserved. Seeds at two places showing badly preserved gametophytic tissue inside integument, gametophytic tissue undifferentiated into nucellus and megaspore. At two places inside gametophytic tissue a central oval circular area visible (Pl. 1, fig. 5) but its precise nature remaining uncertain due to lack of cellular details.

*Comparison and remarks*—The morphological features shown by the present cone, i.e., bract scales arranged in close spiral to the axis and each bract scale with a deeply embedded seed are enough evidence to place this cone in Araucariaceae. But, due to lack of knowledge about the distal tips of cone scales, whether ovuliferous scale forms a ligular sulcus and the cellular details, its precise identification remains incomplete. Moreover, in outer appearance and cellular imprints of sclerotesta the present specimen comes nearest to *Araucaria mirabilis* (Spegazzini) Windhausen described by Stockey (1978, pl. 1, fig. 6; pl. 2, fig. 12; 1975, fig. 10; 1980, pl. 81, fig. 2; pl. 85, fig. 3) from Cerro Cuadrado Patagonia and Southern England respectively.

The extant members of the family Araucariaceae show their distribution between equator and 40° South latitude in two geographical areas, one in South America (Brazil, Chili and western part of Argentina) and the other is oceanic region (Australia, Norfolk, Loyalty, New Guinea and New Caledonia). However, presently the members of this family neither grow in Africa nor in Madagascar. The present record confirms the presence of Araucariaceae in Madagascar during the Jurassic period, when its maximum concentration was between 40°-45° North and South palaeolatitudes.

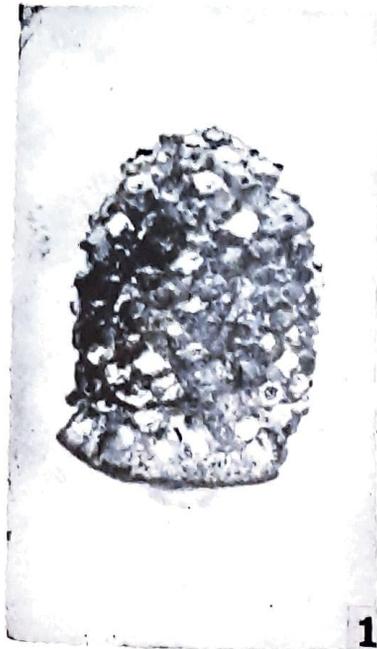
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## Explanation of Plate

### Plate 1

1. Surface view of the cone. × 1.
2. Weathered surface of the same cone. × 1.
3. Seed integument showing thick sclerotesta shown by arrow. × 4.
4. Black arrow indicating the rhomboidal depression formed by bract scales and white arrow indicating the lateral joining of bract and ovuliferous scale. × 6.
5. Gametophytic tissue inside the seed integument showing an oval area. × 6.



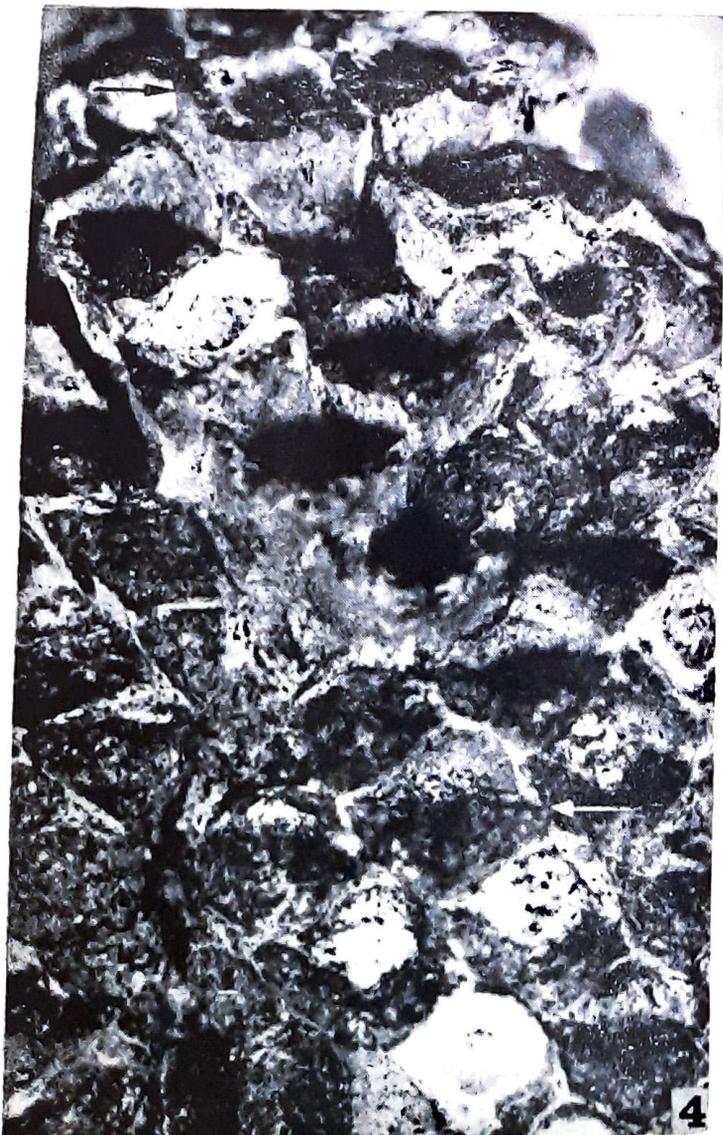
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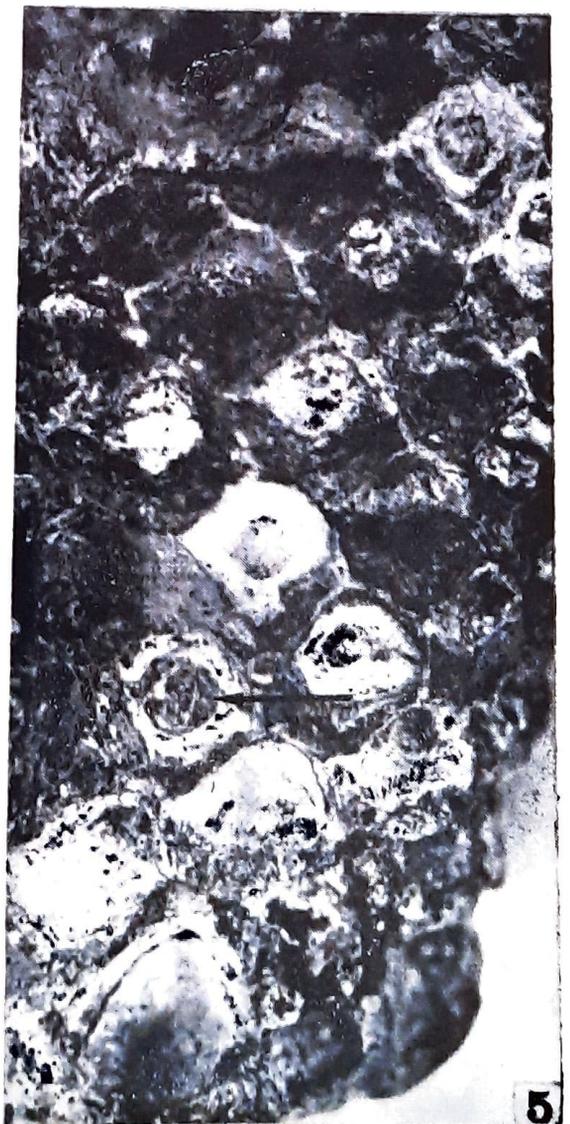
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