

# SOME FUNGAL SPORES FROM QUATERNARY DEPOSITS OF MALVAN, GUJARAT

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## ABSTRACT

In the present paper the sub-fossil fungal spores are reported referable to the genera *Tetraploa*, *Alternaria*, *Helminthosporium*, *Curvularia*, *Hormiscium*/*Torula* and *Puccinia*. These spores were recovered during the pollen-analytical investigations of a pollen profile from Malvan, an archaeological site located in District Surat, Gujarat.

## INTRODUCTION

**D**URING the pollen-analytical investigations of Quaternary deposits from Malvan (Vishnu-Mittre & Sharma, 1975) some well preserved sub-fossil fungal spores and pollen grains were recovered from the samples. Spores from the Quaternary deposits of India are so far reported from two widely separated localities, viz., Ootacamund, South India (Rao & Menon, 1970) and Howrah, Bengal (Gupta, 1970). As our knowledge of sub-fossil fungal remains, particularly from the Indian sub-continent, is still very meagre, this record of fungal spores from Malvan is significant. These spores belong to the class Deuteromycetes except one (Pl. 1, fig. 11) which is a Basidiomycete.

## MATERIAL AND METHOD

The material for the pollen-analytical investigations was received through the courtesy of Prof. F. R. Allchin, Cambridge University. There were in all 34 samples collected by him at an interval of 5 cm each from a dug out 1.7 m deep pit from the archaeological site of Malvan (Lat. 27° 07'N, Long. 72°42'E). This site is situated on the lower estuary of the river Tapti, east of Dumas (see Text-fig. 1), District Surat, Gujarat (Allchin & Joshi, 1970).

The fungal spores were recovered during the pollen-analysis and thus no special technique was adopted for their recovery except for the usual method of acetolysis. A brief account of these spores is given in Table 1.

## *Tetraploa* Berk. & Br.

Pl. 1, figs. 1-4

Conidia quadriseriate, oblong ornamented, generally with four setose and septate, appendages. The size of the body variable from 25 to 40  $\mu$  long, 15-30  $\mu$  broad; setae 20-40  $\mu$  long, 3-5  $\mu$  broad (Ellis, 1949). Such spores are represented in the majority of the samples investigated and as many as seven have been recorded at a depth of 1.5 metre.

## *Alternaria* Nees ex Wallr.

Pl. 1, figs. 5-8

Conidia multicellular, with both transverse and longitudinal septa, much variable in size and shape, obclavate to elliptical or ovoid, (Bessey, 1965) 45-80  $\mu$  long, 10-15  $\mu$  broad at its widest and provided with an apical appendage. The conidia are encountered almost throughout the profile, varying from 1 to 6 in each sample.

## *Helminthosporium* Link ex Fr.

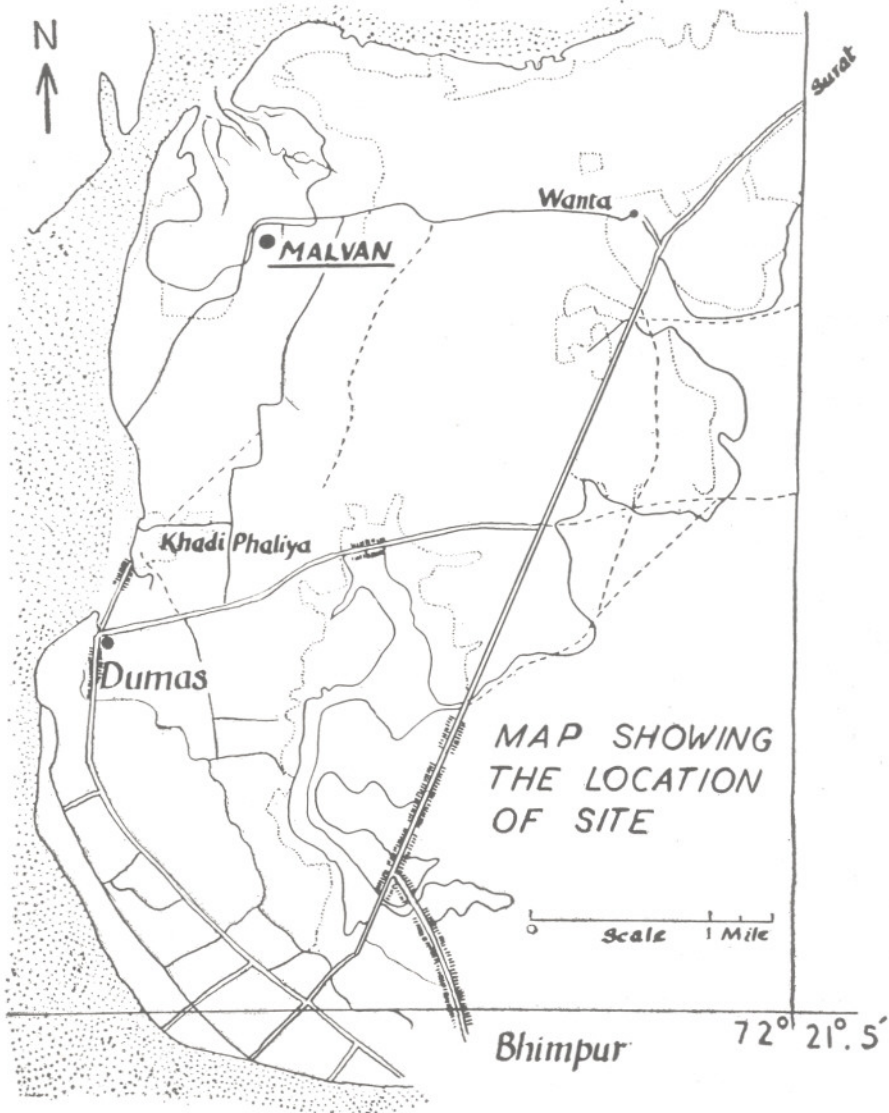
Pl. 1, fig. 9

Conidia 4-8-celled, thick walled, cylindrical or ellipsoidal, often curved a little, gradually narrowing at both ends, the ends rounded, 70-85  $\mu$  in length, and 15-20  $\mu$  in breadth. These are encountered in most of the samples in varying frequencies and the maximum number recorded in the profile is 19 at the depths of 10 and 60 cm.

## *Curvularia* Boedijn

Pl. 1, fig. 10

Conidia 3-5-celled, 40  $\mu$  long, and 10  $\mu$  broad at its broadest, thick walled, somewhat fusiform, curved or bent, with one or two central cells enlarged. Sporadic pre-



TEXT-FIG. 1

sence of such conidia is noted at the depths of 1.5 m and at 15 cm.

*Puccinia* Persoon

Pl. 1, fig. 11

Characteristic two-celled, thick walled solitary teliospore (?) was encountered in the sample no. 30 at a depth of 1.5 metre.

*Hormiscium* Kunze ex Wallr./*Torula* Pres. ex Fr.

Pl. 1, fig. 12

Entire branch of mycelium made up of rounded or oblong single-celled conidia forming a chain. Conidia appear to be thick walled along the joints (Barnett, 1956). Such fragments are recovered at 5 cm and 50 cm depths only, from sample nos. 1 and 12 respectively.

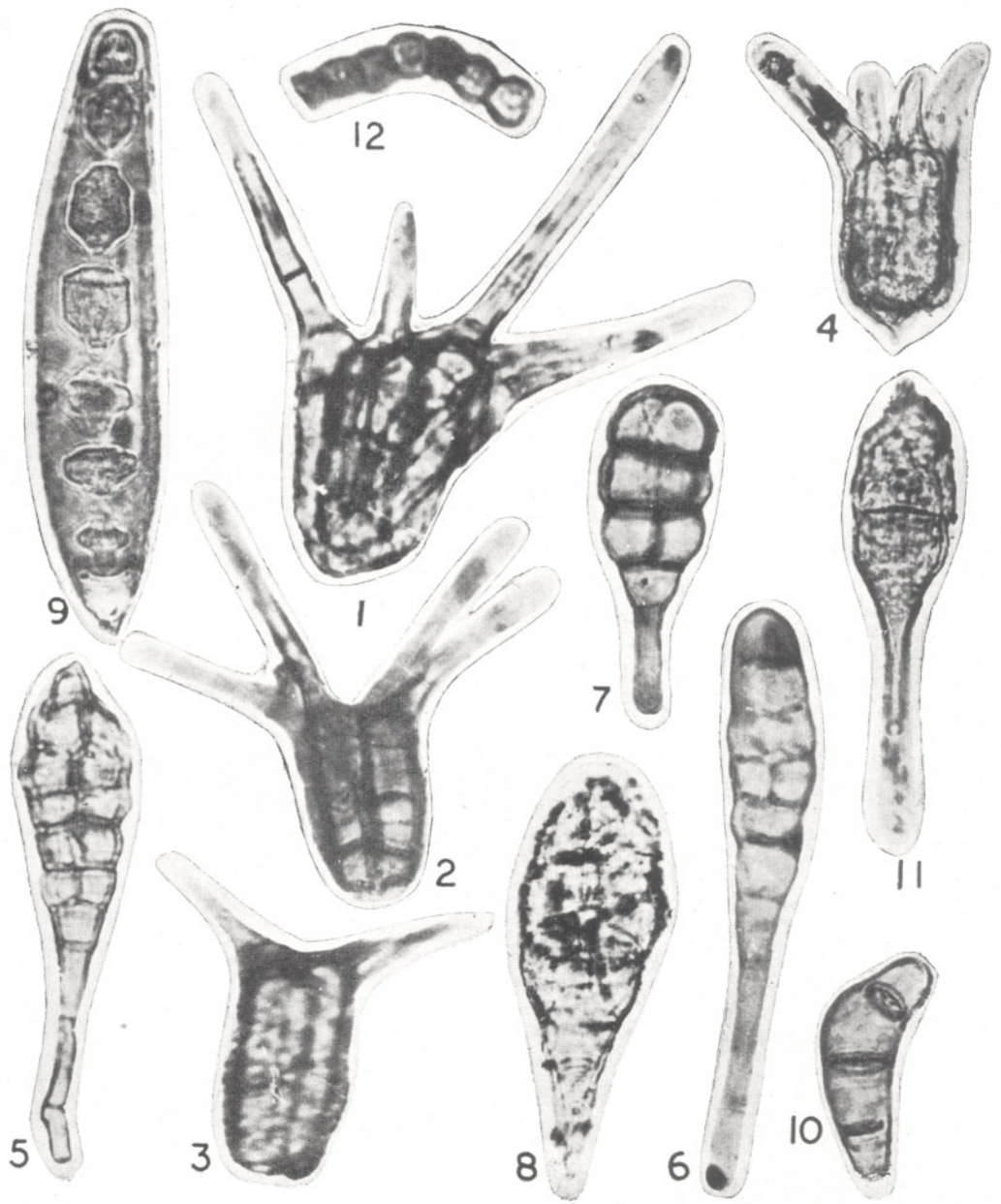




TABLE 1 — SHOWING NUMBER OF FUNGAL SPORES PRESENT IN EACH SAMPLE

SAMPLE No. & DEPTH*	<i>Tetraploa</i>	<i>Alternaria</i>	<i>Helminthosporium</i>	<i>Curvularia</i>	<i>Hormiscium/Torula</i>	<i>Puccinia-Teliospore</i>
1 (5 cm)	—	2	15	—	1	—
2 (10 cm)	1	2	19	—	—	—
3 (15 cm)	5	2	17	1	—	—
4 (20 cm)	1	2	2	—	—	—
6 (30 cm)	1	1	—	—	—	—
8 (40 cm)	4	2	3	—	—	—
10 (50 cm)	—	1	—	—	—	—
12 (60 cm)	3	—	19	—	2	—
14 (70 cm)	1	—	—	—	—	—
16 (80 cm)	3	1	6	—	—	—
20 (1.0 m)	—	1	1	—	—	—
22 (1.1 m)	—	3	—	—	—	—
24 (1.2 m)	4	6	—	—	—	—
26 (1.3 m)	2	2	2	—	—	—
28 (1.4 m)	5	2	6	—	—	—
30 (1.5 m)	7	2	1	1	—	1
32 (1.6 m)	6	4	10	—	—	—
34 (1.7 m)	4	1	5	—	—	—

\*Some of the intervening samples were found palynologically barren.

DISCUSSION

Five Deuteromycetous and one Basidiomycetous genera were recovered and counted alongwith the pollen grains while investigating the samples for pollen analytical purpose.

Since the frequencies of the spore-assemblage remains more or less the same throughout the pollen sequence except for some minor fluctuations, it can only be presumed that climatic conditions remained the same throughout the period of their deposition. However, *Helminthosporium* — species of which mostly parasitise grasses

(Subramanian, 1971) has the maximum representation followed by *Tetraploa* — common on grasses and sedges (see Table 1) correspond with the maximum frequencies for Gramineae in the pollen diagram (Vishnu-Mittre & Sharma *op. cit.*). Thus *Helminthosporium* and *Tetraploa* support that area had an open vegetation dominated by grasses.

No radiocarbon date is available for 1.7 m deep pollen profile investigated here, but the adjacent excavated archaeological mound is C<sup>14</sup> dated at 1 m depth to 2750 ± 95 B.P. (TF-1084), i.e. 800 B.C.

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EXPLANATION OF PLATE

(Magnification × 1000)

- 1-4. *Tetraploa*.
- 5-8. *Alternaria*.
- 9. *Helminthosporium*.
- 10. *Curvularia*.
- 11. *Puccinia* (Teliospore).
- 12. *Hormiscium/Torula*.