

# A TALCHIR MIOFLORA FROM NORTHERN SATPURA BASIN, INDIA

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## ABSTRACT

A mioflora from Northern Satpura Basin has been found to contain radial monosaccate miospore genera, alongwith abundant alete miospores. Its similarity with the mioflora of Umaria marine beds is suggestive of Late Talchir age and the marine palaeo-environment.

## INTRODUCTION

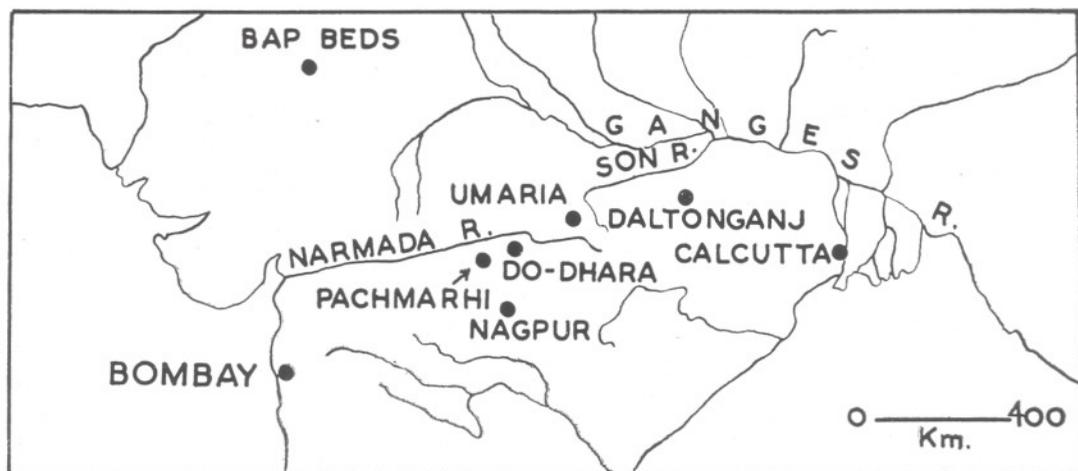
THE Talchir Formation, the lowermost unit of the Indian Gondwana, is noted for its glacial records. It is regarded as Lower Permian in age. The mioflora of the Talchir Stage is well known and is characterized by the dominance of trilete bearing, girdling monosaccate pollen grains; other genera—disaccate-striate and trilete—are also present but they are at a lower level of diversity, both in kind and number, as compared to the younger miofloras in the Lower Gondwana.

In the present paper a brief account of Talchir mioflora from a locality in the northern part of Satpura Basin, Central India is being communicated (Map 1). The

importance of this report lies in the fact that such a miospore assemblage is being recorded for the first time from this region. The preponderance of alete miospores is suggestive of its resemblance with some miofloras known from well-dated marine sediments.

## LOCALITY AND GEOLOGICAL SETTING

The Lower Gondwana sediments, mainly the Talchirs, are exposed about 6 km south of Fatehpur at the confluence of Anjan and Pathapani streams—locally known as Do-dhara (Survey of India, Topo Sheet no. 55 J/10; latitudes 22°40' N to 22°42' 50" N, longitudes 78° 30' E to 78°33' E). The place is linked with Jabalpur-Piparia



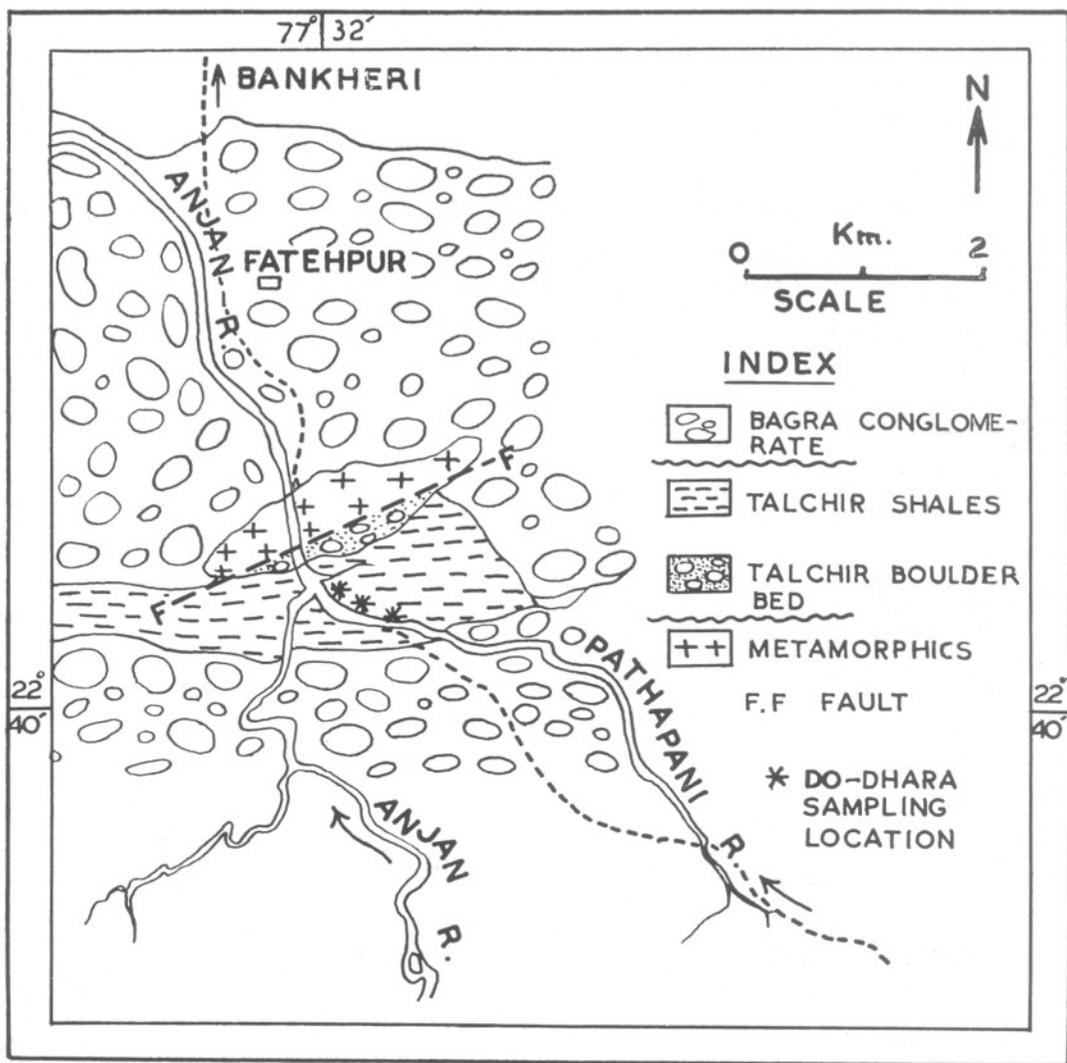
MAP 1— Position of Do-dhara, Talchir exposures in Northern Satpura Basin in relation to known marine beds of Daltonganj, Umaria, Bap beds and the west coast.

highway in Madhya Pradesh by a fair-weather road near Bankheri (Map 2).

In order to study the Lower Gondwana sediments of the northern part of Satpura Basin, this area was visited in the year 1975, and traverses were taken along the Anjan and Pathapani streams (Text-fig. 1). The samples were analysed for their palynological contents.

So far, the geology of this area has not been studied in detail, mainly because it

is not of much economic interest. Crookshank (1936) has described the Talchir sediments of this area while dealing with the northern part of the Satpura Basin. It was observed that the oldest Gondwana sediments, i.e. the Talchirs, are exposed over the uneven basement of metamorphic rocks. Basal Talchir boulder bed and shales are much affected near the contact with the metamorphics along the boundary fault. Boulder bed has been hardened main-



MAP 2 — Geological map of Do-dhara area (confluence of Pathapani & Anjan rivers) from where the Talchir shales have been studied.

ly due to silicification, and shales are almost converted into phyllites. These sediments are folded forming an anticline, as the Talchir sediments are dipping at about 20° towards north and south at places. A number of minor folds have also been recorded leading to a tightly folded condition of the Talchir shales, and therefore the precise determination of the dip is difficult. The Talchirs are unconformably overlain by the Bagra conglomerates.

The sequence of deposition in this area is given below:

Bagra		Conglomerates
	-----	unconformity -----
T	Greenish and	yellowish-green sandstones
A		
L		
C		
H	Khaki-green and buff-red	coloured shales
R	Boulder bed	
	-----	unconformity -----
		Metamorphics

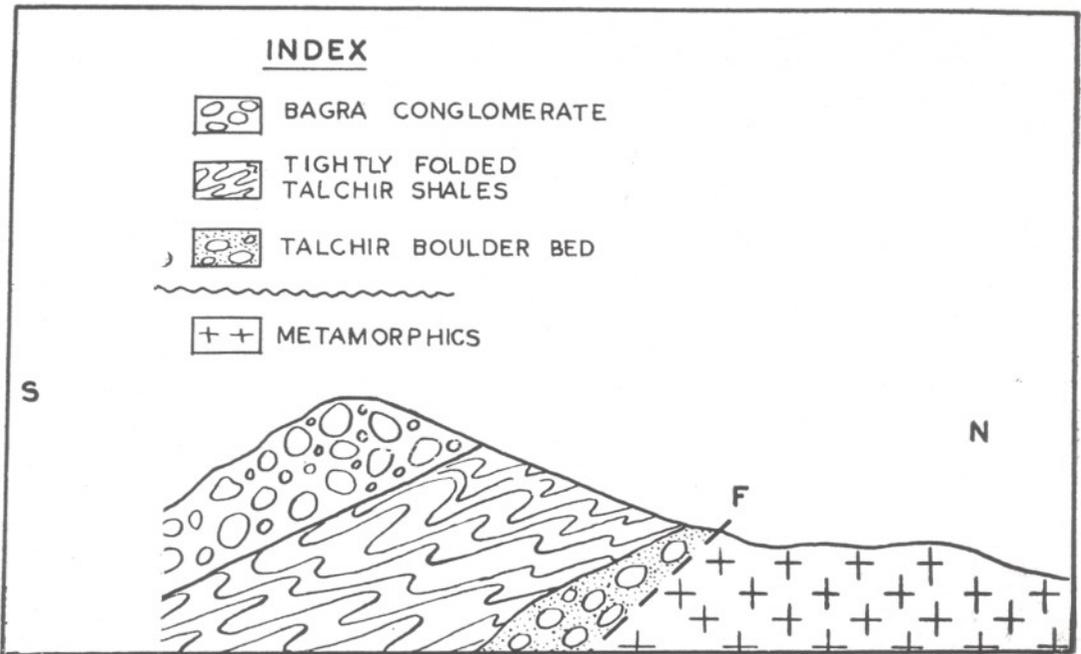
*Talchir Boulder Bed* — It is composed of subangular assorted boulders of different

sizes and shapes — very much like the basal boulder bed of Talchir Formation seen in other areas. It can be differentiated from the Bagra Conglomerate mainly through the absence of jasper fragments, subangular nature of the clasts and poor sorting. In addition to this, the boulders represented in the Talchir boulder bed are mainly of granites, gneisses and quartzites.

*Talchir Shales* — These shales are alternately khaki-green and buff-red in colour and are distinguished by their characteristic pattern of weathering into needle-like fragments along the joints. Along the fault, these shales have been converted into phyllites and are tightly folded at many places.

*Talchir Sandstones* — The sandstones are coarse to medium-grained, greenish to yellowish-green in colour containing grains of fresh feldspar, like a characteristic Talchir sandstone.

*Bagra Conglomerate* — It unconformably overlies the Lower Gondwana sediments and is characterized by the subcircular to rounded clasts embedded in a hard



TEXT-FIG. 1 — Diagrammatic Section (not to the scale) showing the position of Talchir boulder bed, Talchir shales and Bagra conglomerate at Do-dhara, near Fatehpur, Northern Satpura Basin.

(siliceous) matrix. The boulders are mainly of quartzites and jasper. The sorting is of uneven nature; at places the fragments of similar size are seen arranged in lines representing the bedding plane.

### PALYNOLOGY

In all, nine samples were collected representing the khaki-green and buff-red shale members of the Talchir Formation (Table 1). Out of these, five samples have yielded the miospores. It is interesting to note that in all the samples the mioflora is similar and contains primarily an alele dominating assemblage.

Following miospore genera have been recorded in the samples:

*Plicatipollenites* Lele, 1964 (Pl. 1, figs. 1, 3, 7).

*Virkkipollenites* Lele, 1964 (Pl. 1, fig. 2).

*Parasaccites* Bharadwaj & Tiwari, 1964 (Pl. 1, fig. 4).

*Potomiesporites* Bharadwaj emend. Bharadwaj, 1968 (Pl. 1, fig. 6).

*Striatites* Pant emend. Bharadwaj, 1962 (Pl. 1, fig. 5).

*Callumispora* Bharadwaj & Srivastava, 1969 (Not illustrated).

Alete forms:

*Foveofusa* Lele & Chandra, 1972 (Pl. 2, figs. 12, 13, 20, 21).

*Leiosphaeridia* (Eis.) Downie & Sarjeant, 1963 (Pl. 1, figs. 8, 10; Pl. 2, fig. 16).

TABLE 1 — SEQUENCE OF SAMPLES (FROM BOTTOM TO TOP) AT DO-DHARA

No.	LAB SAMPLE No.	LITHOLOGY	REMARKS
			Bottom
1.	DD/1	Yellowish-green Sandstone	No miospores
2.	DD/2	Grey shale	"
3.	DD/3	Khaki-green shale	"
4.	DD/4	Greenish shale	Miospores
5.	DD/5	Buff-red shale	"
6.	DD/6	Khaki-green shale	"
7.	DD/7	Buff-red shale	No miospores
8.	DD/8	Khaki-green shale	Miospores
9.	DD/9	Grey shale	"
			Top

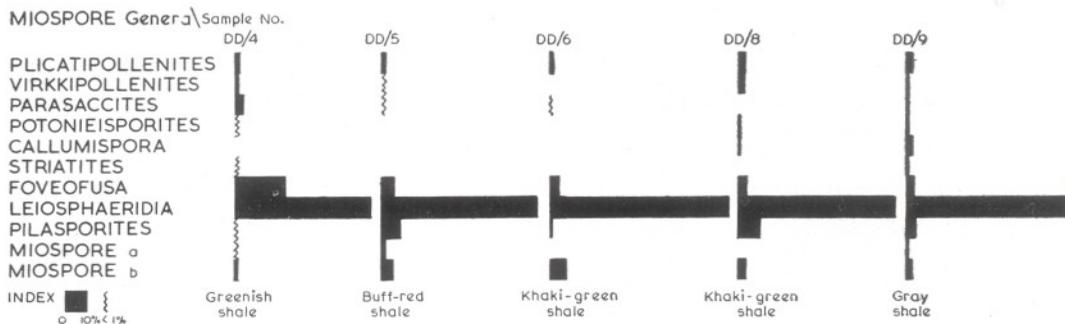
TABLE 2 — PERCENTAGE OF MIOSPORE GENERA IN SAMPLES FROM DO-DHARA, SATPURA BASIN

GENERA	SAMPLE No.				
	DD/4	DD/5	DD/6	DD/8	DD/9
<i>Plicatipollenites</i>	2.0	1.5	1.0	3.0	3.0
<i>Virkkipollenites</i>	1.5	0.5	—	3.0	1.0
<i>Parasaccites</i>	3.5	0.5	0.5	—	1.0
<i>Potomiesporites</i>	0.5	—	—	1.0	1.0
<i>Callumispora</i>	—	—	—	1.0	3.0
<i>Striatites</i>	0.5	—	—	—	1.0
Alete:					
<i>Foveofusa</i>	24.0	6.0	4.0	4.0	4.0
<i>Leiosphaeridia</i>	65.0	74.5	87.5	75.0	77.0
<i>Pilasporites</i>	0.5	9.0	1.0	10.0	5.0
Miospore type A	0.5	2.0	—	—	1.0
Miospore type B	1.5	6.0	8.0	3.0	3.0

*Pilasporites* Balme & Henn. emend. Tiwari & Navale, 1967 (Pl. 1, fig. 9; Pl. 2, figs. 17, 18). Spore A (Pl. 2, fig. 11); Spore B (Pl. 2, figs. 14, 15).

The results of quantitative analysis, plotted in Histogram 1, indicate the dominance of alele miospores (Table 2). The girdling monosaccate genera, although rare in frequency, are the important constituents of the assemblage, and by their virtue this flora compares well with other known Talchir miofloras (Lele, 1974; Lele & Chandra, 1972, 1973; Lele & Makada, 1972; Bharadwaj, 1974).

As regards the alele miospores, comparable forms have been recorded only in a few miofloras from Talchir Formation. Lele and Chandra (1972) have shown that the Talchir assemblages of Manendragarh and Umaria contain significant alele forms — classified by them as "acritarchs". In the latter area they are more abundant and diversified. In this respect, therefore, the alele-rich assemblage found during the present study resembles the Umaria assemblage, although the qualitative differences between the two are noteworthy. The dominant element of the present assemblage is *Leiosphaeridia*, while in that of Umaria it is *Foveofusa*. In spite of such a difference, the group-resemblance is very striking. No other Talchir mioflora is known to possess high percentage of alele miospores.



HISTOGRAM 1 — Percentage frequency of miospore genera in the yielding samples under study.

### AGE AND PALAEOENVIRONMENT

The presence of monosaccate genera, viz., *Parasaccites*, *Plicatipollenites*, *Virkkipollenites*, *Potonieisporites*, as well as a trilete genus *Callumispora*, and the absence of diversified trilete and disaccate genera determine, beyond doubt, the age of the present mioflora to be Late Talchir. This conclusion corroborates with the lithological observations also. The fresh water equivalents of this deposit are the beds below the coal facies of Mohpani Coalfield (Bharadwaj & Anand-Prakash, 1972) and the second radial monosaccates horizon in Korba sequence (Bharadwaj & Srivastava, 1972).

The alete miospores, which are dominant in the Do-dhara assemblage, as such do not indicate its age. The simplicity in their organization and exine structure and the absence of germinal mark, a character of the alete group, do not make them comparable with the land plant miospores.

This alete group, sometimes also classified as acritarchs, is therefore presumed to be microplanktonic in nature being the produce of algae and protozoa. It is interesting to note that the 'acritarcha' found in the present assemblage as well as in other similar assemblages are mostly smooth-walled, without any processes, and could be the cysts or spores of floating algae. Smooth-walled acritarchs are known from marine as well as fresh water basins (cf. Umaria & Singrauli coalfields respectively). However, the similarity of the Do-dhara aleles with those of undisputed marine deposits of Umaria enhances the probability of the former also having been deposited under marine or at least brackish water environment.

Thus, the discovery of the Talchir mioflora in the northern part of the Satpura Basin, having suggestive affinities with the marine mioflora of Umaria bed, tends to extend the sea arm farther west of Umaria.

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EXPLANATION OF PLATES

(All figures are.  $\times 500$ )

PLATE 1

- 1, 3, 7. *Plicatipollenites*; Slide nos. B.S.I.P. 5282, 5285, 5283.
- 2. *Virkkipollenites*; Slide no. B.S.I.P. 5285.
- 4. *Parasaccites*; Slide no. 5286.
- 5. *Striatites*; Slide no. 5288.
- 6. *Potonieisporites*; Slide no. 5287.

PLATE 2

- 8, 10. *Leiosphaeridia*; Slide nos. 5284, 5282.
- 9. *Pilasporites*; Slide no. 5228.
- 11. Alete spore A, Slide no. 5287.
- 12, 13, 20, 21. *Foveofusa* Slide nos. 5285, 5285, 5283, 5285.
- 14, 15. Alete spore B; Slide nos. 5286, 5286.
- 16, 19. *Leiosphaeridia*; Slide nos. 5283, 5282.
- 17, 18. *Pilasporites*; Slide nos. 5284, 5286.

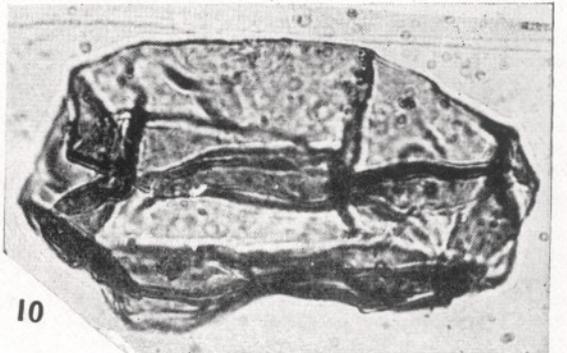
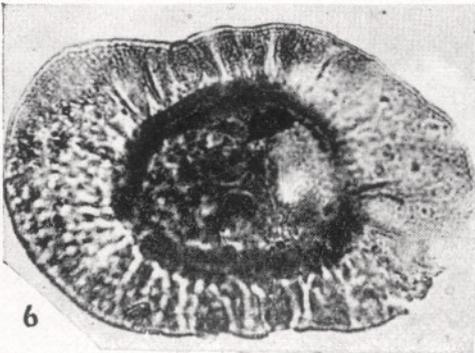
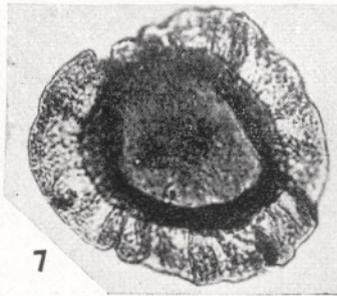
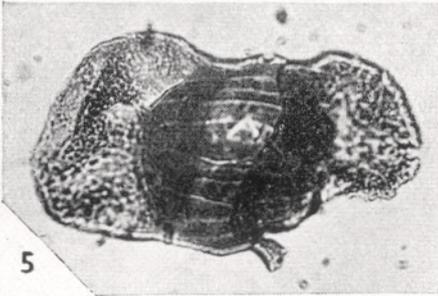
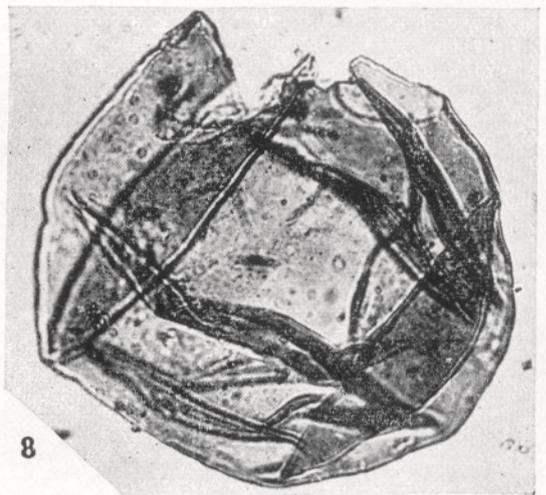
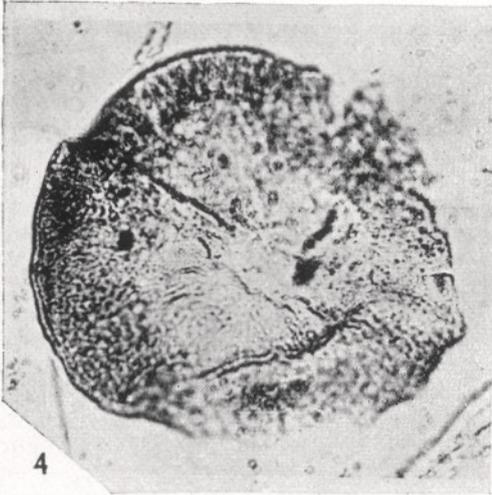
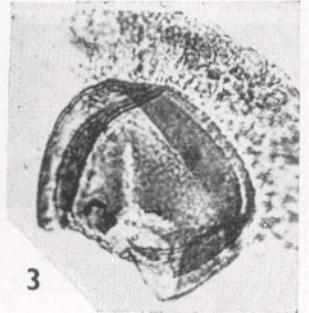
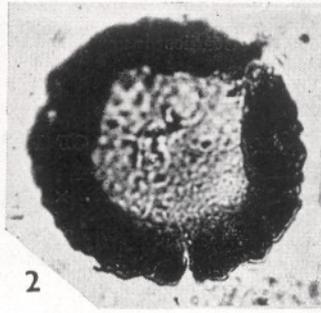
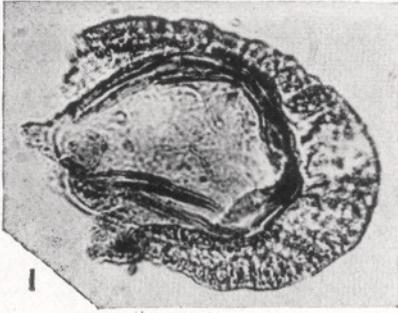


PLATE 1

