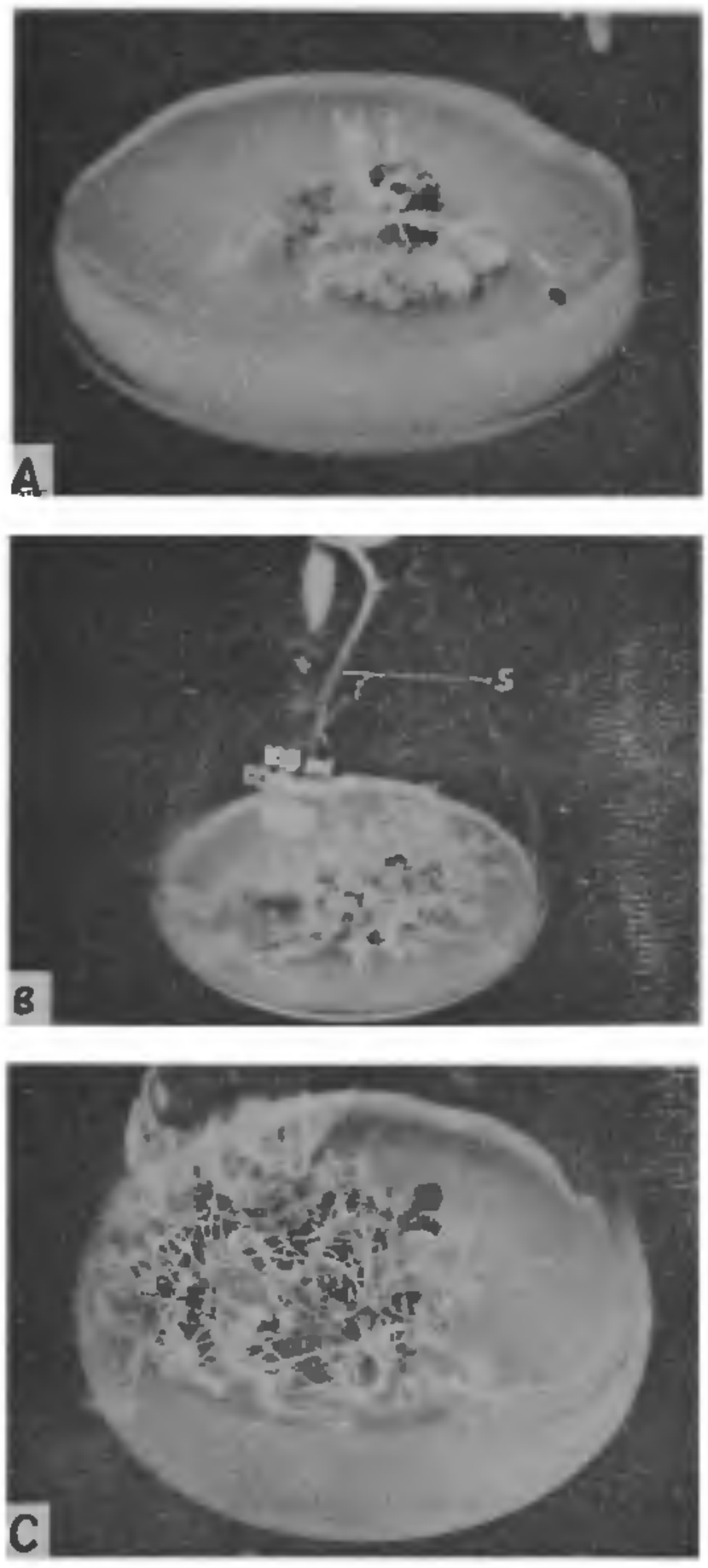

Figure 1. Negatively geotropic roots in cultures of *Tagetes patula*. **A.** Roots arising from cotyledonary explant on MS+IBA (1·0 mg/l) + K (1·0 mg/l). **B.** The same arising from hypocotyl explant on MS+IBA (1·0 mg/l) + BAP (3·0 mg/l). Note also a shoot emerging out (S). **C.** Showing profuse regeneration of negatively geotropic roots on subculture on MS+IBA (1·0 mg/l) + K (1·0 mg/l).

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IDENTIFICATION OF PEPPER VEINAL MOTTLE VIRUS ON TOMATO, (*LYCOPERSICON ESCULENTUM* MILL.) IN INDIA

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DURING a survey of the tomato growing areas, it was observed that virus and yellows-type of diseases cause significant loss in production. While identifying different viruses infecting this crop, a virus disease different from the ones already reported on this crop was isolated. This paper reports the results of a series of glass house experiments conducted to determine the causal virus.

Under natural conditions, the tomato plants infected with the virus were stunted and leaves exhibited mosaic mottling symptoms. In most of the leaves vein banding symptoms were very much conspicuous and in certain plants stem necrosis was also noticed. The virus culture was maintained on tomato var. *Pusa Ruby* under glass house conditions. For mechanical sap inoculation, the inocula were prepared by grinding the infected tomato leaves in phosphate buffer pH 7 (0·05 M) and was rubbed manually on carborundum dusted leaves of test plants. The host range was confined to *Solanaceae* and *Chenopodiaceae.* On the inoculated leaves of tomato, black necrotic lesions measuring 3–4 mm were noticed 5–6 days after inoculation, followed by systemic mosaic mottling and vein banding symptoms (figure 1). About 30% of the plants died within 25–30 days after inoculation, due to stem necrosis and leaf defoliation. Even chillies and bell pepper plants also expressed similar symptoms as noticed in tomato, but the majority of leaves were filiform; whereas in *Petunia hybrida* L., *Solanum nigrum* L. and *Physalis floridana* Rydb., initial mild mottling was noticed and by 35–40 days they became chlorotic. Reddish brown necrotic local lesions were observed on *Chenopodium quinoa* Willd and *C. amaranticolor* Coste and Reyn., 8–12 days after inoculation. On *Nicotiana tabacum* var. W. B. only necrotic local lesions were formed 4-5 days after inoculation. The virus failed to infect when mechanically sap inoculated, to the hosts like *Cucumis*

Figure 1. Tomato leaves showing mosaic mottling and vein banding symptoms.

sativus L., *C. melo* L., *Vigna sinensis* Savi., *Dolichos lablab* L., *phaseolus vulgaris* var. Pinto, *Glycine max* Merr *Datura stramonium* L. *Gomphrena globosa* L. and *Brassica oleracea* L. For determination of *in vitro* properties, the standard procedures[1] were followed and *C. amaranticolor* was used as a test plant. The virus had dilution end point of 1/1000 to 1/10,000, thermal inactivation point of 55–60°C and ageing *in vitro* for 48 hr at room temperature (29°C). Insect transmission tests were conducted by using two aphid species *viz.*, *Aphis gossypii* Glov. and *Myzus persicae* Sulz. During the aphid transmission tests, the preliminary fasting period of 1 hr and acquisition and inoculation periods of 30 min each were given and ten plants were used for each aphid species. The virus was successfully transmitted and the percentage of transmission was 40 and 70 for *A. gossypii* and *M. persicae* respectively. The seed transmission tests were conducted by collecting the seeds from the artificially inoculated plants of tomato and chillies and they were germinated in the insect proof house. In another test, the seeds collected from infected plants were macerated in phosphate buffer pH 7 (0·05 M) and inoculated to *C. amaranticolor* plants. In both tests, no positive reaction was obtained, indicating thereby that virus under study is not seed transmitted.

The virus in the present study resembles with the members of potyvirus group according to the classification of Harrison *et al.*[2], in host range, vector transmission and physical properties. Under Potyvirus group, the viruses like bean common mosaic virus, bean yellow mosaic virus, clover yellow vein virus, cowpea aphid borne mosaic virus, pea mosaic virus, soy bean mosaic virus and water melon mosaic virus (S. Africa) are included and the virus under study differs with them by not infecting any leguminous or cucurbitaceous hosts. It also differs with the other members of this group like Tobacco etch virus in symptoms on *Nicotiana tabacum* var. W. B. and *D. stramonium*, where it infects systematically. It differs with PVY also in not infecting *N. t.* var. W. B. systematically. This virus was confirmed by the immuno diffusion tests, following the sodium dodecyl sulfate technique[3]. The medium contained ionagar (0·85%), sodium dodecyl sulphate (0·5%) and sodium azide (0·02%). The antisera included were PVY, TEV, TSWV, TMV, PVMV and CMV and only the antisera of PVMV gave positive precipitin bands. No reaction was obtained either with the other five antisera or sap from healthy tomato leaves. The virus under study closely resembles with the pepper veinal mottle virus isolates of tomato[4,5] in host range and physical properties. This is also confirmed by serological studies. The occurrence of PVMV on peppers has also been reported from Ivory Coast[6], Nigeria[7] and India[8], but none of their isolates infected tomato by artificial inoculation and also had different properties. From India, viruses like ToAMV[9], CMV[10], TMV[11,12], TSWV[13], ToBRV[14] and TLCV[15] were reported earlier on tomato and there was no record of pepper veinal mottle virus. A perusal of the bibliography of plant virus and mycoplasmal diseases in India[16], also indicated that there is no record of this virus on tomato. In the present communication, the natural occurrence of pepper veinal mottle virus on tomato is reported for the first time from India.

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FLOWERS AS SOURCE MATERIAL IN CHROMATOGRAPHIC DETECTION OF CITRUS GREENING DISEASE

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GENTISOYL-B-D-Glucose is known to be present in the roots, leaves, twigs and fruits of greening infected citrus plants and has been used as 'marker' for the detection of greening disease[1, 2, 3]. However, so far no work has been reported regarding its distribution in different flower components of diseased citrus trees. In order to obtain this information, flowers were collected from greening infected and greening-free healthy blood red and musambi sweet orange trees. Different flower components, namely petals, sepals, pedicel, carpel and stamen were separated and extracted individually with 70% ethanol to detect greening marker substance (GMS). The GMS was estimated by thin layer chromatographic technique[1] using benzene: acetic acid: water (6:7:3 V/V/V) as solvent.

The results revealed that GMS was present in detectable amounts in all the flower parts of greening infected trees excepting stamen (filament + anther). The concentration was highest in carpels. The amount of GMS in complete flowers was as high as 2.5 mg/g fresh tissue in each cultivar. It was, however, absent in the flowers obtained from healthy virus-free trees. Since flowers from greening infected blood red and musambi contained detectable amount of GMS, these organs may also be used for chromatographic detection of greening.

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FIRST PETRIFIED FOSSIL *RICCIA* L. FROM INDIAN BEDS

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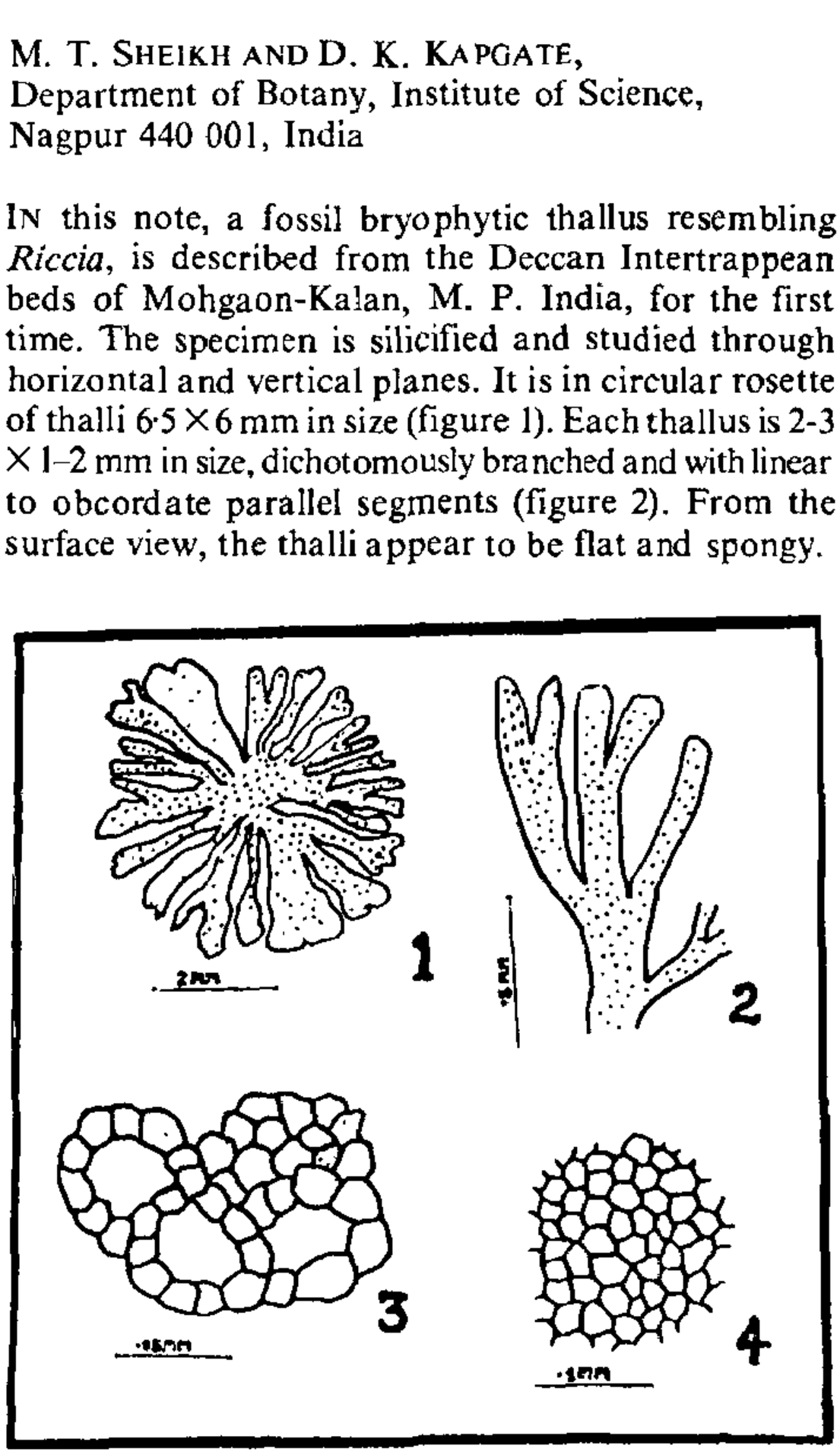
IN this note, a fossil bryophytic thallus resembling *Riccia*, is described from the Deccan Intertrappean beds of Mohgaon-Kalan, M. P. India, for the first time. The specimen is silicified and studied through horizontal and vertical planes. It is in circular rosette of thalli 6·5 × 6 mm in size (figure 1). Each thallus is 2-3 × 1–2 mm in size, dichotomously branched and with linear to obcordate parallel segments (figure 2). From the surface view, the thalli appear to be flat and spongy.



The dorsal surface anatomy shows numerous narrow air spaces 45–60 μ in diameters (figure 1). Each air space is encircled by layer of 7–8 parenchymatous, oval to angular cells (figure 3). These cells are full of brownish depositions possibly representing the fossilized chloroplasts. Moreover these are arranged in vertical columns as evident from its vertical view. This suggests an assimilatory zone of the thallus. The epidermis is not preserved. The lower ventral region of