OCCURRENCE OF A FOSSIL AXIS BELONGING TO AGAVACEAE FROM NEYVELI LIGNITE, SOUTH INDIA

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ABSTRACT

A fossil axis closely resembling the extant genus *Dracaena* belonging to the tribe Dracaeneae of the family Agavaceae, was recovered from the Neyveli lignite, South India. The carbonized axis shows leaf-base scars on its outer surface and also anomalous secondary growth.

INTRODUCTION

So far, only palynological work on Neyveli Lignite, South India has been carried out (NAVALE, 1961; THIERGART & FRANTZ, 1962; RAMANUJAM, 1963a, 1963b, 1966; DEB, 1973; NAVALE & MISRA, 1979, AMBWANI *et al.* 1981). The megafossils of these beds still need attention. A fossil axis belonging to Agavaceae, indicating close affinity with the present day *Dracaena*, has been recovered and described in this communication.

DESCRIPTION

The carbonized axis is dark brown in colour, fairly well preserved to reveal all anatomical features, and externally shows spirally oriented leaf-base scars. The fossil axis measures 4×2.5 cm in size (Pl. 1, Fig. 1). The detailed anatomical characters are as follows :

Epidermis—Epidermis is represented by a dark layer (Pl. 1, Fig. 2).

Cork—Below the epidermal layer a few cells thick cork zone is present. The cells of this zone are mutually compressed and are usually round, oval to variously shaped. These cells are suberised and have slightly thicker walls (Pl. 1, Fig. 3).

Cortex—The cortical zone lies below the cork. The cells are moderately thick-walled, suberised and usually contain some organic substance. The shape of these cells is almost similar to those of cork zone (Pl. 1, Fig. 3)

Cambium—It is between the cortex and the vascular system and has rectangular to squarish cells arranged in tiers in transections (Pl. 1, Fig. 3). This zone in turn gives rise the secondary vascular system towards the inner side whereas the primary vascular system is pushed towards the centre of the axis (Pl. 1, Figs. 2 & 3).

Secondary vascular system—The major portion of the axis consists of the secondary vascular system with the vascular bundles arranged radially (Pl. 1, Fig. 2). Each secondary vascular bundle is amphivasal with central phloem surrounded by xylem tracheids (Pl. 1, Fig. 7). These vascular bundles usually range from 100×160—160×200 μm in size; sometimes a few larger bundles may also be seen. Phloem, though not fully preserved, shows a few cells in the centre of the bundle (Pl. 1, Fig. 7). The ground parenchyma cells of this system are thick-walled and pitted. The xylem tracheids are much longer than the parenchymatous cells and they range from 600-800 μm and 50-100 μm, respectively.

Primary vascular system—The primary vascular bundles are scattered in the centre and reveal similar size to those of the secondary vascular bundles except that they are collateral (Pl. 1, Fig. 2).

Leaf-trace bundles—They are conspicuous in the outer portion of the central core. The xylem has fairly wide angular tracheids with indistinct end-plates. They have pitted as well as scalariform thickenings. The ground tissue in the centre is compact and the cells are thick-walled with simple pits. These pits may be circular to elliptical in shape.

Affinities—The anatomy of the fossil axis shows the anomalous type of secondary growth and critical observations suggest that it belongs to the tribe Dracaeneae of the family Agavaceae (HUTCHINSON, 1959) and closely resembles *Dracaena* as well as to some extent *Cordyline*.

Both the fossil axis as well as *Dracaena* show single cell layered epidermis whereas the cortical zone is suberised (Pl. 1, Figs. 3 & 4). The cells of cortex are similar to that of cork zone in both the specimens. Cambium lying below the cortex generally shows rectangular to squarish cells in transverse section which are arranged in tiers. The secondary vascular system occupying the major portion of the axis shows amphivasal type of vascular bundles in both where the pholoem is surrounded by xylem tracheids (Pl. 1, Figs. 2, 5-8). The ground parenchyma cells have simple pits on their walls, both in the fossil as well as in the living specimens. The primary vascular system has irregularly oriented vascular bundles in both having similar structure, i.e. they are collateral in nature. The present fossil axis is also comparable to *Cordyline* but it shows lacunar cortex (TOMLINSON & ZIMMERMANN, 1969, fig. 21, p. 170 ; ZIMMERMANN & TOMLINSON, 1969). This feature is not seen in the fossil axis and as well as in the stem of *Dracaena*. Since the present fossil axis shows more resemblance with *Dracaena* stem, it can be presumed that the plants similar to *Dracaena* were growing during the Neogene time in Neyveli.

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EXPLANATION OF PLATE-I

1. Fossil axis showing spirally arranged leaf base scars, ×natural size. Specimen no. 36033.
2. Transverse section of the fossil axis to show general anatomical features, ×3. Slide no. 6679.
3. Transverse section of the fossil axis to show cork, cortex, cambium and a part of secondary vascular system, ×20. Slide no. 6679. C=cork, C1=cortex, C2=cambium.
4. Transverse section of *Dracaena* stem to show the cells of cork, cortex, cambium and part of secondary vascular system, ×20, C=cork, C1=cortex, C2=cambium.
5. Transverse section through secondary vascular system of the fossil axis to indicate the orientation of secondary vascular bundles, ×20. Slide no. 6679.
6. Transverse section through secondary vascular system of *Dracaena* to indicate the orientation of secondary vascular bundles, ×20.
7. Single enlarged secondary vascular bundle of the fossil axis to show detailed cellular structure. Note the presence of phloem in the centre of the bundle, ×60. Slide no. 6679, Ph=Phloem.
8. Single enlarged secondary vascular bundle of *Dracaena* stem to show detailed cellular structure. Note the presence of phloem in the centre of the bundle, ×60. Ph=Phloem.

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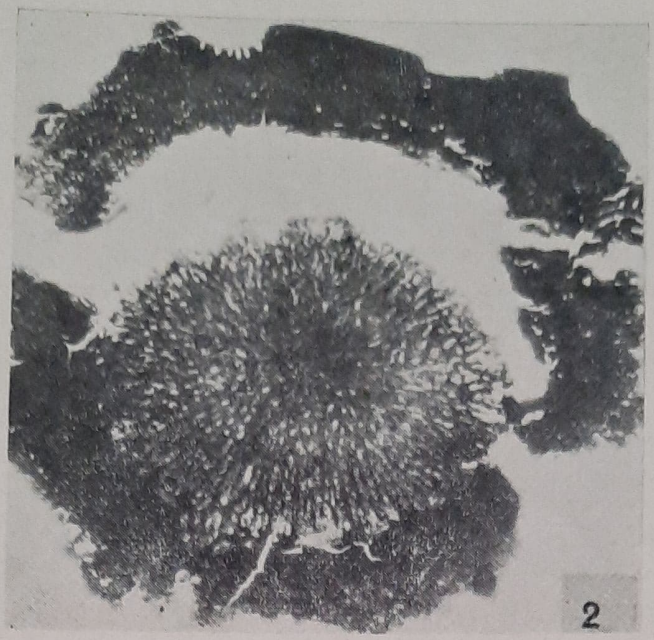

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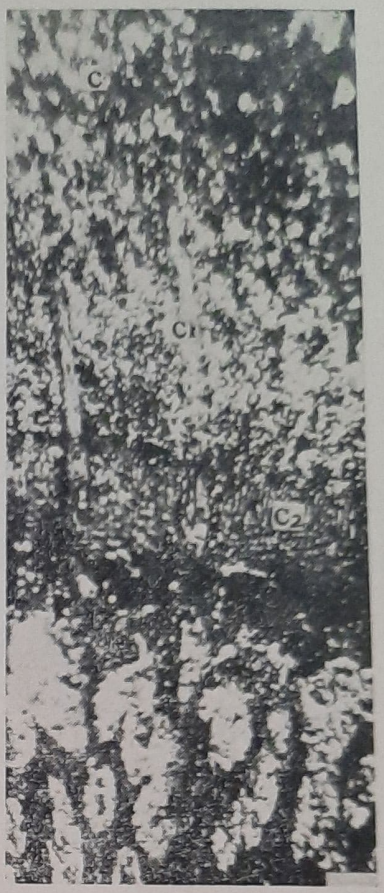

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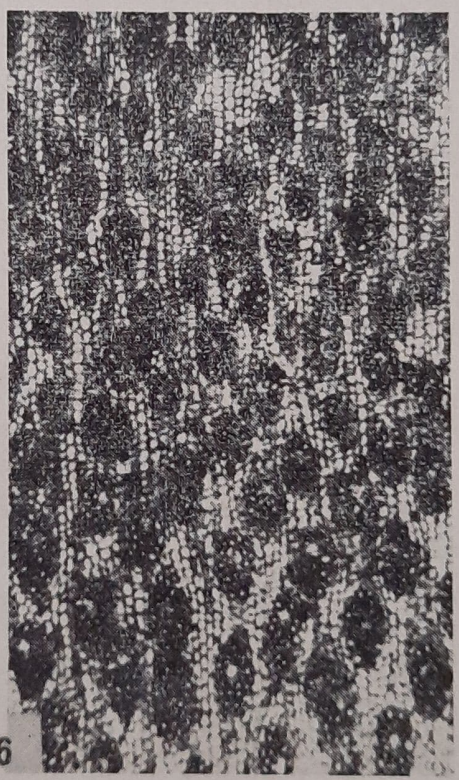

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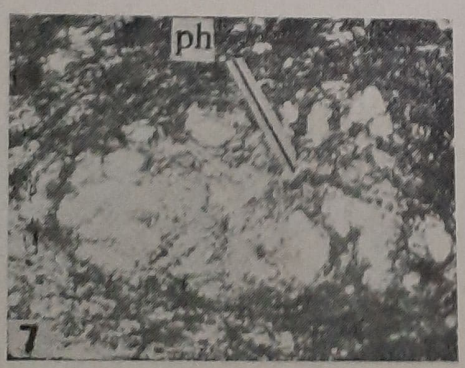

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