

Q. Describe Pentoxylales? Point out the affinities of the group.

INTRODUCTION → Pentoxylales is a small but remarkable group of relatively recent discovery. The name Pentoxylales was proposed by Prof. Bisbal Sahni (1948) for a group of fossil plants discovered from the Jurassic horizon of the Rajmahal hills Bihar of India. These plants have been treated under a separate order by Sporne (1965). Separate from genera of the group has been discovered by various workers. Sahni & Srivastava (1948) discovered stem, leaves and seed bearing organ from the village Nipania, Rajmahal hills, Bhagalpur. Vishnu Mitra described the pollen bearing organ. The members of this group are unique in showing characteristic of Bennettiales, Cycadales and Coniferales. Harris (1962) has also discovered them from Newzealand.

FORM GENERA → The group has been described under the following form genera

- (A) stems - Pentoxylon, Nepanioxylon.
- (B) leaves - Nepaniophyllum.
- (C) Pollen bearing organs - Sahnianipaniensis.
- (D) Seed bearing organs - Carnoconites.

MORPHOLOGY OF THE PLANTS → The stems have been described under the species *Pentoxylon sahni* and *Nepanioxylon gupta*. They were discovered from the Rajmahal hills in India.

The stems were 3mm to 2cm in diameter. It bears rhomboidal leaf scars and spirally arranged simple leaves.

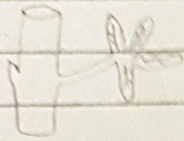
The leaves were described under the name *Nepanic-phyllum raii*. They were simple petiolate, strap shaped with entire margin and obtuse apex. There was a distinct mid rib with parallel vein unbranched lateral veins. There were short lateral shoots. They bear reproductive structure.

ANATOMY OF THE STEM → The internal structure of the stem reveals 5 main primary steles. Each stele is a concentric structure having its own cambium that is uniformly active in young stem. The cambium on its outside formed sec. phloem. The vascular strand run longitudinally and give off leaf traces an addition to 5 main strands. There were 5 smaller strands alternating with these. According to Sahni (1948) these were the strands of the lateral shoots.

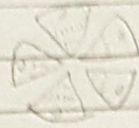
The sec. xylem was pycnoxylic. This is a coniferous character.

The tracheids were with circular bordered pits that may be uniseriate or biseriate. The sec. medullary rays were also uniseriate and varied in height from one to 5 cells. The secondary wood developed more towards the centre.

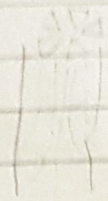
The leaf traces are typically cycadalean.



Reconstruction of stem & leaves



T-S of stem



Reconstruction of stem

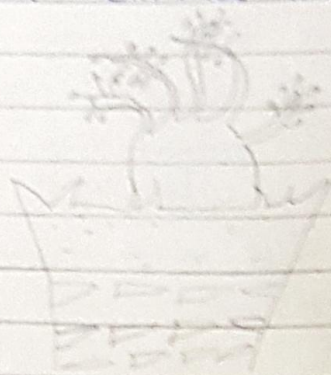
REPRODUCTIVE ORGANS

POLLEN BEARING ORGANS → It has been described by Vishnu Mitter (1953) as *Sabini Niponiensis*.

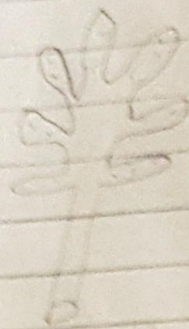
The microsporangiate or the pollen bearing organs were born terminally on short lateral shoots. Each male flower has a dome shaped receptacle that bears about 24 microsporangium. They are found arranged in a single whorl. The microsporangiphore were fused at the base into a discoid structure. They were spirally arranged branches which intertwine bore pear shaped terminal & microsporangia.

The sporangia are uninucleate and contain several boat shaped and monolate microspore. Each

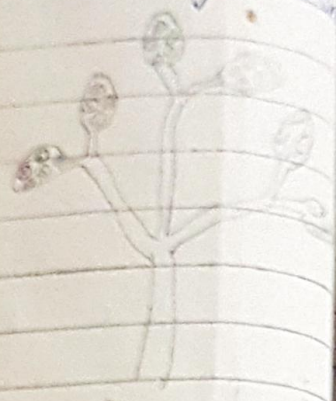
sporangium receive a single vascular bundle that divides into several radiating branches.



Reconstruction of
Male flower



Detached
megasporophyll



Reconstruction
of female cone

MEGASPORANGIATE CONE → The seed bearing organs have been described by Sahni and Srivastava from the Jurassic horizon of Rajmahal hills, Bihar, India etc. These are described as cornocanites compactum and C. laxum.

Each seed bearing organ is a short lateral shoot. It looks like a stalked mulberry fruit. The peduncle of the seed bearing organ divides into several branch or pedicels. Each pedicel terminate into a female strobilus. According to Vishnu Mitter (1953) the peduncles are unbranched.

The strobili measured about 1.5 cm long in C. compactum. It has central receptacle bearing about 20 sessile ovule. The megasporophyll and or inter-seminal scales are absent.

The ovule were surrounded by a single integument that was free from the nucellus. The integument had an outer fleshy sarcotesta and inner stony sclerotesta. The microphytes were directed outwards. The cone axis was transversed by 5 vascular strands.