A CONTRIBUTION TO THE EMBRYOLOGY OF BOMBACACEÆ

BY C. Venkata Rao

(Department of Botany, Andhra University, Waltair)

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The Bombacaceae with 20 genera and about 140 species (Willis, 1948) is treated by Bentham and Hooker (1862–83) as a tribe of Malvaceae due to the presence of common characteristics like the large showy flowers, epicalyx, corolla with contorted estivation and monothecous anthers. Engler and Prantl (1895), on the other hand, raised it to the rank of a family on account of the predominantly arborescent habit of its members and the presence of smooth-walled pollen grains. The present study was undertaken with a view to elucidate how far the embryological characters justify such a separation.

The previous embryological work in the family is meagre. Thirumalachar and Khan (1941) and Banerji (1942) studied the development of the female gametophyte and floss in Eriodendron anfractuosum DC. and Bombax malabaricum DC. respectively. Their observations can be summarised thus: The ovules in both species are crassinucellate, anatropous and bitegmic and show a zigzag micropyle. Usually a single hypodermal archesporial cell functions. Megaspore tetrads are linear in Bombax and T-shaped in Eriodendron. The chalazal megaspore functions and forms the 8-nucleate embryo-sac. The antipodals are ephemeral and in Eriodendron, they are said to degenerate even before the egg apparatus is organised. The polar nuclei fuse before fertilization. The case of an embryo-sac with reversed polarity was recorded in Eriodendron anfractuosum. In both species studied, the epidermal cells of the inside wall of the loculus develop into floss. In Eriodendron, the nucleus of the epidermal cell divides once mitotically before the cell begins to elongate.

There is no previous account of microsporogenesis, pollen grains, fertilization, embryo and seed development in the family.

This paper deals with the development and structure of the anther and pollen, ovule and embryo-sac in the following members of the family: Eriodendron anfractuosum DC., Bombax malabaricum DC., Pachira aquatica Aubl., P. rosea, Adansonia digitata L., Ochroma lagopus Sw. and fertilization,
development of endosperm and embryo in the last named species. A few 
observations are also made on the seed development in *Adansonia digitata*
and *Pachira aquatica*.

**Materials and Methods**

The materials of *Bombax* and *Eriodendron* were obtained locally and 
those of *Pachira rosea* and *Adansonia digitata* were kindly sent by Miss S. 
Yesoda Devi, B.Sc. (Hons.), from Madras. The material of *Pachira aquatica*
was sent by Mr. R. Seshagiri Rao from the Indian Botanic Gardens, Calcutta. 
A few trees of *Ochroma lagopus* (the balsa or cork wood) which is originally 
a native of S. America, are being successfully grown in Anakapalli Agricult-
ure Farm, Visakhapatnam District, wherefrom the material was obtained. 
All materials were fixed in formalin-acetic-alcohol and the slides were 
stained in Heidenhain’s or Delafield’s hæmatoxylin or a combination of 
safranin and fast green.

**Flowers**

The flowers of all species are bisexual, pentamerous and dichlamydeous. 
The gynecium is 5-carpellary except in *Adansonia* in which it is upto 8-
carpellary (Fig. 53) and syncarpous. The septa do not fuse at the centre 
completely but leave a 5-angled space (Fig. 31). From the inner margins 
of the carpels arise the numerous ovules. The andrœcium shows much 
variation in different members. In *Eriodendron*, there are 5 large stamens 
with 2–3 thecous sinuous anthers. In *Ochroma*, there are 5 large stamens 
whose massive filaments twist spirally to form a column which surrounds 
the gynœcium. On the surface of this are found the numerous folds of the 
sinuous tranversely septate anther lobes (Fig. 1). In *Bombax*, there are 
75 stamens in three series; the outermost of 5 antipetalous groups of 12 
stamens each, a median ring of 10 stamens and the innermost of 5 stamens 
whose filaments and anthers are much larger than those of the rest and which 
are termed ‘double stamens’ (Gamble, 1935). In *Pachira* and *Adansonia*
there are numerous stamens with renifrom monothecous anthers all of which 
are united at the base into a short tube.

**Microsporogenesis and Male Gametophyte**

The flowers in all species are protandrous, the formation of the micro-
spore tetrads being completed by the time the megaspore mother cell is de-
marcated. One or two rows of hypodermal archesporial cells differentiate 
in the anther at two places. By a periclinal division these cells form the 
primary sporogenous cells to the inside and the primary parietal cells to 
the outside. Both sets of cells undergo repeated divisions, in all planes as a