

in a previous communication from this department has found to be the condition in *Alternanthera sessilis*. Some examples from other families of the flowering plants in which a similar situation has been found are mentioned in Kajale's paper. Recently Mr. C. V. Rao of P. R. College, Cocanada, in a letter to me reports the same condition in a species of *Iresine*, another genus of the *Amaranthaceæ*. This behaviour of the antipodals is therefore quite likely to be characteristic of the family.

The antipodals in *Digera arvensis* remain in this position on one side of the embryo-sac until the early stages of embryo-development, up to the 2-celled stage or so, though they begin to degenerate by this time. The embryo-sac by this time has reached a considerable length (Fig. 2).

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¹ *Bull. Acad. Sci., U.P.*, 1933, 3.

² *Jour. Ind. Bot. Soc.*, 1934, 13.

³ *Proc. Ind. Acad. Sci.*, 1935, 1 B.

⁴ *Ibid.*, 1935, 2.

A Preliminary Note on the Embryology of *Duabanga sonneratioides* Ham.

THIS note presents briefly the results of a detailed study of the embryology of *Duabanga sonneratioides*. This plant is a member of *Sonneratiaceæ*, one of those families of *Myrtifloræ* that has received very scant attention from students of angiosperm-embryology. So far the only species investigated, as cited by Schnarf⁷ in his recent book, is *Sonneratia apetala* worked out by Karsten,⁵ and this work dates as far back as 1891, besides being of fragmentary nature. Another point of interest relating to this family is that the genera included in it are placed by some systematists in the *Lythraceæ* and by others have been raised to the status of a separate family. Therefore it has been thought worthwhile to examine the embryological features of one of these genera.

The ovules are numerous and are borne on large axile placentæ. They are anatropous, with a fairly thick nucellus and two-integumented. Both the integuments take part in the formation of the micropyle. The primary female archesporium very frequently extends to more than one cell, and more than one functioning archesporial cells are occasionally met with. A parietal

cell is cut off, which by subsequent divisions forms 4-5 cells thick parietal tissue above the embryo-sac. The megaspore-mother cell undergoes the heterotypic and homotypic divisions forming the normal linear tetrad. The homotypic division in the chalazal dyad usually precedes that in the micropylar dyad. The chalazal megaspore is the functional one and develops in the normal manner into an 8-nucleate embryo-sac after 3 successive nuclear divisions. The mature embryo-sac (Fig. 1) is 4-nucleate, just as in the *Lythraceæ*,^{1,2,3,4,6,9} due to the early

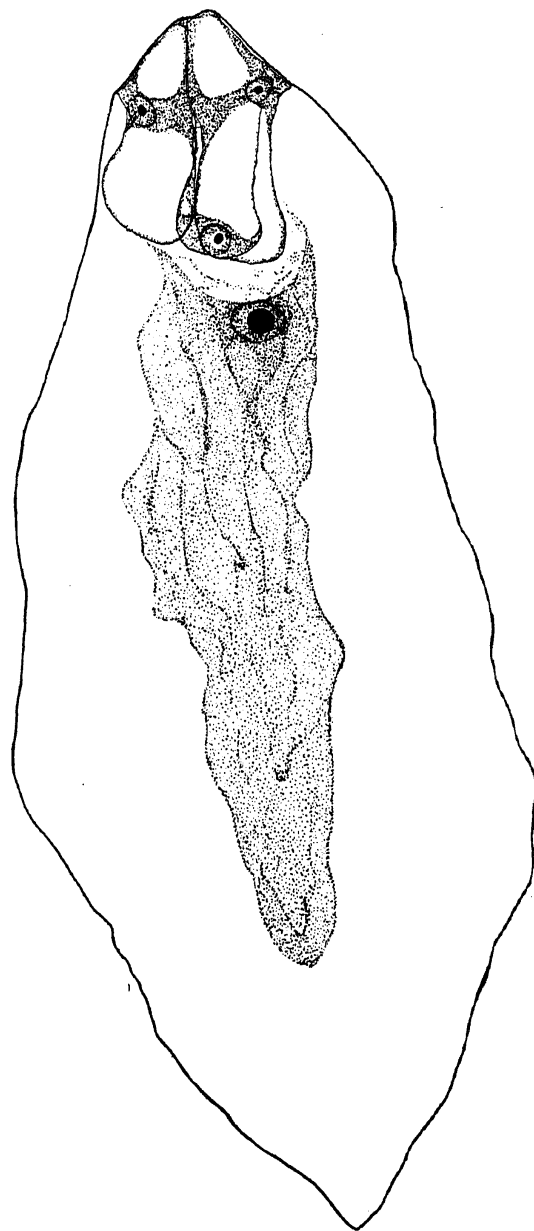


Fig. 1.

Duabanga sonneratioides, Mature embryo-sac. $\times 1650$.

degeneration of the antipodals. The synergids are hooked and have a small vacuole in their micropylar apex in addition to the usual very prominent chalazal vacuole.

A single nucleus is situated between the two vacuoles. The egg has the usual form.

The nucellus shows a chalazal strand of specially differentiated cells connecting the antipodal end of the embryo-sac and the vascular bundle of the ovule, just as in the Lythraceæ.^{2,3,4}

The fertilisation is porogamous. The endosperm is nuclear in the early stages but becomes cellular in the later stages of seed development. The development of the embryo takes place according to the *Capsella* type and agrees in all essential points with that of the Lythraceæ.^{4,5}

On the whole, the embryology of *Duabanga sonneratioides* shows a close resemblance with the embryological features of the Lythraceæ, which have been described in detail recently by Prof. Joshi and the writer.^{1,2,3,4}

I desire to express my sincere thanks to Prof. A. C. Joshi for helpful suggestions during the progress of the work. I am also indebted to Mr. I. Banerji of Calcutta University for a part of the material used in this investigation.

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March 19, 1936.

¹ Joshi, A. C., and Venkateswarlu, J., *Ann. Bot.*, 1935, 49, 196.

² Joshi, A. C., and Venkateswarlu, J., *Proc. Ind. Acad. Sci.*, 1935, 2, No. 5.

³ Joshi, A. C., and Venkateswarlu, J., *Proc. Ind. Acad. Sci.*, 1935, 2, No. 6.

⁴ Joshi, A. C., and Venkateswarlu, J., *Proc. Ind. Acad. Sci.*, 1936, 3, No. 4.

⁵ Karsten, G., *Bibl. Bot.*, 1891, 22.

⁶ Mavritzon, J., *Medd. Goteborgs Botaniska Trädgård*, 1934, 9.

⁷ Schnarf, K., "der Angiospermen," Berlin, 1932.

⁸ Souéges, R., *C. R. ac. Paris*, 1925, 180.

⁹ Tischler, G., *Ber. d. Deutsch. Bot. Ges.*, 1917, 35.

Embryo Development in *Boerhaavia diffusa* Linn.

THE development of the embryo in *Boerhaavia diffusa* has been described by Dr. Maheshwari¹ to correspond to the *Capsella* type. This is wrong and the mistake has probably arisen on account of the incomplete observations of the various stages in

development. It appears that 3 apical cells of the pro-embryo take part in the development of the embryo, excluding the root tip, and the embryo-development either corresponds to Chenopodiaceous or Caryophyllaceous type. Full details shall be published by the writer shortly elsewhere.

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Benares Hindu University,
April 4, 1936.

¹ Maheshwari, P., *Jour. Ind. Bot. Soc.*, 1929, 8, 219-234.

The Ram Sarcophagus.

WHETHER the Sarcophagus from Sankhavararam described by me¹ is ram-shaped, is questioned by Mr. Govinda Menon² on the grounds that the head does not show the ears, the Sarcophagus has six legs, and the curling excrescences from the sides of the head are wings rather than horns. The rams among the bronze antiquities from Adichanallur are modelled without ears but with large horns as in the Sankhavararam Sarcophagus. As regards the number of legs, all cists of this size have more than four legs, as the potter's handiwork requiring more legs to support the torso of the animal than nature's. If a head removable from the torso were invested with a pair of "sturdy wings", the flighty head must have had a purpose we cannot trace. Were the whole object a bird, one would rather have expected that the wings would be attached to the torso, and not to the detachable head that could fly away leaving the torso and the bones behind. If the torso is bulkier in proportion to the head, it is because the torso, and not the head, was to be the receptacle for the bones.

I should therefore decline to follow in the wake of Mr. Govinda Menon when he passes on to speak of composite animals and the primitive mind.

Perhaps I may add that the Cochin Sarcophagus came to my notice shortly after my paper was prepared.

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March 12, 1936.

¹ *Curr. Sci.*, 1935, 4, No. 5.

² *Curr. Sci.*, 1936, 4, No. 8.