# EMBRYOGENESIS IN *JANSENELLA GRIFFITHIANA* (C. MUELL) BOR

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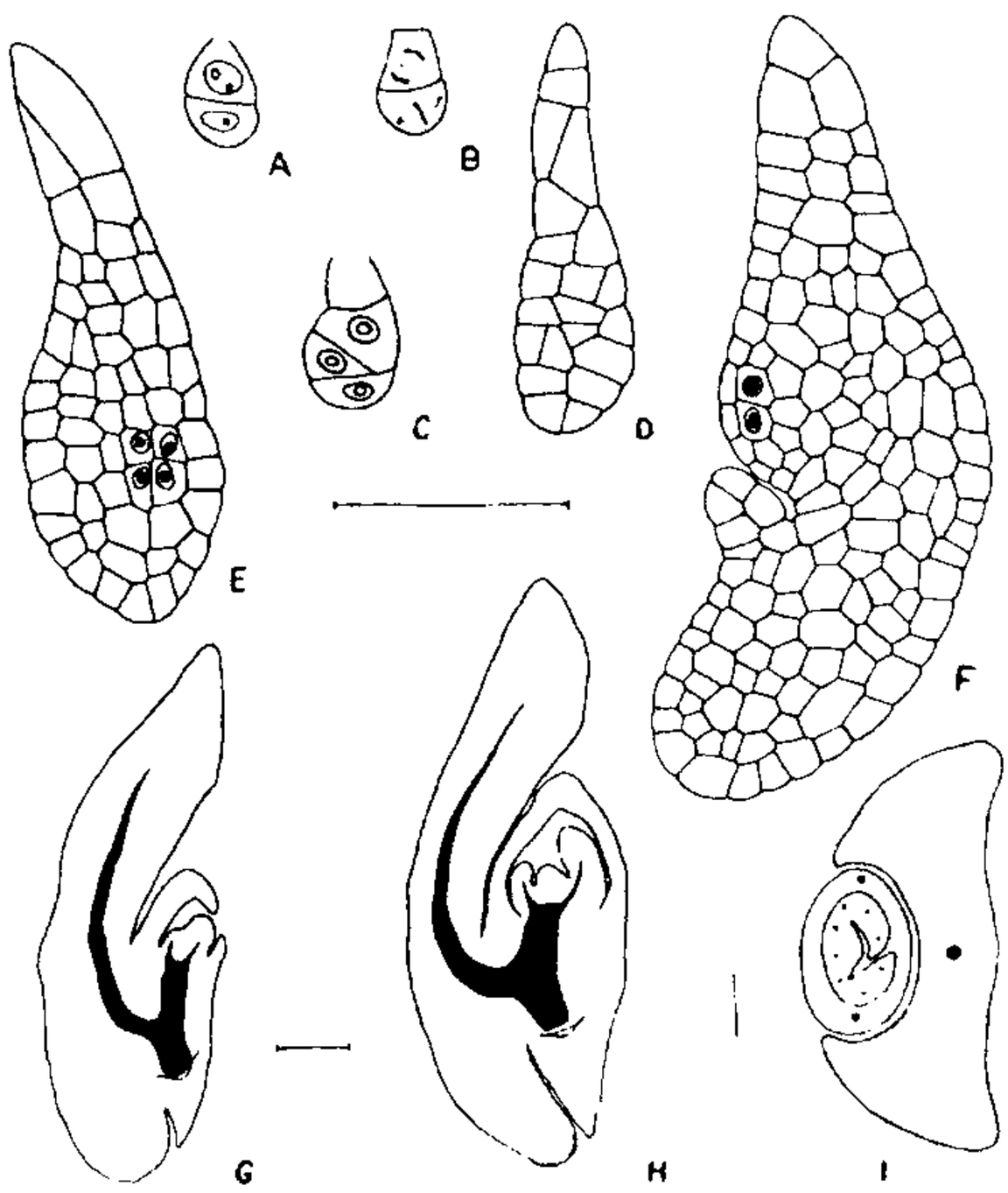
EMBRYO development among grasses is very interesting and unique. It totally differs from that of other monocotyledonous taxa in its structure and development[1,2]. The pattern of embryo development among grasses has been interpreted in various ways[3,4]. The mature embryo of grasses has been an important taxonomic criterion in the classification of grasses[5,6]. Because of the uncertainty of the taxonomic status of *Jansenella griffithiana* ($2n = 20$)[6-8] the present study on the monotypic uninvestigated taxon was undertaken to understand the ontogeny and structural aspects of the mature embryo.

Material for the present study was collected from Agumbe, Karnataka during October. To study the post-fertilization stages the material was fixed in acetic alcohol (1:3), and processed for microtomy according to customary procedure. Serial longitudinal and transverse sections were cut at 10–12 $\mu$ thick and stained in Heidenhain's haematoxylin as well as phenolic haematoxylin. The latter gave better results.

The zygote is more or less spherical in shape, and the first division is transverse which results in a small terminal cell *ca* and a larger basal cell *cb* (figure A). This is followed by an oblique division in the basal cell resulting in a smaller cell *m* and a larger cell *ci* towards the base (figure B). The cell *ca* also undergoes an oblique division (figure C). Further activity of growth is concentrated in the apical region of the proembryo (figure D). The terminal hemisphere consists of central cells covered by the corresponding number of peripheral cells. The peripheral cells increase in the surface area by means of anticlinal divisions to form the protoderm and the axial cells increase in bulk by diverse planes. In the terminal hemisphere, one half of the sector acquires a large number of cells due to frequent divisions while the other sector remains relatively quiescent. The former constitutes the cotyledonary sector and the quiescent group the epicotyledonary sector (figure E). The epicotyledonary sector is a relatively dormant group of 2--4 cells characterized by dense cytoplasm. Thus the terminal portion of the globular proembryo consists of a cotyledonary and epicotyledonary sectors. They are juxtaposed to one another and occupy terminal position on the embryonal axis.

Because of the asymmetric increase in the girth of the globular embryo, a depression or notch-like appearance is seen where the cells of the future shoot apex are located (figure F). The outgrowth above the notch is the beginning of the coleoptile development. Gradually the tip of the coleoptile extends until it completely surrounds the shoot apex (figure G).

The mature embryo of *J. griffithiana* is relatively large in proportion to the size of the seed. In median longitudinal section the coleoptile is inserted at some distance above the point of divergence of the scutellum bundles, and there is a distinct internode between the




**Figures 1 A–I.** Embryo development in *Jansenella griffithiana*. All figures drawn from median longisections except figure **I** which is a transection. (**A**) 2-celled embryo. (**B**) oblique divisions in basal and terminal cells of proembryo. (**C**) 4-celled proembryo. (**D–F**) proembryo development; cells with nuclei represent epicotylary locus. (**F**) shows coleoptile protuberance. (**G, H**) coleoptile formation stages; note the presence of cleft between scutellum and coleorhiza. (**I**) transverse section of embryo showing first embryonal leaf; note numerous bundles and overlapping leaf margins. Bar represents 50 $\mu$m.

coleoptile and scutellum, and the presence of a distinct cleft between the lower part of the scutellum and the coleorhiza is seen (figure H). The epiblast is absent. In transverse section the primary leaf with its numerous bundles has overlapping margins (figure I).

Earlier investigations[9-15] have clearly shown for diverse taxa of monocotyledons, the shoot apex and the cotyledon are terminal on the embyonal axis, thus changing the earlier concept that the shoot apex originated from a lateral locus and a single cotyledon from a terminal portion of the proembryo[16]. According to Philip[17] both the loci of epicotyl and scutellum in *Bambusa arundinacea*, a primitive grass, are terminal and situated adjacent to each other. The present taxon also shows a terminally positioned cotyledonary and epicotyledonary sectors, juxtaposed to each other.

The taxonomic placement of *J. griffithiana* has been interpreted in various ways. Bor[8] includes this genus under the group Pooideae. Recently, Hilu and Wright[6] studied the systematics of Gramineae with cluster analysis techniques for 215 grass genera using 85 morphological and microscopic characters including the characteristics of the embryo. Accordingly, this genus is included in the sub-family Panicoideae. Much earlier, Reeder[5], based on the mature embryo structure has classified 6 distinctive embryo types, of which the true panicoids with the formula P-PP are characterized by having panicoid vascularization, no epiblast, a distinct cleft between the scutellum and coleorhiza. In transverse section the primary leaf has overlapping margins and numerous vascular bundles. Since the mature embryo possesses all the features of true panicoids as mentioned by Reeder[5], the present observation lends support to this view that it belongs to Panicoideae.

PS is thankful to UGC, New Delhi, for financial assistance.

26 August 1985

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## MYROTHECIUM POD SPOT OF CLUSTER BEAN AND ITS SIGNIFICANCE

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*MYROTHECIUM RORIDUM* Tode ex Fr is known to cause leaf spot in cluster bean (*Cyamopsis tetragonoloba* (L.) Taub)[1]. *Myrothecium roridum* is also a severe pathogen of many valuable crops such as *Dolichos lablab*[2], brinjal[3], cotton[4], tomato[5], castor[6], groundnut[7], coffee[8,9] and soybean[10]. So far, *Myrothecium* podspot has not been reported in cluster bean.

During the Kharif season of 1983 in Mysore (Karnataka State) heavy incidence of pod spot due to *M. roridum* was observed in cluster bean crop grown in experimental plots. About 80% of the plants showed infection due to the fungus.

The fungus was isolated on potato dextrose agar medium. Ten-day-old culture of *M. roridum* was inoculated to the stem, leaves and pods to confirm its pathogenecity. The per cent incidence of *M. roridum* in seeds obtained from spotted pods was recorded by standard blotter method[11]. Healthy and infected seeds were subjected to Ragdoll method[12] and seedling vigour was calculated.

Leaf spot symptom was observed in the early growth stage and pod spots in the fruiting stage of severely infected plants. The pod spot first appeared as a water-