influence the immunity of this wild rice strain.

Besides its immunity to *X. campestris* pv. *oryzae*, it is also immune to *X. campestris* pv. *oryzicola* (bacterial leaf streak), *Pyricularia oryzae* (blast) and resistant to Drechslera *oryzae* (brown spot) and *Corticium sasakii* (sheath blight) when inoculated artificially with four aggressive isolates of the respective pathogens.

This immune strain of *O. barthii* would be an excellent material for investigating host-parasite relationship, inheritance of disease resistance, breeding for disease resistance and pathotype classification. Use of this strain in studying the above aspects of bacterial blight should greatly influence our way of thinking. As this strain is also immune or resistant to a number of other rice pathogens it can be used as a multiple disease resistant donor to incorporate the resistance to all these pathogens along with bacterial blight resistance in *O. sativa* background.

My sincere thanks are due to Mr. P. J. Jachuck, Scientist S-2 for providing this strain of wild rice and I express my gratefulness to Dr. H. K. Pande, Director for his constant encouragement.

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THE DEVELOPMENT OF EMBRYO IN *LYCOPSIS ORIENTALIS* LINN.

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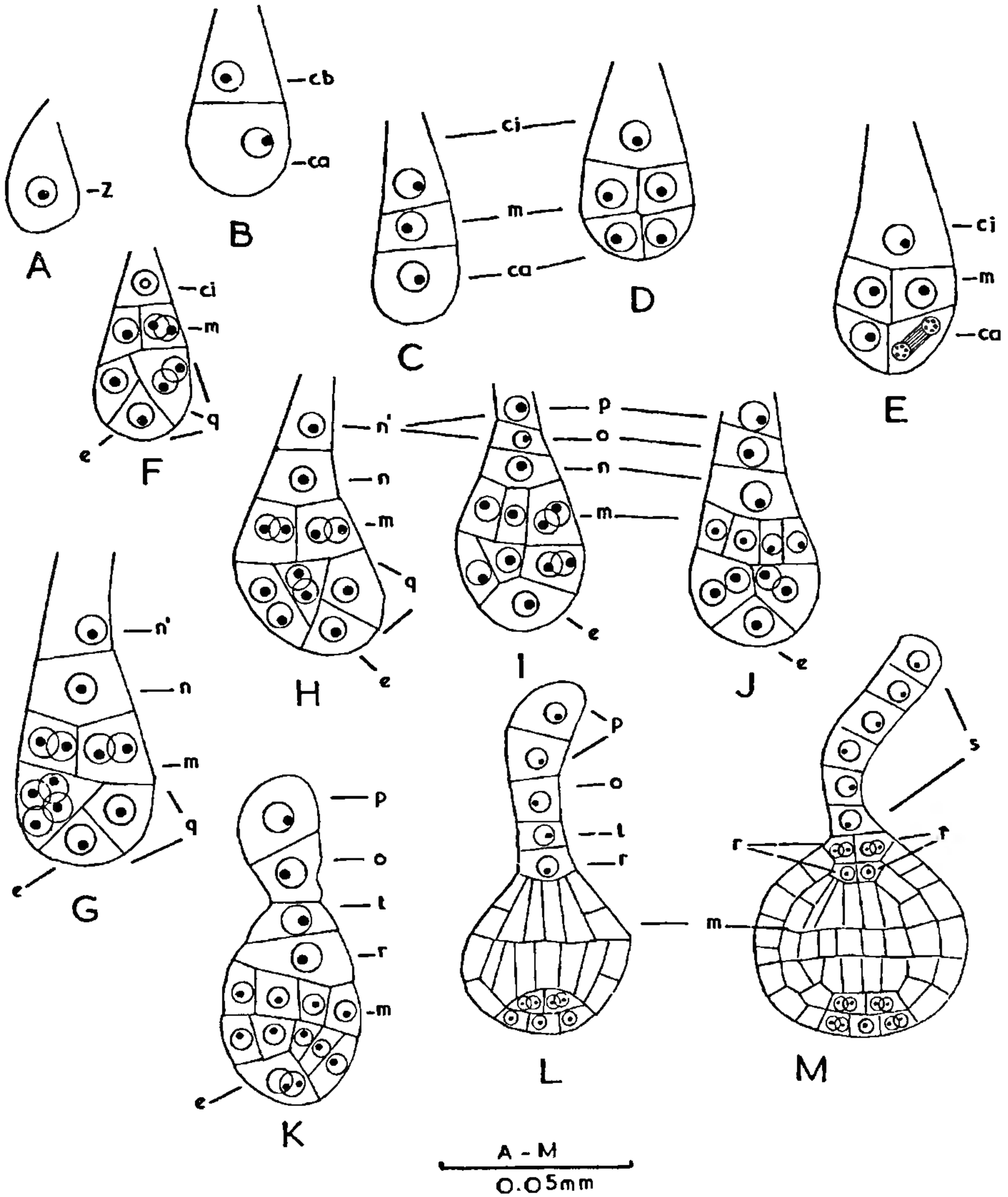
BORAGINACEAE is interesting and unique in manifesting sufficient diversity in the genesis of megagametophyte, endosperm and embryo[1-14], but compared to the extensiveness of the family, embryological studies are less satisfactory[1]; though four main types of embryogeny—asterad, onagrad, solanad and chenopodiad—are known in the family. In view of these facts, the present report is timely. Earlier, one of us (BHR) has critically studied embryology of 18 taxa of the family. Of these *Lycopsis orientalis* Linn. (subfamily Boraginoideae) showed variation in the type of embryogeny from that in *Lycopsis arvensis*[2]. The developmental details of the embryo in *Lycopsis orientalis* are given below.

The first division of the zygote is transverse and takes place only subsequent to the formation of considerable amount of endosperm, which is *ab initio* cellular, engendering the apical cell *ca* and basal cell *cb* (figures A and B). The division in *cb* precedes that in *ca* resulting in a middle cell *m* and the lower cell *ci*; the latter eventually playing a major role in the formation of a suspensor (figure C). Both *ca* and *m* undergo division simultaneously forming two juxtaposed cells in each of these tiers (figure D); thus a proembryo comparising five cells disposed in three tiers *ca*, *m* and *ci* is organised (figure D). Of the two cells of the tier *ca* the one that is slightly bigger undergoes division followed by an oblique wall demarcating a triangular apical cell which functions as the epiphyseal initial *e* (figures E–J). The three cells derived from *ca* constitute the tier *q*. The cell *ci* segments by a transverse wall to result in two superposed cells *n* and *n'* (figures G and H). The two cells of the tier *m* subsequently divide by another longitudinal division leading to the formation of four circumaxially arranged cells (figures F–H). Vertical divisions in these cells lead to the differentiation of dermatogen, periblem and plerome (figures K–M). In the meantime the cells *n* and *n'* divide transversely engendering four superposed cells *r*, *t*, *o* and *p* (figures H–M). By about the time the cells of the tier *m* segment, the cells of the tier *q* divide marking off dermatogen, periblem and plerome (figures G–N). The epiphyseal cell also divides by a vertical wall resulting in two juxtaposed cells (figure K). These in turn divide vertically at right angles to each other followed by periclinal divisions resulting in two groups of cells (figures L and M) of which the outer personates the first epidermal cells of the shoot apex and the inner represents the cortex. By further divisions the epiphyseal region becomes massive. Meanwhile the cell *r* divides transversely resulting in two superposed cells of which the lower one functions as the hypophyseal cell, while the upper cell together with *t*, *o* and *p* organizing into a linear suspensor of not more than six cells (figures L and M).

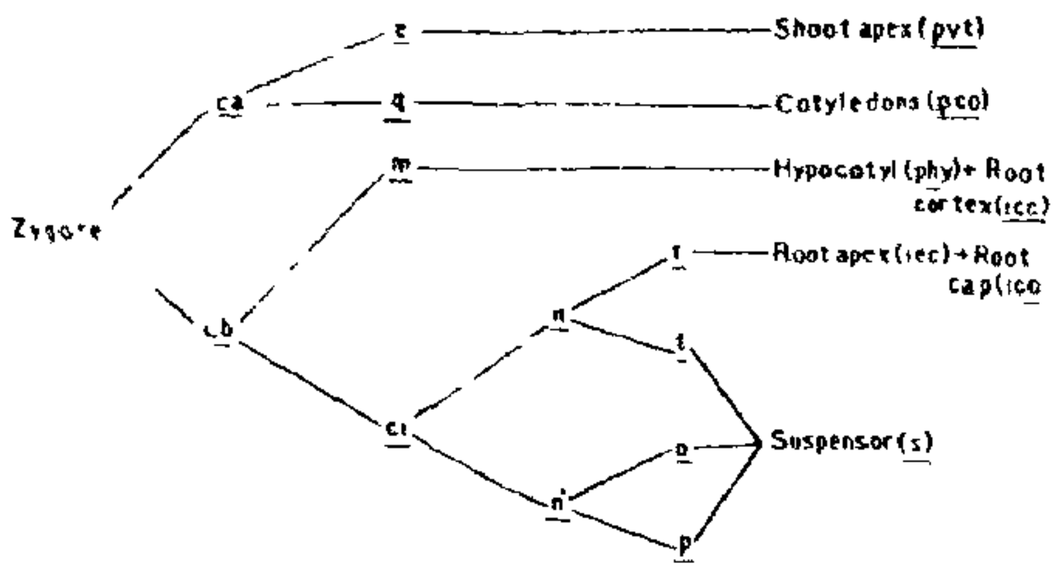
Thus, the derivatives of both *ca* and *cb* are involved in the genesis of the embryo proper. The shoot apex is organised from the derivatives of the epiphyseal cell *q*, whereas the cotyledons are from the other cells of the tier *q*. The tier *m* and its derivatives organise the hypocotyl and root cortex. The root apex and root cap are derived from the derivatives of the tier *r*, whereas the *t*, *o* and *p* together function to form the suspensor. Thus the embryogeny keys out to the Geum variation of the Asterad type of Johansen[3] and corresponds to the Period I, Megarchetype II and



Figures A–M. *Lycopsis orientalis* Linn. **A–M.** Stages in the development of embryo.

Series B_2 of the embryonic classification of Soueges[4]. The following schematic representation displays the differentiation of the embryonic organs from the embryonic tiers.

Among the taxa of the sub-family Boraginoideae studied earlier, *Cynoglossum officinale*[5], *Cerinthe minor*[6] and *Onosma nanum*[7] are the only members, which belong to PI, GII, MTII, B_2 series of Soueges[4] and correspond to the Geum variation of the Asterad type of Johansen[3]. Senecio variation of the Asterad type of embryogeny corresponding to PI, GI, MTII, A_1 series has been reported hitherto in *Lycopsis*



arvensis[2], whereas the present study of *Lycopsis orientalis* lucidly shows that the embryogeny agrees with PI, GII, MTII, B_2 series corresponding to the Geum variation of the Asterad type, which is recorded for the first time in this genus.

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A COMPARISON OF LIPID SYNTHESIZING CAPACITY IN ELONGATING FIBRES OF TWO COTTONS DIFFERING IN LINT LENGTHS

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LITERATURE on cell physiological mechanisms regulating the extent of cotton fibre growth is scanty. Cotton fibres measure 1000–3000 times longer than their diameter membrane lipids are synthesized in large quantities during fibre growth. Among genotypes of cultivated *Gossypium* species, variability exists in terms of mean fibre length. A relationship between lipid synthesizing capacity and the capacity for fibre production is possible. The presence of various types of lipids has been ascertained in developing fibres[1-6] In the present communication, a comparison of (1—^{14}C) acetate incorporation into lipids in elongating fibres of *Gossypium arboreum* L. *cv.* LD 133 (a short staple type) and *Gossypium hirsutum* L. *cv.* LH 372 (a long staple type) has been made.

Bolls from field-grown cotton plants were harvested at 10 and 20 days after synthesis (DAA). 10 g of fibres were placed in 3.0 ml of the incubation medium containing 3 μCi of (1—^{14}C) acetate (specific activity 46.15 mCi/m mole) and 0.15 mM chloramphenicol. The incubations were carried out under aerobic conditions with shaking at 30°C for 4 hr in the dark. Aseptic conditions were maintained. (1—^{14}C) acetate was purchased from the radioisotopic division of BARC, Trombay, India. At the end of the incubation period, the liquid medium was poured out and the fibres were given repeated washings with distilled water to remove adherent radioactivity. The cold extraction method of Folch *et al.*[7] was used for the extraction of total lipids. The solvent partition method of James and Morris[8] was used for the separation of polar and nonpolar lipids. Radioactivity in polar and non-polar lipids was measured using a dioxane based and a toluene based scintillation fluid respectively on Packard Tri-carb scintillation spectrometer Model 3330.

Rate of (1—^{14}C) acetate incorporation into lipids is greater in the fibres of the long staple cultivar than the short staple one (table 1). The incorporation of label in total lipids at 10 and 20 DAA is 47.8% and 12.7% higher in the long fibres as compared with the short fibres. Inspection of radioactivity incorporated in individual polar and nonpolar lipids again reveals greater incorporation in long fibres at the two stages. In both cultivars, the majority of the label is incorporated in polar lipids at the two stages. At day 10, the