DEVELOPMENT OF ENDOSPERM IN *ROCHELIA STYLARIS* BOISS.

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BORAGINACEAE is a family of considerable embryological interest, especially because of the diversity in development of endosperm. Hitherto eight variants have been recorded, viz. *Borago*, *Lycopsis*, *Echium*, modified *Echium*, *Lappula*, *Cynoglossum*, *Myosotis* and *Heliotropium* types[1–5], which basically belong to either the nuclear or the cellular norm of endosperm ontogeny[4]. While studying the endosperm in several members of this family another deviation was observed in *Rochelia stylaris* Boiss, about which no embryological information is available. The endosperm in this taxon conforms to the cellular type, and its ontogeny is detailed below.

The floral material was collected at Srinagar and fixed in FAA. Paraffin sections were cut at 8–10 μm thickness and stained with haematoxylin by the usual methods.

The first division of the primary endosperm nucleus is accompanied by a transverse wall resulting in a smaller, micropylar, and a larger, chalazal, chambers. The next and subsequent divisions in the micropylar chamber are followed by vertical and oblique walls, resulting in a massive tissue in the micropylar region. The chalazal chamber also divides vertically, forming two cells (figure 1). A few free nuclear divisions occur in these cells, but at the globular stage of the embryo the partitioning wall disappears, as a consequence of which the nuclei become aggregated in the periphery of the restored chalazal chamber (figure 2). The endosperm cells in the micropylar chamber have dense cytoplasm and conspicuous nuclei. Even after the organization of a massive endosperm in the micropylar region, the chalazal region shows very few nuclei. The mode of cellularization in this region is discernible only at the heart-shaped stage of the embryo (figure 3).

Endosperm development in *R. stylaris* resembles the *Cynoglossum* type[3] in its first division and much later stages of development. However, in the manifestation of a complete vertical wall during the first division of the chalazal chamber, it differs even from this type, where an incomplete wall was reported[3]. Since this mode of development does not show total similarity with any of the existing types of endosperm development in the Boraginaceae, and being a new variation observed for the first time in the genus *Rochelia*, it can be recognized as the *Rochelia* type of endosperm development in this family.

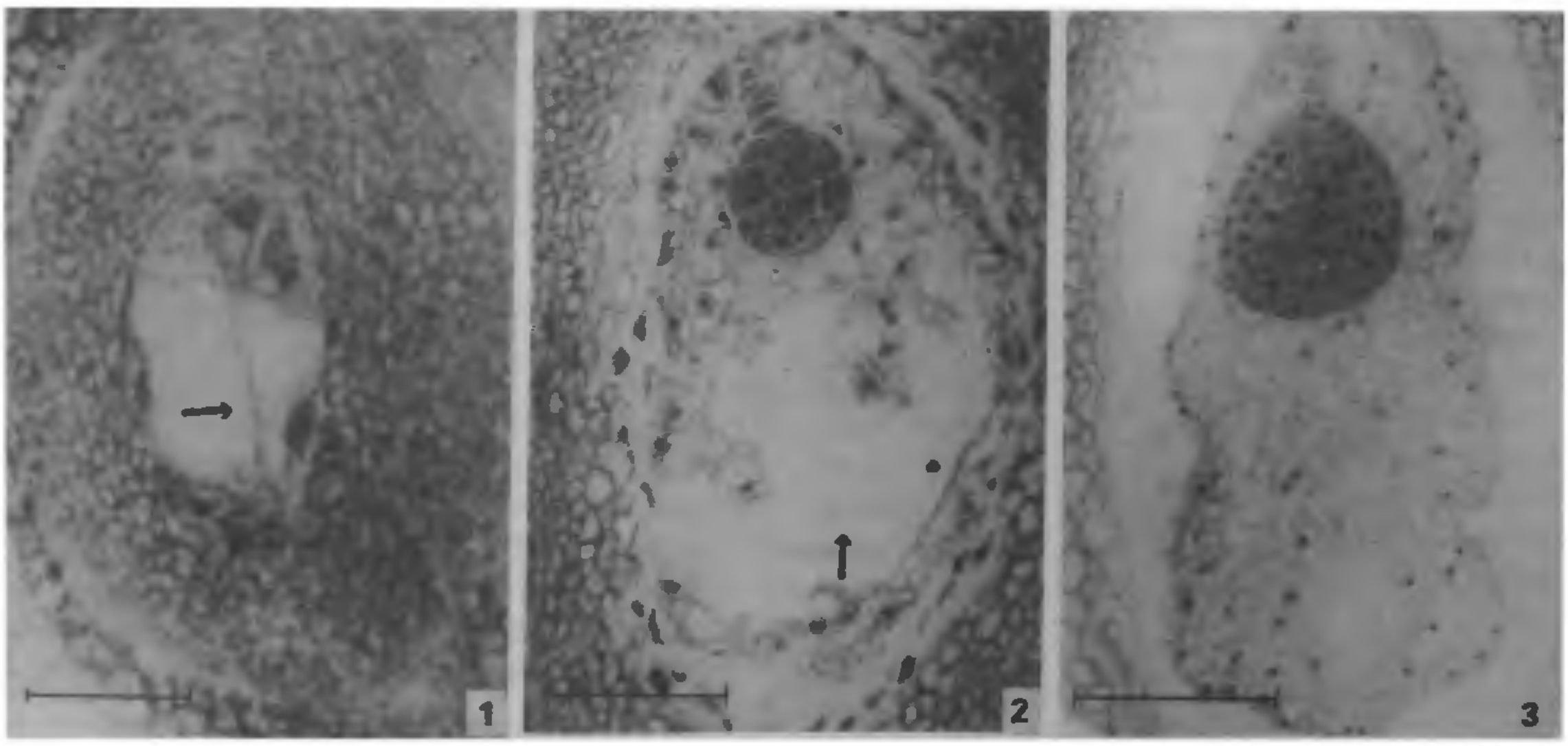

Figure 1–3. Endosperm development in *Rochelia stylaris* Boiss. **1,** LS of endosperm; arrow indicates complete vertical partition in the chalazal chamber. **2,** LS of endosperm; arrow indicates a large vacuole in the chalazal region. **3,** LS of well-developed endosperm. Bar represents 0.05 mm.

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SEM STUDY OF COROLLA TUBE AND POLLEN GRAINS OF *NYCTANTHES ARBOR-TRISTIS* L.

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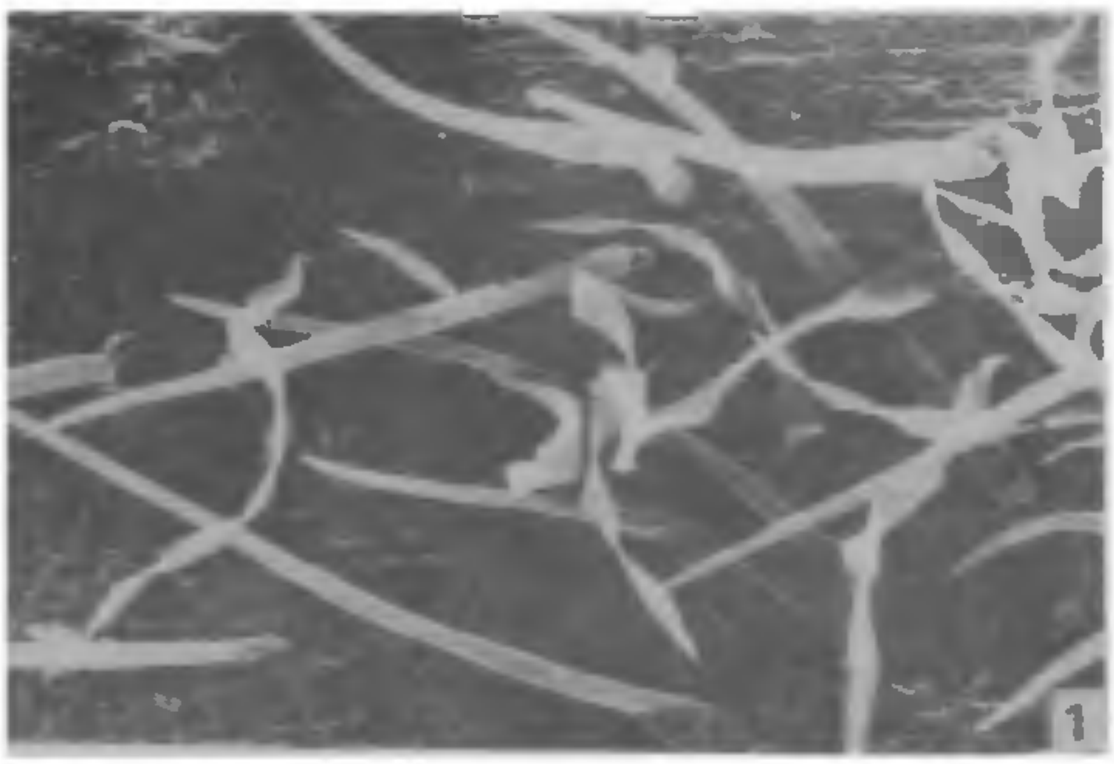
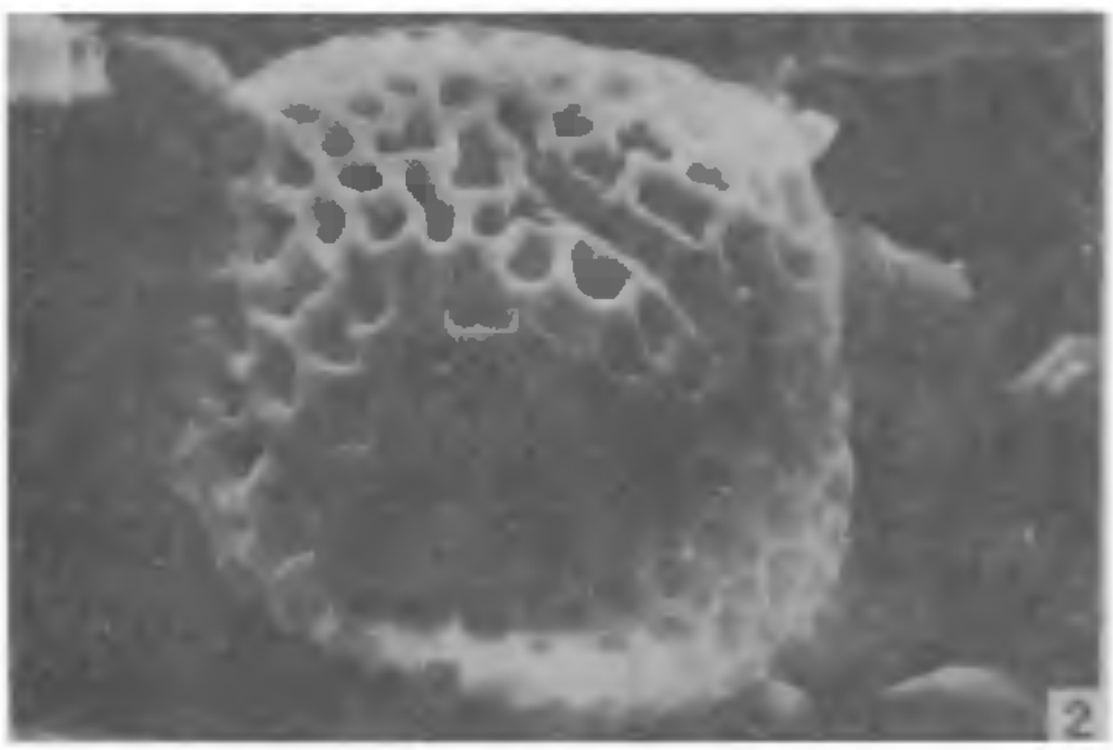
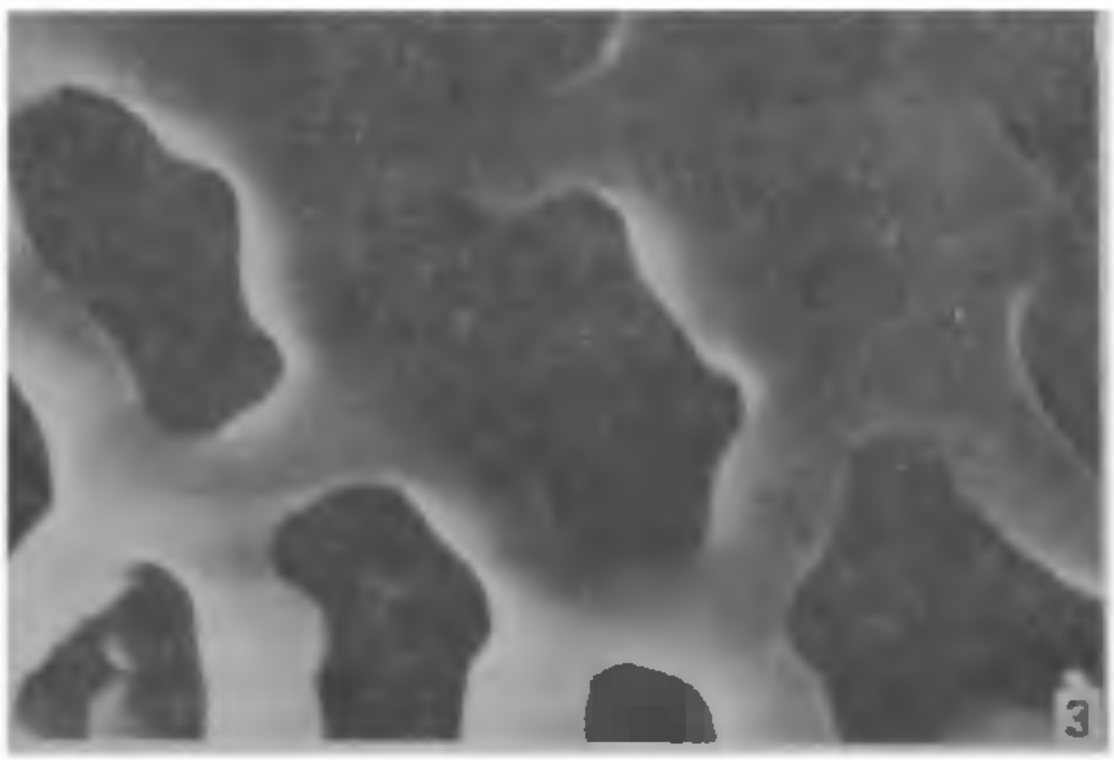
SCANNING electron microscopy allows a better look at the corolla tube and pollen grains of plants. The present study is aimed at assessing the often-emphasized importance of corolla tube and pollen grain studies *vis-a-vis* their systematic significance[1–3]. For this purpose *Nyctanthes arbor-tristis* L. was selected in the first instance as the orange-coloured corolla tubes of *N. arbor-tristis* are often employed for adulterating commercial saffron (styles and trifid stigmas of *Crocus sativus* L.).

The corolla is salver-shaped and comprises 5–7 white, contorted lobes crowning an orange-coloured tube. The length of the coloured corolla tubes of *N. arbor-tristis* varies from 1 to 1.5 cm. Stamens are epipetalous. On the inner border of the corolla tube are present unicellular hairs, restricted to the lower end of the corolla tube (figure 1). Anthers are bilobed, each lobe having two pollen sacs in which characteristic pollen grains are found (figure 2). The tricolpate pollen grains are spherical (figure 2), with smooth intine. The exine surface shows a unique architectural pattern (figure 3), with muri winding and simple swollen ends. The lumina, varying in shape and size, are generally polygonal[4] and provided with bacules (figure 3).







Figures 1–3. Scanning electron micrographs of *N. arbor-tristis*. **1**, Inner surface of corolla tube showing unicellular hairs (× 150). **2**, Pollen grains (× 2000). **3**, Exine of pollen grain (× 12000).

Notably, genuine saffron consists of the 'trifid stigma plus portion of the style' of *C. sativus*, the flowers of which have the typical morphology of those of the family Iridaceae. The three stigmatic lobes possess unique-looking long and short papillae, in which are lodged the distinctly spherical and