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EMBRYO SAC DEVELOPMENT IN SCILLA PERUVIANA L.

The two genera Scilla and Endymion were merged into a single genus Scilla for some time. Chouard (1931, 1934), however, restored Endymion to its former status so that the old genus Scilla of Linnaeus is now subdivided into Urgenia (Steinh.) Baker; Scilla (L.) Baker Emend. Chouard and Endymion (Dum.) Chouard. Two species of Endymion, E. hispanicus (= Scilla hispanica) and E. non-scriptus (= Scilla non-scripta) show a bispotic 8-nucleate embryo sac developed from the upper dyad cell, while the lower one develops up to the 4-nucleate stage finally forming the antigone. In the embryologically known species of Scilla, S. indica (Govindappa and Sherriff, 1951; Sulbha, 1954), S. hyacinthina (Sulbha, 1954), S. autumnalis (Battaglia, 1958) and S. pratensis (Battaglia and Feeley, 1959) and Urgenia indica (Capoor, 1937), a Polygonum type of embryo sac development has been reported. Battaglia and Feeley (1959) expressed the opinion that species of Scilla follow the Polygonum type of embryo sac development and those of Endymion conform to the special bispotic Endymion type. The present embryological study was endeavoure to trace the embryo sac development in Scilla peruviana L., a Mediterranean species, and to examine its bearing on its systematic position.

The tricarpellary ovary is superior, syncarpous and trilocular. Septal nectaries are present in the ovary and their pockets are lined with glandular cells (Fig. 11). A point of interest is the occurrence of abundant raphides in the crystal sacs of all the floral parts. The numerous anatropous, bitemginal and crassuncellar ovules are collaterally borne on axile placentae (Fig. 11).

Figs. 1-11. Fig. 1. Ls. young ovule showing megasporo mother cell and the parietal cell, × 30. Fig. 2. Ls. nucellus showing linear tetrad of megasporas, × 50. Fig. 3. Ls. ovule showing dyad cells under division, × 30. Fig. 4. Ls. ovule showing the chalazal megasporo functioning and other degenerating, × 30. Fig. 5. Ls. ovule showing 2-nucleate embryo sac. Note the vacuolated and radially enlarged nucellar epidermal cells, × 50. Figs. 6. 7. 8. Four and eight-nucleate embryo sac, × 50. Fig. 8. Ls. ovule showing the mature embryo sac, hypostase, enlarged nucellar epidermal cells and funicolar obturator, × 20. Fig. 9. Ls. part of ovule showing mature embryo sac, funicolar obturator and the radially enlarged nucellar epidermal cells, × 25. Fig. 10. Chalazal part of the ovule showing hypostase, hypertrophied antipodal and polar nuclei, × 50. Fig. 11. Cs. Ovary. Note septal nectary, × 3. (ant. antipodal; eg. egg apparatus; es. embryo sac; il. inner integument; ob. funicolar obturator; ol. outer integument; ov. ovules; hy. hypostase; p. polar; sm. septal nectary.)

A single hypodermal archesporial cell differentiates about the time the integumentary primordia begin to make their appearance. The archesporial cell cuts off a parietal cell (Fig. 1) which divides anticlinally and the derivatives thereupon divide
periclinally. The megaspore mother cell undergoes the two meiotic divisions to procreate a tetrad of megaspores of which the chalazal only functions (Fig. 4). The tetrad of megaspores is either linear (Fig. 2) or T-shaped (Fig. 3). The nucleus of the chalazal megaspore undergoes the three free nuclear divisions resulting in an 8-nucleate embryo sac (Figs. 5, 6, 7), while the three micropylar ones degenerate (Fig. 4). The embryo sac development, therefore, is of the Polygonum type.

During the development of the female gametophyte there is a considerable enlargement leading to the destruction and absorption of the cells of the nucellus all around except at narrower chalazal part of the embryo sac (Figs. 8, 9). The persisting nucellar epidermal cells enlarge radially and the cells become highly vacuolated. The mature embryo sac shows the 3-celled egg apparatus, the two polar nuclei, which fuse in the vicinity of the antipodinal cells resulting in the secondary nucleus, and the three antipodal cells which become hypertrophied and occupy the narrow chalazal part of the embryo sac (Figs. 8, 9, 10). A hypostase is discernible at the organised embryo sac stage (Fig. 8). In some preparations one or two antipodal cells were found to degenerate (Figs. 8, 9).

About the time the embryo sac matures a funicular obturator was found to be differentiating (Figs. 8, 9), a feature which does not seem to have been recorded for embryologically known species of *Scilla*.

From the evidence so far available, it is obvious that the type of embryo sac development seems to favour the treatment of *Scilla* and *Endymion* as distinct genera.


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