TABLE 1

*Days taken to attain $Chl_{50}$ and $HMS_{50}$ stage in petiolated and depetiolated leaves, maintained at 25° + 1° C during postharvest storage*

| Treatments | Parameters | |
|---|---|---|
| | $Chl_{50}$ | $HMS_{50}$ |
| Petiolated | 35 | 33 |
| Depetiolated | 42 | 44 |

Each value represents an average of four replicates.

The greater radiation sensitivity of DP leaves is yet another important, though surprising, observation in the present study. Metabolic status of the tissue, often identified by its respiratory activity during post-irradiation period, is known to control the development of radiation effect. The latter, in a high water containing system like leaf in our case, is primarily an indirect' radiation event. A relatively higher radiation effect *vis-a-vis* lower respiratory rate (unpublished) observed here in DP leaves is, however, opposed to the observations of Sreenivasan *et al*[13] in skin-coated fruit showing lower oxygen uptake.

Our results, thus, indicate the potentiality of a dose-dependent regulation of senescence in betel leaf by gamma radiation.

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1. Mishra, S. D. and Gaur, B. K., *Science*, 1970 **167**, 387.
2. Rao, I. M. and Swamy, P. M., *Indian J. Exp. Biol.*, 1977, **15**, 806.
3. Mishra, G. and Biswal, U. C., *Bot. Gaz.*, 1973. **134**, 5.
4. IAEA/FAO/WHO Symp. Section: Control of Physiological changes in Plants. IN: *Food Preservation by Irradiation*. Vol. I STI/Pub/470/ISBN/92-0-010278-6, IAEA, Vienna, 1978, pp. 63.
5. Thomas, P. and Janve, M. T., *J. Food Sci.*, 1973, **38**, 1149
6. Gordon, S. A., *Q. Rev. Biol.*, 1957, **32**, 3.
7. Gordon, S. A., Gaur, B. K. and Woodstock, L., *Rad. Bot.*, 1971, **11**, 453.
8. Gaur, B. K. and Notani, N. K., *Int. J. Rad. Biol.*, 1960, **2**, 257.
9. Machaiah, J. P., Vakil, U. K. and Srinivasan, A., *Environ. Exp. Bot.*, 1976, **16**, 131.
10. Mishra, S. D., Mathew, T., Joshi, R. K. and Gaur, B. K., *Environ. Exp. Bot.*, 1980, **20**, 213.
11. Richmond, A. E. and Lang, A., *Science*, 1957. **125**, 650.
12. Nirale, A. S. and Gaur, B. K., *Bull. Rad. Protection*, 1980, **3**, 77.
13. Srinivasan, A., Thomas, P. and Dharkar, S. D., In: *FAO/IAEA Symp. on 'Disinfestation of fruits by irradiation'*, Vienna, Dec. 7-11, 1970, pp. 55.


## OCCURRENCE OF PROTEINACEOUS MASS OF SPHERULAR ORIGIN IN THE SIEVE CELLS OF *ARAIOSTEGIA PULCHRA* (DON) COPEL

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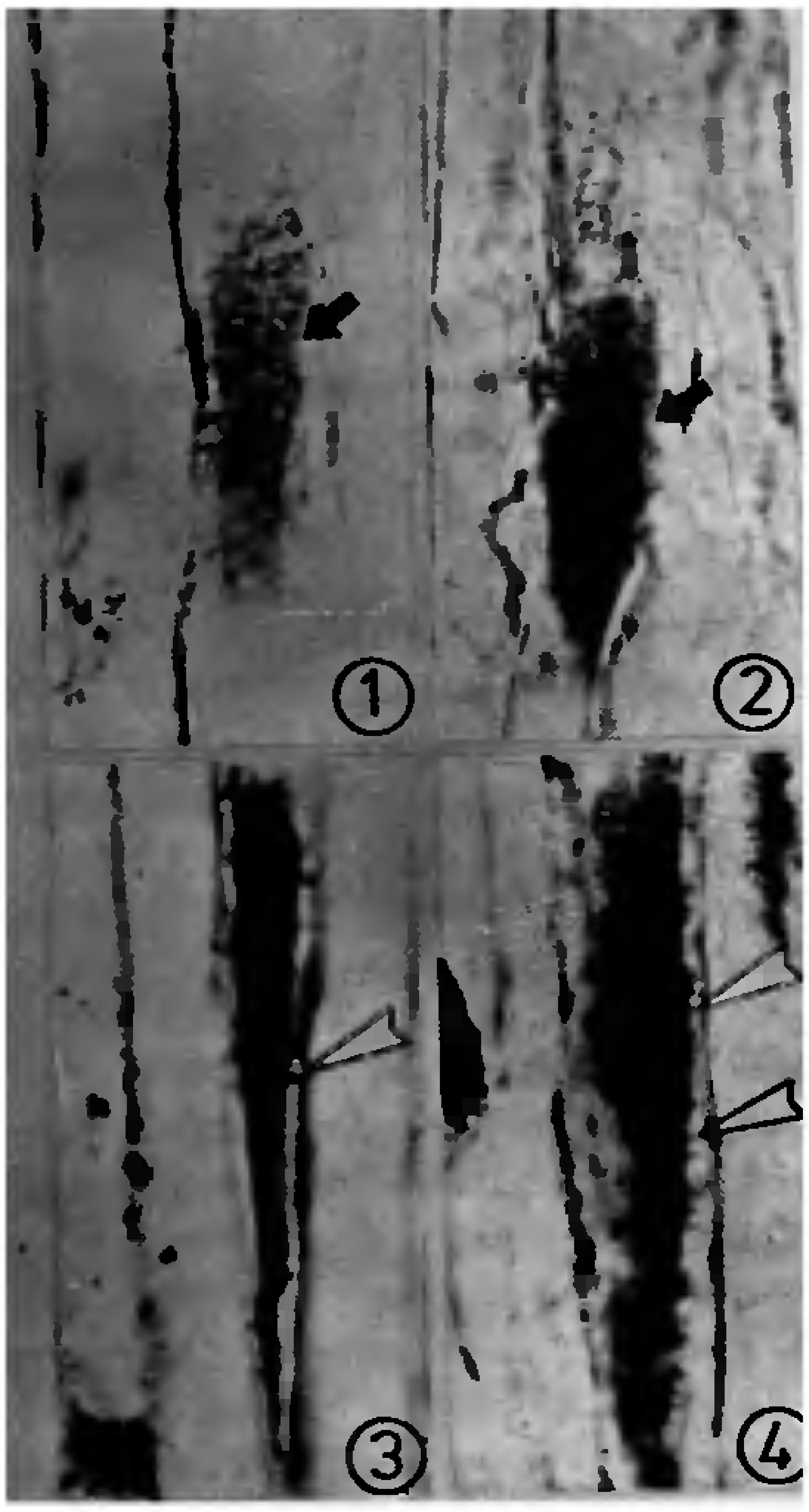
REFRACTIVE spherules present in the sieve cells of ferns form an unique type of cytoplasmic inclusion[1]. In electron microscopy, the refractive spherules appear as electron dense regions surrounded by an unit membrane[2]. In light microscopy, they appear as round bodies without any envelope, though Fotedar[3] reported the presence of a peripheral envelope surrounding the spherules in *Angiopteris evecta*. In fixed material the refractive spherules generally appear accumulated at the sieve areas of the lateral and end walls. Normally, they remain unchanged throughout the life of a sieve cell. However, in some polypodiaceous ferns[4], *Botrychium*[5] and *Equisetum*[6] degenerating stages of spherules are reported. During the study on the structure and development of phloem in pteridophytes, an unusual behaviour of spherules in the sieve cells of *Araiostegia pulchra* (Don) Copel. (Davalliaceae) is observed.

Sieve cells of the metaphloem show aggregation of spherules near the end wall (Figures 1 and 2). This aggregation gradually leads to the formation of a homogenous proteinaceous mass (tested with mercuric bromphenol blue[7]), wherein the identity of the individual spherules is lost (Figures 3 and 4). The peripheral sieve cells show only the transformed mass, whereas, the innermost sieve cells exhibit the aggregation of spherules at the end walls. This suggests that the transformation is a gradual process, since the successive stages could be traced from the inner most sieve cells to the peripheral ones. The proteinaceous material occludes the sieve pores at end walls and lateral walls (Figure 4, at arrowheads). It is possible that in a normal sieve cell, the transformation of




**Figures 1–4.** Longitudinal sections of the rhizome of *Araiostegia*. (× 1023). **1.** Sieve cells showing aggregation of spherules near the end wall. **2.** Transformed mass showing proteinaceous nature. **3, 4.** Amorphous proteinaceous mass near the end wall. Note the proteinaceous material occluding the pores (Arrowheads).

spherules occurs in the lumen of the sieve cell. The accumulation of the transformed mass at the end wall in the fixed material is probably due to trauma, reminiscent of the behaviour of P-protein in the sieve elements of higher plants. It is presumed that as the spherules occlude the sieve pores in some cases, the proteinaceous mass thus formed also might plug the pores at end walls and lateral walls.

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1. Parthasarathy, M. V., *Sieve element structure in Transport in plants I Phloem transport*, (eds) Zimmermann, M. H. and Milburn, J. A., Springer Verlag, New York, 1975.
2. Perry, J. W. and Evert, R. F., *Am. J. Bot.*, 1975, **62**, 1038.
3. Fotedar, R. L., Ph. D. Thesis, Sardar Patel University, Vallabh Vidyanagar, Gujarat, 1976.
4. Evert, R. F. and Eichhorn, S. E., *Planta*, 1974, **119**, 319.
5. Evert, R. F., *Israel J. Bot.*, 1976, **25**, 101.
6. Dute, R. R. and Evert, R. F., *Am. J. Bot.*, 1977, **64**, 421
7. Mazia, D., Brewer, P. A. and Alfert, M. *Biol. Bull.*, 1953, **104**, 57.

## EMBRYOLOGY OF *COREOPSIS LANCEOLARIA* LINN

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A SEARCH of the available embryological literature reveals that *Coreopsis lanceolaria* Linn. of the tribe Heliantheae of the family Compositae has not been investigated embryologically and hence the present investigation was undertaken.

The structure and development of the anther and male gametophyte present usual features and resemble the members investigated earlier[1-4] and hence a detailed description is omitted.

The ovary as characteristic of Compositae is bicarpellary syncarpous and unilocular with a single basal anatropous, unitegmic and tenuinucellate ovule. The ovule arises as a papillate out growth from the base of the ovary in which the archesporial cell becomes differentiated. Anti-and periclinal divisions of the epidermal and hypodermal cells on the adaxial side of the ovule lead to the unilateral growth and the apex of the ovule first assumes a position at right angles to the funicle and then comes to lie parallel to it in the typical anatropous form (Figure 1, 5). The innermost layer of the integument becomes differentiated as the integumentary tapetum. It remains uniseriate with uninucleate cells through out its further growth till it is completely absorbed by the growing embryo sac and later by the growing embryo. The female archesporium is hypodermal and unicellular (Figure 1). It directly functions as the megaspore mother cell (Figure 2) and undergoes meiotic divisions producing a linear tetrad of megaspores (Figure 3). The Chalazal megaspore of the tetrad becomes functional and the three micropylar ones degenerate. The functional megaspore undergoes three mitotic divisions resulting in an eight nucleate embryo sac of the Polygonum