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MICROSPOROGENESIS AND DEVELOPMENT OF MALE GAMETOPHYTE IN *ANISOMELES INDICA* (LINN.) O. KZE.

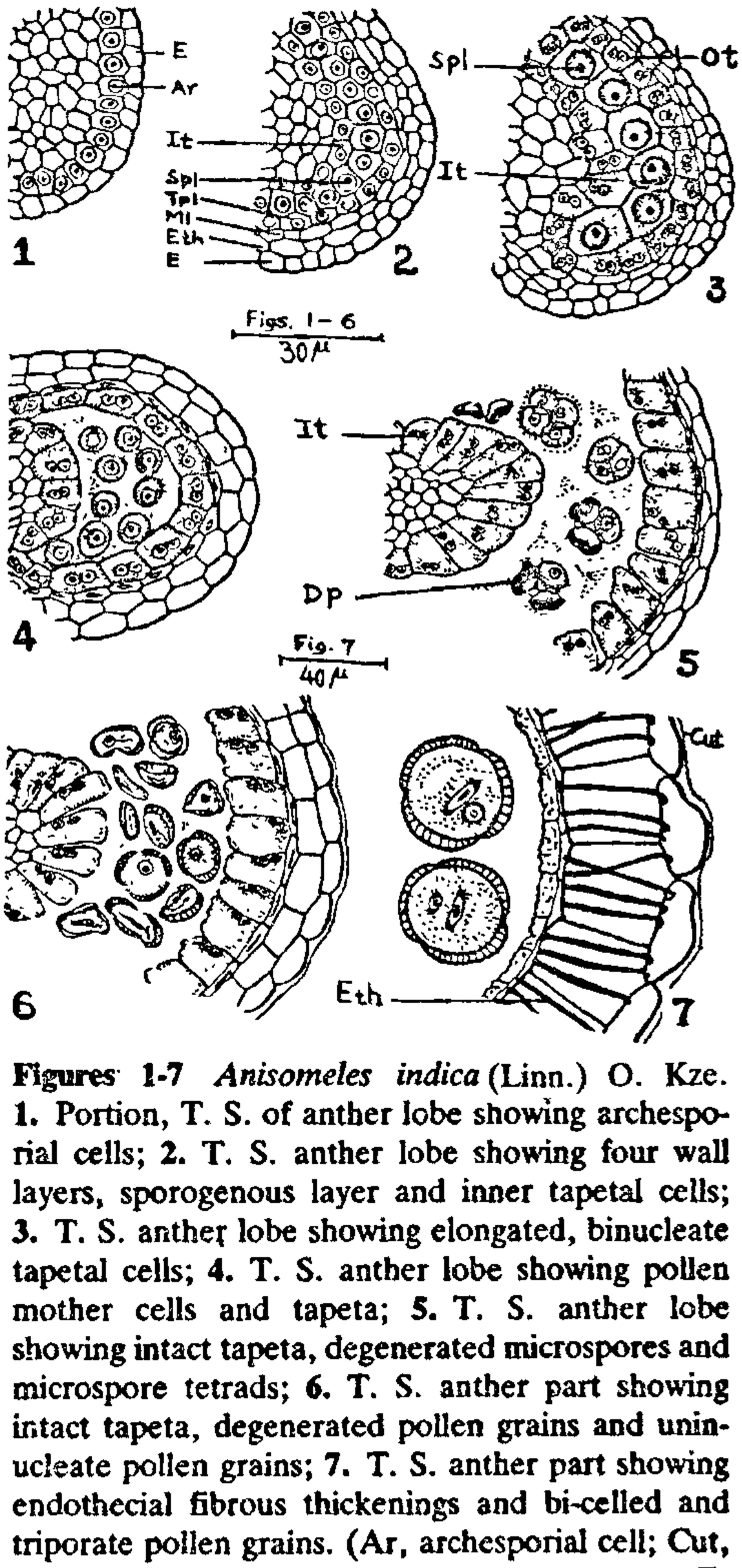
N. K. DWIVEDI

Botany Department, University of Jodhpur, Jodhpur 342 001, India.
Present address: Mulberry Breeding and Genetics Section, Central Sericultural Research and Training Institute, Mysore 570 008, India.

ANISOMELES INDICA belongs to the sub-tribe Lamieae and tribe Stachydeae of Lamiaceae. Megasporogenesis and development of female gametophyte, endosperm, embryo, seed and fruit have been reported in this taxon[1,2]. The present note deals with the microsporogenesis and development of male gametophyte.

Floral buds and flowers in different stages of development were collected from Mount Abu and fixed in FAA. Sections were cut at 4-10 μ following standard techniques and stained with the combinations of Heidenhain's ironalum haematoxylin and safranin-fast green.

The anther is dithecus. In transection, the young anther is rounded in outline and comprises a homogenous mass of cells bound by a well-defined epidermis. It soon reveals a four-lobed appearance and in each lobe some hypodermal cells become more prominent than the rest because of their large size, radial elongation and conspicuous nuclei (figure 1). These cells undergo periclinal division and produce an outer parietal layer towards the epidermis and an inner primary sporogenous layer towards the interior of the anther. Periclinal division in the primary parietal layer results in the formation of two secondary parietal layers. The outer secondary parietal layer divides again to cut outer endothecium and inner middle layer, while the inner one functions directly as the tapetum. Thus the anther wall now consists of four layers viz. epidermis, endothecium, middle layer and tapetum (figure 2). At this stage, the connective cells lying just inner to the primary sporogenous layer diffe-



Figures 1-7 *Anisomeles indica* (Linn.) O. Kze. **1.** Portion, T. S. of anther lobe showing archesporial cells; **2.** T. S. anther lobe showing four wall layers, sporogenous layer and inner tapetal cells; **3.** T. S. anther lobe showing elongated, binucleate tapetal cells; **4.** T. S. anther lobe showing pollen mother cells and tapeta; **5.** T. S. anther lobe showing intact tapeta, degenerated microspores and microspore tetrads; **6.** T. S. anther part showing intact tapeta, degenerated pollen grains and uninucleate pollen grains; **7.** T. S. anther part showing endothecial fibrous thickenings and bi-celled and triporate pollen grains. (Ar, archesporial cell; Cut, cuticle; Dm, degenerated microspores; E, epidermis; Eth, endothecium; It, inner tapetum; Ml, Middle layer; Ot, outer tapetum; Spl, sporogenous layer).

rentiate into a distinct inner tapetal layer (figure 2). Initially, the tapetal cells are uninucleate but later they enlarge in size and become binucleate (figure 3). Concomitant with the differentiation of the outer tapetal layer, the connective cells, situated laterally at the two ends of horse shoe-shaped sporogenous cell plate also develop and join the outer tapetum with the inner one (figures 3 and 4). Thus, a continuous tapetum is organized but it has a distinct dual origin (figure 4). The cells of the inner tapetum are larger than those of the outer tapetum (figures 3-5). The cells of both the tapeta remain intact upto the uninucleate pollen grain stage (figure 6). The middle layer starts degenerating during the formation of microspore tetrads (figure 5). The endothecial cells elongate radially and tangentially and acquire characteristic fibrillar thickenings (figure 7). The epidermal cells become irregular in shape and develop a thin wavy layer of cutin on their outer walls at maturity of anther (figure 7). The development of anther wall corresponds to the dicotyledonous type.

The primary sporogenous cells by further divisions give rise to pollen mother cells which undergo meiotic divisions to produce tetrahedral (79%) and decussate (21%) types of microspore tetrads (figures 4 and 5). The cytokinesis is by furrowing. Degeneration of one to four microspores in an individual tetrad is observed (figure 5). Most of the pollen grains are non-viable (78%). The production of non-viable pollen grains has been associated with the delayed generation or hypertrophy of the tapetum[3-6]. The microspore nucleus divides asymmetrically to form a small generative cell and a large vegetative cell (figure 7). The pollen grains are triporate and shed at two-celled stage (figure 7). Dehiscence of the anther occurs at the junction of the pollen sacs. The endothecial cells at this region lack fibrillar thickenings and the epidermal cells are smaller in size.

Hypertrophied tapetum has not been reported in the members of the family studied so far[7-14] except in *Plectranthus mollis* (sub tribe-Euocimeae, tribe Ocimoideae)[15]. Therefore the present taxon (tribe Stachydeae) shows affinity with *P. mollis* (tribe Ocimoideae) by having this unique character of the tapetum.

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RECORD OF NATURAL ENEMIES ON THE GRAPE MEALYBUG, *MACONELLICOCCUS HIRSUTUS* (GREEN)

M. MANI, T. S. THONTADARYA* and S. P. SINGH

Division of Entomology and Nematology, Indian Institute of Horticultural Research, Bangalore 560 089, India
**No 256, 1st 'N' Block, Rajajinagar, Bangalore 560 010, India*

THE grape mealybug, *Maconellicoccus hirsutus* (Green) has assumed the form of a major pest in all the grape-growing areas of South India[1]. The report of the parasitoid, *Anagyrus dactylopii* (How) and a few undetermined species of predators is the only earlier record of natural enemies of *M. hirsutus* on grapevine[2]. During the search for the natural enemies of *M. hirsutus* during 1984–86 in Karnataka, a total of six parasitoids namely, *A. dactylopii*, *Allotropa* sp nr *japonica* Ashm, *Gyanusoidea mirzai* (Agarwal), *Alamella flava* Agarwal, *Leptopilinia* sp and *Chartocerus* sp nr *Walkeri Hayat*, and seven predators viz *Scymnus* sp, *Scymnus coccivora* Ayyar, *Cryptolaemus montrouzieri* Muls, *Chrysopa*