No. 5 Supplement

M. Feldman

ROBERT JAMES THOMAS. Thimann Laboratories, University of California, Santa Cruz, California 95064 - Carbohydrates in the seta of a liverwort sporophyte before and during elongation.

Sporophyte setae of Lophocolea heterophylla (a leafy liverwort) store sugars rather than starch. Paper chromatographic characterization of the soluble sugars in non-elongate setae reveals the presence of sucrose and a fructosan series; glucose, fructose, and two sugar alcohols, with Rf values comparable to volemitol and mannitol can also be present. Gametophytic tissue grown under similar culture conditions contains the same complement of sugars. Setae harvested during rapid elongation yield reduced amounts of fructosans and sucrose when compared to non-elongate setae; glucose and fructose are more prominent. A conversion from complex to simple sugars which can then be utilized by elongating cells is envisioned. The possibility of incorporation into the cell wall will also be discussed.

LINDA THORNE*, GEORGE P. HANSON, & DANIEL H. ADDIS. Los Angeles State and County Arboretum, Arcadia, California 91006. - Flowering and Ozone Sensitivity in Petunias.

Seeds of six F_1 hybrid multiflora Petunia hybrida differing in ozone sensitivity were planted at eight weekly intervals. Sets of seedlings consisting of one plant of each pedigree at each age level were fumigated with 0.2 ppm ozone for eight hours in a growth chamber at 27°C and 1250 ft-c. Nine sets of plants were fumigated over a two week period starting when the seedlings were 5-12 weeks old. At the time the last set was fumigated, all but the two youngest age groups showed evidence of flower bud initiation and about one-half of the plants were blooming. A petunia plant possessing an evident flower bud was much more ozone tolerant than a plant which was entirely vegetative. As soon as the flower bud became obvious, a specific number of nodes beneath the apical bud were protected from ozone damage. The number of subapical protected nodes was under genetic control and was constant irrespective of the total number of nodes present on the plant (provided that at least one flower bud was evident). Apparently, leaves borne on vegetative nodes increase in sensitivity during growth until a floral bud has been initiated or has developed to a specific stage; then, if the vegetative nodes are sufficiently close to the flowering node, they may reacquire tolerance.

J. GILES WAINES*. Department of Biology, Virginia Polytechnic Institute and State University, Blacksburg, Virginia 24061. Immediate Diploidization of Polyploid Species.

Meiotic chromosome pairing data from hybrids of diploid Aegilops and Triticum species, previously published by Dr. E. R. Sears, are interpreted to indicate that intraspecific genotypic differences control the amount of homoeologous chromosome pairing in diploid interspecific hybrids. There was immediate diploidization, with continued control of homoeologous pairing, when these hybrids were made into amphidiploids. This suggests that loci analagous to the Ph allele in hexaploid T. aestivum are already present in genotypes of diploid species and do not necessarily have to arise by mutation or translocation after polyploid formation. A genetic model for the control of homoeologous chromosome pairing is presented and the importance of this control as an isolating mechanism among diploid populations is stressed. The relevance of genes that promote and suppress homoeologous chromosome pairing at meiosis to the technique of genome analysis is discussed, especially as to the restrictions they place on the use of this technique to indicate evolutionary relationships.

Dan B. Walker* Department of Botany, University of California, Berkeley, California 94720. - Light Microscope and Scanning Electron Microscope Study of Postgenital Fusions in the Gynoecium of Catharanthus roseus.

The basal margins of the young carpel primordia infold and fuse to seal the locular cavities. Independently, the opposing distal tips of the two carpels also unite with the fusion region then differentiating into the stigma, style, and a small distal region of the compound ovary. The basal ovary regions of the two opposing carpels remain unfused leaving the tip fusion spatially restricted. In the regions of contact, the epidermal cells progressively dedifferentiate by initiation of periclinal cell divisions and by loss of the distinctive form characteristic of the unfused epidermal cells. In the fused stigma these former epidermal cells subsequently redifferentiate into transmitting and secretory tissues; in the fused stylar region these cells experience a tremendous expansion in length while forming stylar transmitting tissue; but in the compound ovary region corresponding cells undergo little expansion or redifferentiation. As viewed with the light microscope, the loss of epidermal features or the occurrence of periclinal cell divisions in the epidermis is a definitive indication that cells have fused postgenitally. However, studies with the transmission electron microscope are necessary to define the mechanism of a postgenital fusion.

Dan B. Walker* Department of Botany, University of California, Berkeley, California 94720. - Fine Structure of the Postgenital Fusion between the Carpel Tips of Catharanthus roseus.

Prior to contact, the epidermal cells on the adaxial carpel faces, although meristematically active, display little evidence of cell wall material deposition. With TEM, the outer tangential wall appears homogeneous except for two, 10-15 nm wide bands at the outermost boundary. With SEM, the unfused epidermal surfaces possess a thin covering which is soluble in chloroform and freon but which can be stabilized by treatment in osmium tetroxide. This "cuticle" apparently corresponds to the outermost 10 nm wide band as viewed with TEM. During fusion, the convex external cell walls of the opposing epidermal layers become appressed at random forming intercellular spaces at some locations, but no interlocking of cells occurs. Where the cells are closely appressed, extensive cytoplasmic activity indicates that modification of the walls occurs, probably by the activity of the RER and/or the Golgi apparatus. This conspicuous cytoplasmic activity and the appearance of periclinally divided cells occur very soon after contact. Following the completion of fusion, the united cell walls can be distinguished by their double thickness, the trapped cuticles, a dark layer underlying each cuticle, and a lack of plasmodesmata. Newly deposited wall material is especially visible between the limits of the cuticles and probably represents matrix wall components rather than fibrillar cellulose. The deposition of these matrix components apparently effects adhesion of the contacting cell walls.

This is the abstract of a paper "A model for the origin of diploidizing mechanisms in polyploid species" which has been accepted by American Naturalist. Aliza Vardi has a copy of the draft — you might care to look at it. I look forward to seeing you in 1976. Come and visit California!