BOTANY

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ABSTRACTS

The Effect of Abscisic Acid on Membrane Aggregation and Fusion. Blair Brengle, William Stillwell and Stephen Wassall, Departments of Biology and Physics, Indiana University-Purdue University at Indianapolis, Indianapolis, Indiana 46223.——Abscisic acid (ABA) is shown to enhance the rate of aggregation of sonicated phospholipid vesicles as measured by a change in light scattering. ABA-induced aggregation was measured for phosphatidylcholine liposomes below the phase transition temperature when a second membrane component (phosphatidylethanolamine, phosphatidylglycerol, phosphatidic acid, stearylamine) was added. Pure phosphatidylcholine bilayers as well as mixed component bilayers above their phase transition remain stable in the presence of ABA. Factors upon which aggregation is dependent include the concentration of ABA, the concentration of the second membrane component, and the pH of the surrounding solution. The extent to which ABA enhances membrane fusion has been measured using spectrofluorometric assays. These findings further support our hypothesis that ABA is causing perturbations in the membrane by interacting with bilayers at the regions of interface between two different phospholipids.

Effect of Inductive Photoperiods on Cannabinoid Biosynthesis in Seedlings of *Cannabis sativa* L. (Cannabaceae). O. P. Caracci and C. T. Hammond, Department of Biology, Saint Meinrad College, St. Meinrad, Indiana 47577.——Recent interest in cannabinoid production using seedling systems prompted our investigation into the effect of inductive photosystems on cannabinoid biosynthesis. Cannabinoids found by thin layer chromatography of 6 day old seedlings grown under floral inductive photoperiods (light 8 hr/dark 16 hr) were compared with those found in seedlings grown under vegetative non-inductive photoperiods (light 16 hr/dark 8 hr). Tetrahydrocannabinol (THC) and cannabichromene (CBC) biosynthesis were found to be comparable, but a significant inhibition was seen in cannabigerol (CBG) production. Seedlings grown under inductive cycles whose leaf lengths averaged less than 4 cm showed no trace of CBG production while there was significant CBG production in non-inductive seedling control groups. Cannabidiol (CBD) is absent in our Mexican strain.

Micropropagation of Rare and Endangered *Hippeastrum* (Amaryllis) Species. Ellen A. G. Chernoff, Department of Biology, Indiana University-Purdue University at Indianapolis. Indianapolis, Indiana 46223.——A joint project has been undertaken with plantsman Steve Lowe at the San Antonio Zoological Gardens to propagate rare and endangered *Hippeastrum* (formerly *Amaryllis*) species in tissue culture. Habitat in South and Central America is rapidly disappearing for many of these showy petaloid bulbous monocots. Many of the species involved are the parental stock, many generations removed, of the large hybrid "amaryllises" grown commercially by Dutch, South African, and U.S. bulb companies. The eventual aim of this project is to provide significant numbers

of virus-free plants for distribution to botanical gardens, universities, and private collections for scientific and horticultural purposes. Twelve species are being used in this initial effort. Conditions are being used that have been shown to be successful for shoot multiplication from bulb scale explants of the large commercial hybrids. The media in use are Murashige and Skoog based with 1 mg/L each 2.4-D and BAP or 1 mg/L NAA alone. The preferred growth conditions vary from species to species. Initial results show that *H ambiguum* responds well to the 2.4-D/BAP medium while *H. evansiae, H. fragrantissima*, and *H. reginae* respond best to NAA alone.

Comparison of Iron Sources for *Pilobolus*. K. Michael Foos and Judith A. Royer, Department of Biology, Indiana University East, Richmond, Indiana 47374.——In nature *Pilobolus* is restricted to growth on dung because of its absolute requirement for chelated iron. Several synthetic media have been formulated to provide which include different sources of iron for *Pilobolus*, permitting it to be cultured away from its natural source of nutrients. Each medium reported to support growth and sporulation of *Pilobolus* has been tested on only a few isolates of the fungus. We have cultivated 24 isolates of five species on media containing three forms of chelated iron reported to support its growth. *Pilobolus longpipes* could not be satisfactorily cultivated on any of the iron sources. *Pilobolus crystallinus* and *P. kleinii* exhibited variability. Some isolates of each species grew well and sporulated on each of the iron sources, and some of the isolates did not. *Pilobolus umbonatus* grew, but produced no sporangia; *P. roridus* produced sporangia irregularly. From this study it appears that multiple iron transport mechanisms may exist in *Pilobolus*. None of the three iron sources, claimed in the literature to support growth and sporulation, universally supported the growth and/or sporulation of isolates of *Pilobolus*.

In Vitro Propagation of Pin Oak. Traci Gilland and James J. Tobolski, Indiana University-Purdue University at Fort Wayne, 2101 Coliseum Blvd. East, Fort Wayne, Indiana 46805-1499.——Three shoot multiplication media were compared for in vitro propagation of pin oak (*Quercus palustris* Muenchh.). Surface sterilized modal segments of pin oak seedlings were cultured on broad-leaved tree medium (BTM), woody plant medium (WPM), and Chu N7 medium. Stem segments on WPM medium produced a few shoots in 5-6 weeks and stem segments on Chu N7 medium produced few if any shoots. BTM gave the best results with 80% of the stem segments producing several shoots in 4-5 weeks. However, only one of these shoots formed well-developed leaves and was acceptable for rooting. Rooting of cultured shoots was attempted on either a modified BTM or Chu N6 medium. The BTM rooting medium was one-half strength salt base with 10 g/l sucrose and 0.3 mg/l indolebutyric acid. Pyridoxine and amino acids were deleted. The Chu N6 medium was supplemented was 0.5 mg/l naphthaleneacetic acid, 0.1 mg/l 2, 3-5-triiodobenzoic acid and 100.0 mg/l proline. The modified Chu N6 medium produced no rooted shoots but the BTM medium had a 20% success rate. Several rooted shoots were planted in a 1:1 peat and perlite mixture. The plantlets were acclimatized for 6 weeks and then moved to the greenhouse where growth continued very slowly.

Ultrastructure of Specialized Plastids in the Glandular Secretory System of *Cannabis sativa* L. (Cannabaceae). C. T. Hammond and P. G. Mahlberg, Department of Biology, St. Meinrad College, St. Meinrad, Indiana 47577, Indiana University, Bloomington, Indiana 47405.——Secretory glands on floral axes of *Cannabis* contain cannabinoids and possess plastids structurally and functionally unlike chloro-plastids in adjacent non-glandular cells. The secretory cavity is the site of accumulation of cannabinoids and other secreted products after synthesis in gland disk cells. The plastids in the disk cells reproduce to become the dominant organellar population concommitant with timing of maximal

secretory activity. Plastids develop an extensive paracrystalline body which completely fills the mature plastid. Structurally, the paracrystalline body resembles a prolamellar body, but is much more extensive in its development and, unlike a prolamellar body, does not become transformed into a granal thylakoid system. The organization of the paracrystalline body appears to be unique to the secretary system in *Cannabis*.

A Remarkable Purple-flowered Specimen of *Daucus carota*. THOMAS R. MERTENS, Department of Biology, Ball State University, Muncie, Indiana 47306.——Deam (*Flora of Indiana*, 1940) and others have reported that the flowers of Queen Anne's-lace vary from white to yellow with some specimens having one or more purple flowers in the inflorescence. Deam also notes that rare specimens may have rose colored flowers and that such specimens have been assigned to forma *rosea* by Millspaugh. A single purple flowered plant was found in western Randolph County, Indiana in late June, 1985. All flowers on all umbels of the plant were a deep reddish-purple. Seeds were harvested from the plant in late August, 1985 and were germinated in the greenhouse in Spring, 1986. Seedlings were transplanted to the Christy Woods Arboretum on the Ball State University campus where they matured and bloomed in June, 1987. Many of these plants bore flowers that were as intensely pigmented as those of the parent plant. Two authorities consulted report never having seen *Daucus* specimens with such deeply colored flowers.