BOTANY

Chairman: A. L. DELISLE, Notre Dame University
CHARLES W. HAGEN, Indiana University, was elected chairman for 1956

ABSTRACTS

Artificial Formation of Periclinal Polyploid Forms in Asters. II. ALBERT L. DELISLE, University of Notre Dame.—Seedlings of the common New England Aster which is widely cultivated as an ornamental were treated with the chemical colchicine to induce the formation of giant forms or polyploids. In lot A, the entire young growing tips were treated; in the other, lot B, the tip was cut medially and only one-half of it was treated.

The resulting polypoid forms showed a considerable increase in size of leaf and a significant increase in the diameter of the flowers. The polyploids produced in lot A were of two types: some total polyploids breeding true and superficial polyploids which do not breed true.

The plants of lot B whose tips were cut medially had the highest mortality and produced right-left sports or chimeras. These plants produced polyploid branches on one side and normal branches on the other. The chromosome number of the polyploids (i.e. tetraploids) was 20, that of the diploid controls was 10.

Similar treatment with colchicine was attempted on Aster ericoides without any successful results.

The Mechanism of Variation in a Strain of *Verticillium albo-atrum*. WENDELL L. GAUGER, Purdue University.

Single conidial isolates of a tomato pathogenic strain of *Verticillium albo-atrum* show variation when they are, in turn, single spored. Since the conidia of this organism are uninucleate this is taken as proof that heterocaryosis does not function as a mechanism of variation.

Mutation could account for the variation, and certain data which tend to support this theory are presented.

The Effects of Photoperiod and Temperature on the Preinductive and Postinductive Development of Spring Wheat. J. A. RIDDELL, GEORGE A. GRIES and FOREST W. STEARNS, Purdue University.—Two spring wheat varieties, Chinese and White Federation 38, differing in their season of maturity in the field, were studied under controlled conditions of 8, 12, 16, and 20 hour photoperiods at 15.5, 21.1, and 26.7° C. Both short day-lengths and high temperatures retard preinductive development as indicated both by the number of vegetative nodes differentiated and the time for induction to occur. As the day-length is increased the delaying effect of high temperatures on induction become less pronounced. High temperatures favor rapid postinductive development. Time to flowering follows the same pattern as preinductive development; however, due to the influence of temperature on postinductive growth, flowering of White Federation 38 at long photoperiods is actually promoted by high temperatures. The relative insensitvity of Chinese to both photoperiod and temperature during all phases of development and the strong accelerating effect of long days and warm temperatures on the growth of White Federation 38 results in Chinese being the earlier of the two varieties under short day—cool temperature conditions and White Federation 38 being the earlier in a long day—warm temperature environment.

The Influence of the Length of the Dark Period on the Development of Spring Wheat. GEORGE A. GRIES, J. A. RIDDELL and FOREST W. STEARNS, Purdue University.—Spring wheat plants flower earlier when the daily light-dark cycle is divided into several cycles in which the same ratio of light to dark is maintained. This earliness is apparently the result of the shortening of the dark period since brief night interruptions are also effective in reducing the time to flowering, whereas day interruptions are without effect. The shortening of the dark period results in the differentiation of few vegetative nodes prior to induction. Earlier flowering is primarily the result of the shorter time required for those plants with fewer nodes to complete postinductive development.

Host-Parasite Relations of Corn Infected with *Helminthosporium carbonum* Race I. PETER R. JENNINGS and ARNOLD J. ULLSTRUP, Purdue University.—Spore germination and initial stages of infection were similar on leaves of both susceptible and resistant single crosses, suggesting that resistance was manifested only after penetration. Extensive invasion and killing of susceptible mesocotyl and tassel neck tissues were unaccompanied by host reactions or disintegration. Mycelium ramified rapidly through thin-walled tissues which subsequently supported abundant sporulation. Comparable resistant tissues showed immediate cellular collapse resulting in shallow pit formation about penetration sites. Hyphae were completely inhibited shortly after penetration of a few epidermal and cortical cells. Lignitubers, formed in response to penetration of both susceptible and resistant mesocotyl tissue, did not impede fungus progression. Susceptible leaves showed heavy host-staining reactions and cellular collapse in advance of the fungus resulting in prominent lesions. Hyphae completely parasitized the chlorenchyma about the penetration site but did not extend to lesion borders. Resistant leaves reacted to penetration with the formation of minute chlorotic flecks. Hyphae growth was rapidly inhibited in penetrated epidermal cells but the hyphae remained viable for at least 60 days. Small, round to pear-shaped, safranin-stained droplets of unknown composition were consistently deposited in all parasitized resistant tissues. The absence of any morphological barriers in response to penetration of resistant tissues suggested that the nature of resistance of corn to *H. carbonum* is biochemical and not mechanical.

The Comparative Anatomy of Windowed Leaves of Some South African Succulents. JOHN A. JUMP, University of Notre Dame.—An example of convergent evolution is found in the windowed leaves of some South African species of *Haworthia*, *Kleinia*, and *Lithops* and some of its co-familial genera. These plants belong respectively to the Liliaceae, Compositae and Mesembryanthemaceae. The windows of *Haworthia*, *Kleina* and some species of *Lithops* are formed by the extension of the central aqueous tissue to areas of the epidermis. The window functions as a means of increasing the amount of light available to the chlorenchyma regions which are subterranean or otherwise unfavorably placed. Subepidermal lens cells provide additional internal illumination for the leaves of some species of *Lithops*. These miniature windows are regarded as a completely distinct light-gathering adaptation and not as a stage in the evolution of the large window. The distribution of lens cells and chlorenchyma in *Pleiospilos*, in conjunction with its known habitat, indicates that this genus also should be regarded as possessing a type of windowed leaf. The main vascular bundles in *Kleinia* and *Haworthia* are symmetrically placed in the chlorenchyma, close to the sides of the leaves. *Fenestraria* and *Frithia* show a large central strand which gives off branches as it passes up the center of the aqueous tissue, while *Lithops* exhibits several large strands arranged in a semicircle toward the periphery of the aqueous tissue. Stomata are absent from the window area of all species examined, except for occasional deeply sunken stomata in *Fenestraria*, although they may be quite abundant immediately adjacent to the window. The epidermal cells in *Kleinia* and *Haworthia* show comparatively little xeromorphic specialization but the windowed leaves of the Mesembryanthemaceae show great variation among the genera in their epidermal anatomy. A rather unspecialized epidermis is found in *Fenestraria*. *Frithia* has an epidermis composed of large, bladder-like water storage cells. The epidermal cells of *Lithops* usually show prominent caps of cellulose which in turn may have a papillate cap of cutin. In general the cuticle of these leaves is not especially thick. In view of the structure and function of these leaves the adjective *fenestrate* would seem to apply to them more aptly than to perforate leaves such as *Monstera* for which it is also commonly used.

Cellulose Fibrils in Meristematic Cells. J. J. NESBITT and A. T. GUARD, Ball State Teachers College and Purdue University.—The true nature of cellulose in plant cell walls could only be postulated until the electron microscope was developed. Investigations with this instrument revealed that cellulose exists in the form of long fibrils which are 250 - 400A° in thickness. Fibrils in primary walls have been reported to be intertwined with no particular orientation, while fibrils of secondary walls are supposed to be arranged parallel to one another.

A new method of specimen preparation has been developed which makes possible the study of cell walls of serial sections. When root tips of corn were examined, the apical cells were found to possess the type of fibril orientation heretofore described as characteristic only of secondary walls.

Forest Communities of Versailles State Park, Indiana. FOREST STEARNS, Purdue University.—Four stands lying within the boundaries of Versailles State Park were studied using the random pairs method. These stands represent several successional stages and in addition show the influence of varying topographic conditions. The composition of the arboreal layer is characterized briefly in the following table.

Stand	Dominant Species	Trees per Acre	Basal Area per Acre in sq. ft.	Tree species Present
Young stand "Flats" type Poorly drained.	*Acer rubrum* *Liquidamber styraciflua*	67	9.9	10
Older stand "Flats" type.	*Acer rubrum* *Fagas grandifolia* *Quercus alba* *Carya ovata*	236	191.8	16
Mixed hard-wood on south-west slope.	*Acer saccharum* *Quercus rubra* *Carya cordiformis* *Carya glabra*	191	101.1	22
Oldgrowth forest on level well drained residual soil.	*Acer saccharum* *Fagus grandifolia*	122	160.4	18

These data are presented to supplement work published in 1950 by Dr. John E. Potzger.