

BOTANY

Chairman: W. G. GAMBILL, Wabash College

H. R. Youse, De Pauw University, was elected chairman for 1952.

ABSTRACTS

Hybridization between *Aster sagittifolius* and *A. Shortii*. CHARLOTTE JO AVERS, Indiana University.—A biosystematic study of several species of closely-related asters was undertaken in 1949. The present report includes a portion of the results involving only two of the eight species under consideration.

Studies of herbarium specimens and field observations of *Aster sagittifolius* and *A. Shortii* revealed a great variation in the morphology of the two species, some of which might be due to hybridization between them. Crosses were made in 1950 and the seeds planted in the greenhouse that winter. Many of the hybrids bloomed in the fall of 1951 and appear to be highly fertile. The hybrids are intermediate in morphology although there seems to be a greater tendency for *Aster sagittifolius* characters to dominate. Backcrosses and selfings are being made now.

The chromosome number of these two species in southern Indiana is $n = 18$ with no irregularities at meiosis discernible. The artificial hybrids also show perfect pairing at meiosis which is a strong indication of the close relationship between the two parent species.

Complications in the variation patterns within these species are also introduced due to hybridization with other species in this group, all of which have the basic chromosome number of 9 or 18.

Discovery of the function of the cups of *Polyporus conchifer*. HAROLD J. BRODIE. Indiana University.—The cup-shaped structures produced by the bracket fungus *Polyporus conchifer* are not sterile as has been assumed but are splash-cups from which oidia are thrown to a distance of four feet by raindrops. New fruit bodies develop during late summer, the cup part developing first. Oidia form in the cups in dark-colored granular masses. The jelly in which the oidia are embedded swells when wetted by rain. The cup becomes filled with a suspension of oidia which, when splashed out by raindrops, germinate and produce dikaryotic mycelium. Later in the season, the flat pore-bearing pileus grows out from one rim of the cup and discharges basidiospores. During winter, the flat pileus weathers away from the cup.

Sexuality and taxonomic studies in the Bird's Nest Fungi of the genus *Nidula*. HAROLD J. BRODIE. Indiana University.—Four species only are known in the genus *Nidula* all apparently restricted to cool countries or to cool regions in warm countries. *N. candida* and *N. micro-*

carpa are found along the northwest coast of North America. Both fungi have been studied in single spore culture for the first time. They display tetrapolar heterothallism and four major differences in the growth habits of their mycelia. The mycelia of *Nidula* bear a closer resemblance to those of *Crucibulum* and *Nidularia* than to those of *Cyathus*. *Nidula emodensis* from the Himalayas is probably not a distinct species but is the same as *N. microcarpa*. *Nidula macrocarpa* from South America is very different from any other known species. The tropical forms have not been cultured as yet.

Iron deficiency in Pin Oak. I. W. CARPENTER, JR. Purdue University.—*Quercus palustris*, Pin Oak, normally grows only on acid soils, and when planted on calcareous soils often develops iron deficiency symptoms. The symptoms of iron deficiency in Pin Oak are recognized by a yellowing chlorosis of the new leaves, while the mature leaves remain green. A laboratory experiment was carried out on young Pin Oak seedlings to study the effect of pH on the availability of iron. Four concentrations of iron were used at pH levels of 5.0 and 7.0. It was found that at pH 7.0 a nutrient solution containing ten times the normal concentration of iron produced chlorosis. At pH 7.0 chlorosis was acute in a solution containing 1 ppm of iron, while the same solution produced normal plants at pH 5.0. The chlorotic condition of deficient leaves was corrected by painting the leaves with a 3% solution of ferrous sulphate. Iron deficient trees on the Purdue campus were sprayed with the same solution and the chlorotic condition of their leaves was corrected by this treatment.

Cladophora balls collected in Steuben County, Indiana.¹ FAY KENOYER DAILY, Butler University.—In June this last summer while Mr. Daily and I were collecting in the northeastern part of Steuben County, Indiana, we stopped at Long Lake where we found some "Cladophora balls" washed out on the shore and in shallow water. These are hemispherical growths about one and one-half to two centimeters in diameter and are formed from intertwining algal filaments of a felt-like nature. Slides show the macroscopic appearance of "Cladophora balls" and the microscopic nature of the algal filaments of which they are composed.

The mode of growth, habitat, classification and literature concerning collections in the United States are given.

A qualitative study of the phytoplankton of the Lagoon, Shades State Park, Montgomery County, Indiana: A preliminary report.² W. A. DAILY, Lilly Research Laboratories, and JACK S. MCCORMICK, Butler University.—This report embraces the period of time from June 12 through August 31, 1951 and is based upon 43 collections. Eighty genera representing five classes (Bacillariophyceae, Chlorophyceae,

¹ To be published in the Butler Univ. Bot. Stud.

² To be published in the Butler Univ. Bot. Stud. Vol. X.

Chrysophyceae, Dinophyceae and Myxophyceae) have so far been recorded.

Factors affecting the "waterlogging" of excised sunflower roots cultivated in liquid media. C. W. HAGEN, JR., Indiana University.—The intercellular spaces of excised sunflower roots cultured in White's solution become flooded with liquid after a variable number of weekly transfers. The "waterlogged" roots remain viable but exhibit an altered growth pattern and do not revert spontaneously to the ventilated condition. The probability of flooding of the intercellular spaces increases with the number of weekly transfers the meristem has experienced and also with the amount of growth accomplished during the preceding transfer interval. Waterlogging can be induced by infiltrating the roots with medium under reduced pressure or by growing them in media containing indole-acetic acid. Waterlogged roots can be recovered as ventilated roots by culturing for one week on media solidified with 3% agar.

Quadrat study of fifteen stands in the Early Wisconsin Drift Plain. J. JOHANNA JONES, Butler University.—Woody and herbaceous plants of fifteen stands within the Early Wisconsin Drift Plain are presented in tabular form. *Acer saccharum* and *Fagus grandifolia* are major dominants; *Ulmus americana* and *Fraxinus americana* are present in abundance. Varying percentages of other mesophytic species are present in all cases. Seventy-one woody species and more than one hundred herbaceous species are recorded. Woody and herbaceous species are correlated with climatic and edaphic conditions.

A predaceous fungus, *Sommerstorffia spinosa*. J. S. KARLING, Purdue University.—*Sommerstorffia spinosa* is a species of the family Saprolegniaceae which captures rotifers on specialized pegs and devours their content to produce zoosporangia and zoospores. So far, it has been reported only twice in the literature, once from Sofia, Bulgaria by Arnaudow in 1923 and again from Massachusetts by Sparrow in 1929. The author has found it on numerous occasions in soils of Indiana. Its thallus consists of short stiff tubular branches terminated by tapering blunt pegs which contain a highly refractive and adhesive substance. When rotifers feed on these pegs they are held fast and are unable to pull away. The pegs soon grow into the animal's body, absorb its content and eventually develop into zoosporangia. The latter form laterally biflagellate, hetercont, reniform zoospores which give rise in turn to predaceous sporelings. These capture additional rotifers and soon develop into mature thalli. Sexual reproduction consists of the formation of oogonia on short septate branches, each bearing a single egg which develops into a parthenogenic oospore.

Additional spermatophytes, mosses, and lichens of the Grants (N. M.) lava bed. ALTON A. LINDSEY, Purdue University.—A volcanic area of Tertiary and Recent age covers 220 square miles in west-central New Mexico. The rather small flora includes xerophytes, mesophytes, and hydrophytes, reflecting the wide range of habitat types, such as ice caves, volcanic cones and craters, and permanent ponds in lava. The

latter are unknown elsewhere in North America. The plant species considered most significant ecologically were discussed in a recent paper.¹

Twenty additional spermatophytes, including *Anthericum torreyi*, *Aster arenosus*, *Buchloe dactyloides*, *Koeleria cristata*, *Monarda pectinata*, *Opuntia arborescens*, *Ranunculus scleratus*, *Salvia reflexa*, and *Vitis arizonica*, bring the species of this group identified from the lava area to 122.

The 33 species of Bryophyta that were found include two genera of liverworts. Twenty-one moss genera are represented. The moss species hitherto unreported are *Brachythecium erythorrhizon*, *Bryum cuspidatum*, *Coscinodon calyptratus*, *Dicranoweisia cirrata*, *Eurhynchium diversifolium*, *Grimmia ovalis*, *Mnium serratum*, *Neckera pennata*, and *Paraleucobryum longifolium*.

Additional lichens, bringing the total identified to 22 species, are *Dermatocarpon miniatum* var. *fulvofuscum*, *Parmelia amabileana*, *Parmelia caperata* var. *subglauca*, and *Usnea scabiosa*.

A taxonomic and cytogenetic study of four perennial sunflowers. ROBERT LONG, Indiana University.—Various strains of *Helianthus grosseserratus*, *H. Maximiliana*, *H. giganteus*, and *H. Kellermanni* were grown in the experimental garden at Indiana University. The haploid chromosome number was found to be seventeen in all four species as previously reported. Artificial hybrids between *H. grosseserratus* and *H. Maximiliana*, *H. grosseserratus* and *H. giganteus*, and *H. grosseserratus* and *H. Kellermanni* were produced. The hybrids in general were intermediate between the parental species, showed few abnormalities at meiosis, and were rather highly fertile. The four species appear to be closely related from both morphological and genetic standpoints. Herbarium specimens of these species were also examined and it appears possible that hybridization may be responsible for some of the variation encountered in nature.

✓ **The vascular flora of the Ross Biological Reserve.** CHESTER W. MILLER and A. T. GUARD, Purdue University.—The Ross Biological Reserve is a tract of land consisting of approximately fifty-five acres. It is largely woodland and old fields, both of which had been grazed for many years.

All domestic animals have now been removed from the area and it is the plan to allow it to remain undisturbed except by natural influences.

With this plan in mind it was considered important to have a careful study of the plants growing there at the time of the change.

The vascular flora during the 1950 growing season was found to consist of 319 species in 227 genera and representing 84 families. Of these 43 were introduced species from countries other than the United States.

Inexpensive models and lantern slides for teaching plant science. S. N. POSTLETHWAIT, G. B. CUMMINS, G. A. GRIES, J. H. LEFFORGE, and

¹Lindsey, Alton A. 1951. Vegetation and habitats in a southwestern volcanic area. *Ecological Monographs* 21:227-253.

FOREST W. STEARNS, Purdue University.—One of the most difficult concepts for beginning botany students to grasp is that of the three dimensional structure of a plant cell. The array of teaching aids usually available to teachers, i.e. slides, diagrams, drawings, and pictures, are helpful but leave much to the imagination of the student. A few professionally produced models are available. However, the cost is frequently prohibitive and the models often do not illustrate the desired concept. A method has been devised whereby a variety of models can be prepared inexpensively from sheet plastic and without the use of elaborate equipment.

Lantern slides can be prepared rapidly and cheaply using sheet plastic and india ink and colored dye inks. These slides are especially useful in that they can be used in lighted rooms thus allowing the student to take notes during the discussion. Diagrammatic types of illustrations are particularly adaptable to reproduction on plastic and are a valuable supplement to photographic slides.

The forest primeval of Indiana as recorded in the original United States Land Survey. J. S. POTZGER, Butler University.—The study is based on a tabulation of all stems of witness trees listed by the surveyors in the U. S. Land Survey, dating from 1799 in southern Indiana to 1839 in northern Indiana. The important species in the mixed mesophytic forest cover and the oak-hickory (indicating drier habitats) are presented in terms of percentages of the total number of stems listed for a given township. Only the upland species of ash and oak are included in the percentages. Except for the nine northwestern "prairie" counties, a comparatively narrow strip along the Indiana-Michigan boundary and a few counties in the southwestern corner of the state, where oak or oak-hickory predominate, the primeval forest was chiefly of the mixed mesophytic type in which beech, several species of ash and sugar maple play the major role. In some townships beech represented 69 to 70 per cent of the trees listed, while sugar maple seldom attained an abundance of 20 per cent.

Preliminary study of the effect of topography on the distribution of sugar and black maples and their intermediate forms. CHARLES W. REIMER, Michigan State College.—The technique of Dansereau and Desmarais¹ was used for characterizing maple leaves collected in three areas (two collections in Indiana and one in Michigan). Analysis of the collection from the Michigan woodlot revealed that a total of 11% of the leaves were to be considered as intermediate forms between *Acer saccharum* (Marsh) and *A. nigrum* (Michx). In the two Indiana woodlots totals of 36% and 46% were recorded as intermediate forms. This would suggest that hybridization is more pronounced in the Indiana woodlots.

In all three areas introgression appears in favor of *A. saccharum* although this tendency is more striking in the Michigan woodlot. The

¹Dansereau, P. & Yves Desmarais. Introgression in Sugar Maples II. Amer. Midl. Nat. 37:146-161. January, 1947.

A. nigrum-like specimens including the "pure" forms are all restricted to the lowland, a slightly cooler, more shaded, and possibly more hydric habitat. The habitat for *A. saccharum*-like specimens seems not to be so select, but of the three collection sites (viz. lowland, slope, upland) they appear in greater abundance on the uplands.