PLANT TAXONOMY

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ABSTRACTS

Genetic Isolation in Genus *Tragopogon*. GEORGE M. BROOKS, University of South Dakota, Springfield, South Dakota 57062, and THOMAS R. MERTENS, Ball State University, Muncie, Indiana 47306.——Observations of natural populations and a study of pertinent literature suggest that interspecific hybridization in *Tragopogon* is not uncommon. Since the time of Linnaeus, the hybrid, *T. pratensis* X *porrifolius* has fascinated botanists. Unlike certain other interspecific hybrids resulting from crosses of *Tragopogon* species, there are no reports of amphidiploid species having been derived from the *T. pratensis* X *porrifolius* hybrid. In the present study five categories of data were collected for *T. pratensis* L., *T. porrifolius* L., and their hybrid: (1) achene germination, (2) pollen viability, (3) meiotic chromosome behavior, (4) paper chromatography, and (5) insect pollinators which frequent the plants.

Fewer achenes were produced on plants of the three taxa when inflorescences were covered prior to anthesis than when they were uncovered. Under all conditions fewer achenes were produced by hybrids than by plants of the two species. Pollen of the hybrid was strikingly less viable than that of the two species. Meiosis appeared normal in plants of all three taxa. *T. pratensis* and the hybrid produced similar chromatograms for free amino acids, while the hybrids possessed a blend of the flavonoids of the two species. Most insects collected on *Tragopogon* inflorescences were dipterans (family Syrphidae). No evidence of amphidiploidy or introgressive hybridization was found. The interspecific hybrids appear to have little evolutionary significance.

Chromosomes and Apomixis in the Fern Genus *Bommeria*. CHRISTOPHER H. HAUFLER and GERALD J. GASTONY, Department of Plant Sciences, Indiana University, Bloomington, Indiana 47401.——Species of the fern genus *Bommeria* Fourn. occur from the southwestern United States, throughout much of Mexico and into Guatemala, Honduras and Nicaragua. Specimens collected in the southwestern United States and Mexico are presently in culture in the Indiana University greenhouses and are being used in a biosystematic study of the genus. Based on recent work with three of the five putative species, the first chromosome counts recorded in the genus are reported here and will be documented in a subsequent communication: n=30 in *Bommeria hispida* (Mett.) Underw. and *B. subpalacea* Maxon; "n"=90 in *B. pedata* (Sw.) Fourn. These chromosome counts, gametophyte culturing data and the number of spores per sporangium indicate that *B. pedata* is apomictic.

At early sporogenetic stages, 8 or 16 spore mother cells are found in sporangia of *B. pedata*. Mature, viable spores, however, are found only in 32-spored sporangia and are apparently the products of normal meiosis in sporangia which contained 8 spore mother cells. Sporangia which contained 16 spore mother cells apparently abort. These data suggest the "normal" type of apomictic sporogenesis as described by Manton in 1950 (*Problems of Cytology and Evolution in the Pteridophyta*, Cambridge University Press). Parthenogenetic rather than apogamous apomictic sporophyte development is suspected since both antheridia and apparently functional archegonia are present on the gametophytes.

Gametophyte Development in the Fern Genus *Anogramma*. JUDITH G. BAROUTSIS and GERALD J. GASTONY, Department of Plant Sciences, Indiana University, Bloomington, Indiana 47401.——The tropical and subtropical fern genus *Anogramma* comprises five or six species, two of which have been described as having annual sporophytes and perennial gametophytes. This unique situation is attributed to gametophytic tubercles which permit survival and regeneration of the gametophyte following cold or dry periods. These tubercles were first described for *Anogramma leptophylla* and *A. chaerophylla* by Goebel in 1877 and 1889 respectively. Five species are presently being cultured to determine the extent of tubercle formation in the genus and to examine other aspects of gametophyte biology that might prove useful as part of a broader taxonomic treatment of the genus. Germination rates for each species range from six to nine days, and early prothallial development is similar in all of them. Subsequent development results in a lateral meristem in all cases, but species differ in extent of lobing, gametangial sequences, and tubercle formation. Changes in light intensity, light quality, and substrate lead to varying developmental patterns that differ from those seen under standard conditions. A small percentage (1% or less) of *A. Lorentzii* spores can germinate in darkness and develop slowly for a few weeks before death of the filamentous prothallia. These factors have both ecological and taxonomic relevance.

Experimental Hybridization of the Cultivated Chenopods (*Chenopodium* L.) and Wild Relatives. HUGH WILSON, Department of Plant Sciences, Indiana University, Bloomington, Indiana 47401.——*Chenopodium*, a cosmopolitan genus of weedy annuals, is generally regarded as taxonomically difficult. One area of confusion centers in section *Chenopodia*, subsection *Cellulata*. This subsection contains six tetraploid taxa, two of which are American Indian cultigens, plus a complex of diploids. The literature contains contradictory statements regarding the affinity of the cultivated taxa and little data concerning putative wild progenitors and relatives.

Chenopodium Quinoa Willd. (*Quinua*) has been cultivated as a "pseudocereal" for millennia by inhabitants of the high Andes. A morphologically similar taxon, *C. Nuttalliae* Safford (*Huazontcle*), is utilized in modern Mexico primarily as a broccoli-like vegetable, although a "grain" variety is cultivated in the state of Michoacan. The relationship between these cultivated chenopods has received considerable

attention, mostly of a speculative nature, in both the anthropological and botanical literature.

Aellen's 1929 treatment of North American chenopods places *C. Nuttalliae* in synonymy under *C. Quinoa*. Aellen postulates a derivation of *C. Quinoa* from the wild South American tetraploid, *C. hircinum* Schrader which, in turn, shows affinities with the polymorphic and wide-ranging North American tetraploid, *C. Berlandieri* Moq. More recent studies, essentially based upon comparative morphology, suggest specific rank for *C. Nuttalliae*.

A hybridization program, involving the tetraploids of subsection *Cellulata*, has been initiated as part of a biosystematic examination of the group. Preliminary study of artificial F_1 hybrids indicates a basic genomic continuity between Mexican and North American taxa. Hybrids between *C. Nuttalliae* and *C. Berlandieri* show 90% pollen stainability in most crosses. Crosses between *C. Nuttalliae* and *C. Bushianum* Aellen, a weedy species of eastern North America, produce hybrids that show approximately 50% stainability. The same pollen stainability is obtained in hybrids between *C. Nuttalliae* and *C. macrocalycium* Aellen, a North American Atlantic coastal species.

Stainability decreases markedly when South American taxa are involved in hybridization with Mexican and North American species. Hybrids between *C. Quinoa* and *C. Nuttalliae* never exceed 10% pollen stainability. Backcrosses to either parent, however, usually produce a small amount of fruit set. Similar results are obtained when *C. Quinoa* is crossed with *C. Berlandieri* and *C. Bushianum*.

The crossing program is not complete and more data from other lines of investigation are required before final conclusions can be drawn regarding relationships among the tetraploids of subsection *Cellulata*. It appears, however, that *C. Nuttalliae* is closely related to *C. Berlandieri* rather than to *C. Quinoa*, and thus it should probably be given subspecific status under the former rather than recognition as a distinct species.

New County Records for Porter and LaPorte Counties. GAYTON C. MARKS, Valparaiso University, Valparaiso, Indiana 46383.——In *The Flora of Indiana* Deam indicates that *Kyllinga pumila* is rare or absent from Northern Indiana counties while Pepoon, earlier, states that it was found in Miller, Indiana. This plant now known as *Cyperus tenuifolius* has been found in LaPorte County. *Viola primulifolia* has also been found in LaPorte County. This is reportedly a rare species.

Epipactis hellborine (*Serapias*), an orchid naturalized from Europe has now become well established in Porter County. *Centaurium pulchellum* previously reported from Lake County has now been found in Western Porter County.

Procedures and Problems in the Incorporation of Distributional Data into a Computerized Data Bank. CLIFTON KELLER, University of Notre Dame, South Bend.——Deam's Flora of Indiana was used to extract county distribution data on more than 2000 taxa. They are compared to similar data, for eight northwestern Indiana counties, from Swink's

Plants of the Chicago Region. This comparison reflects changes in taxonomy, plant distribution, and in extent of collection between 1940 and 1969. These data also pose questions of a more theoretical nature. For example, we could construct a frequency distribution of the total number of species found in each county. Is this explainable by chance alone? Does the pattern change from family to family? How do number of genera per county distributions compare with the number of species per county? Is the tension zone across Indiana a reality? Are closely related taxa in juxtaposition geographically? As examples of the problems encountered, we may cite changes in taxonomic nomenclature, procedures to use to integrate data from several sources, and coding of taxon names.

FLIP: The Flora Indiana Program—Possible Procedures. THEODORE J. CROVELLO, Department of Biology, University of Notre Dame, Notre Dame, Indiana 46556.——At last year's Indiana Academy of Science meeting, the scope, value and feasibility of a computerized Flora of Indiana was discussed. The latest published flora of the State is over thirty years old, but its information will serve as the foundation of any printed revision of it. We have already captured the distribution data by county for each species given in Deam. The purpose of the present paper is to report on our progress during the last year and to obtain from systematists and others preferences for the different procedures that can be followed from this point on. We envision a program in which anyone in State who so desires, can make a real contribution. Furthermore, financial support for FLIP will *not* be at one university or college only. Rather it should be possible to provide individual herbaria and botanists with at least some of the resources to get the job done.

Indiana Plant Distribution Records, XXII. 1971-1974. BARBARA KAYS and JACK HUMBLES, Indiana University, Bloomington, Indiana 47401. ——Genera are listed in the order of their appearance in Deam's *Flora of Indiana* (1); species within each genus are in alphabetical order, and they are followed by the county in which they were collected. Nomenclature is in accord with that used in Gray's *Manual of Botany*, 8th ed., 1950 (2), unless noted.

The specimens were collected by the following persons: Bob Bell, R. Betz, T. A. Chandik, M. Pat Coons, Charles Deam, Zoe Ellis, Raymond J. Fleetwood, Chris H. Haufler, Charles B. Heiser, Jack Humbles, Larry D. Jayne, Lewis Johnson, H. Lamp, J. Love, Arthur Mergen, Robbin Mester, Patrick J. Munson, Mark C. Sheehan, Floyd Swink, and Elizabeth H. Youngman. Voucher specimens for all new records are in the herbarium of Indiana University.

The records include one plant new to the state: *Pycnanthemum Torrei* Benth. collected by Mark C. Sheehan and Chris H. Haufler. Also included are removal of seven county records due to redetermination as reported in 1970. Remove from the old county records *Cystopteris bulbifera*, Knox. *Cystopteris fragilis*, Gibson, Jefferson, Monroe, and Owen. *Dryopteris Goldiana* Laporte. *Sporobolus clandestinus*, Cass.

Taxonomic Entities

Osmunda Claytoniana, Monroe. *Lycopodium complanatum* var. *flabelliforme*, (L. *flabelliforme* in Deam), Brown, Spencer. *Potamogeton nodosus*, Brown. *Scirpus validus*, Monroe. *Carex Frankii*, Starke. *Carex intumescens*, Monroe. *Carex louisianica*, Monroe. *Muscari botryoides*, Spencer, *Polygonatum biflorum*, Spencer. *Tipularia discolor*, Owen. *Aplectrum hyemale*, Spencer.

Polygonum lapathifolium, Monroe. *Atriplex patula*, Monroe. *Atriplex patula* var. *littoralis* (as listed in Deam), Jackson. *Amaranthus spinosus*, Monroe. *Cerastium vulgatum* var. *hirsutum*, Spencer. *Stellaria pubera*, Spencer. *Dianthus Armeria*, Spencer. *Nelumbo lutea* (*N. pentapetala* in Deam), Monroe. *Actaea pachypoda* (*A. alba* in Deam), Spencer. *Cardaria Draba* (Deam has *Lepidium Draba*), Lake. *Thlaspi arvense*, Pulaski. *Arabadopsis Thaliana* (Deam has *Sisymbrium Thalianum*), Spencer. *Brassica Rapa* (Deam has *B. campestris*), Spencer. *Cardamine pensylvanica*, Spencer.

Capsella Bursa-pastoris, Spencer. *Draba verna*, Spencer. *Fragaria virginiana*, Spencer. *Vicia villosa*, Spencer. *Viola sororia*, Spencer. *Viola missouriensis*, Spencer. *Rotala ramosior* var. *interior*, Monroe. *Erigenia bulbosa*, Spencer. *Hydrophyllum macrophyllum*, Spencer.

Lithospermum arvense, Spencer. *Synandra hispidula*, Spencer. *Pycnanthemum Torrei*, Brown. *Conopholis americana*, Spencer. *Diodia teres* var. *setifera* (Deam has var. *setifolia*), Newton. *Valerianella olitoria*, Spencer. *Solidago juncea*, Spencer. *Antennaria neglecta*, Spencer. *Coreopsis lanceolata*, Spencer. *Bidens bipinnata*, Starke. *Matricaria Chamomilla*, Spencer. *Matricaria matricarioides*, Hancock. *Carduus nutans*, Marion, Morgan.

Cirsium arvense, Bartholomew. *Krigia biflora*, Spencer. *Taraxacum officinale*, Spencer. *Pyrrhopappus carolinianus*, Spencer. *Aegilops cylindrica*, Hancock.

Literature Cited

1. DEAM, C. C. 1940. Flora of Indiana. Indiana Department of Conservation, Indianapolis, 1236 p.

2. FERNALD, M. L. 1950. Gray's Manual of Botany. American Book Co., New York. 1632 p.