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THE BEAN BAG

Current Research on Legumes



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FROM THE EDITORS. We want to strengthen legume research by stimulating inexpensive and rapid communication with a minimum of organization and "red tape". We can only do this with your contributions and suggestions. The next BEAN BAG is scheduled for a May 1976 mailing, so we hope you will supply information on the enclosed data form which should reach us no later than 1 April 1976.

Several of you have indicated how valuable it will be to have in each issue a listing of recent legume publications. We agree but this will be possible only if all of us submit the necessary citations on the data-collection form enclosed. And it is only the papers on legume taxonomy (*sensu lato*) which have been published in the period since the last BEAN BAG that we will include. It will be helpful, when you are reporting new publications on the form, if you will use the style of literature citation in the following pages.

There have been requests for listings of chromosome numbers but this is being accomplished quite adequately in the pages of TAXON and elsewhere. The costs of producing the BB are sufficient to encourage us to be rather selective in what is included in each issue; however, a large demand for a particular kind of information, not being transmitted otherwise, will be taken seriously.

A number of our readers have asked about the relationship between the International Group for the Study of Mimosoideae and the BEAN BAG. We have in common our research preoccupation with the Leguminosae, but the BEAN BAG has but one purpose--to facilitate communications among legume specialists. It is not the publication of an organization, as is the Bulletin of the IGSM, which is primarily concerned only with the mimosoids. We recognize the overlap but do not feel it is serious, at least at the moment.

The organizers of a 1978 symposium on legumes have supplied us with a news release which will be of considerable interest and importance to all our readers. It is reproduced in the following pages.

FEATURE. Jim Duke claims that he could tell the annual rainfall and temperature of remote areas by the legumes that grow there, provided he had

enough case histories in his legume data bank. For example, the winged bean, subject of a report reviewed in this issue of BEAN BAG, is already reported to range from Subtropical Dry to Wet Forest Life Zone (most cases [37.5%] in Tropical Dry), with annual precipitation ranging from 9.1 to 28.2 dm, annual biotemperature from 22.1°C to 26.8°C. Ranges for Acacia farnesiana and Cassia occidentalis differ somewhat, ranging to cooler and dryer areas, but both are reported more frequently from Tropical Dry Forest Life Zone (27% of cases for Acacia, 21% for Cassia). Thus, someone examining a flora with these three species might expect that the odds are he's dealing with a Tropical Dry Forest Life Zone flora. With more data in a systematic computer program, one could deduce the various meteorological parameters rather accurately. Dr. Duke invites your collaboration. Local legume check-lists accompanied by ecological data are needed to expand his data base. If you are interested in collaborating, please write to James A. Duke, Plant Taxonomy Laboratory (PTL), United States Department of Agriculture, Beltsville, Maryland 20705 USA.

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ADDITIONS AND CORRECTIONS TO BEAN BAG READERSHIP. (Please save both this list and the main list in Number 1 for your future use.)

BOTANICAL MUSEUM, Harvard University, 22 Divinity Avenue, Cambridge, MA 02138 USA.

BUREAU OF FISH & WILDLIFE, Box 1878, Frederiksted, St. Croix, V. I. 00840 USA.

CANO, G., Inst. Tecn. y de Est. Sup. de Monterrey, Sucursal de Correos "J", Monterrey, N. L., MEXICO.

CHRTKOVA-ZERTOVA, A., Botanical Institute, Czechoslovak Academy of Sciences, 252 43 Pruhonice near Prague, CZECHOSLOVAKIA.

DE WIT, H. C. D., Laboratory for Plant Taxonomy & Plant Geography, 37, General Foulkesweg, Wageningen, NETHERLANDS.

DOLLAHITE, J. W., Veterinary Toxicology and Entomology Research Laboratory, Post Office Drawer GE, College Station, TX 77840, USA.

DOMINGUEZ, X. A., Inst. Tecnologico y de Estudios Superiores de Monterrey, Monterrey, N. L., MEXICO.

DUDIK, N. M., Central Botanical Garden, Timiryasevskaya str. I, 252014 Kiev, USSR.

DUNCAN, W. H., Botany Department, University of Georgia, Athens, GA 30602 USA (Flora of SE States).

FLEAK, S., Department of Biology, Missouri Valley College, Marshall, MO 65340 USA.

GEESINK: Correct No. 1 to read (S.E. Asian Papilionatae).

GIANNASI, D. E., New York Botanical Garden, Bronx, NY 10458 USA (Phytochemistry, especially of Cassia).

GILL, L. S., Department of Botany, University of Dar es Salaam, P. O. Box 35060, DAR ES SALAAM, TANZANIA.

GORDAN-GRAY, K. D., Department of Botany, University of Natal, P. O. Box 375, Pietermaritzburg, Natal, SOUTH AFRICA.

GREAR: Add (Rhynchosia and Eriosema).

HOOPER, N. H., Department of Biology, University of Oregon, Eugene, OR 97403 USA.

JIMENEZ A., J., Calle Méximo Gómez 34, Santiago de los Caballeros, República Dominicana, ANTILLAS.

KALIN DE ARROYO, M. T., Escuela de Biology, Facultad de Ciencias, Univ. Central de Venezuela, Apartado 10098 Caracas, VENEZUELA.

KING, R. M., 5432 Connecticut Ave., N.W., Apt. 702, Washington, DC 20015 USA.

LACKEY, J. A., Department of Botany, Iowa State Union, Ames, IA 50010 USA.

LANGE, C., Missouri Botanical Garden, 2315 Tower Grove Avenue, St. Louis, MO 63110, USA.

LASSEIGNE, Alex, Department of Botany, Iowa State University, Ames, IA 50010 USA (Neo-tropical Cassia).

LONG, C. R., New York Botanical Garden, Bronx, NY 10458 USA.

LOS ANGELES STATE & COUNTY ARBORETUM, 301 North Baldwin Ave., Arcadia, CA 91106 USA.

MANNETJE, L.'t, Sciro, Mill Road, St. Lucia, Brisbane, Queensland 4067, AUSTRALIA.

MELJER, William, College of Arts and Sciences, School of Biological Sciences, University of Kentucky, Lexington, KY 40506 USA.

NATIONAL AGRICULTURAL LIBRARY, Current Serial Records, USDA, Beltsville, MD 20705 USA.

NORTHINGTON, D. K., Department of Biological Sciences, Texas Tech University, Lubbock, TX 79409 USA.

PALMER, R. G., Department of Agronomy, Iowa State University, Ames, IA 50010 USA.

PERINO, C. H., Department of Botany, North Carolina State, Raleigh, NC 27607 USA.

PODLECH, D., Institute of Systematic Botany, University of Munich, Menzingerstr. 67, D-8000 MUNCHEN 19, GERMANY (Astragalus).

PONERT, J., Hortus Botanicus Subtropicus Batumensis, Machindjauri Adjarskoi A.S.S.R., SU-384533 SOVIET UNION.

LIBRARY OF RIJKSHERBARIUM Schelpenkade 6, Leiden, NETHERLANDS.

ROBBERTSE, P. J., Department of General Botany, University of Pretoria, Pretoria 0002, REPUBLIC OF SOUTH AFRICA.

ROSENTHAL, G. A., Dept. Biological Sciences, Univ. of Kentucky, Lexington, KY 40506, USA (non-protein amino acids of legumes).

ROSS, J. H., Royal Botanic Gardens and National Herbarium, South Yarra 3141, Victoria, AUSTRALIA.

ROYAL BOTANIC GARDENS & NATIONAL HERBARIUM, Birdwood Avenue, South Yarra, Victoria, 3141, AUSTRALIA.

RUDOLPH, A. W., Battelle Institute, 505 King Ave., Columbus, OHIO 43201 USA.

SALEH, N., A. M., C/O Prof. H. Grisebach, Biologisches Inst. II, Lehrstuhl für Biochemie der Pflanzen, University Freiburg, Freiburg, W. GERMANY (Phytochemistry).

SCHREIBER, A., Botanische Staatssammlung, Menzingerstr. 67, D-8000 MUNCHEN 19, FEDERAL REPUBLIC OF GERMANY (Southwest Africa Legumes).

SHARMA, S. K.: (printed "Shama, S. K." in No. 1) (Indian species Phaseolus & Vigna).

STACE, C. A., Botanical Laboratories, Univ. Leicester, Leicester, LE1 7RH, ENGLAND.

STANKEVICZ: Correct No. 1 to read (Cytotaxonomy and biosystematics of Vicia).

THOTHATHRIA, K., Editor of Publications, Botanical Survey of India, Howrah 3, INDIA.

TINDALE, M. D., Royal Botanic Gardens, Sydney, N.S.W. 2000, AUSTRALIA.

TURNER, R. M., Geological Survey, USDA, 301 West Congress Street, Tucson, AZ 85717 USA.

WAINWRIGHT, C. M., Department of Plant Sciences, University of California, Riverside, CA 92502 USA.

WELSH, S., Rm. 113-B49 Herbarium, Brigham Young University, Provo, UT 84602 USA.

WILBUR, R. L., Department of Botany, Duke University, Durham, NC 27706 USA.

WUNDERLIN, R. P., Department of Biology, University of South Florida, Tampa, FL 33620 USA (Bauhinia).

YAKOVLEV, G., Chemical-pharmaceutical Inst., 14, Prof. Popov Street, 197022, Leningrad, USSR.

YNTEMA: Add (Taxonomy and medicinal uses of Caribbean legumes).

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GLEANINGS FROM DATA COLLECTING SHEETS. For addresses see readers list.

AREVALO DE DELGADO has completed a nutritive study of Medicago sativa, is studying "esparteina" in Spartium junceum and interested in medicinal uses of legumes. Will supply seeds and specimens in return for text "Taxonomy" by L. Benson.

BERNARD would like to exchange Glycine seeds.

CORBY has viable Rhodesian legume seeds; wants viable legume seeds from out-of-way places for studies of nodule-form.

DUNN has 8 graduate students working on facets of New World Lupinus; starting on South American taxa and looking for collaborators. Plans to collect in Mexico and Central America for next 3 summers. Recently completed studies include L. latifolius (K. Vaughn), L. mexicanus (R. Rafail), L. andersonii-L. albicaulis (M. Conrad), and L. montanus (Dunn and Harmon). New project-genetic studies of F2 populations of L. mexicanus x L. campestris. GEESINK will collect in S. E. Asia during 1976.

GRANT has issued Lotus Newsletter No. 5, 1974.

GREAR is now Curator of Vascular Plant Herbarium (TRT); has finished Eriosema and completing New World Rhynchosia.

GUNN has completed typescript of Vicia of Mexico and Central America, has reclassified Medicago sativa s.l. in USDA'S Plant Introduction Program, and now is finishing a survey of flowers of Viciaeae.

HARDING has completed alkaloid and isozyme variation in Lupinus nanus and starting on a study of the autofertility of the annual lupines, esp. of California. Interested in collaborating on study of lupine pollination-ecology. Will be in Puerto Rico through July 1976 to study tropical pollination systems.

HEGANUER has started on manuscript of Vol. 7, "Chemotaxonomie der Pflanzen". Will try to supply European seed samples.

HEYI, PLITMANN, & RUDD have started on Lupinus of Middle East. Want viable seed samples (20-30 seeds) of cultivated Old World Lupinus.

HUNZIKER is in Rome for 6 months as an FAO consultant on "Genetic Resources of Crops"; in press a study of cytogenetics of some taxa in Prosopis.

ISELY has the U. S. caesalpinoids (part 2 of legume flora of U. S.) in galley proof and preparing part 3 (Sophoreae, Trifolieae, Loteae, Galegeae & Podalyrieae).

KALIN DE ARROYO has completed Harpalyce and started on Andira (monograph) and Copaifera pubiflora (ecological genetics). Would like Copaifera seeds from extra-Venezuela areas; samples should be from individual trees. Can supply seeds and herbarium material but needs specific instructions. Has been elected V. P., Sociedad Botanica de Venezuela.

KINGSOLVER studies bruchid beetles, many of which feed on legume seeds; working now on seed beetles of Prosopis in Western Hemisphere. Needs specimens of beetles reared from known hosts, preserved in alcohol or dry in cotton or tissue.

KRUKOFF wants at least 30 grams of seeds for amino acid analysis (write for want-list). Now have more than 1000 samples representing nearly half of known legume genera.

LARSEN, K. has revised Caesalpiniaceae for "Flora Thailand", working with S. Larsen on the family in Cambodia, Laos, and Vietnam; wants Caesalpiniaceae seeds and wood samples.

LARSON, S. has completed pollen study of Thai Bauhinia and working on pollen of genus in Australia and Asia.

LEDINGHAM offers seeds and herbarium specimens of many species of Astragalus.

LEE screening Malaya legumes for lectins; will supply local seeds and specimens; wants 50 gram seed samples with voucher from S. E. Asia. Elected a Fellow of Linnean Society.

LESINS has completed a study of carotenoids in petals of perennial species of Medicago, and has returned from collecting trip in North Africa. Offers Medicago seeds.

PLITMANN see Heyn.

REID has issued Soybean Genetics Newsletter, Vol. 2, 1975.

RUDD see Heyn

ST. JOHN awarded Garden Club of American Medal of Honor for contributions to horticulture.

SCHREIBER has begun a revision of the South African genus Lebeckia Thunb. (Papil.-Genisteae).

STANKEVICZ has two papers in press on Caucasian and Siberian Vicia and started on Vicia for "Cultural Flora of USSR"; would like to exchange herbarium specimens and seeds of Vicia and Lathyrus, and receive American legume literature; will collect in Carpathian Mountains, Crimea, and West Caucasus in 1976.

STEIN published a study of shoot apex of Hymenaea courbaril; starting on Colophospermum mopane and Guibourtia coleosperma. Wants FAA-preserved shoot-tips of Cynometreae - Amherstieae; can supply seedlings of above genera.

STIRTON has completed Eriosema cordatum-complex; wants to exchange Eriosema seeds; needs viable seed of non-African Rhynchosia, Eriosema, Flemingia, Cajanus, and Atylosia. Cannot find Ann. Mus. Congo B. Bot, ser. 6, 1 (1934) (paper on Congo Eriosema by P. Staner & A. de Craene). Recent M.Sc. (cum laude).

VASSAL and collaborators have concluded studies of evolutionary trends in Acacia, as well as on its cytology and taxonomy. New projects include seeds/seedling morphology of a group of Acacia species and of the genus Parkia and the chorology of another group of Acacia from Africa. Seeds in 100-200 gram samples needed of the Filicinae part of Acacia (American

species), with vouchers, pods, and flowers from same tree; also viable seeds, herbarium specimens, flowers collected at night if possible in alcohol of Parkia species. Awarded Prix de Coincy of the Société Botanique de France for research on Acacia.

VERDCOURT will be preparing legume handbook for Papua-New Guinea and will be collecting there, starting Jan. 1976.

VIDAL has completed revision of Asiatic Caesalpinia.

WUNDERLIN now Curator of herbarium Univ. South Florida; wants viable seed of Bauhinia.

YNTEMA and others are preparing natural history guide for Virgin Islands and part of Puerto Rico; can supply some material.

Anyone having access to viable seeds of Trifolium stoloniferum, please contact Marion Cole (1224 Norman Lane, Deerfield, Ill. 60015) who is re-establishing prairie vegetation in small plots where it has been destroyed.

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RECENT LEGUME LITERATURE. Legume oriented publications or notices sent to the BEAN BAG will be listed herein. As space and time permits, some entries may include an abstract or additional key words. Authors are encouraged to note additional key words, or to include a 10-20 word abstract, if needed to augment title. Requests for publications should be sent to the authors (see membership list for addresses) of the publications. The following are mostly taken from the data-forms but only post-1972 papers are listed in order to restrict this section to manageable proportions.

- BRAVATO, M. 1974. Estudio morfologico de frutos y semillas de las Mimosoideae (Leguminosae) de Venezuela. Acta Bot. Venez. 9: 317-361.
- CORBY. 1975. A method of making a pure-culture, peat-type, legume inoculant, using a substitute for peat. I.B.P. Series 7: 169-173.
- _____. 1974. Systematic implications of nodulation among Rhodesian legumes. Kirkia 9: 301-329.
- COWAN. 1974. A revision of the genus Bocoa (Caesalpinioideae-Swartzieae). Proc. Biol. Soc. Wash. 87: 95-128.
- _____. 1975. A monograph of the genus Eperua (Leguminosae: Caesalpinioideae). Smithsonian Contrib. Bot. No. 28, 1-45.
- HARDING et al. 1974. Genetics of Lupinus VII: Outcrossing autofertility, and variability in natural populations of the nanus group. Taxon 23: 529-738.
- ELLIOTT, _____, MANKINEN. 1974. Genetics of Lupinus VI: Reproductive barriers in the nanus group. Taxon 23: 585-594.
- MANKINEN, _____, ELLIOTT. 1975. Genetics of Lupinus VIII: Variations in the occurrence of alkaloids in natural populations of Lupinus nanus. Taxon 24: 415-429.
- KALIN DE ARROYO. 1975. Systematics of the legume genus Harpalyce (Leguminosae: Lotoideae). Mem. New York Bot. Gard. 26: in press.
- LASSETTER. 1975. Taxonomic status of Vicia hassei (Leguminosae). Madroño 23: 73-78.
- LEDINGHAM. 1973. Chromosome numbers of some South American species of Astragalus. Kurtziana 7: 27-37.

LEE et al. 1975. Lectins in some Malaysian legume species. Malaysian J. Sci. in press.
 ST. JOHN. 1973. List and summary of the flowering plants in the Hawaiian Islands. Pacific Trop. Bot. Gard. Mem. 1: 1-519.
 SCHULTES et al. 1975. The Winged Bean--a high-protein crop for the tropics. Obtainable free from: Commission on International Relations (JH215), National Academy of Sciences, 2101 Constitution Avenue, NW, Washington, D.C. 20418 USA.

What legume has high-protein roots (15%), high-calcium pods (.06-0.3%), high yields (2000 kg/ha) of high-tocopherol seeds rich in relatively unsaturated oils (15-20%) and lysine-rich proteins (35%), leaves high in protein (5-15%); flowers, when fried, that taste like mushrooms, and roots that fix a lot of nitrogen without inoculation? Winged bean! Why don't they develop a cultivar photoperiodically suitable for higher latitudes? They will! If the recommendations in this useful report are followed, this promising crop will get the best in taxonomic study, germplasm collection, and genetic improvement.

SCHREIBER. 1974. Über die identität von Lebeckia elongata Hutch. (Papilionaceae - Genisteae). Mitt. Bot. München 11: 579-584.
 _____. 1973. Nachtrag i Zu den familien 58-60 (Leguminosae) in "Prodromus einer flora von Südwestafrika." Mitt. Bot. München 11: 115-152.
 STACE. (with E. Hollings). 1974. Karyotype variation and evolution in the Vicia sativa aggregate. New Phytol. 73: 195-208.
 STEIN. 1975. The shoot apex of Hymenaea courbaril (Leguminosae). Am. Jour. Bot. 62(3): 303-310.
 VASSAL. 1975. Histologie comparée des téguments séminaux dans quelques espèces d'Acacias africains. Boissiera 24: 285-297. 1975. (Study of seed-coat morphology of 31 spp. Acacia showed correlation of variation in some morphological and histological characters which were used to elucidate evolutionary trends in this part of the genus).
 _____. Sur quelques nombres chromosomiques nouveaux dans le genre Acacia. (Place and date of publication not given). (Chromosome numbers for 51 species are reported for the first time).
 VAN STEENIS. 1975. Revision of Sympetalandra. Blumea 22: 159-167. Key to five genera of Dimorphandreae.
 VIDAL and THOL. 1974. Revision du genre Pterolobium. Bull. Mus. Nat. Hist. Nat. (Paris), ser. 3, 227. (Bot. 15): 1-29.

IDENTIFICATIONS. Following are the names of specialists who have expressed willingness to identify legumes and the groups they will accept. Arrangements should be made directly with them, in advance of shipment, using the addresses in BB-1/2:

BARNEBY. Brazilian Cassia.
 COWAN. Tropical South American Caesalpinioideae.
 DUNN. North American Lupinus.
 GEESINK. S. E. Asian Millettia, Fordia, Antheroporum, Whitfordiodendron, and Derris.
 GREAR. New World Eriosema and Rhynchosia.

GUNN. Vicia.

HARDING. Annual Lupinus of California.

HEYN. Annual Medicago, Lotus, subg. Edentolotus except L. corniculatus complex.

ISELY. U. S. mimosoids, casesalpiniooids, Sophoreae, Trifolieae, Loteae, Galegeae, and Podalyriaceae.

KALIN DE ARROYO. Harpalyce, Andira.

LARSEN, K. S. E. Asian Bauhinia, Cassia, Peltophorum, Acrocarpus, Afzelia, Cynometra, Delonix, Koompassia, Parkinsonia, Sindora, Tamarindus, Zenia.

LARSEN, S. Asian Bauhinia, Cassia.

LEDINGHAM. Astragalus.

LESINS. Medicago.

SCHREIBER. Leguminosae from South West Africa.

STANKEVIZ. Vicia of USSR and nearby areas.

STIRTON. South African Eriosema.

VERDCOURT. Phaseoleae, Hedysareae in East & Central Africa and Flora Zambesiaca area.

WUNDERLIN. Bauhinia of New World.

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International Conference on Legumes. An international conference devoted to the classification of Leguminosae (Fabaceae; including Caesalpinioideae and Mimosoideae) will be held at the Royal Botanic Gardens, Kew, Summer 1978. The theme of the conference will be the generic classification of the family, taken in the broad sense, and contributions emphasizing various lines of evidence will be presented. Participation and the presentation of papers will be by invitation, but those interested are invited to contact one of the members of the organizing committee, listed below. Among the papers to be presented will be ones dealing with wood anatomy, cytology, seed morphology, geography, and many aspects of the chemistry of the family.

For the purpose of making the chemical, cytological and anatomical survey as broad as possible, samples of seeds associated with herbarium vouchers are solicited. Small samples are welcome, but those of up to 300 g are preferred. Such samples may be sent either to Dr. B. A. Krukoff c/o The New York Botanical Garden, Bronx, New York 10458, or to Dr. P. H. Raven at the address given below. Samples from the Southern Hemisphere and the Tropics are especially welcome and either Dr. Krukoff or Dr. Raven may be consulted for further details concerning the collection of samples.

A draft synopsis of the Leguminosae at the generic level will be prepared by Dr. R. M. Polhill and circulated during 1976. Revisions and comments on this draft as available upon application to Dr. Polhill, are earnestly solicited and will be taken into account in preparing a further draft which will provide the basis for discussions at the conference. It is hoped that the proceedings of the conference themselves will result in the preparation of an improved and revised classification of the family.

Organizing Committee: Mr. J. P. M. Brenan and Dr. R. M. Polhill, Royal Botanic Gardens, Kew, Richmond, Surrey TW9 3AE, Great Britain, and Dr. P. H. Raven, Missouri Botanical Garden, 2315 Tower Grove Avenue, St. Louis, MO 63110.

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Legume research at the New York Botanical Garden. The long-term project of revising Cassia of the New World, initiated by Dr. Howard S. Irwin, President of the Garden, while a doctoral student at the University of Texas in 1959, continues underway, currently with collaboration of Dr. David Giannasi (flavonoid systematics) and Mr. Rupert Barneby (taxonomy). An account of sects. Absus (160 spp) and Grimaldia (1 sp) is being readied for publication and the preliminary taxonomic study of sect. Chamaecrista (at least 50 major spp, some internally very complex) is well advanced, and when done will complete a modern census of subgen. Lasiorhegma Benth. of the Americas. Irwin and Barneby recently submitted an account of Cassia for the Flora of the Chihuahuan Desert edited by Dr. M. C. Johnston. Work at the Garden on Cassia is supported by research grants from the National Science Foundation.

Mr. Rupert C. Barneby, Research Associate, also sustains a long-time interest in the tribes Astragaleae, Amorpheae and Psoraleeae. His revision of Dalea and related genera will be published as a volume of the Memoirs within a year.

Dr. B. A. Krukoff actively curates the genus Erythrina at the Garden and promotes ancillary studies in the chemistry, cytogenetics, palynology and floral biology of the genus. A supplement to his Conspectus of Erythrina, published in September 1974, is being prepared with the cooperation of Dr. Peter H. Raven. Dr. Krukoff is also deeply engaged in furthering the Legume conference schedule to be held at Kew in 1978. He coordinates a collection of legume seeds from all parts of the world with the aim of obtaining data on chromosome number, seedling morphology, antibiotic and anticarcinogenic properties, and germination technique. While the seeds pass through the Garden they are being processed by a group of specialists widely scattered over the United States and England. Dr. Ghilleen T. Prance, while stationed at Manaus in 1973 - 75, contributed materially to Dr. Krukoff's seed collections.

Dr. Thomas S. Elias, Assistant Director of the Garden's Cary Arboretum, sustains an active interest in Inga Scop. A comparative study of the structure and function of extrafloral nectaries, of which the petiolar glands of Mimosoid and Caesalpinoid Leguminosae are conspicuous examples, is underway under his direction at the Arboretum.