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Hunt Institute was dedicated in 1961 as the Rachel McMasters Miller Hunt Botanical Library, an international center for bibliographical research and service in the interests of botany and horticulture, as well as a center for the study of all aspects of the history of the plant sciences. By 1971 the Library's activities had so diversified that the name was changed to Hunt Institute for Botanical Documentation. Growth in collections and research projects led to the establishment of four programmatic departments: Archives, Art, Bibliography and the Library.

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Buenos Aires, November 21, 1980

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DEPARTMENT OF BOTANY
SMITHSONIAN INSTITUTION
WASHINGTON, D.C. 20560
U.S.A.

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COMPOSITAE



NEWSLETTER

Number Eleven

February 1981

Charles Jeffrey, Editor, Herbarium, Royal Botanic Gardens, Kew, Richmond, Surrey, TW9 3AE, U.K.

Financial support of the NEWSLETTER is generously provided by Otto Koeltz Antiquariat, P.O. Box 1360, 624 Koenigstein - Taunus, BRD, and by the Bentham-Moxon Trust, Royal Botanic Gardens, Kew.

NEWS FROM INDIVIDUALS

LANE, Meredith A., Assistant Professor, EPO Biology Dept., University of Colorado, 110 Ramaley, Campus Box B-334, Boulder, Colorado 80309, U.S.A., writes: My interests within the Compositae are primarily in the Astereae, as I have just completed my doctoral dissertation (at the University of Texas, under the direction of Prof. B. L. Turner) on the several genera Amphiachyris, Greenella, Gutierrezia, Gymnosperma, Thurovia and Xanthocephalum. At present, I am preparing the dissertation for publication in several parts, and am beginning an overview of the subtribe Solidagininae.

THANIKAIMONI, Dr. G., Institut Français, B.P. No. 33, Pondichéry - 605001, India, writes: I am getting several requests for the reprint of my paper "Principal works on pollen morphology of Compositae" published in "The Biology and Chemistry of the Compositae". Unfortunately, I have not received any reprint of this paper from the publishers. However, an updated checklist of 655 Asteraceae genera for which pollen morphological data is available is given in my "Fourth bibliographic index to the pollen morphology of Angiosperms" (Inst. fr. Pondichéry, trav.sec.sci.tech. Tome 17 : 1-338 : 1980), copies of which are available from the Director, French Institute, Pondicherry, India (Cost 125 FF + 10 FF "French Francs" including air mail charge).

EDITORIAL NOTE

I wish to point out to all recipients that the next Compositae Newsletter will be the last, unless an offer to edit, finance, produce and distribute the Newsletter is forthcoming within the next twelve months. I should be grateful to hear from anyone willing and able to undertake this service. Failing a previous solution, the International Botanical Congress in Sydney in August-September this year should provide an opportunity for interested synantherologists attending to discuss the future of the Newsletter. As I am not myself attending the Congress, I should be grateful to hear from a (preferably Australian) recipient willing to organise such a discussion.

C. Jeffrey

RECENT LITERATURE

These references have been extracted from the Current Awareness Lists of the Library, Royal Botanic Gardens, Kew. A comprehensive bibliography of Compositae, published annually, is contained in the Kew Record of Taxonomic Literature.

357-2545

April 16, 1981

Australian Academy of Sciences
P. O. Box 783
Canberra City
ACT 2601
AUSTRALIA

Gentlemen:

Please find enclosed my registration and booking form and a check in the amount of \$204.00A. I hope that everything is in order.

Sincerely,

Digitized by Hunt Institute for Botanical Documentation

Robert M. King
Department of Botany

Enclosure

357-2545

May 6, 1981

Director
British Museum (Natural History)
Cromwell Road, London SW7 5BD
Great Britain

Dear Sir:

The following specimens are needed for my treatment of the Eupatorieae for the Flora Zambesiaca and therefore, I am only interested in material from that region.

I would like to request the loan of the following genera of the tribe Eupatorieae (Compositae):

Ageratum, Adenostemma, Eupatorium, Mikania

Very sincerely,

Robert M. King
Department of Botany

357-2545

May 6, 1981

Director
The East African Herbarium
P. O. Box 45166
Nairobi, Kenya, East Africa

Dear Sir:

The following specimens are needed for my treatment of the Eupatorieae for the Flora Zambesiaca and therefore, I am only interested in material from that region.

I would like to request the loan of the following genera of the tribe Eupatorieae (Compositae):

Ageratum, Adenostemma, Eupatorium, Mikania

Very sincerely,

Robert M. King
Department of Botany

357-2545

May 6, 1981

Director
Missouri Botanical Garden
P. O. Box 299
St. Louis, MO 63166

Dear Sir:

The following specimens are needed for my treatment of the Eupatorieae for the Flora Zambesiaca and therefore, I am only interested in material from that region.

I would like to request the loan of the following genera of the tribe Eupatorieae (Compositae):

Ageratum, Adenostemma, Eupatorium, Mikania

Very sincerely,

Robert M. King
Department of Botany

357-2545

May 6, 1981

Director
Royal Botanic Gardens
Kew, Richmond, Surrey TW9 3AE
The Herbarium - Great Britain

Dear Sir:

The following specimens are needed for my treatment of the Eupatorieae for the Flora Zambesiaca and therefore, I am only interested in material from that region.

I would like to request the loan of the following genera of the tribe Eupatorieae (Compositae):

Ageratum, Adenostemma, Eupatorium, Mikania

Very sincerely,

Robert M. King
Department of Botany

357-2545

May 6, 1981

Director
Botanical Museum
O. Vallgatan 18, S-223 61
Lund, SWEDEN

Dear Sir:

The following specimens are needed for my treatment of the Eupatorieae for the Flora Zambesiaca and therefore, I am only interested in material from that region.

I would like to request the loan of the following genera of the tribe Eupatorieae (Compositae):

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Very sincerely,

Robert M. King
Department of Botany

357-2545

May 6, 1981

Director
Museum of Natural History
S-104 05
Stockholm 50, SWEDEN

Dear Sir:

The following specimens are needed for my treatment of the Eupatorieae for the Flora Zambesiaca and therefore, I am only interested in material from that region.

I would like to request the loan of the following genera of the tribe Eupatorieae (Compositae):

Ageratum, Adenostemma, Eupatorium, Mikania

Very sincerely,

Robert M. King
Department of Botany

357-2545

May 6, 1981

Director
Jardim e Museu Agricola do Ultramar
Calçada do Galvão-Belem
Lisboa, Portugal

Dear Sir:

The following specimens are needed for my treatment of the Eupatorieae for the Flora Zambesiaca and therefore, I am only interested in material from that region.

I would like to request the loan of the following genera of the tribe Eupatorieae (Compositae):

Ageratum, Adenostemma, Eupatorium, Mikania

Very sincerely,

Robert M. King
Department of Botany

357-2545

May 6, 1981

Director
National Herbarium
Department of Research and Specialist Services
P. O. Box 8100
Causeway, Salisbury, Rhodesia
Dear Sir:

The following specimens are needed for my treatment of the Eupatorieae for the Flora Zambesiaca and therefore, I am only interested in material from that region.

I would like to request the loan of the following genera of the tribe Eupatorieae (Compositae):

Ageratum, Adenostemma, Eupatorium, Mikania

Very sincerely,

Robert M. King
Department of Botany

357-2545

May 6, 1981

Director
Centro de Botanica da Junta de
Investigacoes Cientificas do Ultramar
Rua Jau 54, Lisboa 3, Portugal

Dear Sir:

The following specimens are needed for my treatment of the Eupatorieae for the Flora Zambesiaca and therefore, I am only interested in material from that region.

I would like to request the loan of the following genera of the tribe Eupatorieae (Compositae):

Ageratum, Adenostemma, Eupatorium, Mikania

Very sincerely,

Robert M. King
Department of Botany



MINISTÉRIO DA EDUCAÇÃO E INVESTIGAÇÃO CIENTÍFICA
JUNTA DE INVESTIGAÇÕES CIENTÍFICAS
JARDIM E MUSEU AGRÍCOLA
DO ULTRAMAR

Director of
National Museum of Natural History
Smithsonian Institution
Washington, DC. 20560
U. S. A.

Sua referência

Sua comunicação

Nossa referência

Calçada do Galvão — Belém
Lisboa-3 — Portugal

May 6-1981

CL/MA

221

- 3 JUN 1981

Dear Sir

Digitized by Hunt Institute for Botanical Documentation

We acknowledge the receipt of your letter above mentioned and we, inform you that we are sorry, but we haven't any material of the Eupatorieae for de Flora Zambesiaca area.

Yours faithfully

The Director

Al. Augusto Junior



MINISTÉRIO DA EDUCAÇÃO E CIÊNCIA
JUNTA DE INVESTIGAÇÕES CIENTÍFICAS
JARDIM E MUSEU AGRÍCOLA DO ULTRAMAR
BELÉM - 1400 LISBOA



Director of
National Museum of Natural History
Smithsonian Institution
Washington, DC. 20560
U.S.A.

of 221

25 Sept 1981

Dear Bob:

Enclosed is a reprint of a paper ^(much of which I wrote) you probably have already seen. This points to why I prefer to send The Eupatoriaceae material on to Mabry — he has a constant flow of students to study various groups, and he now (after Timmermann) can see how significant the chemical approach is likely to be in this tribe.

I took a look at buds of the two collections now in flower (in case I had to recollect buds). Platypodanthera (K 8597) is $n=10$ and Conoclinium (K 8430) is $n=10$.

The Eupatorium arrived in great shape and planted right away — much appreciated. Probably we will keep it inside over winter and plant it outside in the spring.

Best,
Milce

Missouri
Botanical
Garden



May 3, 1982

Mr. Robert M. King
Department of Botany
Smithsonian Institution
Washington, D. C. 20560

Dear Bob:

The mass of paper that comes with this letter relates to my attempts to update the Flora of Panama. I hope you will assist where you can.

The entire Flora is now on computer here, but I am having the greatest difficulty in getting the programs prepared to write the reports needed. It is at least now possible to update the Flora regularly and to produce the reports you see here. Hopefully, the remaining elements will be ready in a couple of months and I will be able to think about publishing an Index with some kind of revision.

The Flora of Panama Computer Project now attempts the following reports:

- Complete printout: This is primarily for editorial purposes but you may find it useful in your work. To interpret it, there is a format sheet and a list of geographic acronyms. Authors are to be standardized.
- Working checklist: This includes accepted names only and information on province and elevations. Ultimately, it will include occurrences outside of Panama and habit and other information. A version is also being prepared which omits the province and elevation data. Note that authors are in abbreviated form here. An asterisk means not in the Flora of Panama.

July 1, 1982

Dear Bob!

I had a chance yesterday to chat with Ramón Terraza and to broach the matter of the seeds you need of that composite. He took note of the request, indicated he knew where the plants grow & that he would see to it that you get the material you requested. I should imagine this is the best possible resolution of the matter since it takes it out of the hands of a "cross back" not terribly familiar with the genus

in question & places it into those
of Perù's most renowned Vascular
plant specialist of our time.

The Congress begins today. I've no
idea exactly how many will show
up, but Emma Cerrate tells me some
180 papers have been submitted. A
nice-sized group of Argentines arrived
yesterday, and I've at least 2 other
moss men to form a bryology session
with, Bill Steere & Claudio Delgadillo.

Best regards,

W. L. C.

357-2545

August 16, 1982

Director
Conservatoire et Jardin botaniques
Case postale 60, CH 1292
Chambesey G. E., Switzerland

Dear Sir:

Enclosed please find photographs of the following botanists:

E. Kaun, A. P. Decandolle, N. Harriman, R. Jansen, O. Huber,
D. Kaun, J. Steyermark, C. Jeffrey, L. E. Bishop, S. Mori,
O. Tovar, D. Keil, G. Nesom, D. Rindos, S. McDaniel, E. Schilling,
B. Nordenstam, V. Badillo.

I hope that this series will be a welcome addition to your
collections.

Sincerely,

Robert M. King
Department of Botany

RMK:cap
Enclosures

357-2546

December 10, 1984

Agricultural Attache
United States Embassy
Buenos Aires, Argentina

Dear Sir:

I am planning an expedition to Argentina for the of January, 1985.
Would request that I be allowed to send my collections back to the
Smithsonian in the United States through the unclassified diplomatic
pouch. I will provide my own franked labels.

Thank you in advance.

Sincerely,

Robert M. King
Department of Botany

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PLANTS OF ARGENTINA

Cytological and / or Biochemical Vouchers

No.

Digitized by Hunt Institute for Botanical Documentation

August 12, 1985

Agricultural Attachee
United States Embassy
Lima
PERU

Dear Sir:

I am planning a botanical expedition to Peru for the months of January and February of 1986. I would like to ask if there are any problems in the area of Amazonas. Also, would it be possible for me to send some material (mainly cardboard boxes) in advance to the embassy? I would also like to ship my collections via the pouch or APO as I have done in the past.

Thank you.

Sincerely,

Robert M. King
Department of Botany

357-2546

March 12, 1986

Senior Clerk, Flora
Department of Conservation and Land Management
50 Hayman Road, Como
Western Australia 6152, AUSTRALIA

Dear Sir:

I am writing to request a permit for collecting plants for scientific study in Western Australia in August-September of this year. Our studies will include both cytology and biochemistry. We will be working in cooperation with the Western Australian Herbarium with Paul Wilson and J. W. Green. We will be most interested in the family Compositae. My assistant, Dr. Earl Bishop will also be with me.

Sincerely yours,

Robert M. King

Robert M. King
Department of Botany

Digitized by Hunt Institute for Botanical Documentation

May 27, 1986

Senior Clerk, Flora
Department of Conservation and Land Management
50 Hayman Road, Como
Western Australia 6152, Australia

Dear Sir:

I am writing to request a permit for collecting plants for scientific study in Western Australia in August-September of this year. Our studies will include both cytology and biochemistry. We will be working in cooperation with the Western Australian Herbarium with Paul Wilson and J. W. Green. We will be most interested in the family Compositae. My assistant, Dr. Earl Bishop will also be with me.

Sincerely yours,

Robert M. King

Department of Botany

Note: This letter was sent to you earlier, March 12, 1986. Perhaps it was lost in the mail. Thanks.

Parking Office
B-25

July 9, 1986

Robert M. King
W526A NHB Stop 3166

Parking

I would like to request parking for the following days. July 21 and 28.
August 4, and August 11, Thank you.

August 15, 1986

Superintendent for International Cooperation
Conselho Nacional de Desenvolvimento
Científico e Tecnológico
Edifício CNPq
Av. W3 Norte Q. 507/B
CX. Postal, 11-1142
Brasília-DF-CEP. 70000
BRASIL

Gentlemen:

Enclosed herewith is my application for a permit to collect in Brasil.
I hope that everything is in order.

Sincerely yours,

Robert M. King
Department of Botany

February 9, 1989

Weldon & Wesley Ltd.
Lytton, Lodge, Codicote, Hitchin, Herts
SG4 8TE
London
England

Gentlemen:

I am very interested in obtaining a copy of the Flora de Real Expedicion del Nuevo Reyno de Granada the volume on Cucurbitaceas y Campanulaceas, tomo XLV Vol 1 y 2. I believe that this is the volume that contains the first part of the family Compositae by Santiago Diaz-Piedrahita.

Would please let me if you have a copy and the price. I would like to pay by bank card.

Sincerely,

Robert M. King
Department of Botany

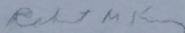
July 17, 1989

Weldon & Wesley Ltd.
Lytton, Lodge, Codicote, Hitchin, Herts
SG4 8TE, London, England

Gentlemen:

I would like to inquire of the status of my order of the Flora de Real Expedicion del Nuevo Reyno de Granada Cucurbitaceas y Campanulaceas, tomo XLV Vol 1 y 2. by Santiago Diaz-Piedrahita. A letter from you indicated that you had to get the book from Madrid. Please let me know when you can expect to ship it.?

Sincerely,


Robert M. King

Department of Botany

December 26, 1989

Superintendent for International Cooperation
Conselho Nacional de Desenvolvimento
Cientifico e Tecnológico
Edifício CNPq
Av. W3 Norte Q. 507/B
CX. Postal, 11-1142
Brasília-DF-CEP, 70000
Brazil

Gentlemen:

I would like to request that you send me the necessary information and forms for applying for a collecting permit for Brasil. I am interested in continuing my research in plant chemistry and biology.

Thank you very much.

Sincerely,

Robert M. King

Robert M. King

Department of Botany

PROPOSAL TO THE NATIONAL SCIENCE FOUNDATION
Cover Page

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FOR CONSIDERATION BY NSF ORGANIZATIONAL UNIT (Indicate the most specific unit known, i.e. program, division, etc.) Systematic Biology Program Division of Biotic Systems and Resources		IS THIS PROPOSAL BEING SUBMITTED TO ANOTHER FEDERAL AGENCY? Yes ☐ No ☒ IF YES, LIST ACRONYM(S):	
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NAME OF SUBMITTING ORGANIZATION TO WHICH AWARD SHOULD BE MADE (INCLUDE BRANCH/CAMPUS/OTHER COMPONENTS) University of Texas at Austin			
ADDRESS OF ORGANIZATION (INCLUDE ZIP CODE) Austin, Texas 78712			
TITLE OF PROPOSED PROJECT Systematic Studies in Neomirandea (Asteraceae--Eupatorieae)			
REQUESTED AMOUNT \$4835.00	PROPOSED DURATION 24 months	DESIRED STARTING DATE January 1, 1984	
PI/PO DEPARTMENT Department of Botany	PI/PO ORGANIZATION	PI/PO PHONE NO.	
PI/PO NAME Randall W. Scott B.L. Turner	SOCIAL SECURITY NO. 213-48-7921 456-20-4697	DATE OF HIGHEST DEGREE ACHIEVED 1975 1953	MALE* X X
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* Submission of SSN and other personal data is voluntary and will not affect the organization's eligibility for an award. However, they are an integral part of the NSF information system and assist in processing proposals. SSN solicited under NSF Act of 1950, as amended.			
CHECK APPROPRIATE BOX(ES) IF THIS PROPOSAL INCLUDES ANY OF THE ITEMS LISTED BELOW:			
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☐ Endangered Species	☐ Marine Mammal Protection	☐ Research Involving Recombinant DNA Molecules	
☐ Historical Sites	☐ Pollution Control	☐ Proprietary and Privileged Information	
PRINCIPAL INVESTIGATOR/ PROJECT DIRECTOR	AUTHORIZED ORGANIZATIONAL REP.	OTHER ENDORSEMENT (optional)	
NAME Randall W. Scott B.L. Turner	NAME G. J. FONKEN	NAME	
SIGNATURE Original Signed By	SIGNATURE Original Signed By	SIGNATURE	
TITLE PhD Candidate Professor of Botany	TITLE VICE - PRESIDENT FOR ACADEMIC AFFAIRS AND RESEARCH	TITLE	
DATE April 26, 1983	DATE APR 27 1983	DATE	

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SYSTEMATIC STUDIES IN NEOMIRANDEA
(ASTERACEAE--EUPATORIEAE)

Research Proposal Submitted to the National Science Foundation under
Grants for Improving Doctoral Dissertation Research
Division of Biotic Systems and Resources
Systematic Biology Program

Randall W. Scott, Graduate Student Investigator
B.L. Turner, Dissertation Advisor

The Department of Botany
The University of Texas at Austin

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Project Summary:

Recent revisionary studies in the Eupatorieae (Asteraceae) by King and Robinson have brought forth a number of questions regarding generic concepts and relationships within the tribe. Over 100 new genera have been proposed by King and Robinson at the expense of the traditionally large genus Eupatorium (sensu latissimo; ca. 600 species) which has been reduced to a small, monophyletic assemblage (ca. 40 species).

As one of 19 subtribes, the Neomirandinae consists solely of the genus Neomirandea. It was delimited principally by the use of "microcharacters", combinations of which are found among several closely related subtribes.

Of the 25 species comprising Neomirandea, thirteen were described by King and Robinson in the five years following their delineation of the genus. Virtually all of the species are reported to grow in relatively close proximity to one another in the montane cloud forests of Costa Rica and Panama with several possessing overlapping or continuous ranges.

The object of this study is to investigate the evolutionary relationships of the taxa included in Neomirandea at the subtribal, generic, specific and populational levels through analysis of: 1) morphology, 2) anatomy, 3) chemistry, 4) cytology and 5) population ecology.

Introduction:

A number of questions regarding generic concepts and relationships within the tribe Eupatorieae have been brought forth by the recent contributions of King and Robinson (Grashoff and Turner, 1970; McVaugh, 1983). Until recently, most workers have tended to follow Betham's (1873) concept of a large diverse genus, Eupatorium (ca. 600 spp.), around which were centered several satellite genera. King and Robinson (1970), however, have narrowed the concept of Eupatorium to a small, monophyletic, closely related assemblage of about 40 species. The remaining species have been placed among approximately 160 mostly small genera, many comprised of one to a few closely related taxa. These have been further grouped into 18 subtribes (Robinson and King, 1977; King and Robinson, 1980) of which the genus Neomirandea comprises the Neomirandeeinae.

The Neomirandeeinae was first referred to by Robinson and King (1977) as the "Neomirandea group". It was characterized as possessing the subimbricate, partially deciduous involucre and smooth corolla lobes of the "Critonia group" along with elongate anther collars of mostly subquadrate cells as are found in the "Hebeclinium group". King and Robinson (1970a) also claimed that the genus seems to be Ageratinioid due to the often lax-celled carpopodia, the inornate anther collars and the distinct stylar node in some species. This is further corroborated by a chromosome count of $n = 17$ for at least one of the species, although species are also known on a base of $x = 10$.

Most members of Neomirandea are either hemi-epiphytic or grow in deep humus. The center of diversity for the group is in the montane cloud forests of Costa Rica and western Panama, while a few species extend northward to Mexico and southward to Ecuador.

When King and Robinson first delineated Neomirandea, they felt two genera could easily have been recognized, but in view of the seemingly close overall relationship of the group they felt such splintering would serve no purpose (King and Robinson, 1970). One is led to believe that these genera would have been separated along their current subgeneric lines with the taxa having higher base chromosome numbers, enlarged style bases and hairs inside the corollas as the more advanced of the two groups. These subgeneric divisions falter with three species (N. burgerii, N. panamensis, and N. grosvenorii) having been described as lacking hairs on the inner corolla surfaces while possessing distinctly enlarged style bases (King and Robinson 1972a, 1973, 1975a). Unfortunately, chromosome work is limited to counts of 2 species in one published account (Turner and King, 1964) ^{King et al} and provides no information in this or similar types of situations.

The need for an in-depth systematic study becomes apparent upon inspection of specimens and a review of the relevant literature. Numerous species are sympatric and are differentiated only by minute detail. An example of this is the complex centered about N. homogama (Hieron.) H. Rob. & Brettell. This species was first described as a Liabum (tribe Vernoniaeae, Senecioneae or Liabeae; depending on treatment) and was transferred to Neomirandea in a recent revision of the Liabeae (Robinson and Brettell, 1974). When this new combination was made two species (N. hitchcockii and N. standleyi) were placed in synonymy under N. homogama. B.L. Robinson (1926) who described both of the former species, noted a strong similarity between the two taxa, but though the resemblance merely habitual. Further, King and Robinson (1970) treat E. breneisii Standley as synonymous with N. standleyi yet these were treated as "good" species by Standley (1938). In their treatment of Neomirandea in the Flora of Panama, King and Robinson (1975c) again delimit N. homogama and N. standleyi

on the basis of head size, number of florets per head, involucre bract and corolla structure. However, they acknowledge problems in separating these two species largely because of their continuous ranges and hypothetical complications arising from putative hybridization.

Problems on the species level are compounded as several species are known only from the type collections and little is known about populational structure and variation in nature.

The purpose of this present study is to elucidate taxonomic and evolutionary relationships from the "extratribal" to the intraspecific level through studies of; 1) macro- and micromorphology including both numerical and cladistic analyses, 2) anatomy, 3) flavonoid/ sesquiterpene chemistry 4) cytology and 5) general population ecology.

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Taxonomic History:

The genus Neomirandea was erected by King and Robinson (for brevity hereafter, K. & R.) in 1970 as part of an extensive revision of the tribe Eupatorieae. Initially, the genus contained thirteen species eleven of which were transferred from Eupatorium while two were newly described by K. & R. Two subgenera were established based on the presence or absence of an enlarged stylar node and hairs within the corolla (King and Robinson, 1970a). Later, this group, currently comprised of 25 species, was felt to be sufficiently distinct as to warrant recognition at the subtribal level (King and Robinson, 1980).

The first species of Neomirandea to be described was done so by Lessing as Eupatorium araliaefolium in 1841. Two other species, Neomirandea carnosa (Kuntze) K. & R. and N. parasiticum (Klatt) K. & R. were delineated before 1900, when B.L. Robinson recognized Eupatorium heterolepis. The latter species was placed in synonymy by B.L. Robinson (1903) under E. araliaefolium. Of the numerous species of Eupatorium described by B.L. Robinson in the first part

of this century, eight were placed in Neomirandea by K. & R. (1970). That B.L. Robinson was aware of the similarities among certain of these species and those of Lessing, Klatt, and Kuntze is apparent in his notes following the formal descriptions of several of his later recognized species (B.L. Robinson 1924, 1926a). He noted, for example, that two of these, E. hitchcockii and E. standleyi shared various characters, but he failed to relate these to either E. angulare B.L. Robs. or E. psoralea B.L. Robs., which along with E. araliaefolium comprised the original subgenus Neomirandea K. & R. Nor does he discuss any possible affinities between the four species he described and the three species of Klatt, Kuntze and Lessing. B.L. Robinson did relate the latter three species to four other species he recognized, E. arthrodes, E. eximium, E. pithecobium, and E. sciaphilum, which together with two other species made up the original nine species of K. & R.'s subgenus Critoniopsis of Neomirandea.

Since the original description of Neomirandea, thirteen additional species have been placed in the taxon eleven of which were proposed by King and Robinson (1972a, 1972b, 1973, 1975a, 1975b). Neomirandea homogama (Hieron) H. Robs. & Brett. was transferred from Liabum in 1974 and N. folsomiana Dillon & D'Arcy was recognized in 1978. In short, 13 of the 25 species comprising Neomirandea came to light in a matter of five years after the genus was put forth by K. & R. Practically all of the species of Neomirandea can be found growing in relatively close proximity of each other in Costa Rica and western Panama which lends the group to interspecific and interpopulational studies with regard to speciation processes. The genus displays a wide variety of habits that range from hemiparasitic shrubs and small trees to those that reportedly approach lianas. Some species are apparently epiphytic (King and Robinson, 1972b) while others are clearly terrestrial. Floral morphology, although fairly consistent, expresses relationships to other groups within the Eupatorieae. These associations are in need of greater clarification.

Previous Systematic Work:

The great bulk of the species belonging to the tribe Eupatorieae were described by Professor B.L. Robinson of Harvard University, whose massive work on the genus can only be described as a "love of labor". In fact, he was so involved with the rich novelties in the tribe that he had little time for organizing them into a cohesive whole. The species were described in numerous, isolated papers and most were placed within Eupatorium (sensu latissimo). Descriptions and specific designations that were made were based largely on morphological characters and, to a lesser extent, upon geographical distribution as the plants often were known from single collections.

In their studies of the Eupatorieae, King and Robinson have brought to attention a number of potentially useful characters, many of which were not used by previous workers. These characters have been principally used to delimit subtribes (King and Robinson, 1980). In the case of Neomirandeeae, a subtribe of one genus, the characters can be applied at the generic level. The "microcharacters" most important in reenforcing the overall uniformity of the genus were described as, "the smooth to slightly bulging, lax cells of the corolla which are very broad and straight-walled in all but a few species; the short carpopodium with small to rather large thin-walled cells; and especially the very elongate inornate anther collars," (King and Robinson, 1970a).

Chromosomal studies have been numerous but sporadic within the Eupatorieae and these have been considered important in combination with other characters in the definition of generic groupings (Turner et al., 1973; Robinson et al., 1981). Chromosome counts have been made for only two species of Neomirandea, N. angularis with $n=25$ (base $x=10$, according to Turner, pers. comm.) and

N. costaricensis with $x=17$ (Turner and King, 1964). The latter, as noted above, has been viewed as indicative of support for possible affinities between Neomirandea and the Ageratinioid element of the Eupatorieae, whereas the former could be interpreted as a possible divergent element within the genus. Clearly, more chromosomal studies are needed among the species of Neomirandea in order to assess the value chromosomes have as systematic markers.

No analysis of the chemistry of any of the species of Neomirandea has been reported to date. Due to the complexity of the species problems, chemical analysis could, perhaps, be very informative. Only about 20% of the members of the tribe Eupatorieae have any record of chemical study and of those that have been studied, essential oils yielding aromatic terpene derivatives have been isolated along with sesquiterpene lactones (germacranolides and guaianolides), diterpenoids, triterpenoids, steroids and flavonoids (see Domínguez, 1977, for review). Chemistry has not been used as a primary factor for delimiting taxa or for placing species in genera within the Eupatorieae, but, when used systematically, it has been as a reaffirmation of previous species assignments based on an assessment of morphological characters (Bohlman et al., 1977).

Proposed Research:

The present study will focus on the following problems:

- 1) Elucidation of interspecific relationships among the taxa of Neomirandea with particular attention being focused on intra- and interspecific morphological, chemical and cytological variation of certain species complexes (ie. N. homogama - N. standleyi; N. costaricensis - N. exima).
- 2) Investigation of inter and intrapopulational variability of morphology and chemistry as they correlate with ecological differences in order to gain insights into speciation processes.

- 3) Clarification of the subtribal and generic relationships of Neomirandea within the Eupatorieae.

A. Field and Herbarium Studies:

Field research will constitute an extremely important element of the present study due first, to the number of species presently known only from the type collections and second, to the problems in delimiting various taxa which have continuous and/or overlapping distributions.

In order to procure the necessary material for a thorough cytological and chemical study, and to make observations regarding population structure and reproductive biology (e.g. probable pollinators, flowering phenology, reproductive success), extensive field work is planned. During these periods of field studies, material will be collected as pressed specimens, preserved (FAA) vegetative and floral structures, bud material for cytological studies and bulk collections for phytochemical analysis. These studies will be carried out in Costa Rica and western Panama, as all but one species (N. ovandensis) are reported to occur in these areas. An attempt will be made to cultivate all species collected in order that breeding systems can be observed and preliminary hybridization experiments can be carried out.

Specimens have already been borrowed from Field Museum and others are to be requested from major U.S. herbaria and Mexico.

B. Morphological and Anatomical Studies:

Morphological studies will comprise a major component of this study due, in part, to past useage, but primarily, to the introduction of a set of microcharacters into the classification of the Eupatorieae (King and Robinson, 1969, 1977). Evaluation of these characters similar to that of Wetter's (1983) examination of micromorphological characters as generic markers

in certain New World Senecionae will be undertaken. As mentioned earlier, these characters have been used in conjunction with the more traditional "macrocharacters" to delineate Neomirandea on both the generic and subtribal levels and, also, within the genus at the subgeneric and species levels.

The two major areas of this study will be:

- 1) Cellular components: The structure of such features as anther collars, achene carpopodia, style bases and appendages, corollas and the hairs or glands attached to the corolla will be studied using a compound light microscope. Further studies will be made using Scanning Electron Microscopy (SEM) and when necessary TEM.
- 2) Vegetative anatomy: Thin sections of stems will be made in order to determine if Neomirandea has similarly unique anatomy as is found in the genus Mikania (Carlquist, 1965), which shares similar habitats and viny habit of Neomirandea.

C. Phytochemical Investigations:

Flavonoid and/or terpenoid constituents will be isolated from species of Neomirandea utilizing the excellent laboratory facilities under the direction of Dr. T.J. Mabry at the University of Texas. Because of previous work among other genera and subtribes within the Eupatorieae, the determination of such compounds will provide for a better formulation of relationships on these levels. At the species level, elucidation of the phytochemistry of closely related taxa will possibly provide clues to modes of speciation when correlated with cytological, morphological and ecological studies.

D. Numerical or Computer Studies:

Computer-assisted research will be done using the phentic (NTSYS) package of Sneath and Sokal and the cladistic (Wagner 78) package of

James Farris, both of which are currently available on the University of Texas IBM 370/158 computer. These packages will be used to generate hypotheses of relationships through character distribution networks. Such networks will be useful in indicating areas of homoplasy (convergence) as well as evolutionary divergence among characters. The reticulate nature of character distribution among the Eupatorieae does not lend itself to straightforward analysis, but it is felt that the resolution of the character complexities found within Neomirandea can be greatly aided by the use of such packages.

E. Cytological Studies:

Chromosome counts will be made of as many individuals as possible using standard chromosome count techniques. In order to clarify to what extent aneuploidy or polyploidy has been a factor within the group a complete survey will be required. Comparisons of karyotypes with regard to chromosome size, centromeric position and banding patterns will also be attempted.

Results of Preliminary Research:

To date, research has been primarily restricted to library and herbarium studies. Most of the relevant literature has been compiled and studied. The loan received from the Field Museum herbarium was pulled on a trip to Chicago in October, 1982. Morphological studies have been started using microscope slide preparations of floret dissections made utilizing material from Field and specimens from the collection at the University of Texas herbarium.

One field trip was taken to Oaxaca and Chiapas, Mexico during January of this year. A single collection of Neomirandea aralaefolia including seed and bud material was made in Vera Cruz.

Seed material along with voucher specimens of two species was kindly brought back from Costa Rica by Allen Zimmerman. Cultivation of these has begun in the University of Texas greenhouse facilities along with the species mentioned above from Mexico.

Schedule of Research:

It is requested that the grant be active from January 1, 1984 to December 31, 1985, in order that fieldwork can be carried out during the spring of 1984 and 1985 and, if necessary, the fall of 1985. All research is scheduled for completion by the fall of 1985 at the latest.

Future Research Goals:

Due to the complexity of evolutionary relationships between taxa in the Eupatorieae, further studies of speciation processes will be pursued particularly among taxa of the "Hebeclinium" and "Grisonia" groups. Of primary interest is the relationship of chemistry and morphological character variability with respect to different habitats. Future research will also involve population and ecological studies of woody species inhabiting cloud and tropical rain forest regions of Central and South America.

Budget Summary:

1. Travel

A. Foreign

Austin, Tx. to San Jose, Costa Rica (roundtrip)	
\$ 1050.00 x 2 trips	\$ 2100.00
Trip I (predicted May 15 - June 15, 1984)	
30 days at \$10.00 per diem	\$ 300.00
Car rental at \$150.00 a week for 4 weeks.....	\$ 600.00
plus \$0.25 per km. for 1500 km.....	\$ 375.00
Trip II (predicted Dec. 15 - Jan. 5, 1986)	
21 days at \$10.00 per diem	\$ 210.00
Car rental at \$ 150.00 per week.....	\$ 450.00
plus \$ 0.25 per km. for 1000 km.	\$ 250.00
Subtotal....	\$ 4285.00
2. Computer time	\$ 100.00
3. Scanning Electron Microscopy (20 hours at \$15.00/hour).....	\$ 300.00
4. Miscellaneous (greenhouse supplies, collecting materials).....	\$ 150.00
Subtotal....	\$ 550.00

TOTAL REQUESTED.....\$ 4835.00

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Budget Justification:

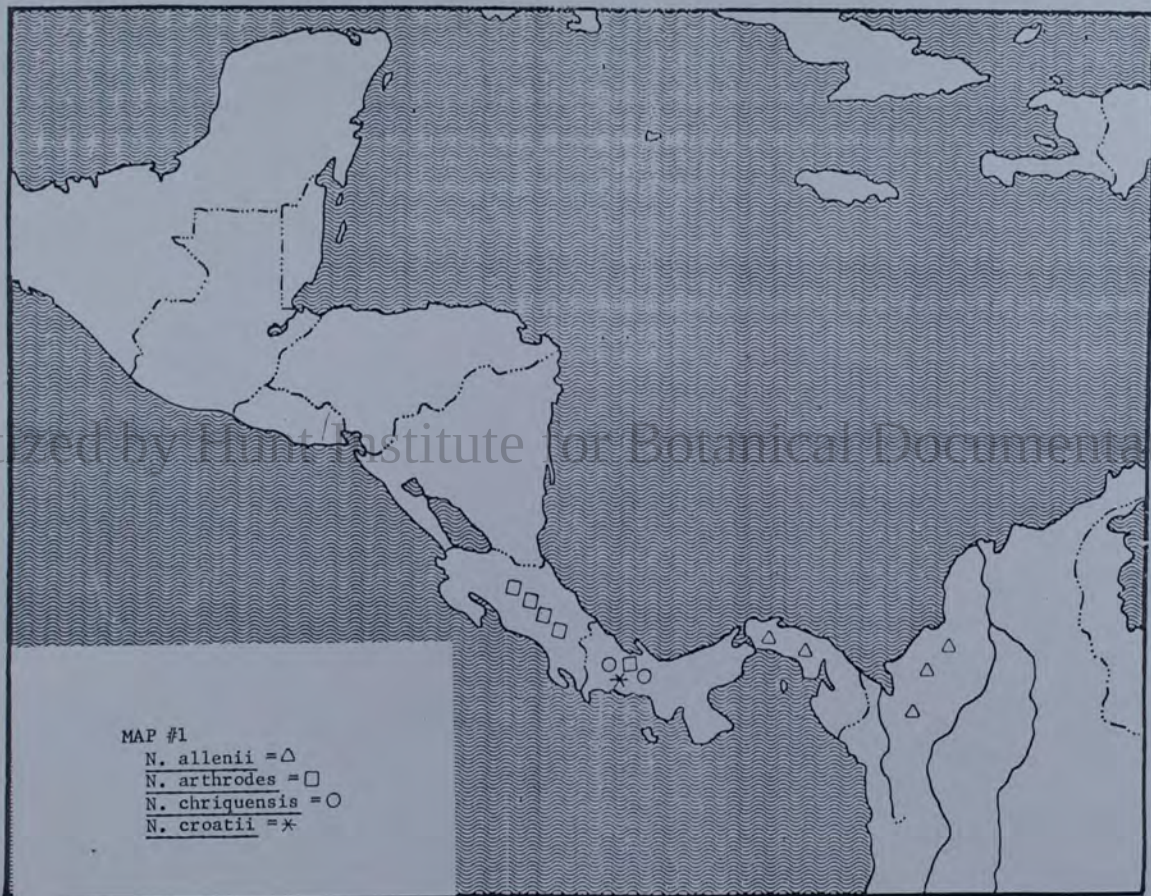
Field observations and material collections are unquestionably essential for the successful completion of this study. Due to the apparent existence of two distinct flowering periods that correlate with the dry and rainy seasons of Costa Rica and Panama, two trips have been proposed in order to maximize the possibilities of collecting the necessary material. The remote locations of the collection sites and the need for bulk material for chemical analysis necessitate the expense of car rental. Access to a car will also allow for the maximum efficient use of time that is so important when making comparative population studies.

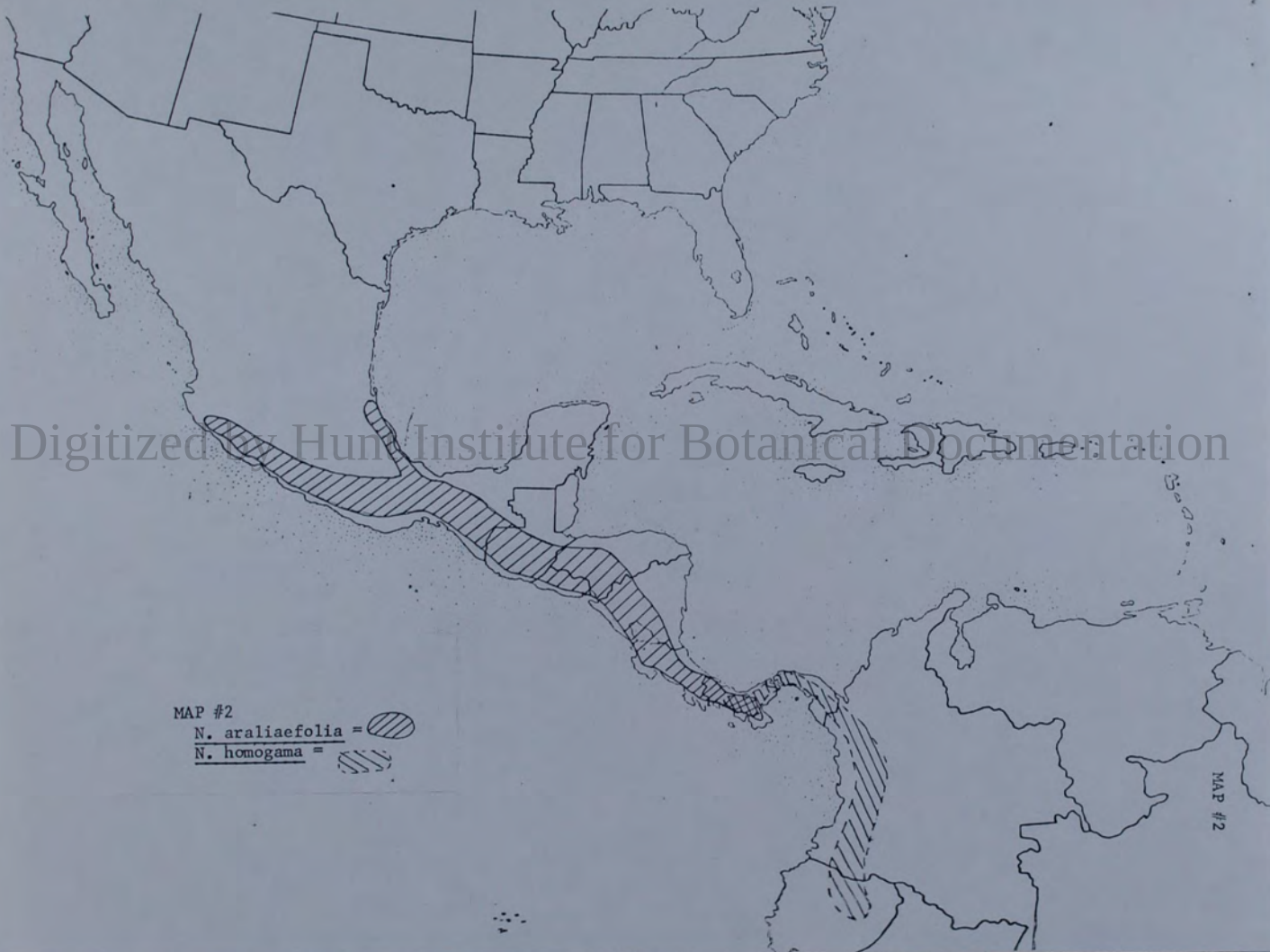
Literature Cited and Selected Bibliography

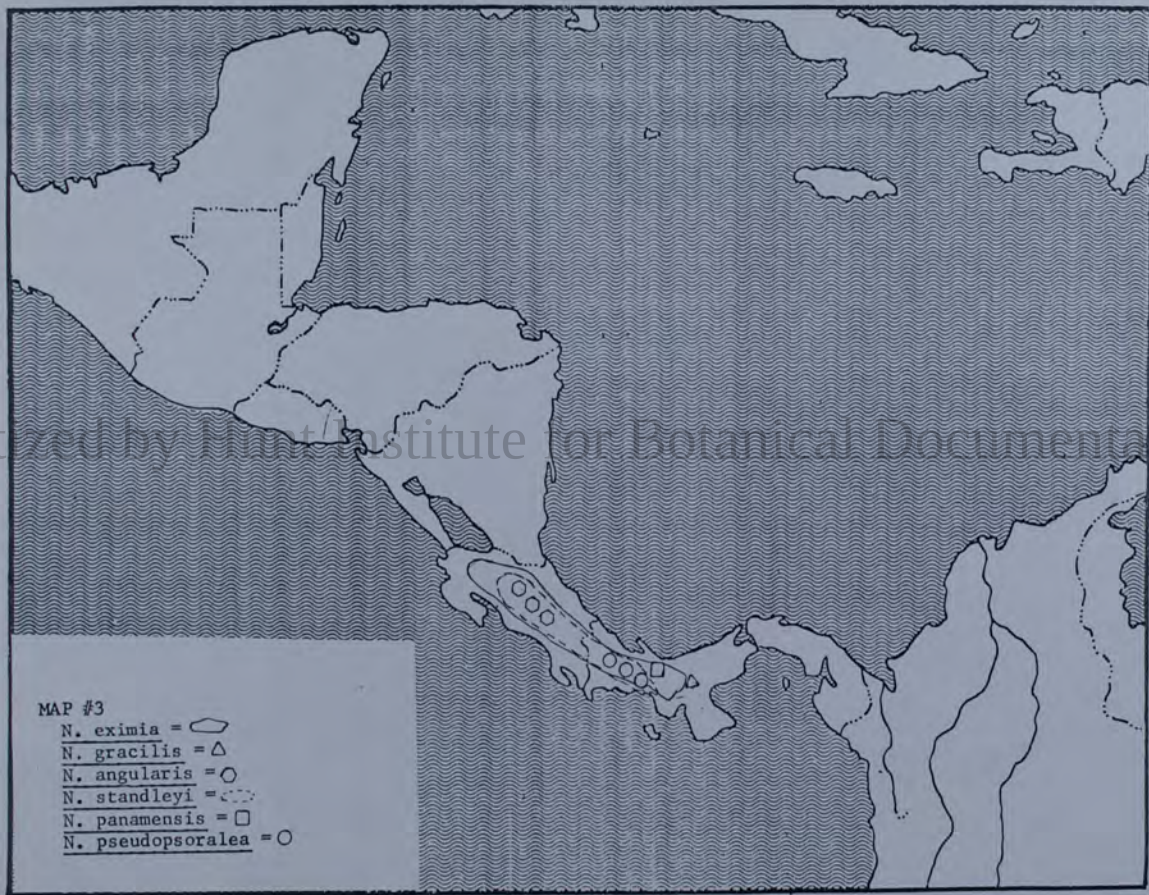
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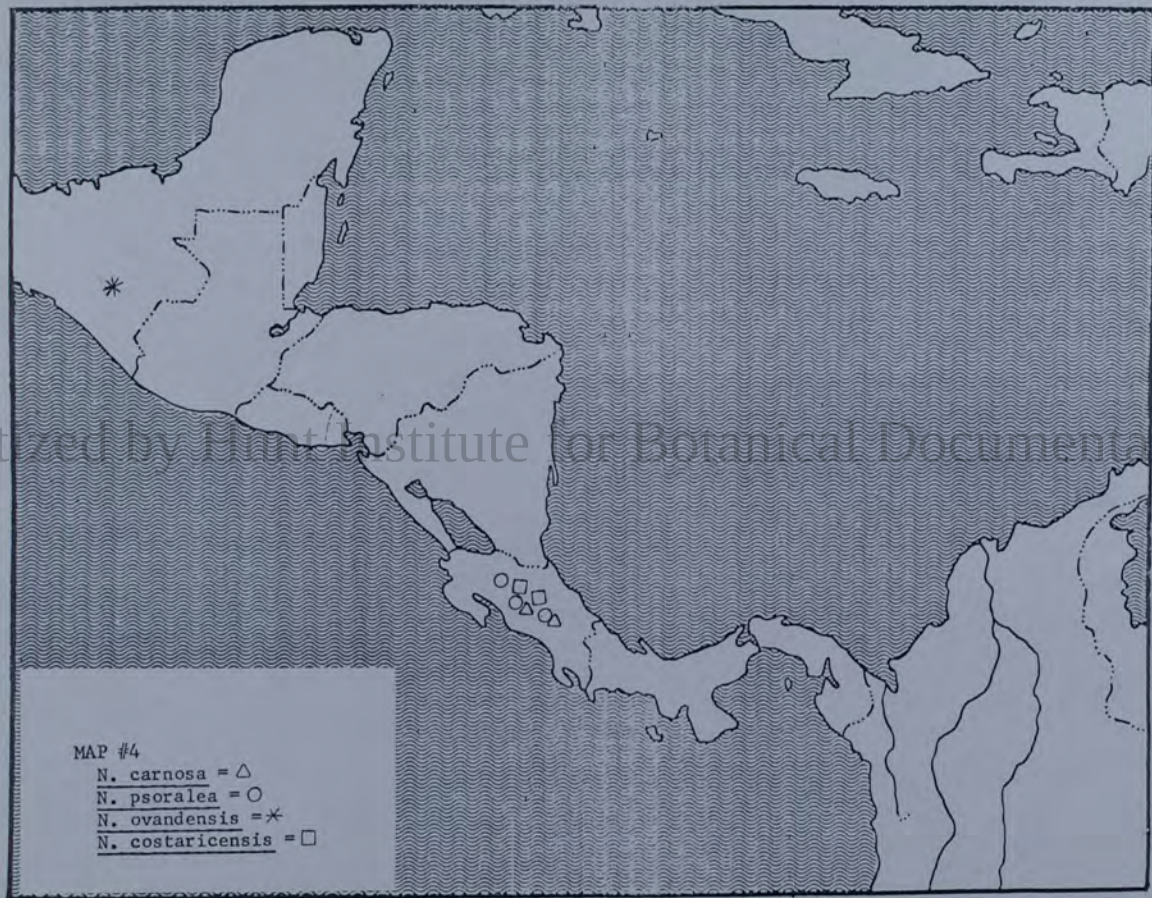
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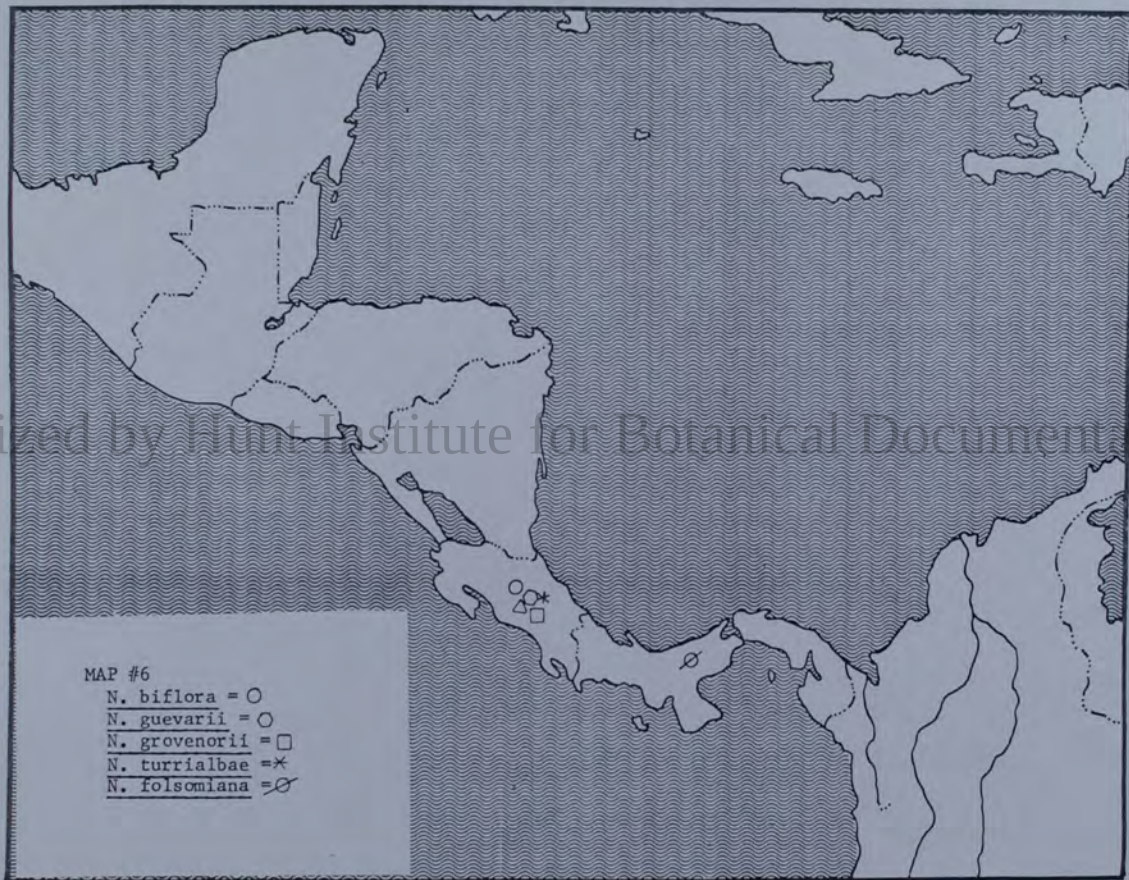












Appendix I

Biographical Sketch:

Name: Randall W. Scott

Born: 2 July, 1952

Washington, D.C.

Education:

- B.A. - English/ Classics	Denison University, Ohio	1975
- 90 quarter hours of biological and botanical science courses	Montana State University	1977-1981
- 5 semesters of graduate study in Botany	University of Texas at Austin	1981 - present

Employment and Teaching Experience:

Teaching Assistant	1981-present	Univ. of Texas: Biology/ Botany
Herbarium Assistant (part-time)	1979-1981	Montana State Univ.
Professional Cabinetmaker/ Carpenter	1975-1976 1977-1979	Washington, D.C. Bozeman, Mt.

Professional Societies:

Botanical Society of America
American Society of Plant Taxonomists

Publications:

Scott, R.W. and Scott Sundberg. In preparation.
Microcharacters as Generic Criteria (see abstract in appendix)
Paper will be presented as part of a special symposium entitled,
"Generic Concepts in the Compositae", which will be held at the
1983 A.I.B.S. meeting.

Miscellaneous:

A total of approximately 18 months spent travelling throughout Mexico, Central America and western South America attest to the fact that the linguistic and cultural milieu of such areas will not hinder the successful completion of the present study. Two recent field trips to Colombia and Mexico indicate the ability to carry out the necessary field work associated with this study.

Name: B. L. Turner

Born: Yoakum, Texas, 1925

High School: Texas City, Texas - Valedictorian

Service: 4 years, Navigator, Air Force (1st Lt.) 1943-1947

College: B. S., Sul Ross State (Alpine, Texas) 1947-1949
M.S., Southern Methodist University 1949-1950
Ph.D., Washington State University 1950-1953

Positions: Associate Investigator on an Ecological Study of Africa, sponsored by the Office of Naval Research and the University of Arizona 1956-1957 (on leave from the University of Texas).

Instructor to Professor and Director of Herbarium, The University of Texas 1953-1967; Chairman, Department of Botany 1967-74; Chairman, Division of Biological Sciences, 1972 - 1973.

National Science Foundation Senior Postdoctoral Fellow and Visiting Professor, University of Liverpool, England 1965-1966.

Visiting Professor, University of Montana Biological Field Laboratories, Flathead Lake, Montana Summer, 1971, 1973, 1975

Distinguished Visiting Professor of Botany, University of Massachusetts, Amherst, fall semester, 1973.

Sidney, F and Doris Blake, Centennial Professorship in Systematic Botany, 1982 -

Honors, etc.: Phi Beta Kappa; Sigma Xi; Secretary, Botanical Society of America 1959-1964; Vice President, 1970. President, Southwestern Association of Naturalists 1967; Membership in 10 or more American and International Societies, serving on various committees in several; New York Botanical Garden Award for Outstanding Contributions to American Botany, 1965; Council, American Society of Plant Taxonomists, 1967-1973.

Committees: Chairman, Program Committee on Systematic Botany, XI International Botanical Congress, Seattle, Washington, 1969.

Steering Committee, First International Congress of Systematic and Evolutionary Biology, Boulder, Colorado, August 4-12, 1973.

Advisory Council, Flora of North America, 1967-1971.

Invited (and continuing) member of an International ad hoc Committee on Chemotaxonomy, sponsored by the International Union of Pure and Applied Chemistry. Meetings held at Kyoto, Japan, 1964; Stockholm, Sweden, 1966; Copenhagen, Denmark, 1970.

Formal member of the Committee on Chemotaxonomy of the International Association of Plant Taxonomists, 1970-72.

Chairman, Panel to Ascertain Environmental Impact of the Installation of a Project Sanguine (U. S. Navy) Facility upon Central Texas, 1973.

Member, Workshop to Determine National Priorities in Systematics and Evolutionary Biology, St. Louis, Missouri May, 1974 (NSF sponsored).

Member, Workshop for Biological Energy Research, Smithsonian Institution, Belmont Conference Center, Elkridge Maryland, October, 1979.

Various University Committees, including the Committee to form a Division of Biological Sciences at the University of Texas and The Molecular Sciences Committee under the NSF sponsored Developmental Program.

Editorial Board Member

Journal of Molecular Evolution, Springer-Verlag -
West Germany
Biochemical Systematics and Ecology, Pergamon
Press - England
Plant Systematics and Evolution, Springer-Verlag,
Wien, New York

Current Research Interests (in order of interest):

Biochemical Systematics
Chromosome Numbers in Compositae and Leguminosae, particularly
as related to phyletic arrangements
Natural hybridization
Gypsum habitats in North America
Numerical systematics

University Courses Taught:

Undergraduate level - General Biology: Molecular Biology; Environmental Biology; Biological Basis of Behavior; Plants and Man; Vegetation of North and South America.

Graduate level - Plant Chemosystematics; Experimental Systematics; Advanced Systematics.

Graduate students to finish their programs under my direction as Major Advisor. (1960-1982). 38 Ph.D. students 10 MS students

Invited Lectures: 1960-1970 (Selected list)

1. Lecturer, Eighth Annual Symposium on Systematics. The population concept in systematics. Missouri Botanical Garden, October, 1961.
2. Lecturer, Institute of Evolutionary Biology. Vanderbilt University, July 23-27, 1962 (summer).
3. Lecturer, Botany Conference for College Teachers, Biochemical Systematics, University of North Carolina, July 6-11, 1964.
4. Lecturer, Summer Institute for College Teachers of Biology. New Advances in Systematics. Michigan State University, July 6-11, 1965.
5. International Symposium on "The Chemistry of Natural Products", Section Lecture on "Chemical Taxonomy" - sponsored by the International Union of Pure and Applied Chemistry, Stockholm, Sweden, June 26-July 2, 1966.
6. Smithsonian Summer Institute in Systematics, Washington, D. C., July, 1967.
7. Lecturer on chemosystematics, University of Montana, November, 1967.
8. Lecturer on chemosystematics, Duke University, December, 1967.
9. Discussion Leader, Smithsonian Summer Institute in Systematics, Washington D. C. 1967.
10. Speaker, Smithsonian Summer Institute in Systematics, Washington, D. C. 1968.
11. Lecturer, First International Citrus Symposium, University of California, Riverside, California, 1968.
12. Speaker, Symposium on Chemical Approaches to Systematics, University of Washington, Seattle, Washington, 1969.
13. Speaker, Smithsonian Summer Institute in Systematics, Washington, D. C., 1969.
14. Speaker, Guest Lecture Series, Louisiana State University, New Orleans, Fall, 1970.
15. Keynote speaker, First Nobel Workshop on Biochemical Systematics, Vavarsunda, Sweden, May-1971.
16. Speaker, Symposium on Plant Disjunctions, Botanical Society of America, Edmonton, Canada, June-1971.
17. Speaker, Symposium on Biochemical Nature of Populations, Phytochemical Society of North America, Monterrey, Mexico. September-1971.
18. Lecture on chemosystematics, Yale University, January-1972.

19. Lecture on The Future of Plant Systematics, University of Washington, Seattle, Washington and University of British Columbia, Canada, February - 1972.
20. Lecture on Comparative Phytochemistry and Population Biology, The University of Utah, Salt Lake City, Utah, July-1972.
21. Lecture on Volatile constituents and their use in chemosystematics. Nobel Symposium. Stockholm, Sweden, August, 1973.
22. Lecture on Chemosystematics. University of Michigan, March, 1974.
23. Lecture on the use of macromolecules as chronistic markers, Smithsonian Institution, Washington, D. C. June, 1974.
24. Annual Fairchild Distinguished Lecture, Fairchild Tropical Garden, Miami, Fla., February, 1975.
25. Biochemical Systematics, Symposium Lecture Botanical Congress, Leningrad, June, 1975.
26. Fossil History and Distribution of Asteraceae, Symposium Lecture, Reading, England, July, 1975.
27. Chemosystematics and its effect upon the traditionalist. Keynote Address, Annual Symposium, Missouri Botanical Garden, October, 1976.
28. Chemical documentation of allopatric introgression in Juniperus. Ohio State Univ., February 1977.
29. Thermopsidaeae, Invited paper, International Conference on Legumes Royal Botanical Garden, Kew London. July 1978.
30. Arid Land Symposium, Invited paper, Texas Tech University, Lubbock, Texas Nov. 1978
31. Invited speaker on Chemosystematics and The Vegetation of Peru. University of Alberta, Edmonton, Canada, Department of Botany, October, 1980.

Selected Publications

(1950-1977)

Six books and over 170 articles in various scientific journals, not counting abstracts, reviews and poems. A selected listing follows:

1951

Revision of the United States Species of Neptunia (Leguminosae). Field & Lab. 46: 82-92.

1953

Chromosome complements in Desmanthus (Leguminosae). Field & Lab. 21: 47-50.

1955

Chromosome numbers in the genus Sesbania (Leguminosae): Evidence for a conservative treatment. Rhodora 57: 213-218.

1956

Chromosome numbers in the Leguminosae. I. Amer. J. Bot. 43: 577-581.

A cytotaxonomic study of the genus Hymenopappus (Compositae). Rhodora 58: 163-308.

1958

Chromosome numbers in the genus Krameria: Evidence for familial status. Rhodora 60: 101-106.

Book

Vegetational Changes in Africa Over a Third of a Century. University of Ariz., College of Agriculture Report 169, 158 pages. (with H. L. Shantz).

1959

(with O. S. Fearing) Chromosome numbers in the Leguminosae II: African species, including phyletic interpretations, Amer. J. Bot. 46: 49-57.

(with R. Alston) Applications of paper chromatography to systematics: Recombination of parental biochemical components in a Baptisia hybrid population. Nature 184: 285-286.

(with R. Alston) Segregation and recombination of chemical constituents in a hybrid swarm of Baptisia laevicaulis X B. viridis and their taxonomic implications. Amer. J. Bot. 46: 678-686.

1900

Phytogeographic reconnaissance: the western segment of the Michoacán coast. In Coalcoman and Motines del Oro (ed. D. D. Brand) Martinus Nijhoff, The Hague, pp. 272-286.

(with O. S. Fearing) The basic chromosome number of the genus Neptunia (Leguminosae-Mimosoideae). Madrono 15: 184-187.

(with O. S. Fearing) Chromosome numbers in the Leguminosae. III. Species of the Southwestern United States and Mexico. Amer. J. Bot. 47: 603-608.

(with H. S. Irwin) Chromosomal relationships and taxonomic considerations in the genus Cassia. Amer. J. Bot. 47: 309-318.

Book

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1961

(with M. C. Johnston) Chromosome numbers in the Compositae. III. Certain Mexican Species. Brittonia 13: 64-69.

(with W. L. Ellison and R. M. King) Chromosome numbers in the Compositae. IV. North American Species, with Phyletic Interpretations. Amer. J. of Bot. 48: 216-223.

(with J. H. Beaman and H. F. L. Rock) Chromosome numbers in the Compositae. V. Mexican and Guatemalan Species. Rhodora 63: 121-129.

(with B. C. Parker) 'Operational Niches' and 'Community-Interaction Values' as determined from in vitro studies in some soil algae. Evolution 15: 228-238.

(with D. Hunsaker, R. E. Alston and W. F. Blair) A comparison of the Ninhydrin Positive and Phenolic Substances of Parotid Gland Secretions of Certain Bufo Species and their Hybrids. Evolution 15: 352-359.

1962

(with R. E. Alston) New techniques in analysis of complex natural hybridization. Proceedings Nat'l. Acad. Sci. 48: 130-147.

(with R. E. Alston, R. N. Lester and D. Horne) Chromatographic validation of two morphologically similar hybrids of different origins. Science 137: 1048-1050.

(with W. L. Ellison and R. E. Alston) Methods of presentation of crude biochemical data for systematic purposes, with particular references to the genus Bahia (Compositae). Amer. J. Bot. 49: 599-604.

Taxonomy of Hymenothrix (Helenieae, Compositae). Brittonia 14: 101-120.

1962

(with R. M. King) A cytotaxonomic survey of Melampodium (Compositae-Heliantheae. Amer. J. Bot. 49: 263-269.

(with M. Powell and R. M. King) Chromosome numbers in the Compositae. VI. Additional Mexican and Guatemalan species. Rhodora 64: 251-271.

Taxonomy of Florestina (Helenieae, Compositae). Brittonia 15: 27-46.

1963

(with T. J. Mabry and Ann Taylor) The betacyanins and their distribution. Phytochemistry 2: 61-64.

(with R. E. Alston) Natural hybridization among four species of Baptisia (Leguminosae). Amer. J. Bot. 50: 159-173.

(with R. E. Alston and T. J. Mabry) Perspectives in chemotaxonomy. Science 142: 545-552.

(with A. M. Powell) Chromosome Numbers in the Compositae. VII. Additional species from the Southwestern United States and Mexico. Madrono 17: 128-140.

Book

Biochemical Systematics. Prentice Hall, Spring, 1963 (with R. E. Alston).

1964

(with R. E. Alston) Comparative chemistry of Baptisia. Problems of inter-specific hybridization. In Taxonomic Biochemistry and Serology, C. A. Leone (ed.). Ronald Press, N. Y., 225-283.

(with T. J. Mabry) Chemical investigations of the Batidaceae. Taxon 13: 197-200.

(with A. M. Powell) Chromosome numbers in the Compositae. VII. Additional species from the southwestern United States and Mexico. Madrono, 17: 128-140.

(with D. Horne) Taxonomy of Machaeranthera sect. Psilactis (Compositae-Astereae). Brittonia 15: 316-331.

1965

(with R. E. Alston and R. N. Lester) Serological studies in Baptisia and certain other genera of the Leguminosae. Amer. J. Bot. 52: 165-172.

(with W. H. Lewis) Chromosome numbers in the Compositae IX. African species. J. South African Bot. 31: 207-217.

1966

(with D. L. Flyr) Chromosomal numbers in the Compositae. X. North American species. Amer. J. Bot. 53: 24-33.

(with D. Boulter and D. Thurman) The use of disc electrophoresis of plant proteins in systematics. Taxon 15: 135-143.

(with J. J. Skvarla) Pollen wall ultrastructure and its bearing on the systematic position of Blennosperma and Crocidium (Compositae). Amer. J. Bot. 53: 555-563.

Chromosome numbers in Stackhousia (Stackhousiaceae). Australian J. Bot. 14: 165-166.

(with J. J. Skvarla) Systematic implications from electron microscopic studies of Compositae pollen--a review. Ann. Mo. Bot. Gard. 53: 220-256.

1967

(with D. A. Thurman, D. Boulter and E. Derbyshire) Electrophoretic mobilities of formic and glutamic dehydrogenases in the Fabaceae: a systematic survey. New Phytol. 66: 37-45.

(with J. B. Harborne) Distribution of canavaine in the plant kingdom. Phytochemistry. 6: 863-866.

Plant chemosystematics and phylogeny. Pure and Applied Chem. 14: 189-213.

Systematic significance of the lupine alkaloids with particular reference to Baptisia (Leguminosae). Evolution 21: 508-517.

(with A. M. Powell and J. Cuatrecasas) Chromosome numbers in Compositae. XI. Peruvian species. Ann. Mo. Bot. Gard. 54: 172-177.

Chemosystematics: present and future applications. Bull. Nat. Inst. Sci. of India, No. 34: 190-211.

Chromosome survey of Podolepis (Compositae-Inuleae). Aust. J. Bot. 15: 445-449.

Chapter

(with T. J. Mabry and R. E. Alston) Chemotaxonomy. Chapter in the Encyclopedia in Biochemistry (eds.) Roger J. Williams and E. M. Langsford, Jr. Reinhold Publ. Corp. 226-228.

1968

(with H. E. Miller, T. J. Mabry and W. W. Payne) Intraspecific variation of sesquiterpene lactones in Ambrosia psilostachya (Compositae). Amer. J. Bot. 55: 316-324.

(with R. H. Flake) Numerical classification for taxonomic problems. J. Theoretical Biol. 20: 260-270.

1969

Problems of hybrid nomenclature. Proc. First International Citrus Symposium 1:451-454.

(with R. H. Flake and E. von Rudloff) Quantitative study of clinal variation in Juniperus virginiana using terpenoid data. Proc. Nat'l. Acad. Sci., U. S. 64: 487-494.

1970

Chromosome numbers in the Compositae. XII. Australian species. Amer. J. Bot. 57:382-389.

(with R. P. Adams). Chemosystematic and numerical studies of natural populations of Juniperus ashei Buch, Taxon 19: 728-751.

Chapter

Molecular Approaches to Population Problems at the Intraspecific level. In Phytochemical Phylogeny, J. B. Harborne, (ed.) Academic Press, London.

1971

"Training of Systematics for the Seventies." Taxon 20: 123-130.

(with H. D. Behnke) "On specific sieve-tube plastids in Caryophyllaceae". Taxon 20: 731-737.

Chapter

"Implications of the Biochemical Data: A summing Up." In Chemotaxonomy of the Leguminosae, J. B. Harborne, D. Boulter and B. L. Turner (eds.). London: Academic Press, pp 543-558.

Book

(with J. B. Harborne and D. Boulter) Chemotaxonomy of the Leguminosae. London: Academic Press, 612 pp.

1972

Strotheria (Compositae-Tageteae) a new monotypic genus from north-central Mexico. Amer. J. Bot. 59: 180-182.

Two new species of Isocoma (Compositae-Astereae) from north central Mexico. Sida: 23-25.

A new species of Dyssodia (Compositae) from north central Mexico. Madrono 21: 421-422.

Two new gypsophilous species of Gaillardia (Compositae) from north central Mexico. Southwestern. Nat. 17: 181-190.

1973

(with A. M. Powell and T. J. Watson) Chromosome Numbers in Mexican Asteraceae. Amer. J. Bot. 60:592-596.

Machaeranthera restiformis (Asteraceae) a bizarre new gypsophile from north central Mexico. Amer. J. Bot. 60:836-838.

A new species of Frankenia (Frankeniaceae) from gypseous soil of north central Mexico. Sida 5:132-135.

Chapter

(with T. J. Mabry) Tassonomia moleculare. In Enciclopedia della Scienza e della tecnica Mondadori. pp 253-268.

(with R. H. Flake) Confirmation of a clinal pattern of chemical differentiation in Juniperus virginiana from terpenoid data obtained in successive years. In Terpenoids: Structure, Biogenesis, and Distribution. Academic Press, pp. 215-228.

1974

(with A. M. Powell) A generic conspectus of the subtribe Peritylinae (Asteraceae-Helenieae) and reassessment of its tribal position. Amer. J. Bot. 61:87-93.

Taxonomy of Loxothysanus (Compositae, Helenieae) Wrightia 5:45-50.

Encyclopaedia unit

Fabales, Encyclopaedia Britannica, 5 pages, Fifteenth Edition.

Chapter

(with R. H. Flake) Volatile constituents, especially terpenes, and their utility and potential as taxonomic characters in populational studies. In Chemistry in Botanical Classification. Nobel Symposium, Academic Press, N.Y.

1975

(with B. N. Smith) Distribution of Kranz syndrome among Astereae. Amer. J. Bot. 62:541-545.

(with D. E. Fairbrothers, T. J. Mabry and R. L. Scogin). The bases of Angiosperm phylogeny: chemotaxonomy. Ann. Mo. Bot. Gard. 62:765-800.

(with J. Bacon and T. Wendt) Chromosomes and phyletic position of Aster sonora Gray (Asteraceae - Sect. Oxytripolium). Southwestern Naturalist 19:361-364.

Taxonomy of Haploesthes (Asteraceae - Senecioneae). Wrightia 5:108-115.

1976

(With M.I. Morris) Systematics of Palafoxia (Asteraceae: Helenieae). Rhodora 78: 567-628.

(With R. Hartman) Intraspecific categories of Machaeranthera pinnatifida (Compositae). Wrightia 8: 308-315.

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Henrickson (Asteraceae - Coreopsidinae), a newly discovered genus with a paleaceous pappus from north-central Mexico. Amer. J. Bot. 64: 78-80.

Taxonomy of the genus Cymophora (Asteraceae: Heliantheae) Madrono 24: 1-6. Chemosystematics and its effect upon the traditionalist. Ann. Missouri Bot. Gardens 64: 235-242.

Fossil History and Geography of Compositae. In Biology and Chemistry of Compositae, Vol. I (eds., J.B. Harborne, V. Heywood and B.L. Turner). Academic Press. London.

(With D.A. Levin) Clutch size in the Compositae. In Evolutionary Ecology. B. Stonehouse and E. Perrin (eds.) McMillan Press, London.

(With A.M. Powell) Helenieae. In Biology and Chemistry of Compositae, Vol. 2 (eds. J.B. Harborne, V. Heywood and B.L. Turner). Academic Press, London.

Book

The Biology and Chemistry of the Compositae. (Edited with V. Heywood and J.B. Harborne). 2 Volumes. Academic Press. London.

1978

Articles

Taxonomy of Axiniphyllum (Asteraceae-Heliantheae). Madrono 25: 46-52. new species and combinations in the genera Sigesbeckia and Trigonospermum (Compositae: Melampodiinae). Brittonia 30: 64-68.

A new species of Brickellia subgenus Phanerostylis (Asteraceae). Brittonia 30: 342-345.

Articles

A new species of Viguiera (Asteraceae-Heliantheae) from Nayarit Mexico. Madrono 25: 221-223.

(With J. Bacon, L. Urbatsch and B. Simpson). Chromosome numbers in South American Compositae. Amer. J. Bot. 66: 173-178.

Chapter

(With A.M. Powell). Deserts, Gypsum and Endemism. In ARID LAND PLANT RESOURCES [Eds. J.R. Goodin and D.K. Northington] Texas Tech University, Lubbock, Texas

1980Articles

Revision of the genus Piptanthus (Fabaceae: thermopsidae). Brittonia 32: 281-285.

La Taxonomía del genero Aphanactis (Asteraceae - Heliantheae). Bol. Soc. Argentina Bot. 19: 33-44.

(With F. Davies). Stuessya (Asteraceae: Heliantheae), a new genus from southcentral Mexico. Brittonia 32: 209-212.

(With D. Dawson). Taxonomy of Tetragonotheca (Asteraceae-Heliantheae). Sida 8: 296-303.

1981Article

New species and combinations in Vernonia sections Leiboldia and Lepidonia (Asteraceae), with 2 revisional conspectus of the groups. Brittonia 33: 401-412.

Chapter

Thermopsidae in Advances In Legume SYSTEMATICS. Polhill, R. M. and R. H. Raven (eds.). Royal Botanical Gardens, Kew England.

1982Article

New species and combinations in Chrysanthellum (Asteraceae-Coreopsidae).
Phytologia 51: 291-293.

New taxa in Verbesina (Sect. Verbesinaria) from north-central Mexico.
Southwestern Naturalist 27: 345-346.

Taxonomy of Neurolaena (Asteraceae-Heliantheae). Plant Syst. Evol.
140: 119-139.

Revisional treatment of the Mexican species of Seymeria (Scrophulariaceae).
Phytologia 51: 403-423.

(with M. Dillon) Chromosome numbers of Peruvian Compositae. Rhodora
84: 131-137.

(with G. Langford) A new species of Ericameria (Asteraceae-Astereae) from
north-central Mexico. Madrono 29: 234-236.

Review

Leguminosae of the United States III. Subfamily Papilionoideae: Tribes
Sophoreae, Podalyrieae, Loteae by Duane Isely, 1981. Syst. Bot. 7: 351-352.

APPENDIX II

NOTICE OF RESEARCH PROJECT
SCIENCE INFORMATION EXCHANGE
SMITHSONIAN INSTITUTION
NATIONAL SCIENCE FOUNDATION
PROJECT SUMMARY

SIE PROJECT NO.

NSF AWARD NO.

FOR NSF USE ONLY

DIRECTORATE/DIVISION	PROGRAM OR SECTION	PROPOSAL NO.	F.Y.
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NAME OF INSTITUTION (INCLUDE BRANCH/CAMPUS AND SCHOOL OR DIVISION)

University of Texas at Austin

ADDRESS (INCLUDE DEPARTMENT)

Department of Botany
Austin, Texas 78712

PRINCIPAL INVESTIGATOR(S)

Randall W. Scott
B.L. Turner

TITLE OF PROJECT

Systematic Studies on Neomirandea (Asteraceae--Eupatorieae)

TECHNICAL ABSTRACT (LIMIT TO 22 PICA OR 18 ELITE TYPEWRITTEN LINES)

Recent revisionary studies in the Eupatorieae (Asteraceae) by King and Robinson have brought forth a number of questions regarding generic concepts and relationships within the tribe. Over 100 new genera have been proposed by King and Robinson at the expense of the traditionally large genus Eupatorium (sensu latissimo; ca. 600 species) which has been reduced to a small, monophyletic assemblage (ca. 40 species).

As one of 19 subtribes, the Neomirandinae consists solely of the genus Neomirandea. It was delimited principally by the use of "microcharacters", combinations of which are found among several closely related subtribes.

Of the 25 species comprising Neomirandea, thirteen were described by King and Robinson in the five years following their delineation of the genus. Virtually all of the species are reported to grow in relatively close proximity to one another in the montane cloud forests of Costa Rica and Panama with several possessing overlapping or continuous ranges.

The object of this study is to investigate the evolutionary relationships of the taxa included in Neomirandea at the subtribal, generic, specific and populational levels through analysis of: 1) morphology, 2) anatomy, 3) chemistry, 4) cytology and 5) population ecology.

1. Proposal Folder
2. Program Suspense
3. Division of Grants & Contracts
4. Science Information Exchange
5. Principal Investigator
6. Off. of Govt. & Pub. Progs.

SUMMARY PROPOSAL BUDGET

ORGANIZATION University of Texas at Austin		FOR NSF USE ONLY		
		PROPOSAL NO.	DURATION (MONTHS)	
PRINCIPAL INVESTIGATOR/PROJECT DIRECTOR Randall W. Scott/B.L. Turner		AWARD NO.	Proposed	Granted
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.S. show number in brackets)		NSF FUNDED PERCENTAGE	FUNDS REQUESTED BY PROPOSER	FUNDS GRANTED BY NSF (IF DIFFERENT)
1. _____		CAL. ACADEMUR	\$	\$
2. _____				
3. _____				
4. _____				
5. () OTHERS (LIST INDIVIDUALLY ON BUDGET EXPLANATION PAGE)				
6. () TOTAL SENIOR PERSONNEL (1-5)				
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)				
1. () POST DOCTORAL ASSOCIATES				
2. () OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)				
3. () GRADUATE STUDENTS				
4. () UNDERGRADUATE STUDENTS				
5. () SECRETARIAL CLERICAL				
6. () OTHER				
TOTAL SALARIES AND WAGES (A+B)				
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)				
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A+B+C)				
D. PERMANENT EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$1,000; ITEMS OVER \$10,000 REQUIRE CERTIFICATION)				
TOTAL PERMANENT EQUIPMENT				
E. TRAVEL 1. DOMESTIC (INCL. CANADA AND U.S. POSSESSIONS)				
2. FOREIGN			\$4285.00	
F. PARTICIPANT SUPPORT COSTS				
1. STIPENDS \$ _____				
2. TRAVEL _____				
3. SUBSISTENCE _____				
4. OTHER _____				
TOTAL PARTICIPANT COSTS				
G. OTHER DIRECT COSTS				
1. MATERIALS AND SUPPLIES			\$ 450.00	
2. PUBLICATION COSTS/PAGE CHARGES				
3. CONSULTANT SERVICES				
4. COMPUTER (ADPE) SERVICES			\$ 100.00	
5. SUBCONTRACTS				
6. OTHER				
TOTAL OTHER DIRECT COSTS				
H. TOTAL DIRECT COSTS (A THROUGH G)			\$ 4835.00	
I. INDIRECT COSTS (SPECIFY)				
TOTAL INDIRECT COSTS				
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)			\$ 4835.00	
K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECTS GPM 252 AND 253)				
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)			\$ 4835.00	
PI/PD TYPED NAME & SIGNATURE* Randall W. Scott/B.L. Turner		DATE 4/26/83	FOR NSF USE ONLY	
INST REP TYPED NAME & SIGNATURE*		DATE	INDIRECT COST RATE VERIFICATION	
			Costs Checked	Date of Rate Sheet Initials - DGC

SCOTT, RANDALL W. and SCOTT D. SUNDBERG. Department of Botany, University of Texas at Austin, Austin, Texas, 78712

-Microcharacters as Generic Criteria.

A study of the microcharacters (as viewed under the compound microscope) in the Eupatorieae and Astereae (Compositae) was undertaken in order to evaluate their reliability as taxonomic markers. Character states of various microcharacters are widely distributed within the tribes Astereae and Eupatorieae. Correlations between microcharacters and yet other characters were used in order to evaluate their applicability in delimiting genera. A high degree of microcharacter correlation with other characters was found in some species groups, suggesting that they are useful and consistent markers among such taxa, whereas in other groups they may be of little value.

357-2545

December 23, 1980

Administrador
Hotel Columbus
Avda. Arequipa 1421
Lima, Peru

Estimado señor Administrador:

Favor reservar una habitacion sencilla, con camas gemelas,
para la noche de 1ro. de enero de 1982.

Llegaremos en el vuelo Aero-Peru, desde Miami, Florida y
esperamos estar en el hotel alrededor de las 9:30 de la noche.

Con gracias anticipadas, quedo de usted

Cordialmente,

Robert M. King
Departamento de Botanica