COMPOSITAE NEWSLETTER

Number 19 **Jan 1991**

Scientific Editor: Bertil Nordenstam
Technical Editor: Agneta Lindhag
Department of Phanerogamic Botany,
Swedish Museum of Natural History,
P.O. Box 50007,
S-104 05 Stockholm, Sweden.
(Director: Prof. Bertil Nordenstam)

ISSN 0284-8422

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SPECIES PLANTARUM PROJECT (SPP)

For those not familiar with the SPP, an outline of its aims and development can be found in Taxon 39: 541-542 (1990). Here I report on the meeting at Kew announced in that article. Following the meeting on Design for a Global Plant Species Information System (GPSIS) at Delphi on 12-16 Oct 1990, the meeting on the SPP was held at Kew 12-13 Nov., and was attended by over 80 people from some 50 institutions and 22 countries. The purpose was to discuss and formally establish the project.

The GPSIS meeting reported as needs: 1, a checklist of the world's plants; 2, a design study of information systems for a GPSIS; 3, the provision of descriptive information therein; and 4, links to data sets of other types.

Suggested as user requirements from a SPP checklist were: accepted taxon names (including infraspecific); important synonyms; geographical distributions; bibliographic reference to recent monographs; and an assessment of the reliability of the work.

Interdigitation of SPP with current Flora projects (especially those database-supported) and integration of bibliographic data from existing databases, e.g. BIOSIS, was envisaged. The experience of the legume database (ILDIS) in drawing together data from other databases, in demonstrating the need to find people wishing to enter data-sets, the need not to be overambitious, and the need for careful definition of fields to ensure comparable inputs, and in highlighting the funding and computer problems involved in such a project, was reported.

Following report of the coming publication in 1991 of a list of "family names in current use", there was debate on whether a "concen-

sus" or a "with alternative taxonomies" system should be adopted (the former found more favour), on the categories of names (accepted, synonyms, doubtfuls, etc) for the top priority tasks, on how to deal with hybrids, on the use of available resources (e.g., standard Floras, Australian, South African database checklists etc.). and on whether a users' needs survey was required.

Regional "state of the art" surveys, dealing with existing and currently in preparation Floras and databases, typification problems, and available manpower and resources, were presented for Europe, the Mediterranean, N & E Asia, tropical Asia, Australasia, the Pacific, tropical & S Africa, N & C. America, and S America, and also a survey for cultivated plants. Problems included knowledge gaps in tropical SE Asia and tropical S America, taxonomically conflicting treatments within areas, the danger of SPP being seen as a "Eurocentric luxury" in places where most α-taxonomic work is still to be done, artificial hybrids, and the persistence of errors in the literature even after published correction. The contribution of taxon-based studies was exemplified by reports on Annonaceae, Euphorbiaceae, Cyperaceae and Polygalaceae, with problems of across-family descriptors and taxonomic differences within family treatments emerging. The general problem of obtaining taxonomic integrity, inherently low in accounts from Floras but high in those from revision works, was highlighted and discussed. The need for input by taxon-orientated groups was stressed.

An outline was given of the "names in current use" (NCU) project and its relationship to SPP; the NCU lists (initially for only families and genera) are designed to accommodate alternative taxonomies. The NCU project involves amendments to ICBN and will therefore need to be approved by the 1993 International Botanical Congress if it is to be implemented.

On publication, the huge volume of data would require CD-ROM and on-line dissemination rather than hard copy for the full descriptive "world flora" account; possible update frequencies were briefly mentioned. Eng-

lish was recommended as language to be used. Supportive material could be published in hard copy and in other languages.

Financial, managerial, organizational and administrative aspects were considered. Since SPP was to work above other projects, coherence and internationality in management would be essential; especially important is maintenance of botany/computer science integrity; the products must be made useful to funding bodies, and the organization be equipped to deal with botanical "empires", live with national politics and encourage third-world participation. Problems of ownership, copyright, membership, appointment of governing body, funding and availability of data were discussed; the last must be on a quasi-commercial basis if SPP is to value its own work and products and attract funding. It must be a legally constituted body and a link with UNESCO was favoured. A more publicity-valuable and widely-understood and graphically descriptive name or acronym to replace SPP needs to be found and adopted.

On the computing side, problems discussed especially in relation to manpower and costs included: problem analysis; developing system requirement specifications; software development and whether currently available software might meet the checklist production requirements; handling nomenclatural complexity and interface building as major software development tasks; and system maintenance.

After some debate, including a request for, and a statement of, the terms of reference of its governing body, and some proposals for, and discussion of, its working organization, a formal proposal of constitution of the SPP was made, seconded and accepted nem. con. Some 15 names were proposed and accepted as members of a governing body (Council) of 25-32 members which was charged with launching the project and producing the preliminary "world checklist" of vascular plants and bryophytes within 5 years. Kew undertook to fund and accommodate the Secretariat. The exact relationship of SPP to GPSIS remained unclarified. Presented to the meeting but not discussed in detail were 3 papers: "Preliminary Report of the Global Plant Species Information System Action Group"; "Fields Required for Species Plantarum Project"; and "SPP Data Definition Document". All three require further consideration.

THE GENISIS PROJECT

Those who have received circulars (still available on request) on the FIRST KEW COMPOSITAE CONFERENCE 1994 will know of the intention to deal at that conference with problems of taxonomic data handling and dissemination, and of the proposal to establish an organization to produce and maintain a computer-based account of the genera of the Compositae as a solution to some of those problems in the foreseeable future. Those who have expressed an interest in this project, in its management, in contributing to accounts of the tribes, or in software development and database structuring, have been kept in touch with by way of correspondence, and their views taken into consideration.

In course of this development, it became obvious that there was much that was not unique to composites and that the proposal could easily be a special, initial contribution to a generic and higher level database and information system covering all genera of flowering plants and capable of extension to all plants in the strict sense - i.e., those organisms possessing the unique homologies defining the Chlorobionta. This is the GENISIS project, currently set out in the document "THE GENISIS PROJECT Generic International Systematic Information Service Phase I COMPOSITAE PROJECT PLAN FIRST DRAFT. Statement of Aims and Problems", now available on request.

This document sets out the background to the project, its origin as applicable to the Compositae, the role of the taxonomist, the proposed information services, envisaged data types and database structure, data input, software development needs, project development requirements, and estimated costs. Decisions are needed on services to be provided, database design, data flow and structure, hardware to be employed, and software to be used and if necessary developed. The project organization needs to be considered, accepted and formalized - at present envisaged are a Steering Committee, Secretariat, Database Management Working Group, Tribal Taxonomy Working Groups, and Regional Advisers. The aim is to get the Project Phase 1 Compositae set up and operative at the latest by the 1994 Conference. The initial task for Compositae is considered to be production of a checklist with selected synonomy of accepted genera and higher taxa. Comments and offers of help on all these would be welcome. Many of the problems reported on above as discussed at the SPP meeting are of course germane also to the development of GENISIS.

The extension of the idea of a GENISIS to other plant families immediately raises the question of its relationship to other current projects - "The Families and Gene-

ra of Vascular Plants" (FGVP) being produced by Springer-Verlag under the guidance of Prof. Kubitzki at Hamburg, a hard-copy production of which Vol. 1 (1990), "Pteridophytes and Gymnosperms", has just appeared under the editorship of K. U. Kramer & P. S. Green, and the SPP reported on above. Duplication or triplication of effort would be an obvious waste of scarce resources of all kinds.

In the case of FGVP, an approach has already been made offering cooperation and I have no doubt that in this I will have the support of the majority of working synantherologists. At the SPP meeting, reference was explicitly made to GENISIS-Compositae as an organization through which contributions could be made to SPP and again, in pledging our support, I trust I was reflecting the views of most of us. Personally, I have undertaken to produce the first draft of a world species checklist for the Senecioneae, which will be circulated for comment and amendment in due course.

More basically, one may question the need for a GENISIS as well as an SPP, seeing that the latter also intends to cover levels up to family rank. The answer I think is that there is such a need. SPP at generic level does not provide for the information content envisaged by GENISIS and furthermore, gives priority to data capture at the specific level. While for some classes of data it may be true that information at higher levels could be largely synthesized from the species data, this is definitely not the case for much attributive data; descriptors and descriptions quite adequate at the species level need not necessarily deal with any of the characters definitive at the generic level. Problems of partial synonymy are also much more frequent at the generic level: it is comparatively rarely that infraspecific taxa are switched between species, but species are very commonly changed in generic position. Work at the generic level will therefore require its own customized descriptors and descriptions and its own types of software, which must therefore be under its own managerial control, so that it can be designed and redesigned as is necessary. Such work needs to proceed in parallel with that at specific level. It is impossible to adopt a stable specific nomenclature until generic concepts are agreed. The number of genera being smaller than the number of species, it will be possible to realize a "complete" first-level information system within a reasonable time scale, which will moreover fulfil the needs of a considerable market. Other than those professionally concerned with plants, it is at the generic level that most people conceive of plants, as oaks, begonias, elms, dahlias, roses, chrysanthemums etc., and seek information about them. Historical considerations bear this out; Linnaeus needed a Genera Plantarum as well as a Species Plantarum and it is the former that such as Endlicher and Bentham & Hooker provided, while the last "Species Plantarum", DeCandolle's Prodromus,

still remains incomplete. Whether GENISIS would better be subsumed into SPP as a subunit of it is of course another question; opinions on this are sought.

C. Jeffrey
Herbarium
Royal Botanic Gardens
Kew
Richmond
Surrey TW9 3AE
UK

COMPOSITAE IN ETHNOMEDICINAL PRACTICES OF NIGERIA

L.S. Gill and H.G.K. Nyawuame
Department of Botany, University of Benin,
P.M.B. 1154, Benin City, Nigeria

Abstract

An account of 29 species of the family Compositae known to be of ethnomedicinal uses in Nigeria is presented.

Introduction

Plants have always played and will still continue to play a vital role in the welfare of mankind throughout the world. As a matter of fact, the natural ecosystem is the storehouse of innumerable products which are exploited and could still further be exploited by man for his own welfare. For example, it is known that many ethnic/tribal groups particularly in Africa have developed their own folklores, traditions, taboos, medicinal care and health practices. Over the centuries a relationship has existed between man and his ambient environment and the study of this relationship is referred to as ethnobotany (Schultes, 1967).

According to Gbile (1986), ethnomedicine is the use of plants by members of an indigenous culture for which there is no organised medicinal system or formal training for the prescriber. He further states that traditional medicine refers to the use of plants for the treatment or amelioration of diseases within an organised indigenous system. However, Mume (1973) suggested a new terminology "Tradomedicalism" for traditional healers which can be interpreted as a system of treating diseases by the employment of agencies and forces of Nature. Wambebe (1990) states that 80% of the world's population depend wholly or partially on traditional medicine for their primary health care needs. It is known that the rural populace of many less developed countries depends on traditional health care due to its relative cheapness and easy accessibility. Nevertheless, disillusioned with the Western type of medical system, more and more people in the urban areas are realising that "natural is better" and as a matter of fact turning to the fold of traditional herbal system of medical care. This shift from the Western medicine to traditional herbal medicine is described as "green wave" by Tyler (1986) and is fast gaining momentum. According to Farnsworth and Morris (1976) higher plants are still "the sleeping giant of drug development" and a virtually untapped reser-

voir of a potentially useful source of drugs. They further state that this reservoir will continue to serve mankind in the twenty-first century as it has done since man learnt how to use plants as drugs.

From the foregoing, it is clear that pharmaceutical science can no longer afford to ignore the reports of traditional medicinal uses of plants or simply because their practises apparently fall short of the expectations of modern science. But the indigenous information on the uses of such plants should stimulate and encourage the systematic analyses of the plants following modern scientific techniques.

In Nigeria, therapy with medicinal plants plays an important role in the health care of the people alongside the Western medicine. In fact, the national policy and goal of the present administration is to make health care delivery available to every citizen in Nigeria by the year 2000 AD. Nonetheless, this aim could only be accomplished if the Western type of health care delivery system is supplemented by the efforts of traditional medicine.

The family Compositae is represented by 288 species distributed in 84 genera in Nigeria (Gill, 1988). Despite the large number of taxa recorded, only a few species are used in ethnomedicinal practices of Nigeria. So far 29 species of this family are known to be commonly used in ethnomedicine by various ethnic groups of Nigeria. The aim of this paper is to put on record information about the uses of these plants in ethnomedicinal practices of Nigeria. Available information on chemical constituents on any of the species is also given. The arrangement of taxa in the following account is alphabetical.

Enumeration of species

Ageratum conyzoides L. (Goat Weed)
The leaf juice is used for dressing wounds, ulcers, for craw craw and as a remedy for inflammation and redness of the eye. The leaves are given with water as an emetic. A hot poultice of the leaves and stem is applied to lepsorous sores and other skin deseases. Leaves are used intravaginally for uterine disorders. Decoction of the root of the herb is a remedy for abdominal pains and the raw root is chewed for digestive disturbances. In Urhoboland, fresh seeds are ground and boiled in water and is administered as an anti-poison. The dose is one wineglass full thrice a day. In Akoko-Edo area of Bendel State, leaf juice is put into eyes for the treatment of convulsions. Fresh leaves are chewed as an emetic. The leaves with those of *Ocimum* and "bush pepper" are used as a cure for abdominal disorders (Ayensu, 1978). The decoction of leaves and roots is given as tonic, and remedy for fever, colic, diarrhoea and rheumatism (Watt and Breyer-Brandwijk, 1962).

Active principles: Flavonoid - conyzorigun, S1-methoxy-nobiletin (Adesogan

and Okunade, 1979), cardinol-x-pinene, limonene, cardinene, oxygenated sesquiterpenoids (Okogun, 1986), saponin and tannins (Gill and Akporhonor, 1988).

Aspilia africana (Pers.) C.D. Adams
The Urhobo herbalists use the juice of fresh leaves to cuts and wounds to stop bleeding. Also, the decoction of leaves is prepared, put in a basin, and a woman suffering from internal bleeding is allowed to sit in it to stop bleeding. The juice of the leaves is reported to be haemostatic and vascoconstrictive (Oliver, 1960). The decoction of the root is a remedy for lumbago, sciaticaneuralgia (Watt and Breyer-Brandwijk, 1962). The Okpameri people of Bendel North use the decoction of the leaves to wash face to relieve febrile headaches. The infusion of the leaves is given as tonic to women after delivery. The leaf juice with little salt and lime juice is applied to eyes for corneal opacitities and other foreign bodies in the eyes. According to Ayensu (1978) the leaf decoction with native chalk is used to cure stomach troubles.

Active principles: Inulins, tannins, saponins (Gill and Akporhonor, 1988).

Bidens pilosa L. (Black Jack, Bur Marigold)
The dried crushed flowers are given for diarrhoea. The leaf juice is squeezed into eyes and ears for eye and ear complaints. The decoction of the leaves is a remedy for abdominal disorders and as enema. The young shoots are chewed for rheumatism. The decoction of the leaves and roots is given for colic and coughs.

Active principles: Alkaloids (Adegoke *et al.*, 1968).

Blumea aurita (L.f.) DC.
The whole plant is used as antipyretic and is given for intestinal problems.

Calendula officinalis L. (Marigold)
The decoction of the leaves and flowers is prescribed for increased perspiration and thus flushing poisonous things from the body. The poultice of the herb is a local remedy for varicose veins and ulcers.

Centaurea praecox Oliv.
The decoction of the whole plant is used as a purgative and stomachic.

Chromolaena odorata (L.) King and Robinson (Siamweed)
syn. *Eupatorium odoratum* L.
The Okpameri people use the infusion of the leaves as a remedy for dysentery and the decoction of the leaves with *Azadirachta indica* is given for cure of malaria fever. The juice of the leaves is used to stop bleeding. The leaves when chewed, alleviate headache and toothache. The leaves have been proved to have antimicrobial and anticoagulant activities (Akubue, 1986; Igboechi and Anuforo, 1986).

Active principles: Essential oil-cardinol, x-pinene, limonene, cardinene and oxygenated sesquiterpenoids (Okogun, 1986), flavonoids, oxalates (Bose *et al.*, 1973), tannins.

Chrysanthemum cinerariifolium (Trev.) Bocc.
syn. *Pyrethrum cinerariifolium* Trev.
The flower heads are used as an insecticide. The diluted infusion of the flower heads is used to cure fever and is given as a tonic for body weakness. The leaf juice is applied to fresh cuts and wounds.

Active principles: Pyrethrins, cinerins (Adegoke *et al.*, 1968).

Crassocephalum rubens (Juss. ex Jacq.) S. Moore
The fresh leaves are rubbed and put into carious teeth for toothache.

Active principles: Alkaloids (Adegoke *et al.*, 1968).

Conyza sumatrensis (Retz.) Walker
syn. *C. floribunda* H.B.K., *Erigeron floribundus* (H.B.K.) Sch. Bip.
The ground leaves with dry pepper (*Capsicum annuum*), palm oil, alum and crayfish are boiled. The concoction is recommended for gastric ulcers and constipation.

Dicoma tomentosa Cass.
The whole plant is crushed, made into a thin paste and is applied to cuts, bad wounds, sore and ulcers.

Active principles: Alkaloids (Adegoke *et al.*, 1968).

Eclipta alba (L.) Hassk.
syn. *E. prostrata* L.
The plant is purgative, emetic, expectorant and antiseptic. The decoction of the fresh plant is used as tonic and deobstruent in the enlargement of the liver and spleen. The dose is one tablespoonful twice a day. The juice of the plant is a remedy for fever, dropsy and liver ailments. A paste of the herb with palm oil is used over glandular swellings, elephantiasis and skin diseases. The root decoction or root powder with honey is prescribed in scalding urine and is also used as purgative and emetic.

Active principles: Alkaloids - ecliptine, nicotine (Watt and Breyer-Brandwijk, 1962).

Elephantopus scaber Klatt
The decoction of the leaves and root is given for fever, cough and inflammation of uterus and ovaries.

Emilia sonchifolia (L.) DC.
syn. *E. sagittata* DC.
The juice of fresh leaves is used as a remedy for eye and ear ailments, vertigo and epilepsy. The root decoction is a remedy for colic in sucklings (Watt and Breyer-Brandwijk, 1962). The leaves with guinea corn and lime juice are given for sore-throat. Leaves are rubbed on limbs of children which makes them walk. The whole plant is used as a remedy for fever or malaria, rashes, measles and other forms of inflammatory diseases and also for pericarditis.

Active principles: Saponin, tannins (Gill and Opara, 1988).

Gynura amplexicaulis L.
The leaves are crushed and used as a remedy for gonorrhoea. The juice of the leaves is a remedy for sore eyes.

Helianthus annuus L. (Sun Flower)
It is used as a diuretic and expectorant. The leaves are used for the remedy of malaria. Decoction of seeds with water and little sugar is prescribed for bronchial, laryngial and pulmonary troubles. The dose is one tea cup daily.

Active principles: Semi-drying oil, linoleic acid, oleic acid (Watt and Breyer-Brandwijk, 1962).

Launaea taraxacifolia (Willd.) Amin ex C. Jeffr.
The crushed leaves are rubbed on the limbs of the children which makes them walk. The leaves mixed with ashes is given for yaws.

Active principles: Alkaloids (Watt and Breyer-Brandwijk, 1962).

Melanthera brownei (DC.) Sch. Bip.
The leaves are used as haemostatic cicatrizant, purgative and in opthalmias.

Microglossa afzelii O. Hoffm.
The decoction of the leaves in local gin and guinea corn is given for chest complaints, bronchial problems, coughs, colds, sore throat and tuberculosis. The fresh crushed leaves are applied over cuts. The juice of the fresh leaves is a remedy for earache. The decoction of the stem is also used to cure coughs, colds and bronchial ailments.

M. pyrifolia (Lam.) O. Ktze.
syn. *M. volubilis* DC.
The decoction of the leaves is given for headache, fever, yellow fever and women in labour. The powdered root is used as snuff. The decoction of the root is a strong purgative and is used as enema, abortifacient and aphrodisiac. The root juice is a remedy for eye ailments. The paste of the powdered root is applied over forehead for the relief of headache. The crushed leaves are placed in carious teeth to relieve toothache.

Active principles: Alkaloids, sterol, haemolytic principle (Oliver, 1960).

Mikania scandens Willd.
The plant is diuretic and is used as anthelmintic and in coughs and opthalmias. The latex is applied over ringworm and is very effective for insect bite.

Active principles: Saponins, tannins, alkaloids (Watt and Breyer-Brandwijk, 1962).

Sigesbeckia orientalis L.
The extract of the plant is prescribed for the diseases of urethra.

Sphaeranthus senegalensis DC.
The flowering top decoction is prescribed for relieving headache, fever, toothache and sore throat. The dose is one wine glassful thrice daily. The powdered flowering tops are placed in tooth cavity for relieving toothache. The root decoction is given as anthelmintic and stomachic.

Active principles: Spilanthol, sterol, reducing sugars (Watt and Breyer-Brandwijk, 1962).

Spilanthes africana DC.
Plant is crushed and is rubbed on the lips and gums of a person suffering from oral infections. The flowerings tops are chewed for toothache and is also used as haemostatic and analygesic.

Active principle: Spilanthol (Adegoke *et al.*, 1968).

S. filicanlis (Schum. and Thonn.) C.D. Adams
The leaves along with alum are recommended as emetic and laxative.

Active principles: Tannins, fats and oils (Gill *et al.*, 1990).

Synedrella nodiflora (L.) Gaertn.
The infusion of the leaves is a laxative. The leaf juice is applied to fresh cuts and wounds to stop bleeding. Leaves of *S. nodiflora* and *Cyathula prostrata* along with guinea corn and caolin are ground together and is given to a person suffering from cardiac troubles. The decoction of the whole plant is used for the cure of leprosy.

Active principles: Inulin, saponins, tannins (Gill *et al.*, 1990).

Vernonia amygdalina L. (Bitter leaf)
The Urhobo herbalists prescribe the leaf extract with a pinch of salt as a remedy for stomach ache. Leaves are also rubbed on the body for itching conditions and ringworms. Decoction of the root is used as stomachic tonic, antipyretic and laxative. Tella (1976) reports antimicrobial and analgesic properties of the crude drug in gingivitis and toothache. Igboechi and Anuforo (1986) report the anticoagulant activities of the drug. Abimbola - Sodipe (1986) describes the use of the leaves of

V. amygdalina for the cure of diabetes. The decoction of leaves is used to cure pneumonia and is also used as an enema (Ayensu, 1978). Roots and stem are chewed as chewing stick for oral hygiene, though roots are preferred to stem twigs.

Active principles: Vernodalin, Vernomygdin (Kupchan *et al.*, 1969), Saponin (Gill and Akporhonor, 1988).

V. biafrae Oliv. and Hiern
The leaves are boiled and the patient suffering from fever is given bath with that water. The roots are crushed and used as poultice for eyes, boils and wounds.

Active principles: Glycoside, alkaloids (Adegoke *et al.*, 1968).

V. cinerea Less. (Ash-coloured Fleabane)
The plant is alterative, anthelmintic and diphoretic. The decoction of the herb is given in one tablespoonful doses in fever and in incontinence of urine in children. The juice of the leaves is administrered in dysentery. A poultice of the leaves is locally applied for the extraction of guinea worms. The root is also used as anthelmintic. The powdered seeds are given for the expulsion of threadworms. A paste of the seeds is used locally in skin deseases and for killing headlice.

Active principles: Glycoside - vernonioside - vernonin. 15-sesquiterpene lactones (Adegoke *et al.*, 1968; Watt and Breyer-Brandwijk, 1962).

Acknowledgments

We are thankful to Dr. J.M.O. Eze for kindly going through the manuscript and making useful suggestions.

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POLLEN DIAMETER, EXINE THICKNESS, AND ULTRASTRUCTURE TYPE IN THE TRIBES OF THE COMPOSITAE

Margaret R. Bolick
Division of Botany
University of Nebraska State Museum
W-532 Nebraska Hall
University of Nebraska-Lincoln
Lincoln, Nebraska, 68588-0514, U.S.A.

Abstract

The average pollen diameters and exine thicknesses for fourteen tribes of the Compositae were determined from a sample of 917 species. In general, pollen in the subfamily Asteroideae has both a smaller diameter and a proportionately thinner exine. Pollen diameter and exine thickness in the family are also correlated with exine ultrastructure type [caveate (Helianthoid, Senecioid) or non-caveate (Anthemoid, modified Anthemoid, Arctotoid)] (Mann-Whitney test, 99%).

Introduction

Pollen morphology and ultrastructure have proved useful in the systematics of the Compositae, especially at the subtribal, tribal, and subfamily levels of classification. Pollen size has been used less often even though many workers have noted that some tribes such as the Eupatorieae tend to have small pollen while others such as the Vernonieae tend to have more robust grains.

This study is an attempt to quantify the differences among the tribes in average pollen diameter and exine thickness and to relate any differences to ultrastructure types.

Materials and Methods

Pollen size and exine thickness were measured for 917 species of Compositae using a Leitz Ortholux microscope, an oil immersion objective and prepared slides of acetolyzed pollen in D. A. Livingstone's reference collection, housed in the Department of Zoology, Duke University. Pollen diameter and exine thickness in species with an echinate surface were measured using the point where the bases of the spines were contiguous in optical cross section as the outer edge. The

genera and species were placed into tribes following Heywood et al. (1978). Exine ultrastructural types were defined following Skvarla et al. (1978).

The non-parametric Mann-Whitney test was used to test the null hypothesis that pollen size and exine thickness are not correlated with ultrastructure type in the Compositae.

Results

Table 1 presents the average pollen diameters and exine thickness with the ultrastructure type and sample size (n) for each of the fourteen tribes for which there are data. Pollen size and exine thickness are correlated with exine ultrastructure type (Mann-Whitney test, 99% level).

Discussion

When the tribes are listed in order of increasing average pollen diameter, the Asteroid tribes (sensu Bremer 1987) all fall at the smaller end of the range. With the exception of the Anthemideae, all of these tribes also have a caveate (Helianthoid or Senecioid) exine ultrastructure.

Again with the exception of the Anthemideae, the tribes with smaller average pollen diameters also have proportionately thinner walls (Table 2). If the comparison is made between exine thickness and the presence of a cavus, however, there is complete agreement with the thicker exines consistently found in tribes with the non-caveate ultrastructure.

A decrease in average pollen diameter, then, can be added to the cladograms of Bremer (1987) and of Jansen et al. (1988) as a non-homoplasious synapomorphy that links the Asteroid tribes. The character of a thinner exine can also be added noting that it, like the presence of a cavus, reverses in the Anthemideae.

The correlation of thicker exines with the absence of a cavus is also interesting, suggesting that the basic ultrastructure pattern may constrain some changes in pollen size and exine evolution.

Acknowledgements

This work was funded by N. S. F. award R 11-8503107 to M. R. Bolick.

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Table 1. Average Pollen Diameter, Exine Thickness, and Exine Type in the Tribes of the Compositae.

Tribe	Pollen Diameter	Exine Thickness	Exine Type	n
Eupatorieae	22.6 ± 5.0	2.5 ± 0.8	C	33
Astereae	25.0 ± 6.1	2.3 ± 0.6	C	96
Helenieae	25.6 ± 6.4	2.7 ± 1.3	C	13
Anthemideae	26.7 ± 4.8	4.2 ± 1.0	N	111
Inuleae	28.1 ± 5.9	3.5 ± 1.0	C	119
Heliantheae	28.4 ± 7.4	3.0 ± 0.8	C	172
Calenduleae	30.3 ± 4.7	3.7 ± 0.9	C	9
Senecioneae	32.4 ± 7.9	3.5 ± 1.0	C	111
Tageteae	34.3 ± 10.7	3.6 ± 1.0	C	15
Lactuceae	37.1 ± 8.0	6.1 ± 2.0	N	74
Arctoteae	42.5 ± 10.7	6.3 ± 3.0	N	13
Mutisieae	43.1 ± 15.5	6.5 ± 2.9	N	36
Vernonieae	44.9 ± 10.6	6.6 ± 2.2	N	72
Cardueae	49.1 ± 10.5	6.5 ± 2.1	N	53

C = Caveate; N = Non-caveate

n = number in sample

Table 2. Ratio of Pollen Diameter to Exine Thickness in the Tribes of the Compositae.

Tribe	Diameter/Thickness
Eupatorieae	9.0
Astereae	10.9
Helenieae	9.5
Inuleae	8.0
Heliantheae	9.5
Calenduleae	8.2
Senecioneae	9.3
Tageteae	9.5
Anthemideae	6.4
Lactuceae	6.2
Arctoteae	6.7
Mutisieae	6.6
Vernonieae	6.8
Cardueae	7.5

THE SYSTEMATIC POSITION OF *HELICHRYSUM BAXTERI* A. CUNN. EX DC. - A CORRECTION

Arne A. Anderberg
Swedish Museum of Natural History
Dept. of Phanerogamic Botany
P. O. Box 50007
S-104 05 Stockholm, Sweden

In one of my recent papers (Anderberg, in press) an error bound to create confusion has regrettably been published. The error concerns the systematic position of *Helichrysum baxteri* A. Cunn. ex DC.

Although the name *Argyrophanes* is cited in my publication as a synonym under *Chrysocephalum*, the species *H. baxteri* (= *Argyrophanes behrii* Schltr) is missing from the list of recognized species of this genus. Instead it is found under "*Lawrencella*" (i. e. a complex of Australian species, excluded from *Helichrysum*). The error is very unfortunate, and I have decided to clarify the issue by proposing the following new combination:

Chrysocephalum baxteri **(A. Cunn. ex DC.) A. Anderb., comb. nov.** — Basionym: *Helichrysum baxteri* A. Cunningham ex De Candolle, Prodromus systematis naturalis regni vegetabilis 6: 193. 1838.

In my treatise, *Helichrysum* was demonstrated to be an unnatural assemblage of taxa, with many of its representatives being related to different parts of the tribe. As a result, some genera which are generally included in *Helichrysum* (e. g. by Bentham 1867, Haegi 1986) were separated. One such genus is *Chrysocephalum*. The species of this genus are diagnosed by specialized two-celled cypsela trichomes with one cell overtopping the other, they have involucral bracts with con-

spicuously fringed margins and divided stereomes, and apically subplumose pappus bristles. These characters are also found in the genera which I have identified as the closest relatives, i. e. *Waitzia*, *Gratwickia*, *Leptorhynchos* and *Asteridia*. In all of these genera the innermost involucral bracts are often provided with a narrow, sometimes terete claw formed by the divided stereome.

Helichrysum baxteri A. Cunn. ex DC., (syn. *Argyrophanes behrii* Schltr) has white, conspicuously fringed involucral bracts, with the innermost being provided with a terete, clawed, divided stereome, cypselas almost glabrous, but with scattered two-celled trichomes which are basically the same as those in *Chrysocephalum*. The presence in *H. baxteri* of these characters supports the notion that it should be placed in the "Waitzia group" (Anderberg, in press). Awaiting a detailed analysis of the whole group at the species level I have tentatively placed *H. baxteri* in *Chrysocephalum*, which thus comprises 8 and not 7 species as indicated in my paper.

1. *C. adpressum* (Fitzg.) A. Anderb.
2. *C. ambiguum* (Turcz.) A. Anderb.
3. *C. apiculatum* (Labill.) D. Don
4. *C. baxteri* (A. Cunn. ex DC.) A. Anderb.
5. *C. eremaeum* (Haegi) A. Anderb.
6. *C. podolepideum* (F. Muell.) A. Anderb.
7. *C. pterochaetum* F. Muell.
8. *C. semipapposum* (Labill.) Steetz

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