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Isaiah 50: 4 and 5. The Sovereign Lord has given me an instructive tongue. The Sovereign Lord has opened my ears. He wakens me morning by morning, wakens my ear to listen like one being taught.

SUMMARY

A MONOGRAPH OF THE GENUS *PASSERINA* L. (THYMELAEACEAE)

by

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The primary objective of this study was to provide a taxonomic revision of the genus *Passerina*, here treated as comprising 20 species and four subspecies. Most species are concentrated in the Cape Floristic Region. Certain species occur along the Great Escarpment, with outliers in East Africa. The present monographic study included extensive fieldwork, more than 5 000 specimens from 22 herbaria were studied and the conservation status of the different species was assessed.

Pollen grains in *Passerina* are adapted to wind pollination. The pollen wall is characterized by a continuous secondary reticulum, distinguishing *Passerina* from the characteristic crotonoid pattern of the pollen wall in all other southern African genera in the Thymelaeaceae. This character was used to elevate the subtribe Passerininae to the tribe Passerineae.

The structure of the abaxial leaf epidermal cells with mucilaginous inner periclinal cell walls, was clarified in the present study. The authenticity of mucilaginous periclinal as well as anticlinal walls of epidermal cells in *Passerina* has also been confirmed. This phenomenon is considered an adaptation to survive the dry warm summers typical of the Cape Floristic Region.

The epidermal study in *Passerina* proved to be a source of new characters at both genus and species levels. The structure and possible function of the epidermis should be considered in context with the inversely dorsiventral leaves in *Passerina*. Two groups of species, Groups A and B, were distinguished on the basis of the arrangement and shape of epidermal cells as well as cuticular ornamentation.

Leaf anatomical evidence was extremely useful in the infrageneric classification of *Passerina*. Four anatomical leaf structural types and ten states were identified and correlated with specific habitats and geographical distributions. The leaf structural types and states also illustrate a xeromorphic gradient. On this basis all infrageneric taxa in *Passerina* could be identified.

Floral morphological and anatomical evidence assisted in resolving the floral structure in *Passerina* and also proved taxonomically useful at species level. The structure of the integuments surrounding the ovule also provided taxonomically useful evidence. The mechanical part of the seed coat is derived from the palisade-like outer epidermis of the inner integument, hence it is an exotegmen. The Euphorbiales–Malvales–Thymelaeales–Tiliales (Malvacean complex) is distinguished on the basis of the exotegmic palisade. A Malvacean relationship for the Thymelaeaceae is strongly supported by molecular phylogeny, as well as by floral morphology, anatomy, embryology and palynology.

A cladistic study based on leaf and floral morphological and anatomical characters supports *Passerina* as a monophyletic group. The taxonomic and phylogenetic values of the character set were also evaluated, indicating the most significant plesiomorphic and synapomorphic characters. Based on the distribution and array of plesiomorphic characters, *P. filiformis* and *P. paludosa* are regarded as morphologically close to the hypothetical ancestor of the genus.

OPSOMMING

'N MONOGRAFIE VAN DIE GENUS *PASSERINA* L. (THYMELAEACEAE)

deur

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Die hoofdoelwit van hierdie ondersoek was die daarstel van 'n taksonomiese hersiening van die genus *Passerina*, wat tans uit 20 spesies en vier subspecies bestaan. Die meeste spesies is in die Kaapse Floristiese Gebied gekonsentreer. Sommige spesies word op die Groot Eskarp aangetref, met uitskieters in Oos-Afrika. Die huidige monografiese studie is op uitgebreide veldwerk sowel as die studie van meer as 5 000 eksemplare uit 22 herbariums gebaseer en die bewaringstatus van al die verskillende spesies is vasgestel.

Stuifmeelkorrels by *Passerina* is aangepas by windbestuiwing. Die stuifmeelwand word gekenmerk deur 'n aaneenlopende sekondêre retikulum, wat *Passerina* onderskei van die tipiese krotonoïede patroon van die stuifmeelwand, kenmerkend van al die ander Suider-Afrikaanse genusse van die Thymelaeaceae. Hierdie kenmerk is gebruik om die subtribus Passerininae na die tribus Passerineae te verhef.

Die huidige studie het die struktuur van die abaksiale epidermisselle van die blaar, wat slymagtige binneste periklinale wande het, bevestig. Die bestaan van slymagtige periklinale sowel as antiklinale wande by die epidermisselle van *Passerina* is verder ook bevestig. Hierdie verskynsel word beskou as aanpassing om die droë, warm somers van die Kaapse Floristiese Gebied te oorleef.

Die epidermale studie van *Passerina* word as 'n bron van nuwe kenmerke op beide genus- en spesievlak beskou. Die struktuur en moontlike funksie van die epidermis moet in konteks met die omgekeerd dorsiventrale blare van *Passerina* gesien word. Twee groepe spesies, naamlik Groepe A en B, is op grond van die rangskikking en vorm van die epidermisselle, sowel as die ornamentasie van die kutikula, onderskei.

Blaar-anatomiese getuienis is uiters suksesvol by die infrageneriese klassifikasie van *Passerina* aangewend. Vier anatomiese blaar-strukturele tipes en tien state is vasgestel en is met spesifieke habitats en geografiese verspreidings gekorreleer. Die blaar-strukturele tipes en state dui ook 'n xeromorfeise gradiënt aan. Op grond hiervan kon al die infrageneriese taksons in *Passerina* geïdentifiseer word.

Bewyse gebaseer op die blommorfologie en -anatomie het grootliks gehelp om die blomstruktuur van *Passerina* te bepaal en was ook taksonomies waardevol om die spesies te onderskei. Die struktuur van die integumente wat die saadknop omring is ook 'n bron van taksonomies nuttige kenmerke. Die meganies verharde deel van die saadhuid ontstaan uit die palissade-agtige buitenste epidermis van die binneste integument en word daarom as 'n eksotegmen geklassifiseer. Die Euphorbiales–Malvales–Thymelaeales–Tiliales (Malvales-kompleks) word op grond van die eksotegmiese palissadeweefsel onderskei. 'n Malvales-verwantskap vir die Thymelaeaceae word sterk deur die molekulêre filogenie, asook blommorfologie, anatomie, embriologie en palinologie ondersteun.

'n Kladistiese studie gebaseer op morfologiese en anatomiese kenmerke van die blare en blomme ondersteun *Passerina* as 'n monofiletiese groep. Die taksonomiese en filogenetiese waardes van die stel kenmerke is ook beoordeel en die mees betekenisvolle plesiomorfiese en sinapomorfiese kenmerke is uitgewys. Gegrand op die verspreiding en uitbeelding van plesiomorfiese kenmerke, word *P. filiformis* en *P. paludosa* as morfologies die naaste verwant aan die hipotetiese voorouer van die genus beskou.

CURRICULUM VITAE

Christina Lindith Bredenkamp (née Keyser) was born in Luckhoff in 1947. She attended the Hoër Meisiesskool Stoffberg in Brakpan and matriculated in 1964. She studied at the University of Pretoria and was awarded a B.Sc. degree in 1967. In 1968 she obtained the Higher Education Diploma at the Pretoria Teachers' Training College and followed a career in education from 1969–1983. In 1984 she received the B.Sc. (Honns.) *cum laude*, followed by a research project on the taxonomy of the genus *Vitex* L. (Verbenaceae) between 1995 and 1998, culminating in an M.Sc. degree from the University of Potchefstroom for C.H.E. She was employed at the H.G.W.J. Schweickerdt Herbarium, University of Pretoria, between 1988 and 1990 and as senior researcher at the Education Assessment Group of the Human Sciences Research Council between 1990 and 1992. Since 1992 she has been employed at the National Botanical Institute, where she has developed a special interest in the Thymelaeaceae, resulting in the monograph of the genus *Passerina*. She has had the opportunity to extend her interest into management and has also served as Assistant Curator: Information (National Herbarium) for the last five years. She has collected plant specimens from many areas in southern Africa and is the author or co-author of 14 scientific publications. She is married to George Johannes Bredenkamp and has three children, Danie, Elmarié and Nicolene.

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