Conference Abstracts

South African Association of Botanists (SAAB) - Annual Meeting 2013

Abstracts of papers and posters presented at the 39th Annual Congress of the South African Association of Botanists held at Drakensberg, 20–24 January 2013

The presenter of multi-authored papers is underlined

Plenary lectures

The fire-vegetation-climate system - how ecology can contribute to earth system science

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Since the time of Darwin, Wallace and Schimper, botanists and ecologists have been interested in understanding the global distribution of vegetation. Such questions are becoming more pressing as Earth System modellers attempt to predict the current and future state of global vegetation. A key complexity that is currently not well captured by Earth System models is that vegetation is not always deterministically responsive to climate and soils. Feedbacks within the Earth System, top-down controls such as fire and herbivory, and historical contingencies related to the phylogenetic origins of the biota all contribute towards explaining the current distribution of vegetation. Here I discuss some of these aspects in more detail and, in particular, how this might shape the character and distribution of the global savanna biome. Specifically, I highlight the role that fire plays as both a driver and a response in the fire-vegetation-climate system.

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Molecular tools for phylogenetics at different scales: From phylogeography to supertrees

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About twenty years ago, the field of plant systematics and taxonomy was taken by storm by the then new field of molecular systematics. In spite of initial concerns, molecular tools are now viewed to be just another tool for unravelling the relationships of plants together with morphological, anatomical and many other methods. However, one of the “added advantages” of molecular systematic and population genetic analyses is that dated phylogenies can be used in optimizations of a large variety of characters, from morphological and anatomical, to dating and geographic optimizations which then allow one to address fascinating questions about the actual evolution of plants in the context of changing landscapes with regard to climate, geography and even geology. In this context, research conducted in my group was used to analyse the migrations of the genus Zygophyllum from the southwestern African arid areas via the so-called “Arid Corridor” to the Horn of Africa and back, and to other arid areas of the world. Molecular systematic and population genetic analyses in the genus Streptocarpus have indicated that the Pondoland area is a typical Southern Hemisphere East Coast refugium which harbours particularly high levels of endemism. A phylogeny of the genus Disa and other groups allowed us to indicate a migrational route from the Cape to the north via the “high altitude Afromontane route” as well as the origins of fire as a driver of speciation in the Cape Floral Region. More recently, we have now concentrated our efforts on unravelling the phylogenetic relationships of the most species rich genus in the Cape Floral Region, Erica, which shows a reverse route of migration from Europe via the “high altitude Afromontane route” and a major radiation in the CFR. In all of these analyses, the methodology has advanced in relation to the research questions being asked. DNA sequencing has advanced dramatically, next generation sequencing approaches have become a reality, and the massively enlarged data sets such as in the genus Erica, require major bioinformatic and supertree approaches. These approaches and the results of our research will be presented.

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Use of resurrection plants as models to understand how plants tolerate extreme water loss: A system biology approach with potential solutions for making drought tolerant crops

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About twenty five years ago, the field of plant systematics and taxonomy was taken by storm by the then new field of molecular systematics. In spite of initial concerns, molecular tools are now viewed to be just another tool for unravelling the relationships of plants together with morphological, anatomical and many other methods. However, one of the “added advantages” of molecular systematic and population genetic analyses is that dated phylogenies can be used in optimizations of a large variety of characters, from morphological and anatomical, to dating and geographic optimizations which then allow one to address fascinating questions about the actual evolution of plants in the context of changing landscapes with regard to climate, geography and even geology. In this context, research conducted in my group was used to analyse the migrations of the genus Zygophyllum from the southwestern African arid areas via the so-called “Arid Corridor” to the Horn of Africa and back, and to other arid areas of the world. Molecular systematic and population genetic analyses in the genus Streptocarpus have indicated that the Pondoland area is a typical Southern Hemisphere East Coast refugium which harbours particularly high levels of endemism. A phylogeny of the genus Disa and other groups allowed us to indicate a migrational route from the Cape to the north via the “high altitude Afromontane route” as well as the origins of fire as a driver of speciation in the Cape Floral Region. More recently, we have now concentrated our efforts on unravelling the phylogenetic relationships of the most species rich genus in the Cape Floral Region, Erica, which shows a reverse route of migration from Europe via the “high altitude Afromontane route” and a major radiation in the CFR. In all of these analyses, the methodology has advanced in relation to the research questions being asked. DNA sequencing has advanced dramatically, next generation sequencing approaches have become a reality, and the massively enlarged data sets such as in the genus Erica, require major bioinformatic and supertree approaches. These approaches and the results of our research will be presented.

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