Doing the twist: A test of Darwin's cross-pollination hypothesis for pollinarium reconfiguration

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Mating success in plants depends largely on the efficiency of pollen dispersal. For hermaphrodite plants, self-pollination, either within or among flowers, can reduce mating opportunities because of pollen and ovule discounting and inbreeding depression. Self-pollination may be particularly detrimental in plants such as orchids and asclepiads that package each flower's pollen into one or more pollinia which, together with accessory structures, comprise a pollinarium. Darwin proposed that physical reconfiguration of pollinaria serves as a mechanism for reducing the likelihood of self-pollination. To be effective, the time taken for pollinarium reconfiguration would need to exceed the time spent by a pollinator on a plant. We investigated pollinarium reconfiguration (including pollinarium bending, pollinium shrinking and anther cap retention) in 17 orchid and two asclepiad species. We found a strong positive relationship between reconfiguration time and the duration of pollinator visits. Reconfiguration times were also consistently longer than pollinator visit times. These results provide strong support for Darwin's idea that these mechanisms promote cross-pollination.

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Transmission of medicinal plant knowledge in urban Cape Town

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Cape Town, a segregated urban area of high biocultural diversity, presents a unique situation in which to observe cultural distinctions in plant utilization. A group of local healers, Rastafarian Herbalists and Traditional Healers, identified eighteen frequently used medicinal plant species which were used to assess learner knowledge. Seven schools, with and without school gardens, were selected representing majority ethnic groups. Aspects of learner knowledge were quantified with questionnaires and free listing exercises (427 students). Interviews with photographs of chosen species were used to quantify more in-depth knowledge including plant identification, preparation, and use (243 students). Knowledge Indicator Scores were assigned to learners and were evaluated using Kruskal–Wallis and Mann–Whitney *U* analysis. Xhosa and Sotho learners consistently earned highest scores, which correlated to the high scores for recent city migrants. It is suspected that these groups, the most disadvantaged, have remained dependent upon medicinal plants for health care. More established urbanites, whites and coloureds received the lowest scores respectively. Coloureds verified the rejection of traditional belief systems and received the most benefit from school gardening programs whilst white students reported a rejuvenation of the use of medicinal plants in nutraceutical form. Several distinct species were classified as culturally salient by each group, suggesting a representation of cultural keystone species. Transmission of knowledge was primarily vertical (70%) and between female relatives to learners (48%). The influence of school gardens as a teaching technique was representative (12%) but not significant. A novel form of urban transfer, diagonal, was noted a direct link between community leaders or healers and learners.

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Cultivation of medicinal plants: Determining the effect of organic fertiliser on the chemical composition of the plants

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Medicinal plants are declining rapidly in numbers as many of the plants are highly utilised for their medicinal properties. Due to the fact that they are used as medicine, many of them face extinction if the plants are not cultivated to sustainably produce these plants for the market. However, when plants are removed from their natural environment, changes in their chemical composition can be observed. These changes can be enhanced if a plant is cultivated by irrigation, as well as by fertilisation. A pilot study was conducted on six important medicinal plants species to determine the effect of organic fertiliser on the growth and chemical composition of the plants. A fertiliser recommendation was made, based on the soil analysis results that were used to determine different combinations of organic fertilisers. Gypsum, bone meal and an organic nitrogen source was used in the different fertiliser treatments. The average mass, leaf analysis, TLC and HPLC analysis were used to determine the effect of the fertilisers on the plants. Distinct differences were observed between plants in terms of their growth and compounds observed in the plants. A discussion on a possible explanation of the results and the future of cultivation of medicinal plants will be reported in the paper.

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Rarity patterns of South Africa's flora — How this impacts the number of species Red Listed and their relative risks of extinction

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SANBI's threatened species programme have recently undertaken the mammoth task of systematically working through all 20 564 plant taxa occurring in this country to determine their threat status based on the IUCN 3.1 Red List Categories and Criteria. During this process certain patterns of endemism and rarity intrinsic to our flora have significantly influenced the number of species we have list as threatened. In this paper we will look at what type of rarity is present in South Africa's flora specifically relating these to the well known seven forms of rarity defined by Rabinovitch et al. in 1986. Further we will explore how these patterns of rarity vary across different biomes and vegetation types; and between plant taxonomic groupings. Specific examples of threatened species assemblages will be presented to illustrate these patterns. Finally we will determine how current land-use within centres of plant endemism interacts with rarity to result in concentrations of threatened plants and discuss how this should influence target setting for species during conservation planning processes.

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The effect of sediment conditions on the growth rate of mangroves

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South Africa is home to 0.01% of Africa's mangrove forests. It is the southern limit of mangrove distribution in Africa stretching from Kosi Bay (KwaZulu-Natal) in the north to Nahoon (Eastern Cape) in the south. Mangrove forests are important areas of habitat for establishing nurseries and areas of refuge for invertebrates and fish. These forests are also the main primary producers for detrital food webs in mangrove estuaries. Mangrove trees are