

Extracts of four *Podocarpus* species commonly used in traditional medicine were screened for *in vitro* antibacterial activities. The extracts were tested against Gram-positive (*Bacillus subtilis* and *Staphylococcus aureus*) and Gram-negative bacteria (*Escherichia coli* and *Klebsiella pneumoniae*) using the microdilution bioassay. Extracts from each species exhibited significant antibacterial activity with minimum inhibitory concentration (MIC) values of less than 1 mg/ml. Petroleum ether, dichloromethane and ethanol extracts of *P. henkelii*, *P. latifolius* and *P. elongatus* exhibited the highest inhibition against *B. subtilis* with an MIC of 0.098 mg/ml. Ethanol leaf extract of *P. latifolius* showed greater antibacterial activity against *S. aureus* (0.098 mg/ml). Inhibition of growth of Gram-negative bacteria was exhibited by petroleum ether, dichloromethane and ethanol extracts of *P. latifolius*, *P. henkelii* and *P. elongatus* with an MIC value of 0.39 mg/ml. Poor antibacterial activities were observed in aqueous extracts of these species, with the most significant MIC value being 1.56 mg/ml. Plant parts that showed greater antibacterial activities were the leaves, stems and aril (epimatium).

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#### ***In vitro* pharmacological evaluation of three *Barleria* species**

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Petroleum ether, dichloromethane and 80% ethanol extracts of different parts of three *Barleria* species (*Barleria greenii*, *B. prionitis*, and *B. albostellata*) were investigated *in vitro* for their biological activity. Antibacterial activity was evaluated using the microdilution assay against two Gram-positive (*Bacillus subtilis* and *Staphylococcus aureus*) and two Gram-negative (*Escherichia coli* and *Klebsiella pneumoniae*) bacteria. Anti-inflammatory activity was evaluated using the cyclooxygenase (COX-1 and COX-2) assays. All the extracts showed broad-spectrum antibacterial activity with minimum inhibitory concentrations (MIC) ranging from 0.059–6.25 mg/ml. The dichloromethane extract of *B. greenii* root showed the highest activity against *B. subtilis* and *S. aureus* with MIC values of 59 and 230 µg/ml respectively. Petroleum ether extracts of *B. greenii* root and stem, *B. albostellata* leaf and stem, as well as *B. prionitis* root exhibited good inhibition of prostaglandin synthesis in both assays (>70%). These results demonstrate the therapeutic potential of these plants as antibacterial and anti-inflammatory agents.

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#### **The role of hawkmoth pollinators in mediating divergence and maintaining species boundaries after secondary contact in *Gladiolus longicollis***

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Pollinator mediated selection in plants is considered by some to be a very important driver of speciation. We document the variation in tube length of a hawkmoth pollinated plant *Gladiolus longicollis* across its geographic range. Variation in tube length seems to be determined by variations in the pollinator assemblage which has a bimodal distribution of tongue length. We show that *Gladiolus* tube lengths fall into two relatively discrete categories: long or short with few intermediates and that these correspond to hawkmoth populations

that have predominantly long or short tongues respectively. At a contact zone between these two floral morphs, we find few individuals of intermediate length. Distinct floral morphologies at this site are probably maintained by a combination of differences in flowering phenology, intermorph incompatibility and adaptation to distinct pollinator guilds.

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#### **Evidence for volatile signalling between leaf-rust infected and uninfected wheat**

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Plant communication describes the interaction between neighbouring plants whereby information is exchanged between them. Based on earlier biochemical studies, a putative communication event between wheat infected with leaf rust and uninfected wheat was evident. Using a carefully planned experimental setup, the transfer of a putative volatile signal from infected to uninfected wheat was investigated. Results indicated that when infected with leaf rust, uninfected wheat seedlings placed in close proximity exhibited a strong defence response in the absence of the pathogen. Slight variations were evident between the volatile signal produced by the infected resistant (IR) and infected susceptible (IS) plants, leading to a different response in the uninfected plants. After exposure to the volatile emissions of the infected plants, the uninfected plants were also infected with leaf rust. The activation of the defence response in these plants was confirmed with microscopic analysis of the fungal infection structures.

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#### **“Where there is a spark is there fire?: The importance of ignitions in determining fire regimes in southern Africa”**

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Seasonal patterns of burning, fire size distributions, and total burnt area all can impact the vegetation and ecology of a savanna/grassland system. These aspects of a fire regime are influenced by the frequency and timing of ignition events. We know that humans ignite fires in very different ways from the pattern of ignition that might occur due to lightning alone, but it has been difficult to investigate how this influences the fire regime and vegetation in a system. We simulated different possible ignition regimes and explored the consequences for the pattern of burning in a model savanna/grassland system. Human-dominated fire regimes are associated with early-season burning, and smaller fires, lightning-dominated fire regimes are associated with late-season burning, and larger fires. We explore how many early-season ignitions would be necessary to burn the same area as large, late-season lightning fires, and at what point ignitions become saturating in a system. This work provides insights into the relative importance of people and lightning as sources of ignition in different parts of Africa, and how long people have been able to have a significant impact on fire regimes in these systems.

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#### **The effect of meta-topolins on micropropagation of ‘Williams’ banana (*Musa* AAA sub group Cavendish)**

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