DNA Barcoding to discriminate between the interchangeable use of *Pelargonium sidoides* DC. and *Pelargonium reniforme* Curtis in commercial herbal products

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Several *Pelargonium* species indigenous to South Africa are highly valued for their horticultural value and medicinal properties. For hundreds of years various ethnic groups have used root extracts of *P. sidoides* as a remedy to treat coughs, upper respiratory tract irritations and gastrointestinal conditions. An ethanolic extract is used in the proprietary herbal tincture known as Umkaloabo® that is currently successfully marketed in Germany with sales that have escalated over 700%. The use of Commercial Herbal Products (CHP) have surged globally in recent years and as a result the phytomedicine industry is under immense pressure to develop rapid, accurate and economical methods for quality control, especially for the positive identification of raw materials. The taxonomic delimitation of the two taxonomic allies *P. sidoides* and *P. reniforme* has been debated in literature. Most consumer products explicitly refer to the botanical active as *P. sidoides* posing quality control concerns as *P. sidoides* and *P. reniforme* have not been proven to be pharmacologically equipotent. Here, we used DNA sequence information generated through standardized DNA barcoding techniques for the authentication of *Pelargonium sidoides* products. Furthermore, a DNA barcode reference library for the section Reniformia was added to the Barcode of Life Database and several herbal medicines tested, showed not to contain DNA material of *Pelargonium* species, indicating adulteration of the said products. Results as well as recommendations from the study will be presented.

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The evolution of secondary xylem in angiosperms and its loss in monocots

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Since the origin of vasculature around 420 mya, woodiness and arborescence have been gained and lost multiple times in land plants. True wood in the form of secondary xylem can be discerned from the secondary thickening in monocots by particular specialisation of xylem cells, differentiating towards the centre of the stem from a surrounding layer of vascular cambium. Despite our expanding knowledge about the developmental networks regulating secondary cell wall formation, understanding the early phases of secondary xylem identity, establishment and regulation is still lacking. Since loss of wood is thought to have occurred at the base of the monocots, we aimed to investigate, using an evo-devo approach, whether key genes were likely lost from the xylogenesis development pathways of monocots. Using recent literature from *Arabidopsis thaliana* (L.) Heynh., we reconstructed a model of early cambial differentiation and investigated the presence of these orthologs in the fully sequenced genomes of 28 dicot and 8 monocot species. Despite almost complete conservation of orthology within this network among all angiosperms, we found eight key genes that were found to be absent from all monocot species investigated. We further analysed gene families in more than 2,000 orthologs differentially expressed in the xylem of two dicot trees (*Eucalyptus grandis* W.Hill and *Populus trichocarpa* Torr. & A.Gray ex Hook.) and the fate of these in the two angiosperm lineages. Our study provides new evidence for the causal loss of true wood in all monocots, and its consequences on the evolution of downstream gene networks.

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A microbial and insect perspective on mangrove health in South Africa

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Mangrove ecosystems are under threat as a result of global climate change and anthropogenic pressures. While various studies have been undertaken to understand these impacts, little is known regarding the possible impact of pathogens and pests on mangroves. There has been an increase in the level and impact of pathogen and insect damage to tree species globally. This can be attributed to globalization and an increasing movement of people and plant material, resulting in the exposure of trees to pests against which they lack natural resistance. Against this background, it is important that virtually nothing was known regarding fungal and insect associates of mangroves in South Africa prior to this study, which arose from a number of reports of unexplained mangrove deaths. Results revealed a previously unknown fungal disease of the mangrove associate, *Barringtonia racemosa* (L.) Roxb., and the identification of numerous previously unknown fungal species. The only South African mangrove to display disease problems was *Avicennia marina* (Forssk.) Vierh. that displayed significant die-back, stem canker and insect problems at all sites investigated. Analyses of survey data suggested that the incidence and severity of the die-back is associated with sites with high levels of human disturbance. Although no serious pathogen or insect pest problems were observed on the majority of mangrove species in South Africa, monitoring of these ecosystems for pests and diseases should continue. This is especially important because many mangrove ecosystems occur around major harbours, which would be a pathway of entry into the country.

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New insights from an updated checklist of the food plants of southern Africa

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