Nobel winner declares boycott of top science journals (The Guardian, December 2013)

Randy Schekman, a US biologist who won the 2013 Nobel prize in physiology or medicine, said his lab would no longer send research papers to the top-tier journals, Nature, Cell and Science. According to him, leading academic journals are distorting the scientific process and represent a "tyranny" that must be broken… Read more, and Schekman's original commentary.

Plant genome editing made easy: Sophien Kamoun on the CRISPR/Cas system (Biome, December 2013)

Breeding plants to meet the demands of a population has driven agricultural progress throughout history. New techniques are now under development that are faster than traditional breeding methods but notably do not involve the introduction of foreign DNA, such as the CRISPR/Cas system for genome editing… Read more, and the full review in Plant Methods.

'Mosquito oral contraceptive' could aid malaria control (SciDev.Net, January 2014)

A chemical or plant-based 'oral contraceptive' to sterilise male Anopheles mosquitoes is being developed by the Kenya Medical Research Institute (KEMRI) to help reduce mosquito populations and cut malaria transmission in Africa … Read more

RECENTLY PUBLISHED BOOKS

Methods and Techniques in Ethnobiology and Ethnoecology (Springer Publishing Group)

Published November 2013

The study of human interactions, biodiversity, and the environment that surrounds them is a basic tool for understanding the factors that bind human societies to natural resources. Within this context, ethnobiology is a promising discipline that can play a key role as a mediator of dialogue between different academic disciplines and traditional knowledge, a union essential in enabling contextualized and sustainable alternatives to exploitative practices and biodiversity management. Methods and Techniques in Ethnobiology and Ethnoecology introduces the basic techniques and methods traditionally used in ethnobiology and ethnoecology. Comprised of 28 chapters, the book covers the different qualitative and quantitative aspects of ethnobiology research methods, as well as methods from natural and social sciences that will be useful to both beginners and senior researchers. Written by internationally renowned experts in the fields, Methods and Techniques in Ethnobiology and Ethnoecology is a valuable resource for researchers and students interested in ethnobiology.
Science, communication and development

Last year SciDev.Net published a series of interesting articles on the importance of communication from scientists, and the role that interactions with the public can play in assisting career and economic development.

Internet technologies such as social media continue to transform the way the world functions, and Africa is not being left out of the process. In “A future of African-led development is underway”, some constructive uses of these technologies are described. Africans are making use of social media and internet technologies to assert their influence on the continent’s development. Locals and the diaspora are not only advocating for needs on the continent, but chronicling their work in meeting them. Technologies are being used to improve education across the continent, meet basic needs such as water and power, and even promote local technology manufacture. This influence can be leveraged for scientists and research as well.

Unfortunately, “Young scientists are missing out on vital skills” describes how poor connections and communication both within scientific communities and between scientists and society are hindering adoption of technologies to aid sustainability and development. It emphasises the need for young researchers to both be actively encouraged and equipped to engage with other research disciplines and with society. Although there are not yet clear guidelines to assess the impact of scientists’ social engagement, that should not discourage young researchers from starting to develop a voice outside of their research networks. “Cultivating a voice outside academia has tangible benefits” and “How scientists can reach out with social media” explain the impact that scientists sharing informed opinions on non-academic forums can have in advancing both their careers and their ideas. With an increasingly informed public, promoting your thoughts, ideas and the progress of your work as a scientist can impact on your work being funded and able to progress.

It should be emphasised that these sorts of communication skills can be cultivated with experience, and are helped by confidence and being well read in the bigger issues around your field of interest. Practical guides on different forms of communication are also provided, as well as a collection different tools available for you to start sharing your work with the public.

How about a New Year’s resolution- will you start cultivating your voice outside of academia this year?
**JOURNAL ARTICLES**

**Kolaviron, a *Garcinia* biflavonoid complex ameliorates hyperglycemia-mediated hepatic injury in rats via suppression of inflammatory responses**


Chronic inflammation plays a crucial role in hyperglycemia-induced liver injury. Kolaviron (KV), a natural biflavonoid from *Garcinia kola* seeds have been shown to possess anti-inflammatory properties which has not been explored in diabetes. To our knowledge, this is the first study to investigate the effect of KV on pro-inflammatory proteins in the liver of diabetic rats. Diabetes was induced by a single intraperitoneal injection of streptozotocin (STZ) (50 mg/kg) in male Wistar rats. Kolaviron (100 mg/kg) was administered orally five times a week for six weeks. The concentrations of cytokines and chemokine were measured using Bio-plex Pro™ magnetic bead-based assays (Bio-Rad Laboratories, Hercules, USA). Plasma glucose and serum biomarkers of liver dysfunction were analyzed with diagnostic kits in an automated clinical chemistry analyzer. Insulin concentration was estimated by radioimmunoassay (RIA). Kolaviron (100 mg/kg) treatment significantly ameliorated hyperglycemia and liver dysfunction. Serum levels of hepatic marker enzymes were significantly reduced in kolaviron treated diabetic rats. Kolaviron prevented diabetes induced increase in the hepatic levels of proinflammatory cytokines; interleukin (IL)-1beta, IL-6, tumour necrosis factor (TNF-α) and monocyte chemotactic protein (MCP-1). The results of this study demonstrate that the hepatoprotective effects of kolaviron in diabetic rats may be partly associated with its modulating effect on inflammatory responses.

**Antifungal and antibacterial activity and chemical composition of polar and non-polar extracts of *Athrixia phylloides* determined using bioautography and HPLC**


*Athrixia phylloides* DC. (Asteraceae) is used medicinally in South Africa to treat a plethora of ailments, including heart problems, diabetes, diarrhoea, sores and infected wounds. It is also prepared in the form of a tea (hot decoction) taken as a refreshing, pleasant-tasting beverage with commercialization potential. Extracts of the dried ground aerial parts were prepared using organic solvents (diethyl ether, dichloromethane/methanol, ethyl acetate and ethanol) and water. These extracts were subjected to HPLC, TLC and bioautography analysis with the aim of linking a range of peaks visualized in HPLC chromatography profiles to antibacterial and antifungal activity of the same extracts. HPLC revealed a group of compounds extracted by more than one solvent. Compounds identified include inositol, caffeic acid, quercetin, kaempferol, apigenin, hynemoxin and oleanolic acid. The organic extracts displayed similar TLC profiles, and bioautography indicated approximately five antibacterial compounds, but only two antifungal compounds in these extracts. Bioautography indicated that cold water extracted the least antimicrobial compounds. Several previously unknown compounds were identified in *Athrixia phylloides* extracts, and bioautography indicated a number of antibacterial and antifungal compounds. There were notable differences in chemical composition and bioactivity between the organic and aqueous extracts. Further research is necessary to fully characterize the active components of the extracts.

**Incorporating *trnH-psbA* to the core DNA barcodes improves significantly species discrimination within southern African Combretaceae**


Recent studies indicate that the discriminatory power of the core DNA barcodes (*rbcL* + *matK*) for land plants may have been overestimated since their performance have been tested only on few closely related species. In this study we focused mainly on how the addition of complementary barcodes (*rrn18s* and *trnH-psbA*) to the core barcodes will affect the performance of the core barcodes in discriminating closely related species from family to section levels. In general, we found that the core barcodes performed poorly compared to the various combinations tested. Using multiple criteria, we finally advocated for the use of the core + *trnH-psbA* as potential DNA barcode for the family Combretaceae at least in southern Africa. Our results also indicate that the success of DNA barcoding in discriminating closely related species may be related to evolutionary and possibly the biogeographic histories of the taxonomic group tested.

**Pharmacological potential and conservation prospect of the genus *Eucomis* (Hyacinthaceae) endemic to southern Africa**


The genus *Eucomis* (Hyacinthaceae) consists of 10 species that are extensively used in African traditional medicine. This review is an appraisal of current information on the distribution and morphology, traditional uses, pharmacology, toxicology and approaches devised to enhance the conservation of the genus. A systematic and comprehensive literature search using electronic searches such as Scopus, Google Scholar, Web of Science and ethnobotanical books was conducted. Evidence from traditional medicine usage shows wide utilization of this genus for ailments such as respiratory, venereal diseases, rheumatism as well as kidney and bladder infections. Pharmacological screening reported antimicrobial, antiplasmodial, antitumor, cytotoxic, phytotoxic and anti-inflammatory properties. The potential of the genus *Eucomis* especially in terms of pharmacology cannot be overemphasized. Apart from the anti-inflammatory properties, the antifungal activity of *Eucomis* remains a valuable reservoir with potential application in the agriculture sector as a source of an affordable biocontrol agent. Based on the speculated toxic constituents in the genus *Eucomis*, it will be valuable to conduct detailed toxicological studies. Extensive utilization of members of the genus *Eucomis* is causing severe strain on wild populations. Although conventional propagation has been relatively effective in the alleviation of the declining status, micropropagation of members may be vital to guarantee the conservation of wild populations.
Efficacy of the core DNA barcodes in identifying processed and poorly conserved plant materials commonly used in South African traditional medicine


Medicinal plants cover a broad range of taxa, which may be phylogenetically less related but morphologically very similar. Such morphological similarity between species may lead to misidentification and inappropriate use. Also the substitution of a medicinal plant by a cheaper alternative (e.g. other non-medicinal plant species), either due to misidentification, or deliberately to cheat consumers, is an issue of growing concern. In this study, we used DNA barcoding to identify commonly used medicinal plants in South Africa. Using the core plant barcodes, matK and rbcLa, obtained from processed and poorly conserved materials sold at the muthi traditional medicine market, we tested efficacy of the barcodes in species discrimination. Based on genetic divergence, PCR amplification efficiency and BLAST algorithm, we revealed varied discriminatory potentials for the DNA barcodes. In general, the barcodes exhibited high discriminatory power, indicating their effectiveness in verifying the identity of the most common plant species traded in South African medicinal markets. BLAST algorithm successfully matched 61% of the queries against a reference database, suggesting that most of the information supplied by sellers at traditional medicinal markets in South Africa is correct. Our findings reinforce the utility of DNA barcoding technique in limiting false identification that can harm public health.

The potential of anti-malarial compounds derived from African medicinal plants. Part I: a pharmacological evaluation of alkaloids and terpenoids


Traditional medicine caters for about 80% of the health care needs of many rural populations around the world, especially in developing countries. In addition, plant-derived compounds have played key roles in drug discovery. Malaria is currently a public health concern in many countries in the world due to factors such as chemotherapy faced by resistance, poor hygienic conditions, poorly managed vector control programmes and no approved vaccines. In this review, an attempt has been made to assess the value of African medicinal plants for drug discovery by discussing the anti-malarial virtue of the derived phytochemicals that have been tested by in vitro and in vivo assays. This survey was focused on pure compounds derived from African flora which have exhibited anti-malarial properties with activities ranging from "very active" to "weakly active". However, only the compounds which showed anti-malarial activities from "very active" to "moderately active" are discussed in this review. The activity of 278 compounds, mainly alkaloids, terpenoids, flavonoids, coumarines, phenolics, polyacetylates, xanthones, quinones, steroids, and lignans have been discussed. The first part of this review series covers the activity of 171 compounds belonging to the alkaloid and terpenoid classes. Data available in the literature indicated that African flora hold an enormous potential for the development of phytomedicines for malaria.

Differential transcriptome analysis of glandular and filamentous trichomes in Artemisia annua


The medicinal plant Artemisia annua is covered with filamentous trichomes and glandular, artemisinin producing trichomes. A high artemisinin supply is needed at a reduced cost for treating malaria. Artemisinin production in bioreactors can be facilitated if a better insight is obtained in the biosynthesis of artemisinin and other metabolites. Therefore, metabolic activities of glandular and filamentous trichomes were investigated at the transcriptome level. By laser pressure catapulting, glandular and filamentous trichomes as well as apical and sub-apical cells from glandular trichomes were collected and their transcriptome was sequenced using Illumina RNA-Seq. A de novo transcriptome was assembled (Trinity) and studied with a differential expression analysis (edgeR). A comparison of the transcriptome from glandular and filamentous trichomes shows that MEP, MVA, most terpene and lipid biosynthesis pathways are significantly upregulated in glandular trichomes. Conversely, some transcripts coding for specific sesquiterpenoid and triterpenoid enzymes such as 8-epi-cedrol synthase and an uncharacterized oxidosqualene cyclase were significantly upregulated in filamentous trichomes. All known artemisinin biosynthesis genes are upregulated in glandular trichomes and were detected in both the apical and sub-apical cells of the glandular trichomes. No significant differential expression could be observed between the apical and sub-apical cells. Our results underscore the vast metabolic capacities of A. annua glandular trichomes but nonetheless point to the existence of specific terpene metabolic pathways in the filamentous trichomes. Candidate genes that might be involved in artemisinin biosynthesis are proposed based on their putative function and their differential expression level.