

Harnessing potential treasure trove of modern medicines from tropical plants

9 September 2021



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Rapid developments in technology and emerging specialist expertise could be the catalyst to unlocking the world's natural reserves of tropical plants, and a treasure trove of new medicines, according to James Cook University.

A team of researchers from the Australian Institute of Tropical Health and Medicine at JCU has completed a two-year comprehensive review into improving ways of finding new medical compounds from nature, in order to tackle existing and emerging infectious tropical diseases.

AITHM Senior research fellow and microbiologist Dr. Andreas Kupz said nearly half the world's recognized medications were sourced from nature, including broad-spectrum antimicrobial agents, Quinine from the bark of the cinchona plant for malaria, and medicines with anti-parasitic, anti-viral and anti-fungal disease properties.

"We found while there is vast Indigenous knowledge around medicinal use of [tropical plants](#), the underlying active compounds of these plants remain largely unknown," Dr. Kupz said.

He said [new drugs](#) found from tropical sources in nature could potentially better treat up to 41 diseases responsible for major outbreaks including malaria, chikungunya, dengue, Ebola and yellow fever, as well as future emerging tropical diseases.

"The focus of pharmaceutical research in this area has been on flowering plants, whereas mangroves, mosses, ferns, hornworts, cycads, liverworts, and lycopods remain barely studied for drug development to date, and represent an untapped source of new compounds."

JCU Centre for Molecular Therapeutics' microbiologist Dr. Michael Smout said the review team, which includes immunologists, molecular biologists, bioinformaticians, and chemists, found while cost and time were barriers to producing new drugs, rapid developments in technology and expertise were changing that.

"There is a bottleneck in the discovery process, as well as the significant financial investment required to take a promising raw natural product forward in order to become a new standard-of-care treatment for a tropical pathogen.

"However, we now have greater access to emerging areas of research knowledge and advancements in technology, which are improving identification and isolation of compounds in plants," Dr. Smout said.

Principal senior research fellow and co-director of the Australian Institute of Tropical Health and Medicine's Centre for Tropical Bioinformatics and Molecular Biology, Dr. Matt Field, said the use of next-generation sequencing technologies in genomics and metagenomics offers new screening pathways for the discovery of natural products.

"Over the past few decades numerous high-throughput sequencing approaches have been developed and applied to facilitate the process of

identifying protein and small molecule drug candidates," Dr. Field said.

Dr. Field said strategic collaboration between chemists with expertise in natural products and organic synthetic chemistry, and biologists with expertise in biological processes and sample processing, would overcome current challenges.

"We also increasingly require immunologists with expertise in cell and animal-based assays working with bioinformaticians to develop discovery platforms using large-scale genome sequence mining, and shotgun (untargeted) metagenomics," Dr. Field said.

"Technology and these emerging areas of expertise that go with them, will ensure more of these natural reservoirs will likely reveal their pharmaceutical secrets in the near future."

The Australian Institute of Tropical Health and Medicine's Centre for Molecular Therapeutics brings together researchers from across JCU to explore and harness the power of the tropics, in order to develop innovative solutions to global public health problems.

Provided by Australian Institute of Tropical Health and Medicine (AITHM)

APA citation: Harnessing potential treasure trove of modern medicines from tropical plants (2021, September 9) retrieved 6 December 2021 from <https://medicalxpress.com/news/2021-09-harnessing-potential-treasure-trove-modern.html>

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