

Theo Busschau



SNAKES ALIVE!

Forest biodiversity study reveals 10 'cryptic' species in one.

Herpetologists involved in the Eastern Cape Forests Project – a Foundational Biodiversity Information Programme (FBIP) study that aims to document the diversity of these ancient forests – have uncovered a treasure trove of snake biodiversity. Lead author of a paper published on the research in the *Journal of Zoological Systematics and Evolutionary Research*, MSc graduate Theo Busschau, explains that the number of forest thread snake species has increased from two to 10, a fivefold increase in diversity.

The forest thread snake, *Leptotyphlops sylvicolus*, is the only thread snake restricted to the forested regions of South Africa. Unlike many other snakes, *L. sylvicolus* does not have well-developed eyes, spends most of its life underground, and is a very picky eater, feeding exclusively on the larvae of ants and termites.

In its bid to stay nourished on its very specific diet, evolution has seemingly blessed *L. sylvicolus* with an 'invisible cloak' – studies have shown that the snake is able to produce a chemical that mimics its prey's scent and allows it to enter ant nests and termite mounds without being attacked.

An earlier study in 2009 showed that there were possibly two 'cryptic' thread snake species. Cryptic species are those that are morphologically similar, looking nearly identical to each other

in physical features, but at the level of DNA have diverged to the point where scientists can classify them as different species. For the 2009 study, sample sizes were low and further investigation was needed. But Busschau says the findings of his study raise more questions than answers. He describes his analyses of how many species are found under the forest thread snake 'umbrella' as conservative, meaning more than 10 species are likely.

"There are varying degrees of morphological differences among these various species, but more work remains



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The forest thread snake, *Leptotyphlops sylvicolus*, is typically only about 10 cm long and is sometimes mistaken for a worm, as both have the rounded head and poorly developed eyes that are adaptations to a burrowing lifestyle.

before we can describe them,” he adds. Species description is the formal process whereby a newly discovered species is described, usually in the form of a scientific paper. To do this, many more samples will be needed to see what distinguishes one species from another and how they differ from known species.

Genetic diversity

The analyses on the DNA sequence data allowed Busschau and the team to identify how isolated the various populations were, and which populations possibly represented undescribed species.

“We were also able to estimate when these populations became isolated. Our estimates point towards the late Miocene, 11 to five million years ago, when the global climate became cooler and drier, resulting in the fragmentation of forest habitats in South Africa,” he says.

Busschau notes that this and similar studies are important because we need to know what is out there so we can conserve it.

“Unfortunately, conservation management plans don’t often recognise genetic diversity, focusing only on the diversity of described species. Therefore, future research is important to quantify the true diversity and describe the cryptic species in *L. sylvicolus*, so we can conserve them and the habitats in which they occur.”

Although genetic diversity is often a neglected aspect of conservation, Busschau says it is important when species need to adapt to changing environments. *L. sylvicolus* likely shows patterns of genetic diversity that would be shared by other forest-living species, so future work is important not only for *L. sylvicolus* but also for other species that share its habitat.

Forest biodiversity

Forests form the smallest biome in South Africa, yet they support a large proportion of the country’s biodiversity and are of high conservation value. The study shows that forests possibly have much higher reptile diversity than currently recognised, emphasising the importance of forest conservation – especially since many of these cryptic species occur in small forest fragments.

Busschau says that the presence of multiple cryptic species with small distributions have consequences for their conservation status once they are described. At present, *L. sylvicolus* is listed as ‘Least Concern’ in the International Union for the Conservation of Nature (IUCN) Red List of Threatened Species. In future, the description of multiple species means that each could occupy a smaller area than the ‘umbrella species’, leading to higher conservation threat status, such as ‘Vulnerable’ or ‘Endangered’.

The Eastern Cape is home to 46% of South Africa’s remaining natural forest cover, including many of the



Theo Busschau handling a Natal black snake, *Macrelaps microlepidotus*, during a field trip.

country’s most threatened forest types. The area also forms part of the Maputuland-Pondoland-Albany Hotspot for biodiversity. Challenges facing the Eastern Cape forests represent a crucial test case for the nexus between human survival needs and the importance of keeping indigenous forests intact.

According to Stellenbosch University biodiversity expert and ECFP project leader, Prof. Michael Cherry, forests are important in terms of the bio-economy. Although they have traditionally been harvested by local rural communities, they have experienced increased pressure post-democracy due to collection of timber for building material as well as bark for medicinal use. Furthermore, the region has been earmarked for economic development, including dry gas exploration, titanium mining, dam construction and major road infrastructure.

Written by Dane McDonald, Science Communicator for the Foundational Biodiversity Information Programme (FBIP). The FBIP aims to generate, manage and disseminate foundational biodiversity information and knowledge to improve decision-making and service delivery, and to create new economic opportunities. It is funded by the Department of Science and Innovation (DSI) under the Global Change Programme, and is jointly managed by the National Research Foundation (NRF) and the South African National Biodiversity Institute (SANBI).