

Sunbathing tree frogs' future under a cloud

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Animal conservationists in Manchester are turning to physics to investigate whether global warming is responsible for killing sun-loving South American tree frogs.

In a unique collaborative project, researchers in The Photon Science Institute (PSI) at The University of Manchester have joined forces with The Manchester Museum, which boasts an amazing collection of colourful tree frogs.

Physicist Dr Mark Dickinson, working with Andrew Gray, Curator of Herpetology at the museum, and Dr Richard Preziosi from The Faculty of Life Sciences, has started using a technique called Optical Coherence Tomography (OCT) to investigate the properties of the tree frogs' skin.

This non-invasive technique, which does not cause harm or distress to the frogs, allows images to be obtained from within tissue – and the Manchester team believe this innovative application of OCT could hold the key to understanding the alarming global decline in amphibians.

When in their natural habitat, the Costa Rican tree frogs being studied in Manchester prefer to live on leaves and branches high above the ground.

They enjoy basking in the hot sun – which is unusual because frogs normally avoid prolonged exposure to high levels of light due to the risk of overheating and dehydration.

The Manchester team's hypothesis is that global warming is leading to



more cloud cover in the frogs' natural habitat.

They believe this is denying them the opportunity to 'sunbathe' and kill off fatal Chytrid fungal infections, leading to many species dying out.

In their work so far, the team have observed that the skin of basking tree frogs sometimes undergoes a visible change and becomes almost metallic in texture. They think that when this happens, the level of absorption and reflection and the skin temperature also changes.

The Manchester team believe tree frogs are able to bask happily under a fierce sun because they have the ability to regulate their body temperature and prevent overheating through the unique structure and properties of their skin.

Gray, Dickinson and Preziosi are now seeking further funding to do more comprehensive research using the OCT technique – which is more commonly used to examine the human retina – and put their hypothesis to the test.

As part of their studies, they want to use OCT to compare structural changes in the skin of tree frogs with the structural changes in the skin of frogs that do not have the same high levels of infrared reflectance.

This reflectance is associated with a pigment called pterorhodin, and allows the tree frogs to camouflage themselves from predators by adjusting the infrared reflection of their skin to match the infrared reflection of the leaves they laze upon.

They team are hoping to work with and support the important work being carried by the eminent climatologist, Alan Pounds, who has theorised that global warming is a major factor in amphibian declines.



The team plan to travel out to Costa Rica next year and to apply spectral reflectance techniques to tree frogs living in their natural habitat.

Dr Mark Dickinson said: "This is a great example of an exciting interdisciplinary research project that draws on expertise right across the university. It is proof that interdisciplinary research is not just a fashionable expression we band around, but something we actually do."

Andrew Gray said: "With a third of the world's amphibians currently under threat it's vitally important we do our utmost to investigate the reasons why they are dying out at such an alarming rate.

"The imaging technique we use is completely non-invasive and does not harm the frogs in any way. As an animal conservationist, I simply would not allow any research that distressed these amazing creatures."

Source: University of Manchester

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