

FROM CARNIVOROUS PLANTS TO ROCK POOLS: DIVERSITY AND ECOLOGY IN THE KIMBERLEY

On 7 November 2018, **Adam Cross** and **Laura Skates** spoke to the Kimberley Society about their research. Adam is a postdoctoral researcher in the Centre for Mine Site Restoration at Curtin University. His half of the talk was on the ecology of rock pools in the Kimberley region, highlighting the importance of these rock pools as habitat for a diverse array of flora and fauna. Some species are only known from a couple of rock pools in a single small area in the region, so they are highly dependent on conservation.



Dr Adam Cross taking photographs by the edge of a creek in the Kimberley. Many carnivorous plant species can be found growing amongst other vegetation on the fringes of creeks such as this.

Laura is a PhD student in the School of Biological Sciences at UWA (supported by Kings Park and Botanic Gardens, and by the BayCEER Laboratory at the University of Bayreuth, Germany). She provided the following summary of her presentation.

Carnivorous plants are well known for their ability to capture and digest prey using specialised leaf traps. Charles Darwin was the first to provide scientific evidence of plants being capable of carnivory, through a series of elegant experiments carried out in his own personal glasshouse in England.



Charles Darwin glasshouse

Darwin believed the Venus flytrap (*Dionaea muscipula*) to be one of “the most wonderful plants in the world”, but he was arguably even more fascinated by a relative of the Venus flytrap: the sundews (*Drosera*). Instead of capturing prey with a snap-trap, sundews use an adhesive trap – their leaves are covered in glands, which produce a sticky mucilage to capture prey and secrete digestive enzymes to break down and digest the prey. In a letter to a colleague, Darwin wrote “at this present moment, I care more about *Drosera* than the origin of all the species in the world”.



Sundews can be found on every vegetated continent, but the greatest diversity of sundews is found right here in Western Australia, spread across both the Southwest region and the Kimberley region. If you go on a bush walk, keep an eye out for their sticky dew, which shines and glitters in the sunlight. You should also keep an eye out for a group of plants which can look quite similar to sundews: the rainbow plants (*Byblis*). *Drosera* and *Byblis* have evolved independently, the former arising from the family *Droseraceae* in the order *Caryophyllales*, and the latter arising from the family *Byblidaceae* in the order *Lamiales*. Despite this, they have both evolved an adhesive trap to capture prey. This is just one example of convergent evolution of a sticky trap, and many more exist amongst the carnivorous plants of the world, including species of *Roridula*, *Pinguicula*, *Philcoxia*, *Drosophyllum lusitanicum*, and *Triphyophyllum peltatum*.

One of the questions that I have been interested in exploring with my PhD research is whether or not *Byblis* species gain any nutritional benefit from the prey they catch. We've known since the time of Darwin that *Drosera* species can be very successful at capturing and breaking down prey, and more recent evidence gathered over the last 40 years has shown that *Drosera* species are able to take up a large proportion of nitrogen (an essential element) from the prey they capture. However, we know relatively little about *Byblis* species – we know that they are quite successful at capturing and breaking down prey, but we don't know how much they benefit nutritionally from that prey. My research has used natural abundance stable isotope techniques to look at the nutrition of *Byblis* species in both the Southwest and Kimberley regions, and compare their uptake of nitrogen from prey to that of co-occurring *Drosera* species. My PhD supervisors and I are planning to publish the results from this work in 2019, and will be eager to share the final results and outcomes with the Kimberley Society.



Byblis in the Kimberley



Laura Skates with Byblis in the Kimberley



Aside from species of *Byblis* and *Drosera*, the Kimberley region is also home to a diversity of *Utricularia* species (such as this *U. chrysantha*) which use a suction trap to capture their prey (traps not pictured, these are found below ground).

Finally, I'd like to again express my thanks to the Kimberley Society for providing funds so that I could travel to the Kimberley region to conduct this research. I am very grateful for your kind support and for your enthusiasm about carnivorous plants!

Editor's Note: In May 2019, numerous media outlets reported on Dr Adam Cross and honours student Thilo Krueger having recently found the largest Australian population yet discovered of *Aldrovanda vesiculosa*, an aquatic venus flytrap. Located on Theda Station, it was the first such population found in the Kimberley in 20 years. The species is considered critically endangered.