

Untangling the genetic web

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They are large, hairy and some are big enough to devour lizards, mice and birds. Despite their fearsome reputation spiders such as tarantulas — and even the tiny money spider — are now helping researchers at The University of Nottingham carry out a range of studies in the field of genetics and evolution.

Nearly 30 [tarantulas](#) have set up home in a SpiderLab on University Park in the School of Biology. This unique facility was established by research geneticist and RCUK Research Fellow Dr Sara Goodacre who studies the [evolutionary genetics](#) of spiders.

Dr Goodacre said: “It is assumed we know so much, we’ve been to the moon but we don’t yet fully understand how the [spider](#) turns liquid [protein](#) into silk. Spiders are sometimes overlooked in scientific terms yet they lead such fascinating lives.”

Among the residents of SpiderLab is the Goliath Bird Eater — the largest of all the tarantulas; a highly aggressive Tanzanian [Orange Baboon Tarantula](#); and a Chilean Rose Tarantula — commonly kept as a pet. But they aren’t alone; they share their SpiderLab with a variety of other types of spider. Researchers delving into the inner workings of the spider use the tissue of juvenile spiders for their genetic research.

Dr Goodacre said: “We can learn a lot from studying spiders. Some spiders are highly inbred and yet show no signs of strange mutations. Others employ excellent dispersal strategies to ensure survival. Some can fly long distances using strands of floating silk. One species is

predominantly female and yet their colonies manage to remain very stable despite the apparent lack of males. Some can dive into deep water and stay there for long periods. Another species lies beneath the water's surface under a diving bell made of silk, breathing the trapped air.”

Dr Goodacre heads the team of two PhD students and a Masters student. They are currently working on a range of research projects that include studies into pesticides and the effect they have on spider populations, dispersal strategies of money spiders, the mating behaviour and sex ratio bias in tree dwelling spiders, conservation genetics of the endangered raft spider and the consequences of inbreeding in semi-social desert spiders.

Nearly 900 species of tarantula have been discovered. Dr Goodacre wants to know why one type of spider has managed to produce so many variations. By studying the tarantula's evolutionary tree and sequencing stretches of DNA they hope to trace the genes that contain just enough but not too many changes to achieve this.

The SpiderLab has already attracted interest from academics in the Schools of Pharmacy and Chemistry. Using X-Ray crystallography, which provides images of the three-dimensional structure of molecules, chemists hope to learn more about the protein structure of spider silk and what makes it so lightweight but incredibly strong. Applied force microscopy could also tell them more about how spider silk behaves under different physical conditions.

The SpiderLab is currently working in close collaboration with Alex Hyde, a former Masters student in the Department of Biological Photography and Imaging at The University of Nottingham. Researchers are using his expertise in microscopy to get close up and personal with the tarantula and other residents of SpiderLab. His remarkable photography is helping them build up a better understanding of the bio-

mechanics of spiders — such as how they jump and fly.

School children are often entertained by the team who take part in science fairs and demonstrations to explain the work they do and get school children interested in science.

Dr Goodacre is just the person to inspire young people. She said: “I was asked once if I ever run out of ideas for my research. The answer is that I always seem to have a list of about 100 ideas that I’d like to follow up at any one time; I might get this down to 50 but it’s unlikely to go below that — well, not until I’m 95.”

Provided by University of Nottingham ([news](#) : [web](#))

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