

Spider study can light the way to new tech

Spiders and cobwebs are fixtures in haunted houses, but not all of these eight-legged animals are creatures of the night.

Take it from Singapore's own Spider-Man, National University of Singapore (NUS) Associate Professor Li Daiqin, who recently discovered that the *Cosmophasis umbratica*, a species of the jumping spider found here, uses the sun's ultraviolet (UV) rays for communication and to find that perfect mate.

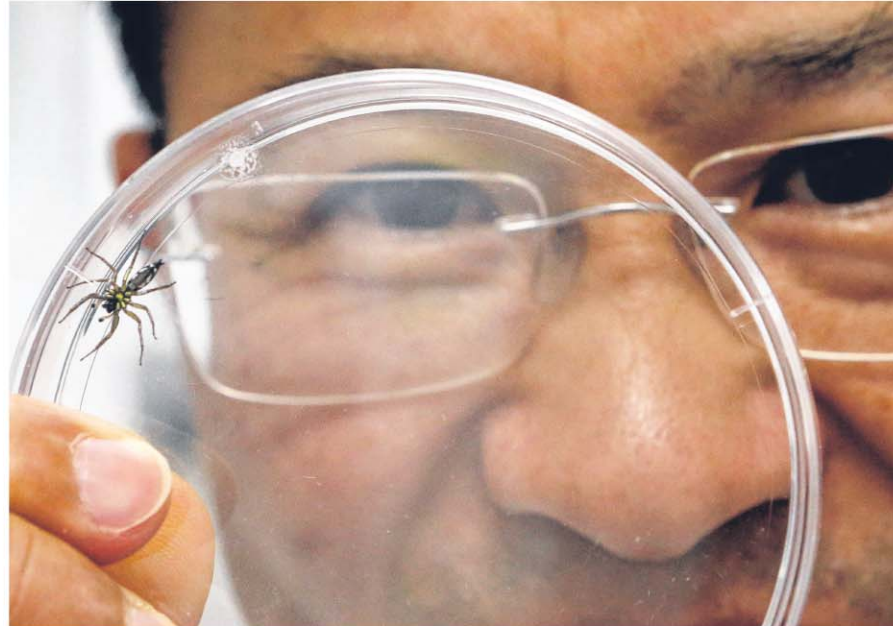
Prof Li, who is from the department of biological sciences at the NUS Science Faculty, found that UVA and UVB light, which humans cannot see, are important to the jumping spider.

Only male jumping spiders can reflect UV light. In the spider world, this works similarly to how, say, peacocks, like many males in the animal kingdom, are more brightly coloured than their female counterparts.

Prof Li found that while UVA is an indicator of gender, UVB reflectance tells the quality of the male. When UVA was filtered out, female jumping spiders behaved as though the males they encountered were females, while males tried to court males.

But when the female spiders were shown two male spiders – one under normal light and the other under light with UVB filtered out – females initially started moving toward both males. Interestingly though, they showed more interest in the male with UVB reflectance, compared to the one without.

Prof Li said the "attractiveness"



Left: NUS researcher Li Daiqin, who is studying the effect of UV light on a species of jumping spider. Below: The tarantula called Singapore blue. PHOTOS: CHEW SENG KIM, JAMES KOH



of the male spider depends on how much UVB is reflected. UVB reflectance is a structural colour, which refers to how light is reflected off microscopic hairs and scales of the spider to produce what humans see as iridescence. In comparison, colours like red, orange and yellow are pigmented colours.

Because of the way the microscopic structures are arranged, and depending on the angle that the UV light hits them, structural colour

may appear different from different angles. This finding could help with the development of defence technology, or paint pigments that do not fade, said Prof Li.

Spider expert Joseph Koh said structural colour is a subject that has attracted some attention from scientists and engineers working on biomimicry – the process of looking for nature-inspired solutions to human challenges.

"One of the most exciting works is focused on a tarantula known as the Singapore blue.

Its hair has a complex nanostructure that produces a non-reflective but consistently vibrant blue coloration regardless of the angle you look at it.

"If we can artificially replicate, emulate or mimic the nanostructure, we will be able to produce colour pigments that will never fade, or reduce glare on smartphone screens and wide-angle television monitors."