Page last updated at 16:20 GMT, Thursday, 4 February 2010

How spider webs catch water drops

By Victoria Gill
Science reporter, BBC News

Water droplets collect on knots in the silk spindle

The new study has shown how spider silk captures water from the air and gathers it into jewel-like droplets.

As well probing the science of this natural phenomenon, the researchers went on to design a new material with similar properties to the spider silk.

They report in the journal Nature that copying spider silk could lead to the development of more "smart materials".

Such materials could eventually be used as catalysts or filters to draw substances out of chemical reactions.

Jewel drops

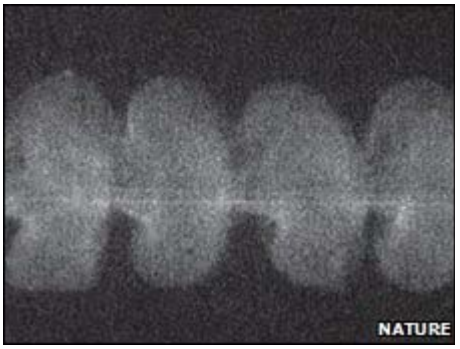
Lei Jiang, the scientist from the Chinese Academy of Sciences in Beijing, who led the research, explained how he came to study this aspect of spider silk.

"Bright pearl-like water drops hang on thin spider silk in the morning after a fog," he said.

Dr Lei explained that these large drops gathered on the "knots" in a spider's web.

"The spider silk can be several tens of micrometres in diameter, [whereas the water drops] can be thousands of micrometres wide," he added.

Using a powerful electron microscope to study the spider silk, his team discovered that the silk transformed when it was wet.



Up close, spider silk fibres are composed of "puffs" and "joints"

At the nanoscale, spindles of spider silk are formed from "puffs" of extremely tiny fibres, or nanofibrils, connected by joints.

But when the web is in a damp, foggy atmosphere, these nanofibrils shrink, causing the bumpy silk fibres to smooth out.

This physically drives the water towards the relatively rough and bumpy knots in the spindle, where it gathers into large droplets.

Dr Randolph Lewis, a molecular biologist from the University of Wyoming, US, who studies spider silk said: "The most interesting feature of this study is that the effect is totally due to the fibres themselves."

He pointed out that spider silk has properties that are "unmatched by any manmade material".

"If we can learn how to match those properties we would have a 'green' material with superior mechanical properties for a wide variety of applications," he added.

FROM TODAY >>

Secret kingdom

Undercurrents in Saudi society

Four-pig wife

An edible dowry for an Australian bride in PNG

Sobering up

Guns N' Roses' bassist McKagan's 'wake-up call'

MOST POPULAR NOW | Traffic to this site is currently 5% below normal