Water good idea

M1 Trad Angl-> Français

Biomimicry: An improved way to harvest drinking water from fog in remote areas takes its inspiration from an African beetle

IN THE dry desert on the west coast of Namibia, where the annual average rainfall is a meagre 40mm, the Namib beetle (*Stenocara gracilipes*) has evolved a unique mechanism to drink. It collects moisture from the early morning fog that is produced when ocean breezes from the Atlantic collide with the hot desert air. Drawing inspiration from this fog-harvesting trick, Shreerang Chhatre, a graduate student at the Massachusetts Institute of Technology, and his colleagues, have developed a simple and inexpensive way to produce drinking water.

The Namibian mist rapidly dissipates once the sun rises, so the beetle has just a brief opportunity to collect water. The insect typically finds a ridge of sand and faces the breeze, tilting its lower body upwards with its specially adapted wings outstretched. The wings have bumps made of a hydrophilic substance that attracts minute water droplets. As they accumulate, the droplets grow larger until their weight causes them to run off into troughs in the beetle's wings. These troughs are covered with a waxy water-repelling substance which has the effect of rolling the droplets down the beetle's inclined body and into its mouth.

Fog harvesting is not a new idea. FogQuest, a Canadian charity, has been installing devices using a metallic mesh to catch water droplets in developing countries for more than a decade. But Mr Chhatre says he and his colleagues have increased the efficiency of water collection using a variety of surface coatings.

Water droplets in fog are very small, typically between 1 to 50 microns (one-millionth of a metre) across. Hydrophilic surfaces gather and hold droplets with electrostatic attraction, which prevents them being picked up and carried away in the wind. As more droplets are attracted, they spread out and eventually join together and run off the surface—as they do on a pane of glass. Hydrophobic coatings, like Teflon, are then needed to repel the water and stream it as quickly as possible to a reservoir so it does not evaporate.

Mr Chhatre, a chemist, studied the so-called "wettability" of various coatings and found mathematical formulae which could determine the ideal combination of coatings for the different sizes of fog particles found in any particular region. The surface texture of the coatings also turned out to be important.

The ideal locations for fog harvesting are mountainous and desert regions where fog is present but water sources are far away. Mr Chhatre is setting up a pilot project in South Africa and hopes to organise another in India. Using a coated aluminium mesh, he conservatively estimates that it is possible to collect about one litre of water daily from a mesh of one square metre. Under ideal conditions, he says, that could increase tenfold. ■