Water walkers

High-speed photography helps researchers find out how water bugs glide on water.

Researchers tested their theory by filming water striders at 500 frames per second.

1. A water strider paddles across water using its middle legs like oars.

2. The rowing of each foot creates a swirling whirlpool just below the surface.

Swirling whirlpool

3. The whirlpools provide thrust, rebounding water like a trampoline, propelling the bug forward.

Swirling whirlpool

Floating particles and fruit flies dusted show their unique footprint.

Surface waves

In the past, researchers thought surface waves propelled striders along. But one problem existed; baby striders don't make surface waves, yet they glide as well as adults.

Rowing leg

A strider can leap into the air or glide.

Staying afloat

Water striders have special body features that help keep them above water.

Long sections of their legs touch the surface. This helps distribute their weight, over the water.

Photos courtesy of John W. M. Bush, David Hu and Brian Chan

Their back legs help steer and slow down.

Thousands of wax-covered hairs line their underside and legs to make them water repellent.

Their short front legs are used to catch prey and eat.

BAD WEATHER
Water striders wait out storms on plants or land. Wind and rain can break the surface tension and the bugs will sink.

Their water-repellent nature keeps them from sinking.

The insect's weight pushes down, creating dimples in the water's surface.

Surface tension creates a skin-like layer on the water's surface. Its force actually pushes the insect upward.

Water's surface
Uppermost edge
Body of water

Water's surface
Uppermost edge
Water molecule
Molecular attraction
Body of water
Water molecule
Molecular attraction

MOLECULES AT THE SURFACE don't have water molecules above them; this creates a heightened attraction for molecules to their side and below. This strong molecular bond is called surface tension.

MOLECULES WITHIN A BODY OF WATER are surrounded by water molecules, which creates an equal attraction from all sides.

Robostrider
is a man-made version of a real water strider, made with an aluminum can and wire. The robostrider moves in the same fashion, by creating swirling whirlpools that provide thrust for movement. The research group plans to use this new information to study the locomotion of other water-walking insects.

Water forces

Water striders are able to stand on water because the upward force of the water is greater than the downward force from the insect's weight.

WATER MOLECULES naturally attract each other.

Hydrogen atoms are slightly positive.

Oxygen atom is slightly negative.

SOURCES: "The hydrodynamics of water strider locomotion" research team: John W. M. Bush, associate professor of mathematics, Massachusetts Institute of Technology; David L. Hu, mathematics graduate student; Brian Chan, mechanical engineering graduate student; "MIT leaps to solution of walking-on-water mystery," MIT News; "Hydrodynamics of Water Strider Locomotion," Nature Publishing Group; "What exactly does a water bug have to do with cohesion?" MadSci Network; "HyperPhysics," department of physics and astronomy, Georgia State University

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