

# Water walkers

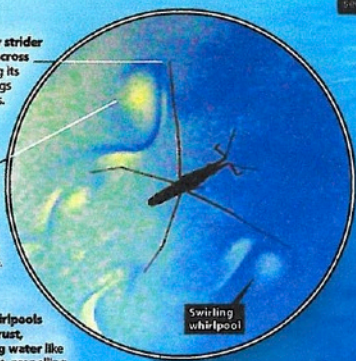
High-speed photography helps researchers find out how water bugs glide on water.

Researchers tracked these tiny winged 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.

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



Floating particles and bubbles lurped above their strategic footprints.

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.

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.

Their back legs help steer and slow down.

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

Their water-repellent nature keeps them from sinking.

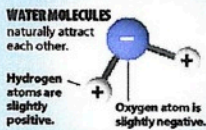
Their short front legs are used to catch prey and eat.

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

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

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

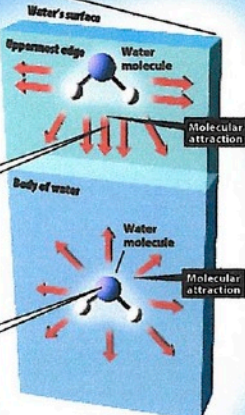
**Surface tension**  
creates a skin-like layer on the water's surface. Its force actually pushes the insect upward.



Water's surface  
Opposite edge  
Body of water

**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.



**Robotripter**  
is a man-made version of a real water strider, made from an aluminum can and wire. The robotripter 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.

**SOURCES:** "The hydrodynamics of water strider locomotion" research team: John W. M. Bush, associate professor of mathematics, Massachusetts Institute of Technology; David 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?" *MIT/Ed Heneveld*; "HyperPhysics," department of physics and astronomy, Georgia State University.

Staff research and graphics/Cheryl Jones-Hallacher  
cjh@sun-sentinel.com

## 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.