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**Collaboration** This aphid soldier ejects its own body fluids to close a wound in its host plant.

CREDIT: MAYAKO KUTSUKAKE

## Aphids Play Doctor

By Elsa Youngsteadt  
*ScienceNOW* Daily News  
25 February 2009

When it comes to insect cleverness, bees and ants get all the credit—but social aphids are closing the gap. Their latest feat, researchers report, is the ability to heal wounds in their host plant by first providing it with a scab and then stimulating plant tissue repair.

Aphids are best known as tiny bugs that spend their lives sitting still and sipping plant sap with strawlike mouthparts. But there is a more dramatic side to their existence. Some species cause their host plant to grow a hollow lump, called a gall, that encloses, protects, and feeds the aphid colony. Some gallmakers have even evolved a caste of nonreproducing soldiers to defend and clean this prime real estate.

In 2003, evolutionary biologist Takema Fukatsu of the National Institute of Advanced Industrial Science and Technology in Tsukuba, Japan, and his team noticed soldiers of the aphid variety *Nipponaphis monzeni* doing something no one had seen before: gall repair. Sometimes caterpillars would munch holes in the galls, rendering the aphids inside vulnerable to predators. Soldier aphids would respond by rushing to the hole, expelling body fluids into the gap, and kneading their own gooey blood into a big scab. The altruistic soldiers shriveled after losing so much fluid and would often get stuck in the plug.

Is it worth it? Fukatsu says it is. In the new study, published online today in the *Proceedings of the Royal Society B*, his team shows that aphids in 18 out of 22 repaired galls were doing just fine a month later. Only one of 12 colonies survived without the repairs.

But the aphid goo only gets some of the credit. Fukatsu says the researchers got a surprise when they sliced open a repaired gall. The plant itself had taken over the healing process, and the inside of the gall was perfectly smooth. By collecting and staining galls in various stages of repair, the team confirmed that the plant sealed the hole within a month. The plant apparently relied on wound-repair signals from the soldiers, because it healed only if live aphids were still in the gall.

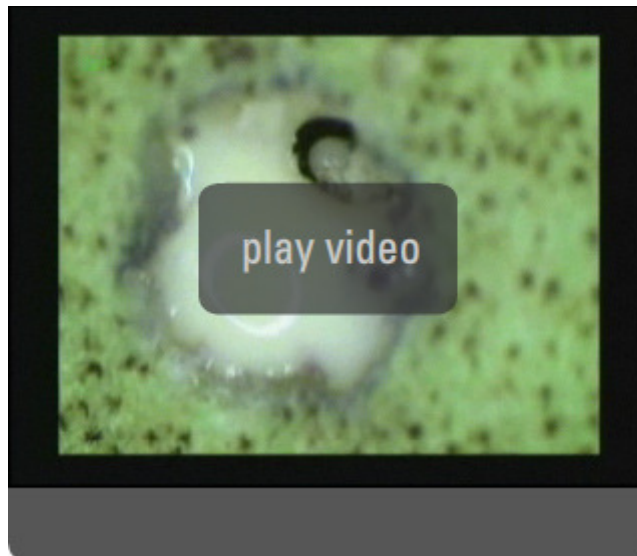
"The extent to which the aphids manipulate their host ... is a novel finding," says Gary

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Felton, an entomologist at Pennsylvania State University, University Park, who predicts that the aphids' wound-repair system will be a classic in insect-plant biology. The big mystery now is what substances the soldiers secrete to stimulate plant healing. Fukatsu hopes they'll include novel compounds that could prove useful for manipulating plant cell and tissue cultures.



Harunobu Shibao

**Expensive repairs.** Aphid soldiers plug a hole in the wall of their plant gall home, a project that will cost some of them their lives.

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