

Found: The First Mechanical Gear in a Living Creature

U.K. scientists find the first biological gears on a jumping insect half the size of a fire ant.

By William Herkewitz
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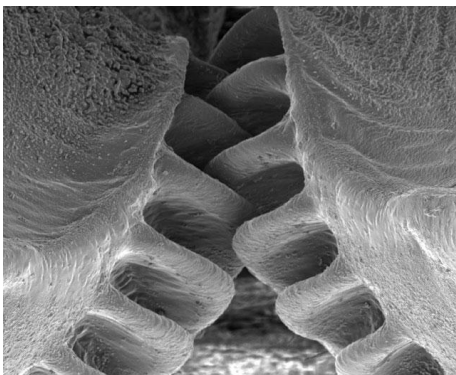
Note from Pastor Kevin: After reading this, I hope the reader is just as amazed as I am at the incredible complexity of this bug. Doesn't it make sense that an all-knowing and all-powerful God must have been behind its design? And if so, wouldn't it be wise and prudent to find out who this God is and worship Him? His name is Jesus and He is coming again for those who know and love Him.



Issus nymph by Malcolm Burrows

With two diminutive legs locked into a leap-ready position, the tiny jumper bends its body taut like an archer drawing a bow. At the top of its legs, a minuscule pair of gears engage—their strange, shark-fin teeth interlocking cleanly like a zipper. And then, faster than you can blink, think, or see with the naked eye, the entire thing is gone. In 2 milliseconds it has bulleted skyward, accelerating at nearly 400 g's—a rate more than 20 times what a human body can withstand. At top speed the jumper breaks 8 mph—quite a feat considering its body is less than one-tenth of an inch long.

This miniature marvel is an adolescent [issus](#), a kind of planthopper insect and one of the [fastest accelerators](#) in the animal kingdom. As a duo of researchers in the U.K. [report today](#) in the journal *Science*, the *issus* also the first living creature ever discovered to sport a functioning gear. "Jumping is one of the most rapid and powerful things an animal can do," says Malcolm Burrows, a zoologist at the University of Cambridge and the lead author of the paper, "and that leads to all sorts of crazy specializations."



A scanning electron micrograph image of the gears. Credit: Malcolm Burrows

The researchers believe that the *issus*—which lives chiefly on European climbing ivy—evolved its acrobatic prowess because it needs to flee dangerous situations. Although they're not exactly sure if the rapid jump evolved to escape hungry birds, parasitizing wasps, or the careless mouths of large grazing animals, "there's been enormous evolutionary pressure to become faster and faster, and jump further and further away," Burrows says. But gaining this high acceleration has put incredible demands on the reaction time of insect's body parts, and that's where the gears—which "you can imagine being at the top of the thigh bone in a human," Burrows says—come in.

"As the legs unfurl to power the jump," Burrows says, "both have to move at exactly the same time. If they didn't, the animal would start to spiral out of control." Larger animals, whether kangaroos or NBA players, rely on their nervous system to keep their legs in sync when pushing off to jump—using a constant loop of adjustment and feedback. But for the *issus*, their legs outpace their nervous system. By the time the insect has sent a signal from its legs to its brain and back again, roughly 5 or 6 milliseconds, the launch has long since happened. Instead, the gears, which engage before the jump, let the *issus* lock its legs together—synchronizing their movements to a precision of 1/300,000 of a second...

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