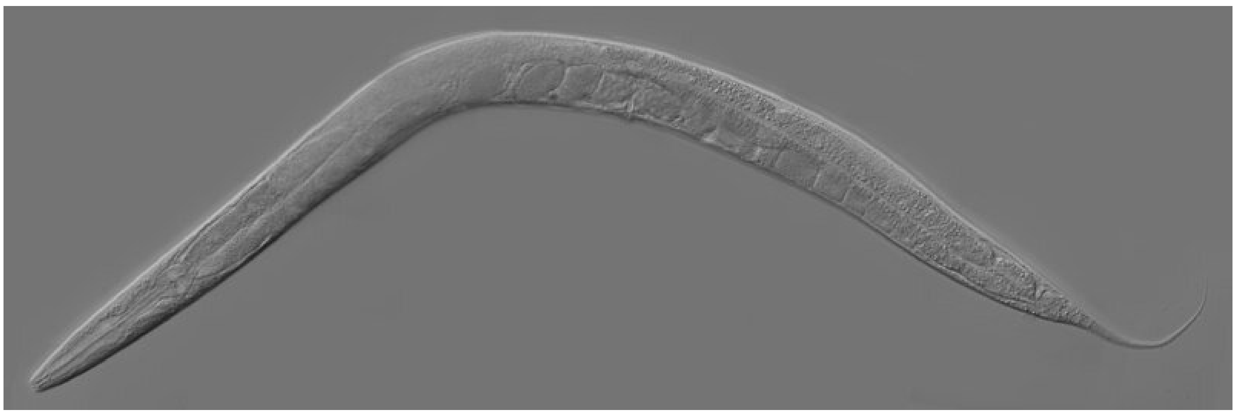
Researchers discover that worms use electricity to jump

June 21 2023



Caenorhabditis elegans. Credit: Zeynep F. Altun/Wikimedia Commons, CC BY-SA

In nature, smaller animals often attach themselves to larger ones to "hitch a ride" and save energy migrating large distances. In paper published on June 21 in the journal *Current Biology*, researchers show how microscopic Caenorhabditis elegans worms can use electric fields to "jump" across Petri plates or onto insects, allowing them to glide through the air and attach themselves, for example, onto naturally charged bumblebee chauffeurs.

"Pollinators, such as insects and hummingbirds, are known to be electrically charged, and it is believed that pollen is attracted by the electric field formed by the pollinator and the plant," says Takuma Sugi, a biophysics professor at Hiroshima University and co-senior author on the study. "However, it was not completely clear whether electric fields are utilized for interactions between different terrestrial animals."

The researchers first began investigating this project when they noticed that the worms they cultivated often ended up on the lids of Petri dishes, opposite to the agar they were placed on. When the team attached a camera to observe this behavior, they found that it was not just because worms were climbing up the walls of the dish. Instead, they were leaping from the floor of the plate to the ceiling.

Suspecting travel by electric field, the researchers placed worms on a glass electrode and found that they only leaped to another electrode once charge was applied. Worms jumped at an average speed of .86 meters per second (close to a human's walking speed), which increased with electric field intensity.

Next, the researchers rubbed flower pollen on a bumblebee so that it could exhibit a natural electric charge. Once close to these bees, worms stood on their tails, then jumped aboard. Some worms even piled on top of each other and jumped in a single column, transferring 80 worms at once across the gap.

"Worms stand on their tail to reduce the surface energy between their body and the substrate, thus making it easier for themselves to attach to other passing objects," Sugi says. "In a column, one worm lifts multiple worms, and this worm takes off to transfer across the electric field while carrying all the column worms."

C. elegans is known to attach to bugs and snails for a ride, but because these animals don't carry electric fields well, they must make direct contact to do so. C. elegans is also known to jump on winged insects, but it was not clear how the worms were traversing such a significant distance for their microscopic size. This research makes the connection that winged insects naturally accumulate charge as they fly, producing an electric field that C. elegans can travel along.

It's unclear exactly how C. elegans performs this behavior. The worms' genetics might play a role. Researchers observed jumping in other worm species closely related to C. elegans, and they noted that mutants who are unable to sense electric fields jump less than their normal counterparts. However, more work is needed to determine exactly what genes are involved in making these jumps and whether other microorganisms can use electricity to jump as well.

More information: Takuma Sugi, Caenorhabditis elegans transfers across a gap under an electric field as dispersal behavior, *Current Biology* (2023). DOI: 10.1016/j.cub.2023.05.042. www.cell.com/current-biology/f … 0960-9822(23)00674-7

Provided by Cell Press