

Social networking helps hermit crabs find homes (w/ Video)

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Everyone wants to live in the nicest possible house, ideally with regular upgrades. A recent study by biologists at Tufts University's School of Arts and Sciences and the New England Aquarium reveals that hermit crabs may locate new and improved housing using previously unknown social networking skills.

The scientists combined field studies, lab experiments and computer models to uncover some surprising new tricks that could lead to better house-hunting strategies for humans and hermit crabs alike. Their research, published in the May/June 2010 issue of the journal *Behavioral Ecology* (available online on April 1), reveals that, contrary to their name, hermit crabs often find the best new shells when they gather together.

Hermit crabs have an unusual lifestyle because they require empty snail shells for shelter. They need to regularly seek new shells as they grow bigger throughout their lives. "Hermit crabs are really picky about real estate because they're constantly getting thrown back into the housing market," says Randi Rotjan, leader of the research team and a co-author with Sara Lewis, professor of biology at Tufts University's School of Arts and Sciences.

Rotjan studied with Lewis to earn her Ph.D. from Tufts Graduate School of Arts and Sciences in 2007 and is now a research scientist at the New England Aquarium. Starting during Rotjan's graduate school days, Rotjan and Lewis have collaborated to gain a better understanding of

social interactions among hermit crabs.

Often there aren't enough suitable shells to go around and some hermit crabs have to go naked. The soft, exposed abdomen of these homeless crabs makes them more vulnerable to predators. "I've seen hermit crabs dragging around in bottle caps and even ballpoint pen tops. It's pathetic," says Lewis, senior author on the *Behavioral Ecology* paper.

So, how do hermit crabs win this life-or-death shell game? One previously identified strategy that apparently helps each hermit crab find the very best shell is joining a lively group activity known as a synchronous vacancy chain. When a new shell becomes available, crabs gather around it and queue up in a line from largest to smallest. Once the largest crab moves into the vacant shell, each crab in the queue swiftly switches into the newly vacated shell right in front of them. As a result, a single vacant shell kicks off an entire chain of shell vacancies that ultimately leads to many crabs getting new, and generally improved, housing.

Hermits Show New Social Behaviors

By seeding vacant shells into field populations and staying up all night to see what happened, the scientists discovered some previously unknown hermit crab behaviors. When a hermit crab discovers an empty but oversized shell, it waits nearby rather than simply walking away. Once a small group gathers, crabs begin piggybacking by holding onto the shell of a larger crab and riding along. Such waiting and piggybacking behaviors seem to increase the chances that a synchronous vacancy chain will happen. "They spend hours queuing up, and then the chain fires off in seconds, just like a line of dominoes," says Rotjan. Computer models populated with virtual hermit crabs and shells confirmed that synchronous vacancy chains depend not only on crab density, but also on how long crabs are programmed to wait near an unsuitable shell.

According to Rotjan, the same kind of synchronous vacancy chain can occur with any animal that relies on discrete and reusable resources, such as anemone-dwelling fish and hole-nesting woodpeckers. Studying vacancy chains in hermit crabs might even lend new perspective on human behaviors, since people regularly participate in synchronous vacancy chains. For example, every September 1, neighborhood streets in Boston, Mass., are clogged with rental trucks and moving vans. This signals that the city's many students are participating in synchronous vacancy chains on this popular start date for annual leases. Like hermit crabs, these savvy apartment-hunters carefully assess all the housing options beforehand, and line up on September 1 to switch into their ideal homes.

Social networking sites like Craigslist and Facebook have made it much easier for people to assess housing options and coordinate their moving dates. Hermit crabs must instead resort to queuing up as they wait near empty shells. But in the end, [social networking](#) leads to better housing for everyone.

More information: Rotjan RD, Chabot JR, Lewis SM, 2010. Social context of shell acquisition in *Coenobita clypeatus* hermit crabs. *Behav. Ecol.* 19 [DOI:10.1093/beheco/arq027](https://doi.org/10.1093/beheco/arq027)

Provided by Tufts University

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