OBSERVATORY

Bees Like a Warm Drink Now and Again, Too

By HENRY FOUNTAIN
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Shivering works to warm the body up on a cold day. But a hot drink can help, too — the more heat from the drink, the less shivering necessary.


Chris Gash

What works for people works for bees as well, researchers in England have found. Given a choice, bumblebees will choose a warmer flower, with its warmer nectar, over a cooler one. What's more, the bees learn to identify warmer flowers by their color.

Bumblebees need to warm themselves up in order to fly, said Lars Chittka of Queen Mary College at the University of London, an author of a brief paper describing the research in the Aug. 3 issue of Nature.

Typically, bumblebees need a body temperature of close to 100 degrees Fahrenheit. To reach that temperature in cold weather takes a lot of energy.

Like people, bees warm up by shivering, but they'll take help when they can get it.

Dr. Chittka said many plant species have an adaptation in the surfaces of their flowers: conelike cells that focus sunlight on the floral pigments underneath. This makes them warmer than species without the adaptation. "We were interested in the question of whether bees take this into account," he said. "Whether they opt for warmer flowers or nectar."

The researchers experimented using artificial flowers of various temperatures (artificial flowers enabled them to eliminate other possible factors, like petal texture, that might influence bee behavior). They found that bees preferred to feed at warmer flowers, even if they were as little as 7 degrees warmer than those at ambient temperature.

In another experiment with artificial flowers of different colors and different temperatures, the researchers found that bees quickly learned to associate warmth with color.

"They needed to land on the flower and experience the warmer temperature," Dr. Chittka said, but once they did, they regularly chose flowers of that color.

The bees benefit, of course, but so do the flowers, by having more bees pollinate

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them. The adaptation that makes the flowers warmer is another example of evolution at work, Dr. Chittka said.

“Flower species are engaged in a competitive race with other flower species,” he said, and do many things to attract and keep pollinators, like making big showy flowers. “But also in this competitive race, they might benefit by offering them warmer drinks.”

Evolving With Invasion

An invasive species can have a direct impact on an ecosystem by reducing or eliminating a native organism that can’t cope with the new predator. But an invader can also have a subtler effect, causing rapid evolutionary changes in the native species without wiping it out.

Examples have seldom been seen, but Aaren S. Freeman and James E. Byers of the University of New Hampshire have identified one. They report in the journal Science that mussels in New England have quickly evolved the ability to protect themselves from an invasive crab by growing thicker shells.

The Asian shore crab was first seen in the area in 1988 and is now found from North Carolina to midway along the coast of Maine. Mussels in northern Maine have yet to encounter the crab, a fact the researchers exploited in their experiments.

In 2002 and 2003, they took mussels from northern Maine and from elsewhere in New England and exposed them to waterborne cues from the Asian crab in a laboratory in Nahant, Mass., and in the field off Woods Hole on Cape Cod. In both cases the southern mussels responded by growing thicker shells, while the northern mussels did not.

The results show that in less than 15 years, mussels in areas populated by the invasive crab developed the genetic ability to deal with it. But mussel larvae are tiny and can disperse over long distances, so why hasn’t this ability been passed on to northern Maine populations, even if they don’t yet need it?

One answer, the researchers suggest, is that the dominant southwestward currents off the coast of Maine act as a barrier to dispersal. So the evolutionary change has remained in more southerly parts of New England — for now.

A Fish and an Ecosystem

Diversity is a good thing, or so the thinking goes. If there are a large number of species in an ecosystem, when something goes wrong — one of the species is eliminated, say — the others can make up for it and keep the ecosystem humming.

In practice, it doesn’t always work out that way. The latest case in point is a single fish that has been found to affect an ecosystem in the Andean piedmont by controlling the flow of organic carbon in a river.

Brad W. Taylor, now at Dartmouth and previously at the University of Wyoming, and colleagues studied what happened when the flannelmouth characin, a fish that feeds on bits of organic matter on river bottoms, was removed from a stretch of the Marias River in the Orinoco basin. This is not so far-fetched; characins are popular in South America and are heavily harvested.

In addition to eating bits of detritus, the fish stir up organic matter from the bottom, enabling it to travel downstream with the current. The researchers set up a barrier that divided the river lengthwise along a 650-foot stretch, removed the characins from one side and compared the flow of organic matter (as measured by levels of carbon) in both.

This river is home to many species of fish — at least 80 in a two-mile stretch. Yet the researchers report in Science that on the side cleared of the characin, the biomass of organic matter on the streambed increased 450 percent, and the amount of carbon

downstream was greatly reduced. Other aspects of ecosystem function like respiration and primary production were also affected.

The effects were as great as those measured in other studies in which all fish were removed from a river. And no compensatory effects by other species were seen. So overharvesting of this species could have a vast impact on the health of an entire ecosystem.

Safety on the Sands

The United States Fish and Wildlife Service has agreed to decide whether the Sand Mountain blue butterfly, a tiny species found only on an ancient sand dune in eastern Nevada, should be protected.

The action, which initiates a 12-month review, is a victory of sorts for environmentalists, who want the butterfly to be protected and dune buggies and other off-road activities to be banned at the mountain, a Bureau of Land Management recreation area about 80 miles east of Reno.

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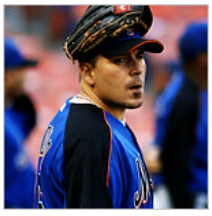
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