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COLUMN

Native bees of Tucson area pose a puzzle



GRACE TREJO, ARIZONA DAILY STAR

Stephen Buchmann, a pollination ecologist specializing in bees, records video of bee clusters during mating season in the Catalina Foothills neighborhood on May 30. *Diadasia Rinconis* are commonly known as cactus bees.

A swarm could be a good sign, but bees still need help

You might think a crowd of native bees would pick a pristine site, someplace like Saguaro National Park, for their nesting.

Not these cactus bees. In late May, thousands were buzzing over a dirt patch maybe 15 by 20 feet, between a street and a driveway in a typical Catalina Foothills neighborhood.

Some burrowed into the ground, others wrestled together in dusty “bee balls,” competing to mate with a female, and hundreds buzzed through the air near the ground.

A vague unpleasant odor marked the area — a bit like Parmesan cheese or vomit, as UA scientist Stephen Buchmann describes it. The smell is from an acid produced by the female bees.

Ninety-nine percent males, they presented minimal risk of stinging as I walked among them with Buchmann and UA col-



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league Dan Papaj. Only the females sting.

The most pressing, very elementary, thought that came to my mind as the bees bounced off me was this: I thought the bees were dying off — aren’t they?

The answer, it turns out, takes some explanation but is crucial to life in the Sonoran Desert and beyond.

For the last 15-20 years, people have worried about the mass deaths of bees used to pollinate food crops — European honeybees. These are, essentially, live-stock that beekeepers take from farm to farm, and for more than a decade have been threatened by “colony collapse disorder” as well as parasitic mites and

Bees

From B1

pesticides.

The cactus bees are as different from honeybees as, say, Gila woodpeckers are from Cornish game hens. Those are both birds, but one is a wild native, and the other is domesticated to make human food.

And while honeybees are still threatened by mites and colony collapse, they are as abundant as they have ever been.

"The honeybee is not at risk of extinction," said Saff Killingsworth, a conservation biologist focused on endangered bees at the Xerces Society for Invertebrate Conservation.

"It's estimated that there are more honeybees on Earth than at any other time in human history."

In the United States, the 2022 agricultural census reported a 31% increase in honeybee colonies since 2007 — an increase of around a million colonies. This may overstate the population growth, the Washington Post reported, but certainly they are surviving well as a species, despite ongoing threats.

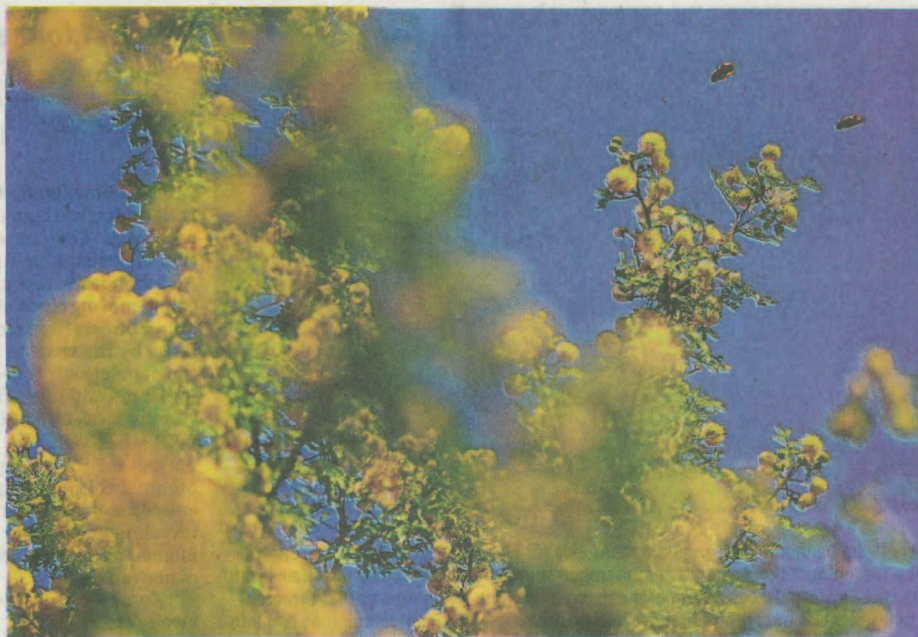
"You can take a (honeybee) hive and almost instantly make two hives out of it by doing what they call a colony divide," Buchmann explained. "I personally am not worried about the status of the honeybee industry."

Cactus bees in good shape

European honeybees are just one species, *Apis mellifera*, with a lot of varieties. Arizona has about 1,300 different wild bee species — an incredible concentration of bee diversity. Among them is *Diadasia rinconis*, the cactus bee that was crowding the residential patch of dirt near Swan and Sunrise.

"I consider the *Diadasia rinconis* the cactus bee, and three or four others in that genus of chimney bees to be quite stable in their populations," said Buchmann, an adjunct professor in the UA's department ecology and evolutionary biology, as well as the entomology department.

"They don't seem to be hampered. They're generally out there in nature in the desert, not being hit by insecticides or that sort of thing. And they



GRACE TREJO PHOTOS, ARIZONA DAILY STAR

Two ground nesting bees look for pollen on a Palo Verde tree in the Catalina Foothills neighborhood on May 30. *Diadasia Rinconis* are commonly known as cactus bees.

move around, so I think they're fairly stable."

In fact, these ground-nesting bees seem to move sites every year, Buchmann said. That's probably an adaptation to fight off parasites, as is their habit of building above-ground "chimneys" out of dirt.

After putting out the word on social media he was looking for such sites this spring, Buchmann learned of 20 of them. He and his students have only been able to study three or four so far, and the season is winding down.

The cactus bees are lucky in that they consume pollen and nectar from cacti that are common around here — prickly pears, chollas and saguaros. Wild bees that have more limited or threatened food sources are likely not faring so well.

Wild bees' status unclear

As to how well the broader wild bee populations are doing, no one really knows, though we know bee and insect populations are declining at a worrying pace worldwide. But efforts are being made to find out, and the threats are clear.

Among the 3,600 species of wild bees in the United States, only about 600 species have had their conservation statuses assessed, Killingsworth said. And of those between 20 and



Two ground nesting bees land on the finger of Stephen Buchmann, a pollination ecologist specializing in bees in the Catalina Foothills neighborhood on May 30. *Diadasia Rinconis* are commonly known as cactus bees.

47% face some degree of extinction risk.

It's possible that social bees are more threatened than solitary ones, because they have more opportunity to pass diseases or parasites to each other. But even a solitary bee, eating from the same flower as a diseased bee, can potentially catch its death.

Key threats to wild bees are habitat loss, pesticides and diseases.

"In Arizona, we have 1,100 species of native ground and twig-nesting bees," Buchmann said. "Some of those are im-

pacted by habitat destruction. Every time you put in a housing development or supermarket or pave over bee paradise, we lose those."

"We don't know how many we've lost."

Pesticides represent a sneaky risk, because they don't only come from agricultural operations. Seed manufacturers may coat seeds with pesticides, meaning every part of the resulting plant could be harmful to bees, unbeknownst to the person planting them.

"Many of these insecticides are highly mobile in the en-

vironment. They don't stay where we put them," Killingsworth said. "Even though there's not a ton of agricultural use in Arizona, the contribution of private insecticide use and the motility of these insecticides can contribute to harmful effects for bees."

DNA 'barcoding'

Killingsworth, who is based in Arizona, is working on a project to assess the conservation status of the 3,000 wild native bees that have not yet been assessed. She's working with researchers at the University of California, Riverside, the state wildlife agencies of Vermont, Texas, Washington, and California, and the Vermont Center for Ecostudies.

At the same time, a more localized effort is underway in a UA-Arizona Sonora Desert Museum project called the Tucson Bee Collaborative.

It's using a method called DNA "barcoding" to identify species and start establishing a baseline for their distribution in Southern Arizona.

Kim Franklin, the associate director of conservation for the museum, pointed to the Sonoran bumblebee, *Bombus sonorus*, as an example.

Anecdotally, sightings of the bee have declined, she and Buchmann said. Seeing one is rare now. But, Franklin added, "we don't know that the population isn't doing well."

Even identifying bees down to the species level is difficult, which is what makes the effort to establish a DNA barcode library important.

"Even though some of the issues facing bees are huge and systemic, people can act independently to preserve our bee fauna," Killingsworth said.

Plant native flowers, avoid using pesticides, make nest sites using woody debris and rock piles. Simple things can help.

And when you see a few thousand of them buzzing around, leave them alone. And look up Steve Buchmann.

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