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The knowledge that our neighborhood bees have about a city's health might be used for disease surveillance and environmental justice, among other things. The honeybee may be the most effective instrument for researchers looking at the health of a city and its residents.

That's because **honey bees gather more than just nectar and pollen** when they go foraging. The fuzzy small bodies of the pollinators can pick up bacteria and other minute particles as they move through their environment, which they subsequently slough off as they enter their hives.

Additionally, as pollinators frequently forage within a mile of their hives in urban settings, the honey they generate, the skin they carry, and the debris at the bottom of hives all contain useful information about a city or even a neighborhood.

"Honeybees will collect a tremendous amount of microorganisms every day that go way beyond the items they are looking for. They've been evolved to do everything the swabs do, according to **Kevin Slavin, an MIT Media Lab professor**, who was speaking at a press conference regarding a recent study published in the journal **Environmental Microbiome**. In order to explore the urban microbiome, new research intends to develop a workable technique for working with beekeepers and their honeybee colonies.

The unseen communities of microbes, fungi, viruses, and bacteria that reside in and around us and are essential to the health and functioning of the urban environment, the human population, plants, and animals are collectively known as microbiomes. Better health outcomes have been associated with exposure to a varied microbiome in earlier studies.

According to Slavin, it may soon be essential to **study microbial habitats** in order to comprehend the numerous ways that environmental and health inequities disproportionately affect marginalized communities. "We now link that to factors like pollution or even shade, [but] part of the aim is merely to collect as much data as we can, much beyond simple pathogen screening, to better understand **what makes healthier neighborhoods**, and can it be evaluated.

Slavin and a team collaborated with neighborhood beekeepers in five different cities — New York, Venice, Tokyo, Melbourne, and Sydney — to collect and analyze microbes from samples of honey, honeybee parts, and debris from hives in an effort to determine whether bees can be used to "**swab**" the city.

In order to demonstrate **how microorganisms may vary from one neighborhood to another**, researchers in New York City analyzed bacteria from three distinct neighborhoods: two in Brooklyn and one in Queens. They were able to identify a wide range of organisms, including diseases that affect humans as well as germs connected to plants and the wider ecosystem. Between the three locations, the substance recovered from hive debris differed the most.

The sample data in Venice, where many structures are perched above submerged wooden piling, included, for instance, fungi associated with wood decay. Additionally, the scientists discovered genetic remnants of a fermenting yeast that is used to make soy sauce and miso paste in Tokyo.

According to co-author **Elizabeth Hénaff**, a computational biologist at the **Tandon School of Engineering at New York University**, "cities have their own microbial signatures, which are also interestingly related to the cultural and geographical context in which those cities have emerged." "It didn't feel like a disjointed metric from all of the other things that we know about these cities," she continued. "It actually kind of felt like a piece of the puzzle that we didn't even know existed."

More than that, the study also showed **how beehive materials may help public health authorities with pathogen detection**. Researchers were able to identify the pathogen **Rickettsia felis**, which causes the bacterial illness known as "**cat scratch fever**," using numerous samples obtained from Tokyo. They then performed additional analysis to discover the genetic components that allow the pathogen to infect its hosts.

A city's microbiome can currently be studied using a variety of techniques, such as wastewater testing, which has previously been used to identify the presence of pharmaceuticals and, more recently, to comprehend the spread of Covid-19 in communities. However, the researchers claim their strategy concentrates on items that have been treated by people.

What about an entire city or neighborhood? Slavin said. What happens to stuff that isn't handled by people?

Source: [bloomberg.com](https://www.bloomberg.com)