

**Bee a non-vegetarian****Challa Nalini <sup>1</sup>, Mahesh Balaso Gaikwad <sup>2</sup>**<sup>1</sup> Teaching Associate, College of Horticulture, Anantharajupeta, Kadapa,  
Andhra Pradesh, India 516105<sup>2</sup> Project Associate, CSIR-Central Institute of Medicinal and Aromatic Plants, Lucknow, Uttar  
Pradesh, India 226015**Corresponding author: [nalinichalla18@gmail.com](mailto:nalinichalla18@gmail.com)**

"Busy as a bee" is a real saying. A bee is the epitome of multitasking. If I ask you to imagine a bee, what is the first thing that comes to your mind? Contemplating, with an exception of a few, the majority of people reading this article are either interested in entomology or have already mastered the subject. I hope the answer to my above question is not just HONEY. To an extent, we are all aware of what a multi performer a bee is. Here is a quick snippet of skills majority of the bees have.

**A janitor:** The very first job a bee gets to do is to clean the hive, removing the dead bees out of the colony and maintaining hygiene (1-2 days-Worker)

**A nurse:** Feeds and cares for the young ones, drones and queen bee (3-10 days -worker)

**A trainee:** They train themselves by taking orientation flights prior to their first foraging flights (11-12 days- worker)

**A carpenter:** They build honeycomb, pack pollen and seals honey in the cells (12-18 days)

**A water carrier:** They carry water to the foraging bees and put it back on their abdomen to reduce the heat that is produced.

**A security guard:** They guard the entrance of the hive (20-21 days)

**A forager:** Field collection of honey and pollen (21<sup>st</sup> day onwards)

**An absent father:** Drones or male bees will vie for the honour of insemination, mate with the queen, and die a victorious death.

**A royal queen/mother:** For a bee to become Queen, it must be fed a unique diet called royal jelly, which is secreted from special glands in young worker bees and is extremely nutrient-dense. She's more like the matriarchal hive's 'mother.' (After all, she did give birth to every single bee in the hive.)

**A dancer:** Honeybees communicate a variety of information, ranging from the need to swarm to the direction and distance to a food source through dance.

**A singer:** Buzzing isn't just for show; vibrations of their wings and bodies cause pollen to be transferred from one bloom to

another, resulting in "pollination." Bees also buzz to defend themselves or their hives and an "altruist" in a whole.

So now let me put another question are bee's vegetarian or non-vegetarian?? Well, that's not quite a tricky question! Majority of your answer would be VEGETARIAN since they obtain nectar from the plants which obvious is a vegetarian source. Bee species can be classified as vegetarian wasps since they evolved from a carnivorous group of wasps known as the spheciform complex. Bees were prompted to use a new energy source not previously utilised by other insects as their feeding patterns changed from carnivorous to floral-based. The proliferation of bee species paralleled the evolution of flowering plants as time passed and evolution selected in favour of these relationships, providing a wonderful example of co-evolutionary connection. This split between wasps and bees occurred between 140 million and 110 million years ago, the mid-Cretaceous period.

Although we can speculate on how the gut microbiome of bees altered when they evolved into vegetarian wasps, we do not know how such drastic transformation took place. What if some extant bee species went back to consuming meat as a nutrition source after becoming vegetarians? Exploring this question, research published in November 2021 in "Microbial Ecology" garnered a lot of attention late last year 2021 (Figuroa *et al.* 2021). Where they studied stomach microbiota

of a group of bees in the American tropics. These bees are possibly the most surprising living example of how dietary changes affect the gut microbiome in animals, as bizarre as that may sound. These bees take meat from carcasses instead of pollen from blossoms in deep tropical jungles from Costa Rica to Brazil. Given their partial or complete reversion to a carnivorous diet making themselves Vulturous bees.

These stingless bees, are members of the Meliponini tribe, these bees are eusocial in habit. In 1982, David Roubik, Ph.D., an entomologist at the Smithsonian Tropical Research Institute, was the first to record a bee species called *Trigona hypogea* that was discovered in the tropical rainforest of Panama and practised obligate necrophagy (eating only on dead animals). *Trigona hypogea*, *Trigona necrophaga*, and *Trigona crassipes* are the world's only three carrion-feeding bee species (Camargo *et al.*, 1991). Other stingless bee species can gain nutrients by eating both pollen and carrion, making them omnivores. However, how do vulture bees only eat carrion? Vulture bees deliver carrion to their nests after slicing flesh from deceased creatures like lizards, snakes, birds, and even fish. However it is unknown how they store it. Two conflicting scenarios have been offered by experts: Vulture bees deposit and mix carrion directly in wax pots in the initial stage. The mixture grows into a nutritious paste that the colony members are fed after 14 days. Young vulture bee workers devour the carrion

to create a secretion with a specific gland, according to the second idea. Workers then store the secretion in wax pots to create the nutritious paste. Whatever technique vulture bees employ to consume the meat they collect, one thing is certain: they regained the taste for rotting flesh that vegetarian bees had lost!

What about the microbiota of vulture bees? The bacterial groups that live in their stomach could have been affected by such a drastic alteration in their nutritional habit. All stingless bees, including vulture bees, are members of the corbiculate bee family, which also includes bumble bees, honey bees, and orchid bees. Corbiculate bees' gut microbiota is made up of five primary bacterial groups that are common and conserved throughout most corbiculate bee species. The vulture bee gut microbiota's reaction to the drastic change in feeding regimen, on the other hand, remained a mystery to bee experts.

"Vulture bees lost some ancestral core bacteria, kept others, and formed new relationships with acidophilic microorganisms," according to the study's findings. What makes acidophilic bacteria so special? You would be more exposed to germs if you ate decaying meat, raising your chances of getting a serious infection. Acidophilic bacteria would be your best friends in such a situation. Carnobacterium and

Apilactobacillus, for example, may increase the acidity of your gut, preventing pathogens from making you sick when you chew decaying meat bits. The vulture bee microbiome, unlike the microbiome of pollen-eating bees, contains lactic acid bacteria and acetic acid bacteria to feed on carrion.

So, next time when someone asks you to imagine a bee or you spot a bee visiting flowers, take into account its vulture species and their carnivorous nature to meet the protein requirement.

#### References:

- Figuerola LL, Maccaro JJ, Krichilsky E, Yanega D, and McFrederick QS. 2021. Why Did the Bee Eat the Chicken? Symbiont Gain, Loss, and Retention in the Vulture Bee Microbiome. *Microbial Ecology*, 12: e02317-21.
- Camargo J, and Roubik DW. 1991. Systematics and bionomics of the apoid obligate necrophages - the *Trigona-hypogea* group (Hymenoptera, Apidae, Meliponinae). *The Biological Journal of the Linnean Society*, 44:13-39.

*MS Received 02 January 2022*

*MS Accepted 12 February 2022*



(Photo by Quinn McFrederick, Ph.D., Figueroa *et al.* 2021)