BUZZ POLLINATION: VIBRATING IN MIDDLE C?

It is not that they buzz, it that they buzz just right!

The hum of contented honey bees signals which flowers in my end-of-winter garden are open to diners, *Halleria lucida and Tetradenia riparia*, in particular. And on the eyelash stamens of *Aloe marlothii*, the bees stuff their little pollen packs, held like side-saddles, to overflowing. But, alone in the tall wild grasses, a yellow banded carpenter bee floats heavily, and I search in vain for the unusual flowers in need of its unique skill. For the carpenter bee, *Xylocopa* species vibrates in middle C! This is buzz pollination, but the one shrub I have in need of its skill set, *Dissotis princeps*, is flowerless; today, this little Zeppelin of the insect world is doing ordinary pollinator duties for another of its favoured species, the slender tree, *Calpurnia aurea* (Natal Laburnum).

The evolution of buzz pollination is fascinating.

"Bees experience forces 30 times greater than gravity as they buzz for pollen" suggests a New York Times article on buzz pollination, and, while all bees buzz, the sound referred to here is a form of sonication, the act of applying sound energy to agitate particles in a sample, for various purposes. The sound frequency emitted by Carpenter bees, and Bumble Bees elsewhere in the world is the only way to release the microscopic pollen balls from the tiny pores at the tips of the anthers of certain flowering plants. Most flowers offer sugary high-energy nectar to lure in the pollinators while making sure the pollen is easily available on the outside of the flower to coast their tiny visitors before they leave. But some plants, to ensure a maximum chance of fertilisation, produce pollen alone and keep it hidden until just the right pollinator comes along. It is a high-energy food to provide, and these plants won't risk giving it away to any and all visitors, only to those prepared to invest just as much energy digging for it before flying off to feed on another plant of the same species! Like the Bumble Bees worldwide, and Carpenter bee species in South Africa.

Our Carpenter bees are active through many seasons and feed on a broad range of plants. As well as indigenous flowering plants like *Orphium frutescens, Dissotis* spp., and *Chironia laxa*, we rely on buzz pollination for many common food plants too: tomatoes, blueberries, potatoes, eggplants, (all members of the Nightshade family), cranberry, to name a few, making these bees vital food-crop pollinators.

How it works:

If you listen carefully, you'll notice a change in the frequency of the buzz once the bee lands on the flower and clasps the anther; it rises slightly – to middle C suggests one botanist – as

the rate at which it beats its wings changes. The carpenter bee then disengages its flight muscles from the wings to reduce unnecessary wing movement and uses these muscles to shake the anthers violently. The anthers respond to the sound frequency caused by the vibrations by opening up pores at their tips to shower the little insect in pollen. And the carpenter bees eat the high-protein rich pollen; they wipe it down their bodies to fill small sacks on their lower legs, ready to carry their plunder back to the hive.

South African plants visited by Carpenter Bees include those in the Fabaceae, Malvaceae and Rubiaceae families.

Watch these beautifully filmed short YouTube videos.
https://www.youtube.com/watch?v=J7q9Kn1rhRc
https://www.youtube.com/watch?v=N72KFpvIiss – Orphium South Africa

Keen for another cool bee fact? This one is in support of the honey bee.

Honey bees aren't just persuasive in how they get plants to give up their wares. They're energy efficient too.

"Bees have a positive electrostatic charge to their bodies," says Denise Ellsworth, an entomologist at Ohio State University "like when you scrape your feet across a carpet."

Flowers have a negative charge, so before a bee lands on one, it uses its body hairs to feel the strength of a flower's charge. A flower that has just been visited by another pollinator "loses a little bit of that negative charge," allowing the would-be pollinator to save time and move on to a flower with a stronger negative charge.

Extraordinary!