Bamboozling by cuckoo bumble bee

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Raising kids is a great deal of work; it will take a lot of energy to provide food and defend helpless offspring. So, brood parasites trick someone else into doing it for them. This type of breeding strategy is well observed in birds, such as cuckoos or the brown-headed cowbird, but in insects the brood parasitism is very often. One of the best example from insects are the cuckoo bumble bees in the subgenus *Psithyrus* (now called "*Bumbus*"). Cuckoo bumble bee (parasitic bumble bee) queens employ sophisticated trick to enter into nests of their hosts, but they don't simply dump their eggs in another bumble bee nest, like a cuckoo bird. Because their host bumble bees (nest building bumble bee) are eusocial, where we can find the highest level of organization of sociality**.** Cuckoo bumble bees have to cheat the entire colony. These bees are also considered "social parasites" because they exploit the whole colony, tricking the host workers into rearing cuckoo brood.

Learning how cuckoo bumble bees cheat the eusocial system of nest building bumble bees can tell researchers a lot about how insect sociality as well as their host parasitic interaction evolves with each other.

Nest seizur: where one queen invades or occupies the nest of another, kills the original queen and adopts her brood - is common among bumble bees (intraspecific). This is called "facultative social parasitism". This type of strategy deployed by bumble bee queens only under certain ecological conditions. But cuckoo bumble bees are "obligate social brood parasites", where they cannot reproduce without their hosts. Because the worker caste is completely absent and they lack pollen baskets on their tibia of hind legs. So, cannot collect pollen from flowers to feed their own offspring and for them it's unable to produce wax from her abdominal segments to build their own nest.

Fig. 1. Forest cuckoo bumble bee (*Bombus sylvestris*), Photo credit: Bumble bee Conservation Trust

In the spring, female cuckoo bumble bees emerge from hibernation a few weeks later than their hosts. After their ovaries are fully developed, female cuckoo bumble bees start to search for host colonies, in which the first worker brood has already emerged. For this, cuckoo bumble bees must find a host colony of another bumble bee species, and it has to be just the right size. Too large, and there will be too many workers defending

the nest and the cuckoo will be killed. Too small and there will be too few workers to raise the cuckoo's offspring. So, cuckoo bumble bees must be species-specific. They also have to be tough fighters to defend themselves from attacking workers as they infiltrate the nest and kill the host queen. Thus, cuckoo bumble bees are heavily armored with larger and stronger mandibles, a hardened abdomen, and a powerful sting with large venom sac. After discovering a suitable nest, they invade it and usually kill the queen and some of the host workers. However, often the cuckoo bumble bee is attacked and killed by host individuals. In cases of successful invasion, the parasite lays eggs that are reared by the host workers into new *Psithyrus* sexual. After the next generation of *Psithyrus* females and males has emerged, they leave the nest for the purpose of mating and the mated females subsequently hibernate.

Most of research work carried out during the past decade have shown that footprints of host bumble bees and chemical mimicry as well as allomone (chemical repellent- dodecyl acetate) produced by cuckoo bumble bees plays an important role in host nest recognition and invasion processes, in the takeover of host colonies, and in newly emerged parasites before they leave their host colony.

References

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