

## Honeybee secretion may find use as local anesthetic

October 29 2012, by Nancy Owano



(Phys.org)—Bees can bite. Biologists from universities in Greece and France have discovered that, besides a tail sting, the honeybee is capable of packing a paralyzing bite. The bee uses its bite weapon on targets too small to be stung, such as wax moth larva and varroa mites. The intruders can infiltrate beehives and eat wax and pollen. The bee delivers a bite that can paralyze them for up to nine minutes, enough time for them to be ejected from the hive. The honeybee uses its mandibles to bite its enemy and then secretes 2-heptanone into the wound. In their paper, the authors explain that this defense weapon is produced in the mandibular glands, released by the mandible pore of a reservoir and through the groove flows at the sharp edge of mandibles.



"We believe, based on our morphological studies and the anatomical evidence provided by others, that the release of 2-H is not passive, but actively controlled by the contraction of mandibular muscles."

The "2-H" they refer to, 2-heptanone, is already known to biologists as a <u>natural compound</u> found in some foods, including beer and white bread, and is secreted by some insects. Biologists assumed, though, that the 2-H function is an alarm pheromone, chemically tagging areas for bees to revisit or calling on other bees to attack intruders.

Alexandros Papachristoforou, at the Aristotle University of Thessaloniki, Greece, and others in the research team, discovered otherwise. He said he believed beekeepers will be surprised by the discovery, as it is "likely to cause a radical rethink of some long-held beliefs." As important, he said that the discovery will probably send honeybee research off in new directions.

A key suggestion from their study is that the 2-H from the honeybee may find use as a local anesthetic in both human and <u>veterinary medicine</u>

Certainly the findings are of interest to UK-based Vita (Europe), a honeybee supplier of honeybee health products, with offices in Italy, France and Russia. The research was funded by Vita, which invests a proportion of its turnover into research and development, and one of the authors works for the company.

Vita earlier this month issued a story on its site noting that the discovery means that the anesthetic has great potential for use in human medicine as it could lead to the production of a natural, low toxicity, local anesthetic for humans and animals.

Vita said that independent tests have verified the potential of



2-heptanone as a local anesthetic, and Vita has already patented the use of the compound for use as a <u>local anesthetic</u>.

Other organizations that contributed to the research include the Aristotle University of Thessaloniki in Greece, the French Centre National de la Recherche Scientifique (CNRS), Université Paris-Sud, Cyprus University of Technology, and the University of Athens.

Actually, the discovery was by accident. According to Dr Papachristoforou, the principal focus of the research was not honeybees but rather wax moths and how they can be controlled. Wax moths are a serious <u>honeybee</u> pest. Their larvae consume wax and pollen, often destroying honeycomb. When exposed to 2-heptanone, the moths seemed to die. The researchers realized, though, that they did not die but were just anesthetized. The period ranged from one to nine minutes. That is when the scientists began to set up experiments to understand what was happening.

While animal venoms are used to create a range of medicines, the researchers acknowledge that "the question here is whether 2-H can pass the preclinical and clinical tests required in order to be considered in clinical practice." The research was published earlier this month in the peer-reviewed open access journal, *PLOS ONE*.

More information: www.vita-europe.com/secrets-of ... eybee-biterevealed/ www.plosone.org/article/info %3Adoi%2F10.1371%2Fjournal.pone.0047432

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