

What is in a honeybee sting?

By Chris Baca

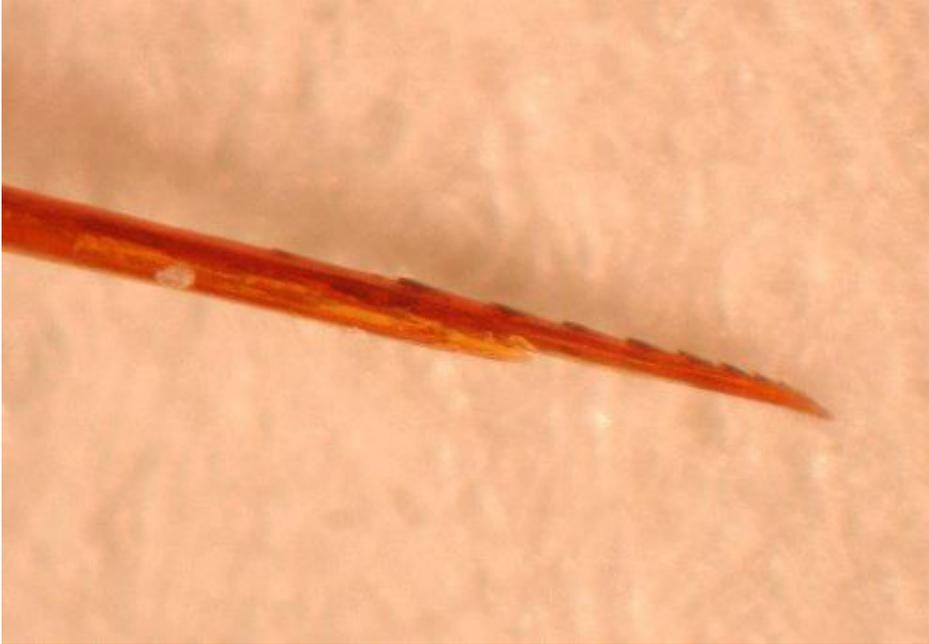
Have you ever wondered how a honeybee stings, and what the “poison” is made up of? And why does a honeybee only sting once?

“The sting is a modified ovipositor, so it is found only in females. When pushed from the end of the abdomen, it locks into position at a right angle to the base. Muscular abdominal plates then push the stinger into the flesh. The sting has a scalpel sharp point, with two serrated retractable rods (lancets) on the sides. The venom bulb is positioned at the top of the sting. It continues to pump venom 30 to 60 seconds after breaking off from the abdomen of the worker bee.



Sting with attached venom sack. Photo by Zach Huang.

As we know from other reports, the stinger and venom bulb are connected to the honeybee’s intestines. When the barb of the stinger is injected into skin, it will all stay attached to the skin, and as the honeybee flees the site, they fly off without their insides and die. The picture below shows the series of barbs, I thought there was just one large barb at the end, but this picture helped me understand that there are several along the stinger shaft.



Close up of sting showing barbs that prevent easy removal. Photo by Zach Huang.

Up to half of the venom stored in the bulb consists of **melittin**, a chemical substance that causes pain, impacts blood vessels, and damages tissues. In response, the body of the stung organism produces histamines, which cause localized itching, redness and swelling.

Phospholipase A2 and **hyaluronidase** contribute to the swelling and spread of the toxin. Additionally alarm pheromone is released at the time of the sting, stimulating further defensive response in the workers. Each worker dies shortly after stinging her victim because the sting and part of the digestive tract are left at the site of the stinging incident (Bishop, 2005)."¹

"**Melittin** is the principal active component of bee venom, and is a powerful anti-inflammatory substance said to be 100 times more potent than hydrocortisone. Melittin is a peptide consisting of 26 amino acids. It also exhibits potent anti-microbial activity. For example, Melittin has been shown to exert "profound inhibitory effects" on *Borrelia burgdorferi*, the bacteria that causes lyme disease (Lubke & Garon, 1997). Melittin has also been shown to kill the yeast *Candida albicans* (Klotz et al, 2004) and to suppress *Mycoplasma hominis* and *Chlamydia trachomatis* infections (Lazarev et al, 2005, 2004, and 2002)".²

"Hyaluronidase The hyaluronidases (EC 3.2.1.35) are a family of enzymes that degrade hyaluronic acid. By catalyzing the hydrolysis of hyaluronic acid, a major constituent of the interstitial barrier, hyaluronidase lowers the viscosity of hyaluronic acid, thereby increasing tissue permeability. It is, therefore, used in medicine in conjunction with other drugs in order to speed their dispersion and delivery. The most common application is in ophthalmic surgery, in which it is used in combination with local anesthetics. It also increases the absorption rate of parenteral fluids given by hypodermoclysis, and is an adjunct in subcutaneous urography for improving resorption of radiopaque agents."³

So the next time you are visiting with your friends and one says to you that a honeybee sting is similar to an injection of penicillin, you can correct them!

¹Stone, David. "An Introduction to Bee Biology." June 2005. Beespace.uiuc.edu. 15 October 2007.
<http://www.uni.uiuc.edu/~stone2/Bee_anatomy.html>

²"Melittin." *Wikipedia, The Free Encyclopedia*. 19 May 2007, 10:48 UTC. Wikimedia Foundation, Inc. 15 Oct 2007
<<http://en.wikipedia.org/w/index.php?title=Melittin&oldid=131979084>>.

³"Hyaluronidase." *Wikipedia, The Free Encyclopedia*. 25 Sep 2007, 04:25 UTC. Wikimedia Foundation, Inc. 15 Oct 2007
<<http://en.wikipedia.org/w/index.php?title=Hyaluronidase&oldid=160181403>>.