proteinspotlight
> ONE MONTH, ONE PROTEIN <

Issue 12, July 2001

www.proteinspotlight.org

Why Pooh luvvs hunny

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Beekeeping is one of the healthiest professions they say. Apparently, apiarists have fewer illnesses than most other humans. They never seem to have cancer or arthritis, or other kinds of immune disease and they even live longer. Though one could rightly argue whether the number of beekeepers in the world represents a significant sample of the human population, it is a fact that the healing properties of honey, and bee products in general, have been popular in a number of civilisations for thousands of years.

In Egypt, honey was mentioned in the Ebers Papyrus[1] for its use in surgical dressings, on burns and infections of the eye as well as in embalming the dead. The bee itself is depicted in hieroglyphs, on tombs and tapestries and carved on the Rosetta Stone. The Greek physician Hippocrates (460-377 BC) used bee venom to treat arthritis, and honey to clean lip sores and ulcers. Ambrosia, the beverage the Greeks offered to their Gods on Mount Olympus, was filled with honey. The Roman naturalist Pliny the Elder (23-79 AD) prescribed a glass of honey and cider vinegar to rinse the system and bring good health, and religious scripts such as the Jewish Talmud refers to honey as a remedy for gout and heart trouble.

What is it that is so good about honey? It is not so much honey as bee products in general and the bee sting in particular. Bees produce quite a variety of products: honey but also propolis[2], royal jelly and bee venom. Bee venom, which is injected into you by way of a bee sting, is a cocktail of pharmaceutical and biochemical active compounds, amongst which is found melittin.

Melittin is a short peptide – only 26 amino acids long in its active form – and the main constituent of honeybee venom. It represents more than 50% of the venom's dry weight and is the principal toxic component. Its underlying structure is helical but its overall shape is that of a bent rod. Melittin adopts a tetrameric conformation in the venom sac of the bee, resembling the arrangement pastry would have on a hot cross bun, and the core of the structure is made up of apolar residues that are completely shielded by a hydrophilic coat.

The tetrameric conformation of melittin

Courtesy of Fabrice David, SIB Geneva

Once melittin is injected via a bee sting, the tetramer splits into monomers, which then hit cell membranes. Monomeric melittin is a powerful cell lytic agent. It binds rapidly to erythrocytes bringing on the release of haemoglobin into the extracellular medium. Since there are about 1.8×10^7 binding sites for melittin per erythrocyte, it is likely that the sites of interaction are the membrane lipids rather than specific receptors. Lysis finally occurs

[1] See issue April 2001

[2] In biblical times, propolis was known as myrrh, and used in perfume, incense and medicine.

when the organisation of a lipid bilayer is perturbed.

Though there is little direct evidence about the molecular mechanism of haemolysis to date, it is thought that lysis occurs by a colloid osmotic mechanism which results in the formation of melittin-induced lesions or 'pores'. Melittin may even interact with membranes in different ways depending on the lipid composition of the bilayer; for instance, in the event of channel formation, the tetrameric conformation of melittin seems to be required.

There is a growing interest in honey – as well as other bee products – for its use in alternative medicines. Stories of people with arthritis or multiple sclerosis, who have been cured thanks to their qualities, abound. Bee products are said to have antiseptic and antibiotic properties, to be an answer to premature aging, physiological weakness, weight loss and constipation. Some believe they boost the immune system, help ulcers, asthma, tendonitis, bursitis, back pains, epilepsy, ligament injuries, premenstrual syndrome and neuroses. They have been said to break down scar tissues, promote thinning of the blood, the dilation of capillaries and arteries, as well as the decrease of blood cholesterol levels…

Are bee products the panacea? Certainly, more and more money is being injected into research. Bee products seem to be beneficial to some although, to date, there are no medical or scientific studies which show that bee stings prompt a healing response strong enough to address illnesses or pains other than the sting itself. Health frauds are also popular; illnesses go through periods of remission, which may coincide with a form of apitherapy. As for the world of biotechnology and drug design, there is a growing interest in melittin which, when coupled to certain types of drug, could facilitate their assimilation. Whatever the characteristics of honey may be, no one has yet shown that it is bad for you. Not only does it taste good but it is anti-bacterial by nature: its acidic and hygroscopic properties cause bacteria to dehydrate. So do like Pooh Bear: just indulge and keep spreading it on your bread.

Cross-references to Swiss-Prot

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