

12. APITHERAPY

Apitherapy – bee-therapy – is treatment with bees and their products. It has ancient origins: the first known prescription using honey was written on a clay tablet, found in the Euphrates valley and dating from somewhere between 2100 and 2000 BC. There are records from ancient Egypt and ancient India of using honey in treating wounds. Hippocrates, the ancient Greek physician and ‘father of medicine’ listed the physical effects of honey: “It causes heat, cleans sores and ulcers, softens hard ulcers of the lips, and heals carbuncles and running sores” (Manjo, 1991). Important religious texts all refer to honey and its healing powers. For Jewish people the Promised Land is described as “a country which abounds in olive oil and in honey” (Deuteronomy 8:8). In the Sanskrit Veda of ancient India, honey is a remedy for many disorders. For Christians, the Bible has many references, and in Islam, honey is a precious medicine. Sura 16 of the Koran mentions the origin of honey and its therapeutic qualities, “It comes forth from their bellies: a liquid of various colours, with healing for mankind”.

Therefore, honey and bee products have a heritage of use as medicine. Today, the virtues of bee products are extolled by some, especially those interested in alternative and complementary medicines, who describe the use of honey, pollen, propolis, wax, royal jelly and venom for medicinal purposes as apitherapy. Others will say that claims for the therapeutic benefits of bee products have not been subject to critical, scientific scrutiny.

The Apimondia Standing Commission for Apitherapy works to promote the use of bee products for apitherapy and proposes the following definition:

‘Apitherapy is a medical concept, based on scientific foundations corroborating traditional knowledge, including:

- *Bee production procedures aimed at medical development;*
- *Transformation of hive product procedures, alone, or in association with medicinal plants and their derivatives (api-pharmacopoeia); and*
- *Clinical protocols incorporating the use of the api-pharmacopoeia and/or of the bees (api-medicine).’*

Much has been written about apitherapy and a number of organizations exist to promote this cause: see Further Information in Chapter 16 for details. This Chapter gives a brief outline of the bee products used within apitherapy.

HONEY AS MEDICINE

Honey has traditionally been regarded as a medicine or tonic, rather than an everyday food. Today honey is once again increasingly recognised for its healing and anti-bacterial properties when taken orally, or applied as a treatment for wounds and burns.

For example, many societies know honey and lemon as an elixir to relieve sore throats. Today there is scientific explanation: the vitamin C of the lemon has immune stimulating and anti-infective effects, while the honey has medicinal power. The most common bacterium known to cause sore throats is *Streptococcus pyogenes*, and laboratory experiments have proved that some honeys can inhibit the growth of this bacterium. Another bacterium that honey has been shown to inhibit is *Helicobacter pylorum* – a causative factor in ulcers. Honey has a number of constituents and properties that can result in healing properties. These include its acidity, enzymic activity, hydrogen peroxide and high osmotic potential. One of the enzymes present in honey is glucose oxidase. This enzyme is produced by the bees’ hypopharyngeal (head) glands. When honey is diluted, the enzyme is activated and oxidises glucose to generate gluconic acid and hydrogen peroxide. The high osmotic potential of honey is due to its high sugar concentration: this means that it has an osmotic effect, which can lead to the breakdown of bacterial membranes, thus inhibiting microbial growth. Honey can be also put to use in healing skin and drying out wounds: its anti-bacterial properties and physical composition, maintaining moist conditions and allowing oxygen to pass, is good for preventing infections, reducing inflammation and promoting rapid healing. Honey also contains

compounds derived from the flowers on which bees were foraging: these may be flavonoids and active phenols, well known for their antibacterial properties. Many studies established that the dark honeys of the coniferous forests have a strong antibacterial activity. Examples of antibacterial honeys are the Australian honey of *Leptospermum polygalifolium* and the well-known manuka honey *Leptospermum scoparium* of New Zealand. More information about honey's healing properties can be found in Molan, 1999.

NATURALLY OCCURRING ANTIBIOTIC IN HONEY²⁴

In 2003, two consignments of honey being brought in to the EU from Zambia were found to contain low levels of the antibiotic streptomycin. According to the *Codex Alimentarius* definition (see Chapter 9), honey must not contain any antibiotics. Within the EU, antibiotics such as streptomycin, tetracyclines, penicillin and sulphonamides are illegal for use in beekeeping. Tetracyclines can be used to treat the honeybee disease European Foulbrood, but only under veterinary control and supervision, and procedures must be followed so that any honey produced during the treatment period cannot enter the honey market.

The imported honey was harvested by beekeepers living and working in the forests that cover Zambia's remote North West Province. It is very unlikely that these beekeepers are using antibiotics in their beekeeping. The honey is harvested from local style hives made from cylinders of bark and placed high in trees of the miombo woodland. No honeybee diseases are known, and beekeepers do not have the resources, possibility or necessity to use antibiotics in their beekeeping.

So how could streptomycin have become present in the honey? Is it possible that it is a natural constituent of honey, carried into the hive by foraging bees? Streptomycin is produced by bacteria belonging to the genus *Streptomyces*: these bacteria are common and widespread. Streptomyces have been discovered in samples collected from the miombo woodland, in places frequented by bees, such as hollows in trees, water holes and leaf mould.

Early indications are therefore that the streptomycin could indeed be occurring naturally. This has implications for honey legislation and the world honey trade, as well as for understanding of honeybee biology and honey's long-known role in health and healing.

It is also known from research that ants and Streptomyces have a highly evolved relationship: some leaf cutter ants have white spots on their bodies – these spots are colonies of a *Streptomyces* species, producing an antibiotic to protect the ant colony's food sources from other pathogens. Could bees also have evolved a way to harness the benefits of the antibiotic streptomycin?

Clearly, research was needed to investigate this amazing discovery, and to provide scientific data concerning the streptomycin and its possible origin. *Bees for Development* is now researching this, in cooperation with the University of Warwick, towards proving the genetic origin of the streptomycin in the Zambian honey.

HONEY TO REDUCE ALLERGIC RESPONSES

As mentioned in Chapter 11, beekeepers have long been aware of local customers who like to purchase local, unfiltered honey in the belief that regular consumption of honey containing pollen helps to reduce their allergic reactions ('hay fever') to these pollens. Recent research on allergic diseases appears to support this belief.

BEESWAX

In the past beeswax was used in medicine, mainly as a carrier for other ingredients, and in salves and poultices. Today beeswax is used extensively in the pharmaceutical and cosmetics industries in ointments, skin creams and pills. Within the field of alternative medicine, beeswax is once again forming part of various medicines. There are some claims that it has antibiotic properties, and can be used in the treatment of arthritis and nasal inflammations.

²⁴ Bradbear *et al*, 2004.

POLLEN

Pollen is certainly very important in the nutrition of honeybees, and some people make great claims for the nutritional value of pollen as being one of the most complete foods in nature. It certainly has all the right ingredients, containing around 30 percent protein and including all the amino acids essential for human diets, a full spectrum of vitamins and minerals, trace elements, hormone precursors, carbohydrates and fatty acids. It is possible that pollen provides valuable trace elements to supplement deficient diets. 'Believers' in pollen say that it gives them energy, fights exhaustion and depression, and ensures resistance against colds and flu.

For use in apitherapy, practitioners prefer to have pollen that is as fresh as possible: pollen that has been dried and stored for some time is thought to have a lower therapeutic value.

PROPOLIS

As described in Chapter 11, propolis contains the gums and resins bees collect from plants, and in many cases these compounds are the plants' own response to injury, or otherwise protecting the plants from predators and pathogens. It is therefore not surprising that propolis has anti-fungal, anti-inflammation and anti-bacterial properties. Propolis is particularly valued as a remedy for toothache, and is sold in toothpastes and chewing gums. One possibility is that it works by inhibiting the enzyme glucosyltransferase of the bacterium *Streptococcus mutans*. This bacterium produces lactic acid in the mouth that decays tooth enamel.

ROYAL JELLY

Worker bees and queen bees start life as identical eggs laid by the parent queen. Whether an egg develops into a worker bee or a queen bee is determined by the way it is fed. Queen bee larvae are fed with copious amounts of royal jelly, and subsequently adult queen bees differ in many respects from adult worker bees: the queen alone is fertile, will mate and will lay eggs very prolifically. She will live much longer than her sister worker bees. Royal jelly is therefore a potent food as far as developing honeybees are concerned. Some people credit royal jelly with remarkable powers for humans and other animals too: however, opinions differ and some people argue that there is no scientific support. Certainly, royal jelly is a concentrated source of many nutrients, including all the B vitamins, as well as vitamins A, C, D and E and essential fatty acids.

BEE VENOM THERAPY

This is therapy using live bees, applied directly to the patient. Hippocrates referred to the medical use of bee venom, and still today, many beekeepers believe that bee stings are beneficial for the treatment of rheumatoid arthritis: it is often stated that few beekeepers suffer from this disease. However, this is anecdotal evidence. Despite the lack of scientific confirmation that sting therapy benefits chronic, incurable diseases, some sufferers of multiple sclerosis and rheumatoid arthritis are convinced that it does help. Venom therapy is also claimed beneficial for the relief of pain from tendon injuries, repetitive strain injury and other muscle injuries. Bee venom (harvested as described in Chapter 11) is now marketed in capsule form, making venom therapy available without the patient having to receive bee stings.

One explanation for the beneficial effects of bee stings may be that it is a form of acupuncture. Indeed, some Chinese practitioners combine the two sciences into api-acupuncture. Acupuncture is widely recognised as a useful technique for relieving pain: it is believed that the acupuncture needles stimulate nervous pathways that cause the release of endorphins that are pain-relieving opioid substances. It seems possible that a bee sting could cause stimulation of endorphin production in a way similar to an acupuncture needle.

Venom is a complex mixture of proteins and amino acids, enzymes, sugars and lipids. One polypeptide, melittin, is a major component of venom, and in humans it has the effect of stimulating the adrenal cortex (part of the adrenal gland) to release cortisol, a hormone associated with reducing inflammations and healing responses. This may also in part explain venom's apparent success in easing inflammatory ailments.