

[Editorial] Special issue: honey

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EDITORIAL

Special Issue: Honey

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The world market for honey is predicted to reach 2.4 million tons by 2022 (Global Industry Analysts Inc., 2016), and it is thought that much of this growth has been due to the perception of honey as a natural product free from the problems of obesity associated with other sources of sugar. As with any growing market, there are, however, a number of important issues relating to honey today. Many relate to aspects of quality. There is a growth in demand for specialist honeys, often from monofloral sources or from narrow geographical regions of origin. This raises the question of how such honeys can be authenticated and discriminated from cheaper or lower quality honey. A separate quality issue relates to the deliberate adulteration with sugar syrups and “honey analog”, and contamination with antibiotics, veterinary drugs and air, soil and water pollution.

Much of the recent interest in honey stems from its perceived health benefits, especially as a medicine, and there is also growing interest in the medicinal properties of the honey from other species of *Apis* than *Apis mellifera*, and in honey from non-*Apis* bees such as stingless bees. As with apitherapy and “alternative” medicine in general, it is important for the consumer to be able to discriminate between good science and spurious claims.

Many of these issues are not new. Eva Crane’s classic book “Honey a comprehensive survey” (Crane, 1975; Figure 1) covered many of these aspects, but sadly has been out of print for many years. Of the ten most highly cited articles published in *Bee World* over its long history, five relate to honey. These include Louveaux et al.’s classic (1978) “Methods of melissopalynology” which was the first real attempt to standardize methods to determine the botanical origins of honey through pollen analysis. Three notable papers by the late Peter Molan (Molan, 1992a, 1992b, 2001) explored the antibiotic properties of honey, and its use as a medicine. Finally, Bogdanov and colleagues from the International Honey Commission (Bogdanov et al., 1999) reviewed honey quality and international regulatory standards. IBRA’s pioneering book “Honey and healing” originally published in 2001, which

features two chapters by Peter Molan on why honey is effective as a medicine, has recently been reprinted (Munn and Jones, 2017; Figure 2).

There remains, however, a need for up to date information, hence this special issue of the *Journal of Apicultural Research*, which contains a mixture of review articles and original research articles, which cover the range of issues affecting honey today. In the first review, De-Melo et al. (2018) explore the composition and properties of honey from *A. mellifera* bees. They discuss how the complex composition of honey is affected by botanical origin, geographical location, climate, and the methods used for collection and storage. They explain that the vast majority of the health benefits attributed to honey have been related to both antioxidant and antimicrobial activities, but honey has other potential functional properties, most notably its antihypertensive capacity and anti-inflammatory activity, as well as prebiotic and probiotic effects. Finally the authors explore the role of honey in biomonitoring the environment for soil, air and water pollution.

In the second paper, Pascual-Maté et al. (2018) review methods of honey analysis, covering the standardized and most widely used techniques, as well as novel techniques. The methods cover the analysis of physical parameters, properties and the most important components of honey. Next techniques for evaluating the antioxidant and antimicrobial activities are described, and finally the most common methods for evaluating honey authenticity in terms of botanical and geographical origin and the detection of honey adulteration. Detailed protocols for standard methods for honey research will be published in the forthcoming COLOSS BEEBOOK Volume III (Dietemann et al, 2018; Figure 3).

In the third review, Marcazzan et al. (2018) describe the sensory analysis of honey, which may be used to complement physicochemical and pollen analyses. Sensory analysis is used to confirm quality, verify the absence of defects, evaluate conformity to the established sensory profiles of unifloral honeys, and also to understand consumer preferences. The authors describe the origins of standards for sensory analysis and best practice procedures.

Thrasylvoulou et al. (2018) review the international legislation that relates to honey criteria and standards. They highlight differences between the revised international Codex Alimentarius standards, those adopted by the European Union, and standards adopted in individual countries around the world. The authors suggest that in order to address the problems that exist in international legislation regarding honey, minimum requirements should be adopted as mandatory for all countries that produce, import or export honey.

The problem of residues of antibiotics and chemotherapeutics in honey is reviewed by Reybroeck (2018). Various chemicals are used by beekeepers to control pests and diseases such as varroa, nosema and foulbrood, but their use may result in residues in honey. The author points out that in the EU, no Maximum Residue Limits (MRLs) have been set for anti-infectious agents in honey, and generally zero-tolerance for the presence of residues of antibiotics in honey has been respected, but he proposes that judgement based on scientific risk assessment would be more appropriate.

In the final review, Kuropatnicki et al (2018) place the use of honey as a medicine in a historical context. The authors point out that the use of honey as an internal and external health agent is actually much older than the history of “medicine” itself. The earliest recorded medical prescription including honey is from Sumer in Mesopotamia, and honey was used as a remedy against a variety of illnesses in ancient Egypt, Greece, and Rome, as well as in traditional Chinese medicine and in Ayurveda. Honey was, however, not commonly used as a medicine in the medieval period, and was neglected with the rise of modern synthetic medicine, but in the last hundred years it has made a strong comeback, especially for its wound healing properties.

Of the eight original research papers, in the first, Kim et al. (2018) evaluate the characteristics of nectar produced by Korean and Chinese varieties of the hawthorn *Crataegus pinnatifida*, which may have potential as a major honey species. In the second paper, Venturieri et al. (2018) discuss novel techniques to increase honey production from the Amazonian stingless bee *Melipona fasciculata*, which can easily be maintained in artificial hives.

Two other papers concern the honey of South America. Lemos et al. (2018) evaluate the physicochemical parameters and inorganic constituents of honeys from the Amazon region produced by three native species of stingless bee compared to the non-native *A. mellifera*. The results showed large differences between species, and emphasize the need for legislation and quality standards for non-*Apis* honey. Zuluaga-Domínguez et al. (2018) describe novel methods for the classification of different *A. mellifera* honeys from Colombia.

Then follow two papers on African honey. Elamine et al. (2018) describe a preliminary study into the characteristics of Moroccan honey produced mainly from nectar of the umbelliferous plant *Bupleurum spinosum*, whilst Zerrouk et al. (2018) describe the physicochemical characteristics of Algerian honey produced from the plant *Ziziphus lotus*, a deciduous shrub of the buckthorn (Rhamnaceae) family, which is known locally as Jujube

honey. In contrast, Wetwitayaklung et al. (2018) describe the characteristics of honey produced from *Dimocarpus longan* and *Litchi chinensis*, both fruit plants of the Sapindaceae family, and from the Siam weed (*Eupatorium odoratum*), of the Asteraceae, in Thailand.

In the final paper in this Special Issue, bringing us back to the medicinal properties of honey, Poli et al. (2018) assess the antibacterial action of Corsican honeys on hospital acquired and foodborne pathogens.

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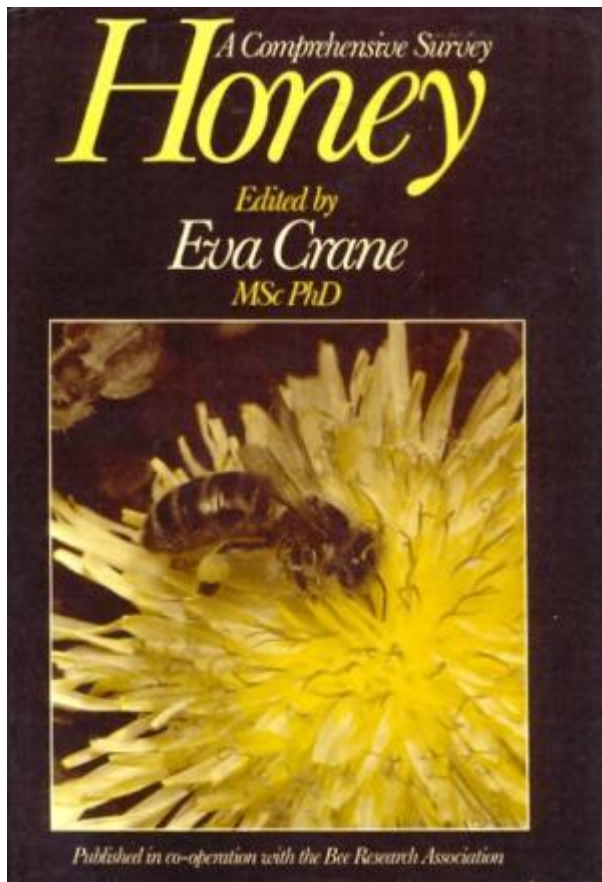


Figure 1. "Honey: A comprehensive survey" by Eva Crane.

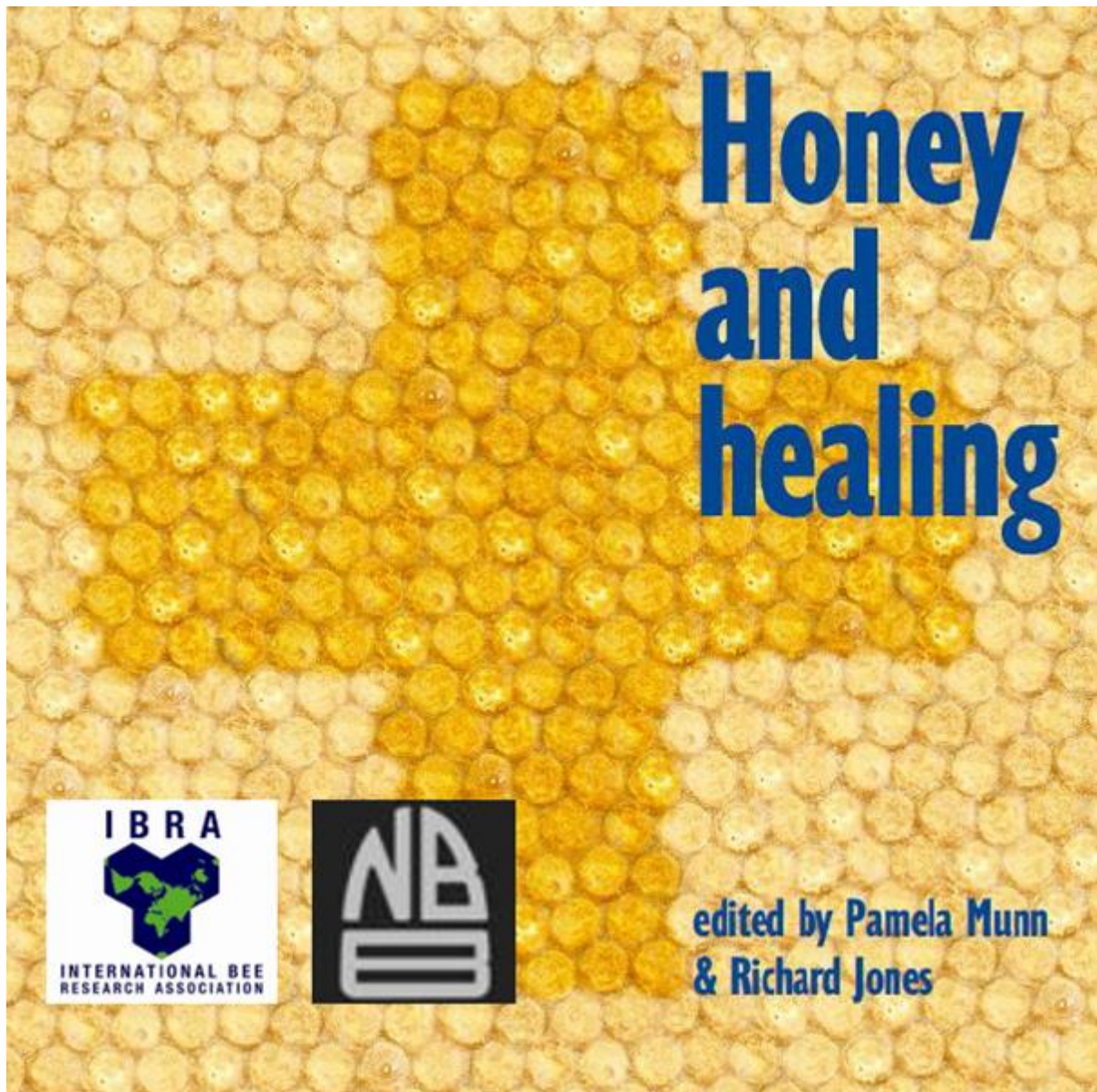


Figure 2. "Honey and healing".

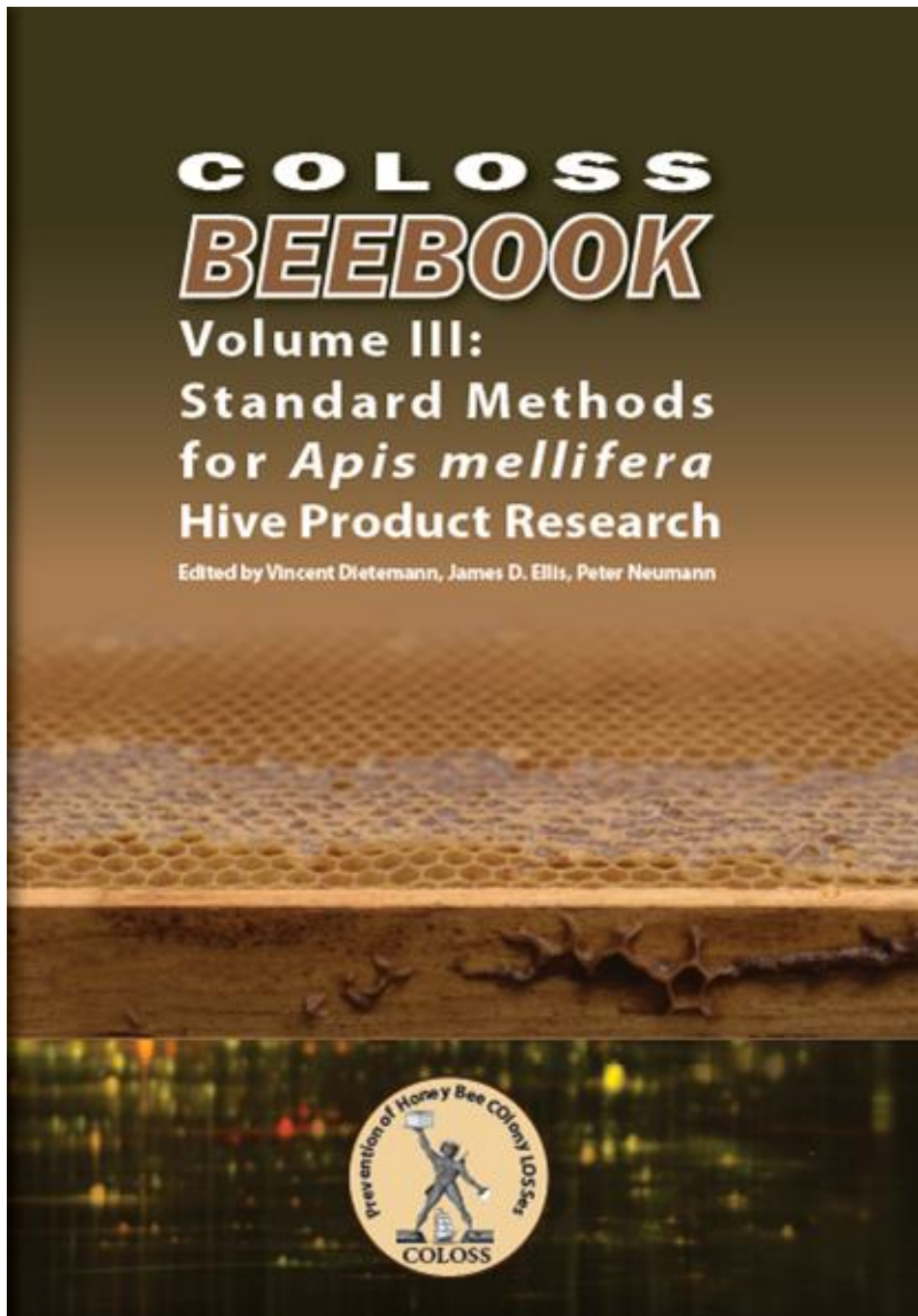


Figure 3. “The COLOSS *BEEBOOK*, Volume III: standard methods for *Apis mellifera* hive product research”.