

## Introduction

The cost of stingless bee keeping is minimal, yet the cost of training persons who know their science and management is considerable, as is that of locating wild nests or communicating with traditional or tribal stingless bee keeping experts. We consider some of these themes in a recent edited book "Pot-honey. A legacy of stingless bees" with many contributors from many countries. Now we have to ask: How far can the exploitation of stingless bees go? For the Western hive bee, *Apis mellifera*, commercial exploitation is clearly a trade-off. We may watch the documentary "More than Honey" shown in Europe and America in 2013, directed by Marcus Imhoof, and come away with the idea that the honey bee industry is not going to protect bees any more than industries protect cattle, chickens, pigs or sheep. Many are the bees and colonies available, and many die due to management, pesticide and pasturage situations. Yet, they are deemed adequate or "sustainable" to pollinate many crops, in many parts of the world. Sustainable here merely means that the losses are tolerable to humans. Does this serve as a model for stingless bees? No.

We know very well there are still many facets of the bees and their biology that need more. More what? More raw data and information, and more thoughtful, complete syntheses of recent knowledge and tribal practice, belief and application. More sense of the marketability and *real* sustainability of having certain of the stingless bees become commercially in vogue. More biogeographic information—the result of having a reliable source of taxonomic data—connected to certain environments and native plants, animals, fungi, microbes, etc. We are beginning to appreciate the Meliponini and the all-encompassing story of the largest group of honey-making creatures on earth. They may catch up to and ultimately surpass the legacy and renown of *Apis mellifera*. Our 'stinger-less' honey bees boast over 50 times as many species, and tropical, subtropical and even a few temperate-zone honeys.

The present volume contains 21 chapters with diverse topics written in English, Portuguese and Spanish. It is to be hoped that they clarify stingless bee origins, names, taxonomy, culture, composition, properties, conservation, education and regulation. Several complementary topics found their place in this e-book. Meliponiculture is discussed for Brazil, Mexico and Argentina. Local names of stingless bees inserted in Brazilian songs and poems express a cultural message in the rediscovery of pot-honey. Palynological studies of honey, geopropolis and propolis are tools for approaching the botanical and geographical origin of meliponine products. The need of post-harvest processing for pot-honey is revealed in a detailed chapter on honey maturation practices in Maranhão State, Brazil. Stingless bees also have a place in Australian education, as told to us by a teacher from Alstonville High School, in New South Wales. Systematic reviews on honey treatments for cancer in general, and for the Thai *Tetragonula laeviceps* pot-honey in cultured cells, are presented. The widespread industrial contaminants of lead and mercury (Pb and Hg) are discussed for pot-honeys from Argentina, Australia, Brazil and Venezuela. Finally, antioxidant activity is evaluated, for the first time, in different components of a stingless bee nest, in a chapter based upon *Tetragonisca angustula*. An important interphase chapter between stingless bee taxonomists and pot-honey analysts illustrates reasons for shifting or overturning previous classification and identification, with examples from Neotropical bees. The cover images from a scientist fully in awe of *Leurotrigona muelleri* are presented in a comprehensive chapter named 'the little pearl'. Foraging specializations carefully condensed as "the fast *versus* the furious" outline morphological foraging traits and foraging strategies guiding meliponine colony decisions in the choice of food sources, and for making their honey in cerumen pots. The significance of a binary system in the life of a taxonomist who devoted his own life to study Meliponini and name 3 genera and 88 species of stingless bees, connects JMF Camargo with his colleagues forever. Inspiration found in fossils recount the evolutionary history of Meliponini with the ancient *Cretotrigona prisca* from the Late Cretaceous of New Jersey, USA, contributing to the continuing stingless bee information we are pleased to receive from professor Charles Michener, currently 94 years young. Two benchmark proposals are given for quality standards of *Melipona* pot-honey in Bahia,

Brazil, and Venezuela, to move forward towards an official regulation for honey produced in cerumen pots, previously designed only for *Apis mellifera* in its beeswax combs. The inclusion of pot-honey in cosmetic formulations, its characterization with an electronic nose and the emotional perceptions, which are quantifiable, open new avenues to investigate human interactions with this ancient honey.

Actions to showcase the value of pot-honey are given in the final chapter of this e-book as an interactive exercise between Costa Rica and Venezuela, that could embrace tropical initiatives to promote meliponiculture, research and education: 1. VIII Mesoamerican Congress of Native Bees. 2. Route of Meliponini Museums in the World. 3. Sensory evaluation of pot-honey. 4. Evaluation of emotions elicited after consuming pot-honey. 5. A project "One meliponary in each school". 6. Thinking on the volume of the honey reactor –the cerumen pot–. 7. A book for the most abundant honeys in the forest but less frequent in the market.

We hope that this brief extension of meliponine knowledge will keep the flames burning bright, because the theme is one that will, we believe, illuminate our world on many timely and interesting subjects.

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