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Stingless Bee Therapeutic Biomaterials: Novel Anti-Antimicrobial-Resistant (AMR) Agents

Vit P

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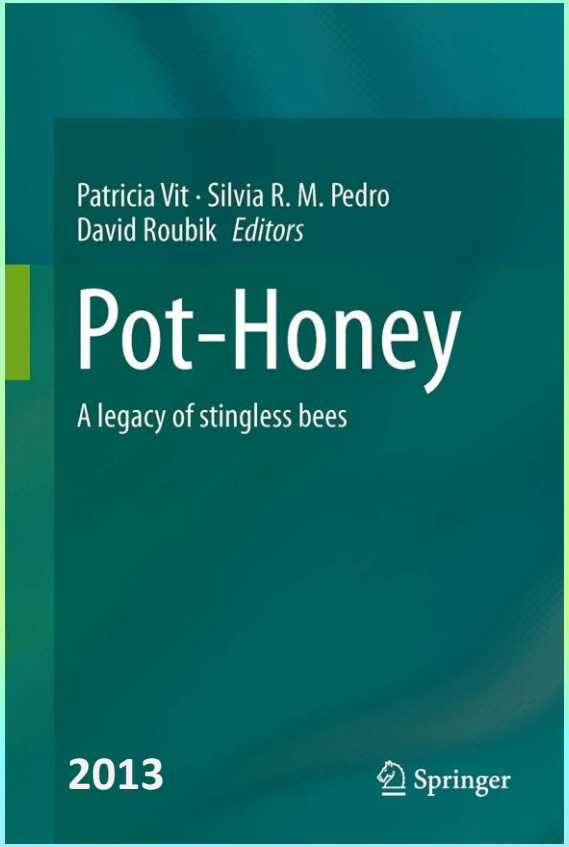
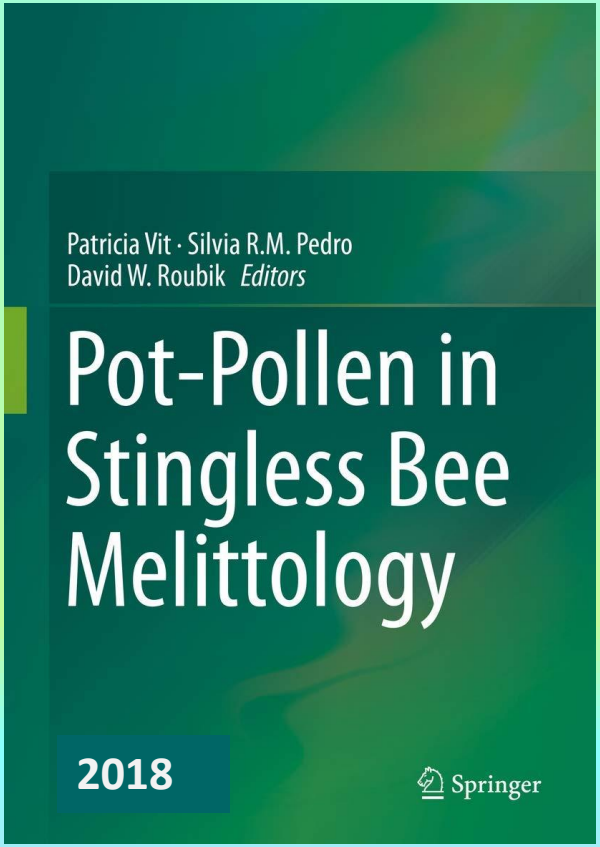
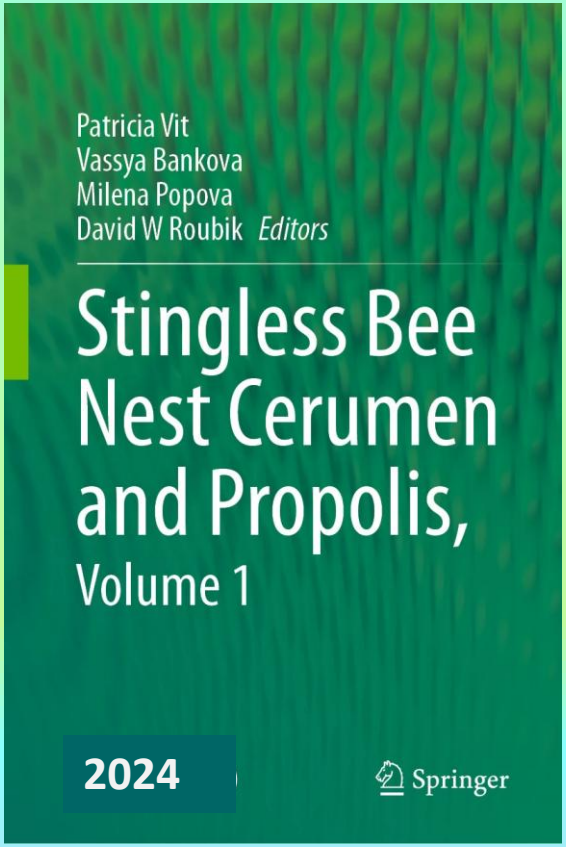
We studied four materials in stingless bee nests







I learned sampling cerumen and propolis , in a *Tetragonisca angustula* nest, preparing the VOC Chapter 7 Vol. 2 analyzed at FEM, Italy in the previous book 2024

Photo: P Vit

This book was inspired by Araque and Vit (2024)

THE EUROPEAN SOCIETY OF MEDICINE
Medical Research Archives, Volume 12 Issue 9

RESEARCH ARTICLE

Evaluation of the potential synergistic effect of *Tetragonisca angustula* pot-pollen with amikacin and meropenem against extensively drug-resistant bacteria of clinical origin

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ABSTRACT

Background. The combination of natural products like the bioactive stingless bee nest materials with conventional antibiotics offers a promising strategy to enhance antibacterial efficacy and contend with antimicrobial resistance. **Objective.** This study evaluated the potential synergistic effects of *Tetragonisca angustula* pot-pollen extract combined with amikacin and meropenem against six extensively drug-resistant Gram-negative bacteria of clinical origin.

and the review by Vit, Araque & Chuttong (2024)

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EDITORIAL

A multifaceted bioactive resource of stingless bees: Unlocking the therapeutic anti-antimicrobial-resistance (anti-AMR) potential of pot-pollen

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ABSTRACT

Pot-pollen, a probiotic processed by stingless bees, has gained attention for its nutraceutical properties and pleasant sour taste. The aim of this editorial is to illustrate the state-of-the-art of pot-pollen research with a bibliometric overview using the Scopus database to value the experimental bioactivity (antimicrobial, antioxidant, anti-inflammatory, and anticancer) of pot-pollen, and the standards for quality control and safety of pot-pollen legislation, considered mandatory for clinical applications of this highly variable natural product. The bibliometric analysis since 2014 revealed a growing interest in pot-pollen research, with a focus on the following academic disciplines: Agricultural and Biological Sciences,

Antimicrobial Resistance (**AMR**) occurs when
bacteria, viruses, fungi, parasites
adapt and no longer respond to medicines,
making infections difficult to treat

This resistance naturally evolves,
and accelerates by the
misuse and overuse of antibiotics
in humans and agriculture

Why AMR is a WHO Global Crisis?

Medical Complications
Procedure Risks
High Mortality

Combating the Threat

One Health approach…
interconnection between humans, animals, and the environment
Use strictly necessary and wisely prescribed antibiotics

Research & Development

Next-generation antibiotics
Innovative treatments & Natural products
Overcome mutating pathogens

Stingless Bee Therapeutic Biomaterials:
Novel anti-antimicrobial-resistant (AMR) agents

Vit Patricia and Meccia Gina

editors

2026

A Springer book with 13 chapters and 67 authors from 21 countries

SYNERGISM

Amikacin		Metronidazole
Ampicillin	Gentamicin	Nystatin
Cefotaxime	Meropenem	Tobramycin
Ciprofloxacin		Vancomycin

ANTIBIOTIC + MELIPONICONAL PRODUCT

Pot-honey	Pot–pollen	Propolis

1. Antimicrobial Resistance: A Global Threat

Javier CORDERO, José-Angel COVA

Venezuela

2. Research Trends on Stingless Bee Materials Using Bibliometrics: Healing Biomolecules After Nutritional and Bioactive Characterizations

Patricia VIT, Bajaree CHUTTONG

Venezuela, Thailand

3. Volatilome of Venezuelan Angelita *Frieseomelitta longipes* Pot-Pollen and Propolis from El Paují, and Synergistic Effects with Meropenem and Tobramycin Against Extensively Drug-Resistant (XDR) Gram-negative Bacteria

María ARAQUE, Emanuela BETTA, Patricia VIT, Nicole MARCEL, Favizia F OLIVEIRA, Gina MECCIA, Franco BIASIOLI

Venezuela, Brazil, Italy

4. Synergistic Antibacterial Effect of Hongwa *Axestotrigona ferruginea* and Nyori *Axestotrigona togoensis* Pot-honeys from Tanzania with Conventional Antibiotics Ciprofloxacin and Metronidazole Against Resistant and Susceptible Bacterial Strains

Christopher MDUDA, Aneth DAVID, Hawa MYOVELA, Dorothy NARWANGO, Juma HUSSEIN

Tanzania

5. Synergistic Effects of Ciprofloxacin and Metronidazole with Tanzanian Hongwa *Axestotrigona ferruginea* and Nyori *Axestotrigona togoensis* Propolis Extracts Against Drug-Resistant and Susceptible Bacteria

Christopher MDUDA, Dorothy NARWANGO, Hawa MYOVELA, Aneth DAVID, Juma HUSSEIN

Tanzania

6. Volatiles and Microbiome of Erica *Melipona favosa* (Fabricius, 1798) Honey from Paraguana Peninsula, Venezuela, and Synergistic Interaction with Conventional Antibiotics Against Multidrug-Resistant Extraintestinal Pathogenic *Escherichia coli* Isolated from Artisanal Cheese

Patricia VIT, Maria ARAQUE, Emanuela BETTA, Gina MECCIA, Daniele VIT, Leonardo VIT, Adriana RESCHINI, Jessica WU-WOODS, Jason E STAJICH, Franco BIASIOLI

Venezuela, Italy, United States

7. Botanical Origin and Volatilome of Kelulut *Heterotrigona itama* Pot-Honey from Malaysia, Antimicrobial and Synergistic Action with Meropenem Against Resistant Bacteria

María ARAQUE, Emanuela BETTA, Patricia VIT, Enrique MORENO, Gina MECCIA, Marylenlid ISLA, Flor D MORA Renan N BARBOSA, Mohd Z MUSTAFA, Franco BIASIOLi

Venezuela, Italy, Panama, Brazil, Malaysia

8. Synergistic Potentiation of Cefotaxime and Ciprofloxacin by *Tetragonisca angustula* Honey Against Strains of Multidrug-Resistant non-Typhoid *Salmonella*

María ARAQUE, Patricia VIT

Venezuela

9. Antibacterial Activity and Synergistic Effect with Amikacin and Ciprofloxacin of Mexican *Melipona beecheii* Pot-Pollen Extracts Against Drug-Susceptible and Multidrug-Resistant *Escherichia coli* strains

Elizabeth ORTIZ-VÁZQUEZ, Carolina DÍAZ-MEDINA, Anahí CHAN-PAZ, Jesús RAMÓN-SIERRA, Felipe POOL-YAM, Alejandro YAM-PUC, Andrés Humberto UC-CACHÓN, Gloria María MOLINA-SALINAS

Mexico

10. The Feasibility of Thai Stingless Bee Honey as a Promising Antibiotic Adjuvant to Battle Drug-Resistant Pathogens

Jakkrawut MAITIP, Wankuson CHANASIT, Surat HONGSIBSONG, Sunisa UNGWIWATKUL, Woranika PROMSART, Lars STRAUB, Kanokwan KLAITHIN, Bajaree CHUTTONG

Thailand

11. Volatilome, Isolation of Fungi, and Synergism of Commercial Pot-Honeys from Bahia, Brazil with Gentamicin and Vancomycin Against *Pseudomonas aeruginosa*, *Escherichia coli*, and two species of *Staphylococcus*

Emanuela BETTA, Patricia VIT, Gina MECCIA, Renan N BARBOSA, Flor D MORA, Thanchanok AUEARCHIN6, Bajaree CHUTTONG, Thanchanok AUEARCHIN, Joana C MOURA, Rarison LIMA, Jason STAJICH, Franco BIASIOLI

Italy, Venezuela, Brazil, Thailand, United States

12. Phytochemicals and Nutraceutical Potential of Stingless Bee Nest Biomaterials: The Emerging Role of Female Stingless Bee Keeping in Global Food Security and Pharmaceutical Development

Patricia VIT, Bajaree CHUTTONG, Ingrid AGUILAR, Ortrud Monika BARTH, Cleofas CERVANCIA, Anna LOCSIN, Jessica BAROGA-BARBECHO, Kemilla Sarmento Rebelo, Favio VOSSLER, Le Nguyen THANH, Prakash KARMAKAR, Ujjwal LAYEK, Gina Meccia, Elia RAMÍREZ-ARRIAGA, Favian MAZA, Claus RASMUSSEN, Sammy KIMOLOI, Megan HALCROFT, Carmen Lucía YURRITA OBIOLS, Silvio LOAYZA, Jesús INFANTE, Flo D MORA, Amelia NICOLAS, Wahizatul Afzan AZMI, Maria Cristina MARCUCCI, David Silva NOGUEIRA, Elizabeth ORTIZ-VÁZQUEZ, Christopher Alphonce MDUDA, Zhengwei WANG, María ARAQUE, Breno Magalhâes FREITAS, Vassya BANKOVA

Venezuela, Thailand, Cosa Rica, Brazil, Philippines, Argentina, Vietnam, India, Mexico, Ecuador, Dinamarca, Kenya, Australia, Guaemala, Malaysia, Tanzania, China, Bulgaria

13. Microbiomes in Stingless Bee Nest Materials: Impact on the Bioactivity of Fermented Pot-Honey, Pot-Pollen and Propolis

Flor D MORA, Patricia VIT

Venezuela

Conclusions

- 215 VOCs were detected and quantified in 17 pot-honeys (13 from Brazil, one from Malaysia, two from Tanzania, and one from Venezuela), one pot-pollen from Venezuela, and two propolis from Tanzania and Venezuela.
- A set of 23 stingless bee species were studied: 13 from Brazil, one from Malaysia, one from Mexico, two from Tanzania, five from Thailand, and two from Venezuela.
- Synergism with antibiotics was studied in one pot-pollen, two propolis, and 11 pot-honeys.
- There are 605 species of SBs… waiting to be tested

Meliponicolous Anti-AMR Agents ?

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Photo: S Ortiz

World Health Organization

Thank you for your attention