

Honeybee digestive tract – source of probiotic microflora with unexplored healing potential.

*Dubná S.<sup>1</sup>, Sedláček I.<sup>2</sup>, Killer J.<sup>3</sup>*



- Probiotics – nonpathogenic living microorganisms, when administered in adequate amounts, confer a health benefit on the host and are able to prevent or improve some diseases.

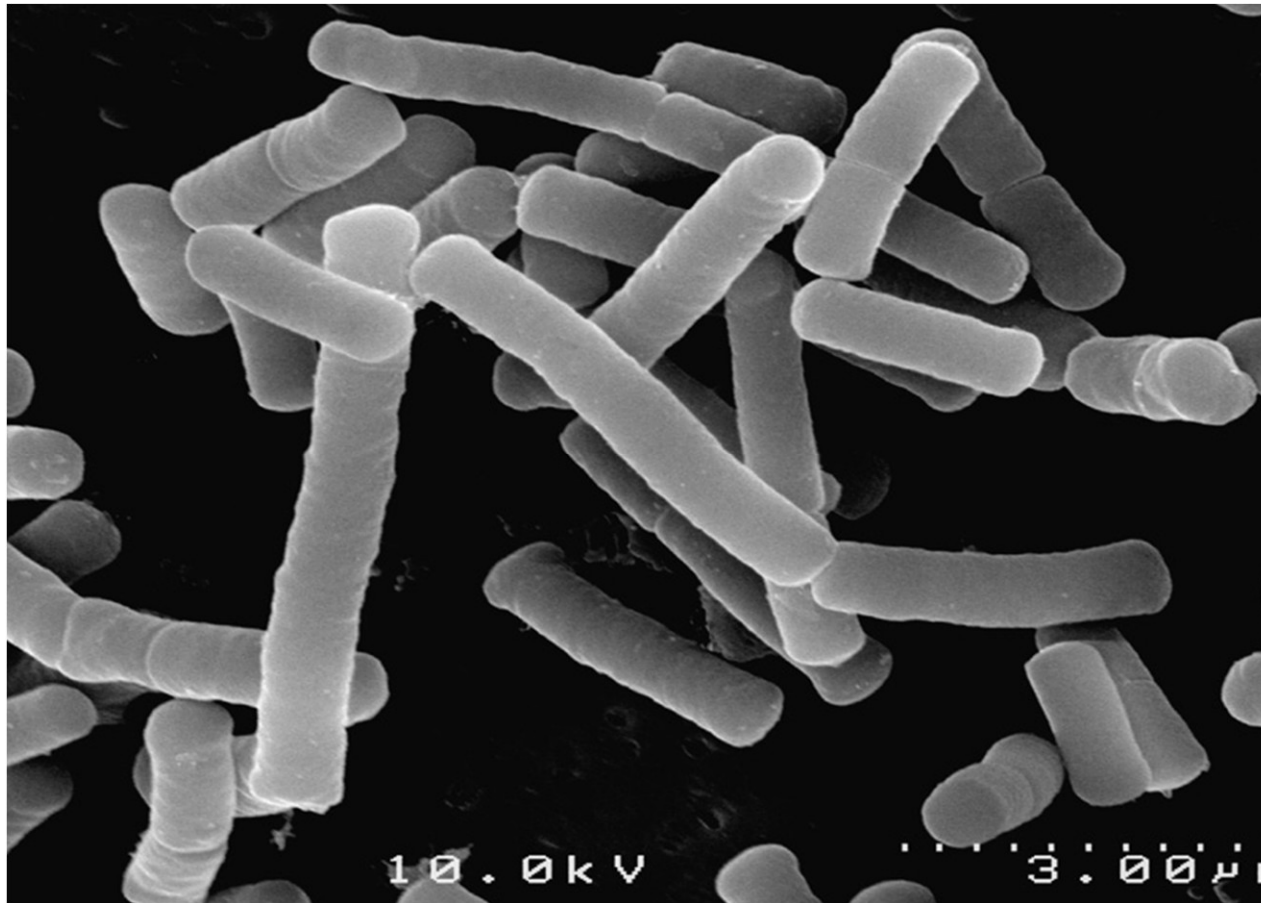
-I.I. Metchnikov – *Lactobacillus bulgaricus* from fermented milk

- H. Tissier – *Bifidobacterium ssp.*

# The effects of probiotics

- Competition with pathogen for adherence to intestinal epithelium
- Synthesis of peptides with bacteriostatic and bactericidal activity
- Influence on immune response
- Inhibition of pathogen overgrowth
- Stimulation of toxin elimination
- Production of short chain fatty acids (lactic, propionic, butyric, acetic)

New *Lactobacillus* ssp. isolated from honeybee  
(Dubná S.)  
*Lactobacillus melliferi*.

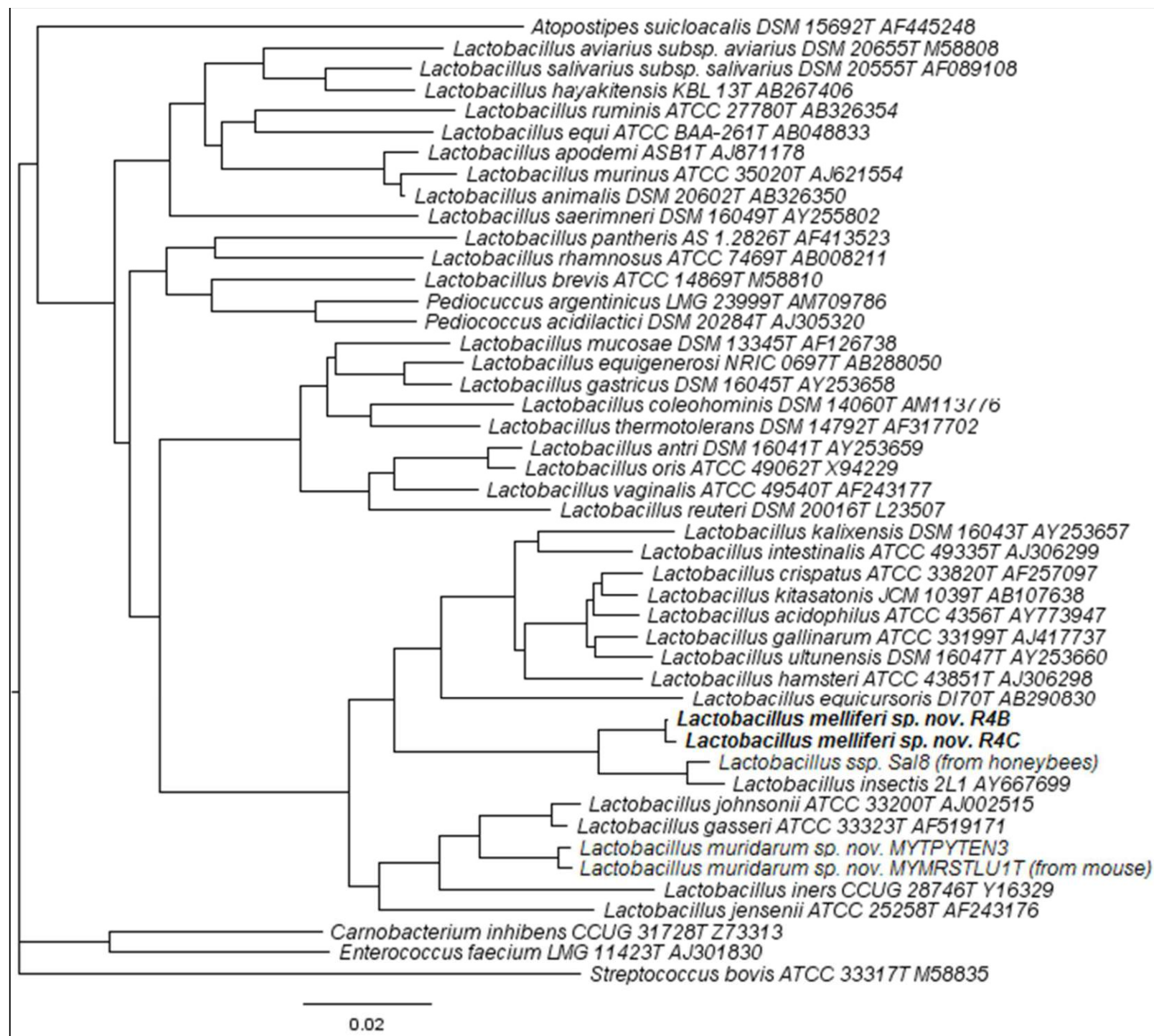


# Results

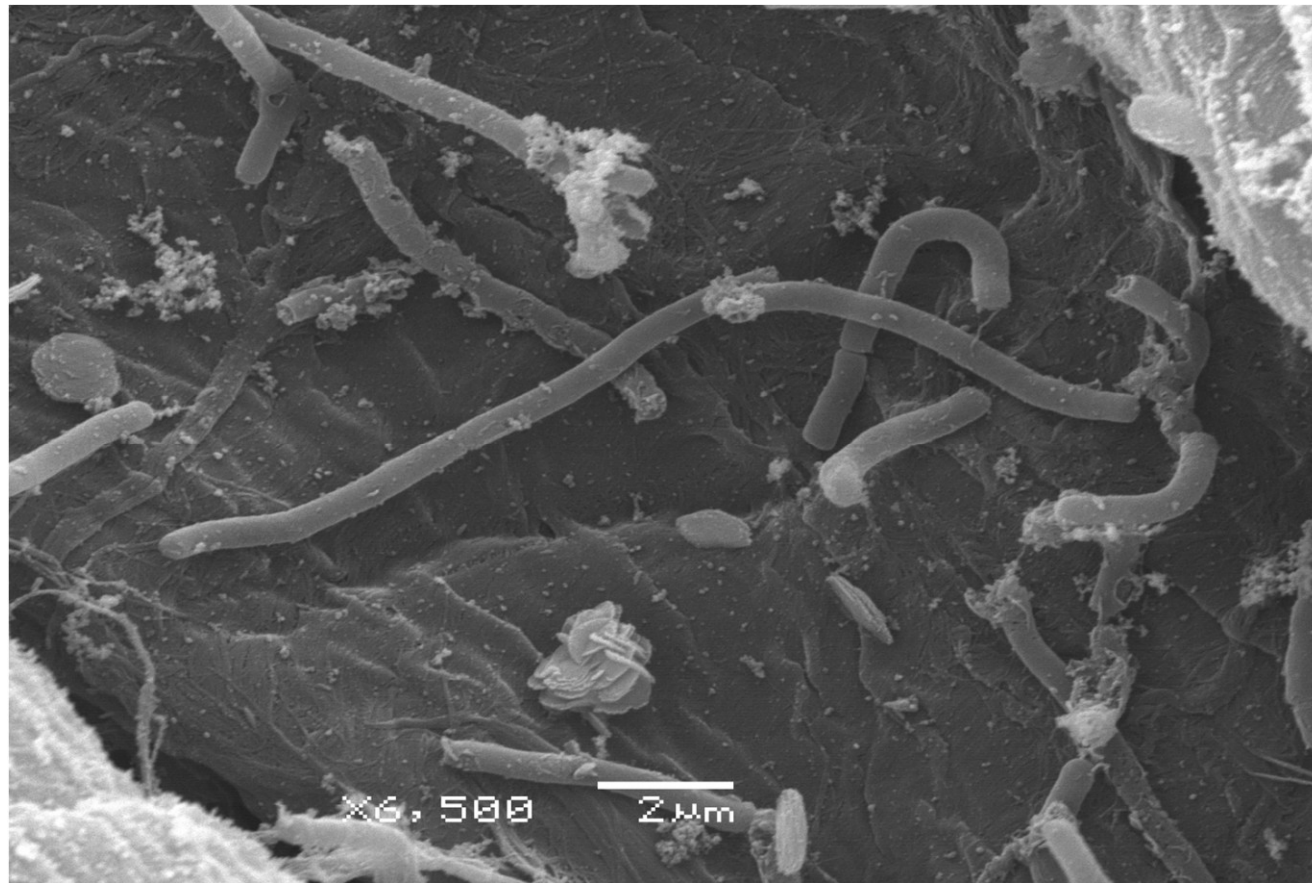
- 16S rDNA sequences of R4B<sup>T</sup> and R4C isolates showed 99.37% similarity to the uncultured *Lactobacillus* AMD B6 from the digestive tract of *Apis cerana indica*, 91.3% similarity to *L. delbruecki* ssp. *delbruecki* and lower to other species of lactobacilli. The strains differ fundamentally in sequence homology of the other phylogenetic markers. They possess only 85.3% homology of the *hsp60* gene with type strain of *L. helveticus* and lower with other lactobacilli. Similar results were obtained in the case of the remaining phylogenetic markers cited above. Classification of the isolates into the genus *Lactobacillus* was supported by the morphology of the cells and analysis of G(uanine)+C(ytosine) content (mol%) in bacterial DNA. *Lactobacillus melliferi* sp. nov. (R4B<sup>T</sup>) is proposed names for the new species.

- New species within the genus *Lactobacillus* was isolated from the digestive tract of european honeybees. The type strain R4B<sup>T</sup> differ from other species of lactobacilli in sequence homology of many phylogenetic markers and phenotypic characteristics (e.g. utilization of different saccharides, production of different enzymes, profile of cellular fatty acids etc.). The proposed name: *Lactobacillus melliferi* sp. nov. according to the Latin name of honeybees (*Apis mellifera* ssp. *mellifera*)....





## 2. New strain





### 3. New strain

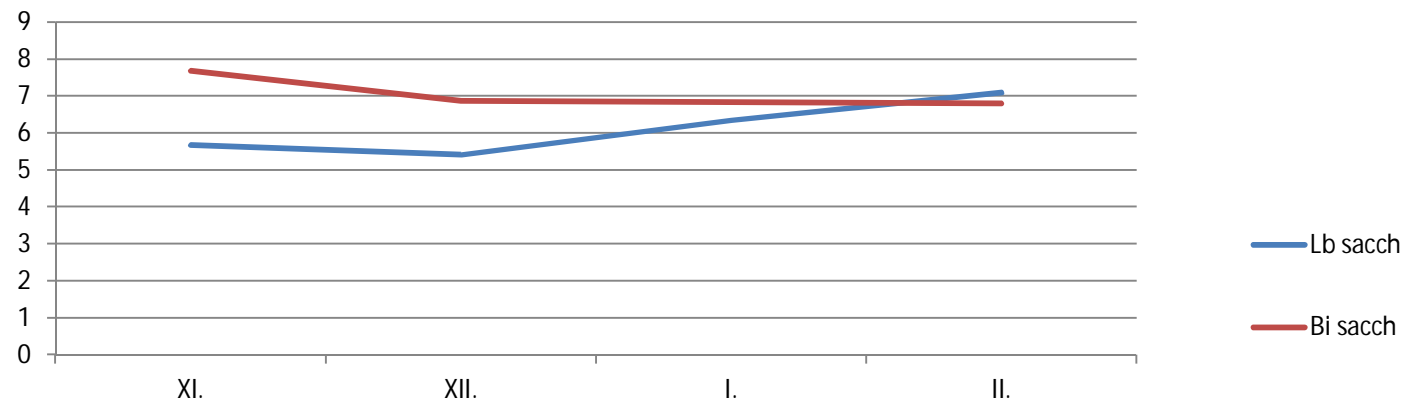


Inhibition of *Paenibacillus larvae* with new strains.

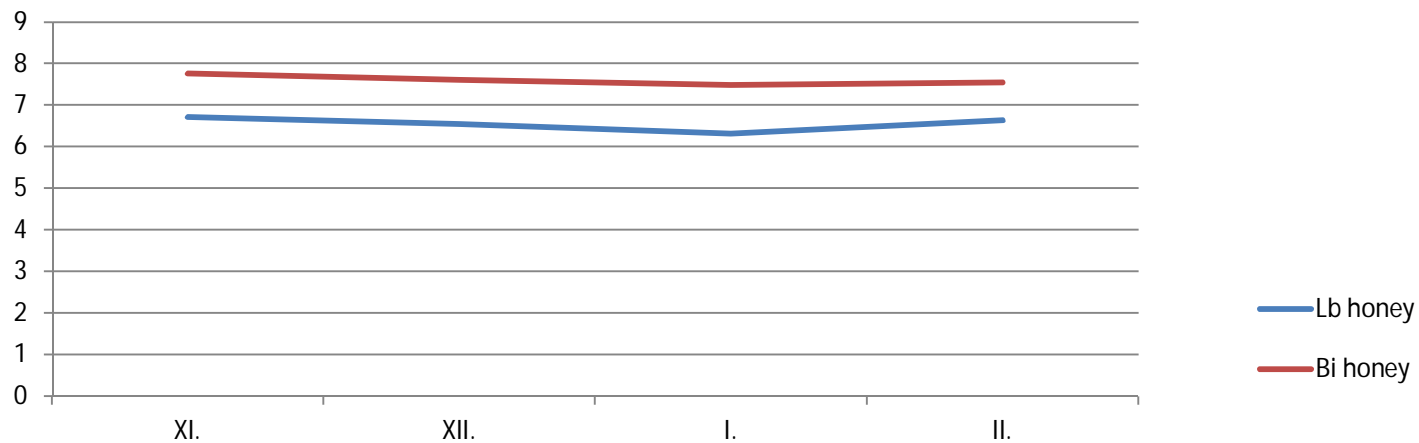


**A. Occurance of *Lactobacilli* and *Bifidobacteria* in bees hivering on saccharosis supplies (CFU/g of faeces)**

**B. Occurance of *Lactobacilli* and *Bifidobacteria* in bees hivering with honey**



**A**



**B**

Medium for cultivation of probiotic  
microorganisms ( $2 \times 10^9$  –  $2 \times 10^{10}$ /1 ml)



# Product development

- $2 \times 10^{6-7}$  / 1 bee (20 000 bees)
- Patent protection
- Registration

Cooperation with Czech collection of microorganisms.

Inhibition of *Aspergillus flavus* with a strain isolated from honey bee.





- Inhibition of *Listeria monocytogenes*
- Inhibition of *Gardnerella vaginalis*

# Authors

- Dubná S.: Privat laboratory, Zelenečská 42, Praha 9, 198 00
- Sedláček I.: Czech collection of Microorganisms, Masaryk university, Faculty of science, Tvrdého 14 Brno, 302 00
- Killer J.: Institute of Animal Physiology and Genetics, Academy of sciences of the Czech Republic, Vídeňská 1083, Prague 4, Krč

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