

# Lund University

(In southern Sweden)



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2006.06.22 13

# **Novel Lactic acid bacteria from the honey stomach of honey bees – the answer to the beneficial properties of honey, bee pollen and bee bread**



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# Lactobacilli & Bifidobacteria

- fermented food – yoghurt, olives
- fermented beverages – beer, wine
- humans & animals – as protectors in the gut, vagina, mouth
- honey bees



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# Discovery



**Naturally occurring  
Lactic acid bacteria  
(LAB)  
within honeybees  
and their products**

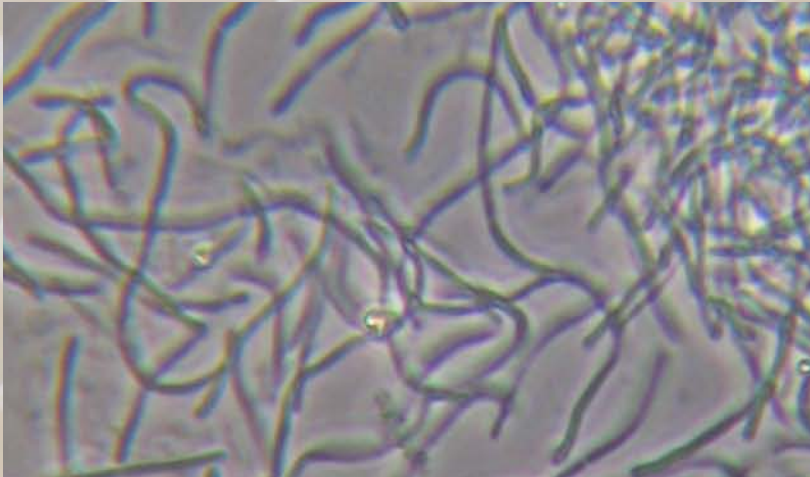
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# The discovered LAB flora

*European and American honey bees*  
– *A. mellifera*



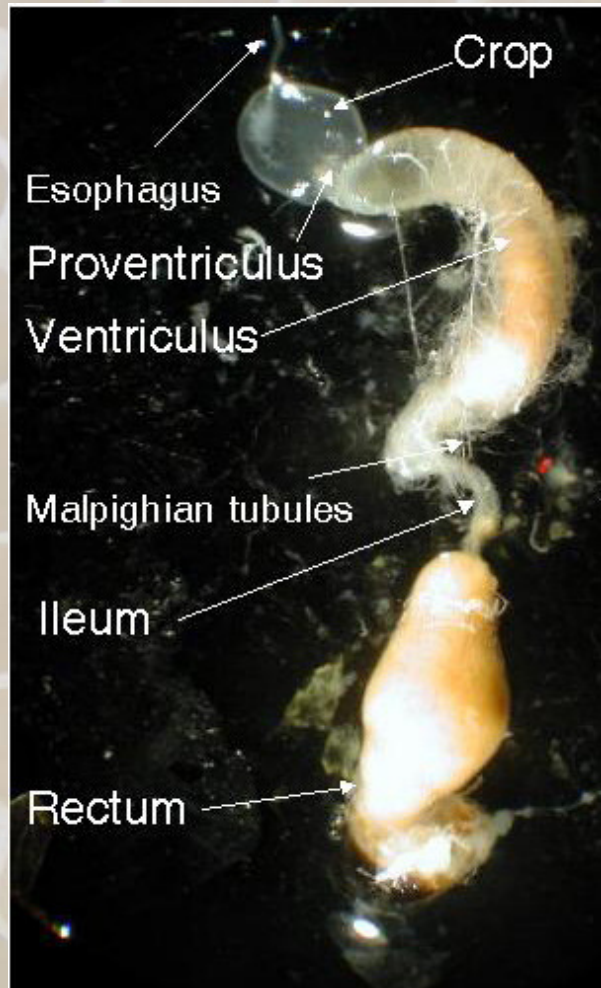
***Lactobacillus* spp. (9)**



***Bifidobacterium* spp. (4)**

Vásquez, A., Olofsson, T. C. & Sammataro, D.  
*Apidologie* DOI:10.1051/apido:2008063 (2009).

# The Honey Stomach



Home of the beneficial bacteria





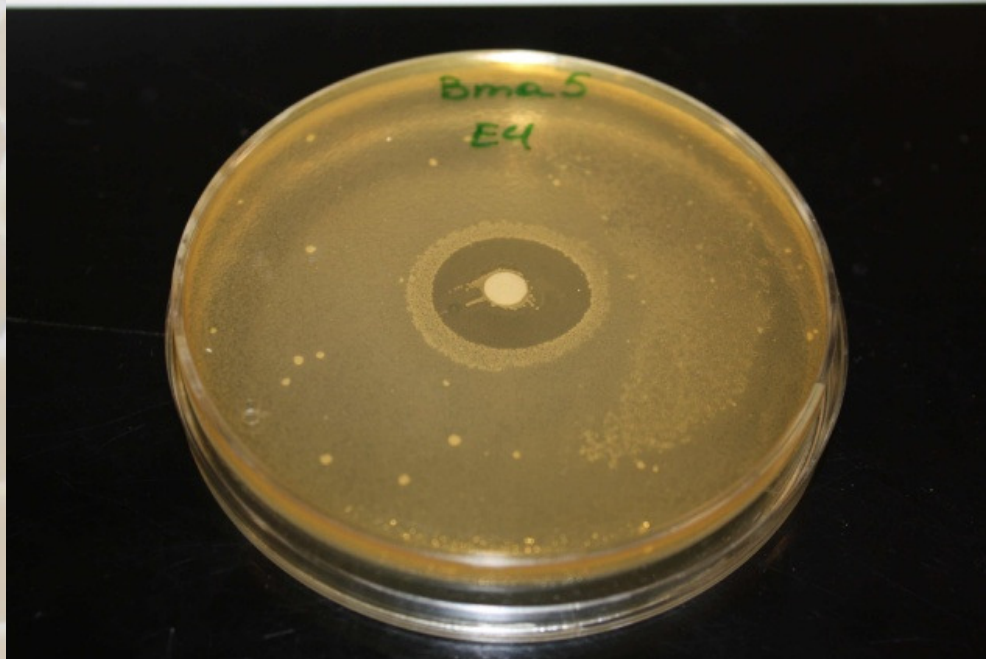
# LAB-antibacterial compounds

**Lactic acid, acetic acid, formic acid,  
hydrogen peroxide, antibiotics etc.**  
are all produced by these beneficial  
bacteria

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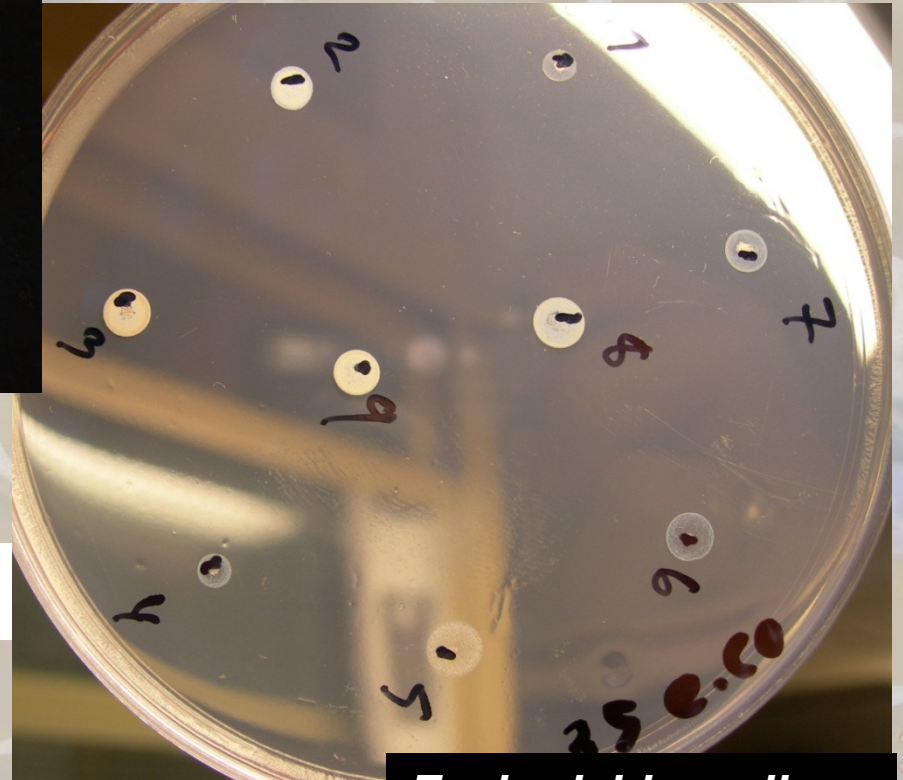


# Antimicrobial properties



***Paenibacillus larvae***

Forsgren, E., Olofsson, T. C., Vásquez, A. & Fries, I. In press, *Apidologie*.



***Escherichia coli***

# How many?

- **13** different types of lactobacilli & bifidobacteria
- 1 000 000 bacteria of each type in one honey stomach → **13 000 000 in total**
- **1 300 000 bacteria/g in fresh honey - *A. mellifera***



# → FUNTIONAL FOODS AND ADDITIVES

- A fermentive food?
- A natural synbiotic food product?
- A natural probiotic food product?



- The novel LAB flora is consumed viable in honey daily



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# The secret of bee bread

All honey stomach bacteria involved in bee bread!



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## **BENEFICIAL BACTERIA** in honey stomach



**Bee bread**

**Honey**

**Bee pollen**

**Defense against  
American foul brood**

**Antimicrobial  
compounds**

**Organic acids**



**Health of the entire colony**