

Isolation and Identification of Lactic Acid Bacteria in Insects

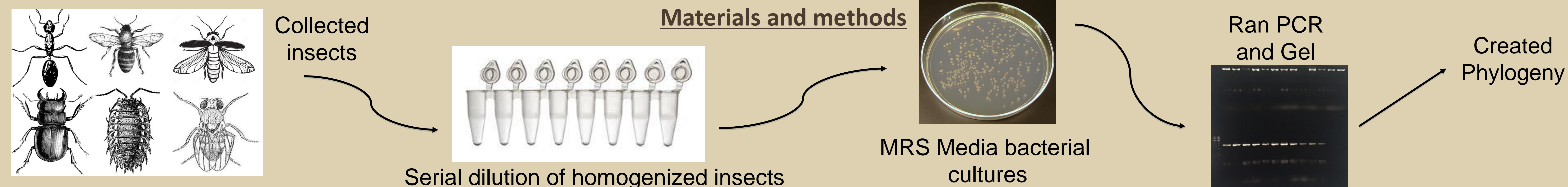


Eric R. Larson; Jessica Gutierrez; Fredrick J. Lee; Irene L. G. Newton, Ph.D.

Indiana University, Bloomington, IN 47405

Abstract

Lactic acid bacteria (LAB) are symbionts to the honeybee and aid in the disassociation of complex polysaccharides. For the most part, however, little is known about the function of lactic acid bacteria and the role they play in their hosts. **This study examined whether lactic acid bacteria were present in a wide array of insects and if so, determined what species of the LAB's were present.** Six species of insects were collected from Dunn Woods, and these insects were homogenized and serially diluted. The bacteria were then streaked and incubated at 37 degrees Celsius for three days. We sequenced the 16S rRNA gene. Sequencing results showed that four different species of LAB's were present in the insects. The LAB's were similar for different samples of the same insect, but different across the range of insects. Further research will study the effects of LAB's on host-specific metabolism and investigate other possible functions of the bacteria.



Background Knowledge

- Bacteria are symbionts to their hosts
 - Parasitism: harm the host
 - Mutualism: benefit the host and the bacteria
 - Commensalism: has no effect on the host
- Bacteria can be gut symbionts
 - Typically mutualistic
 - Aids in metabolism, absorbing nutrients, producing vitamins, and storing fats
- Lactic Acid Bacteria (LAB's)
 - Anaerobic
 - Aid in fermentation
 - Break down complex polysaccharides
- The function of lactic acid bacteria is not well understood, and the first step in discovering function is identification indifferent species.

Proposed Research Questions

- Are lactic acid bacteria present in a wide array of insects?
- Which lactic acid bacteria (if any) are present?

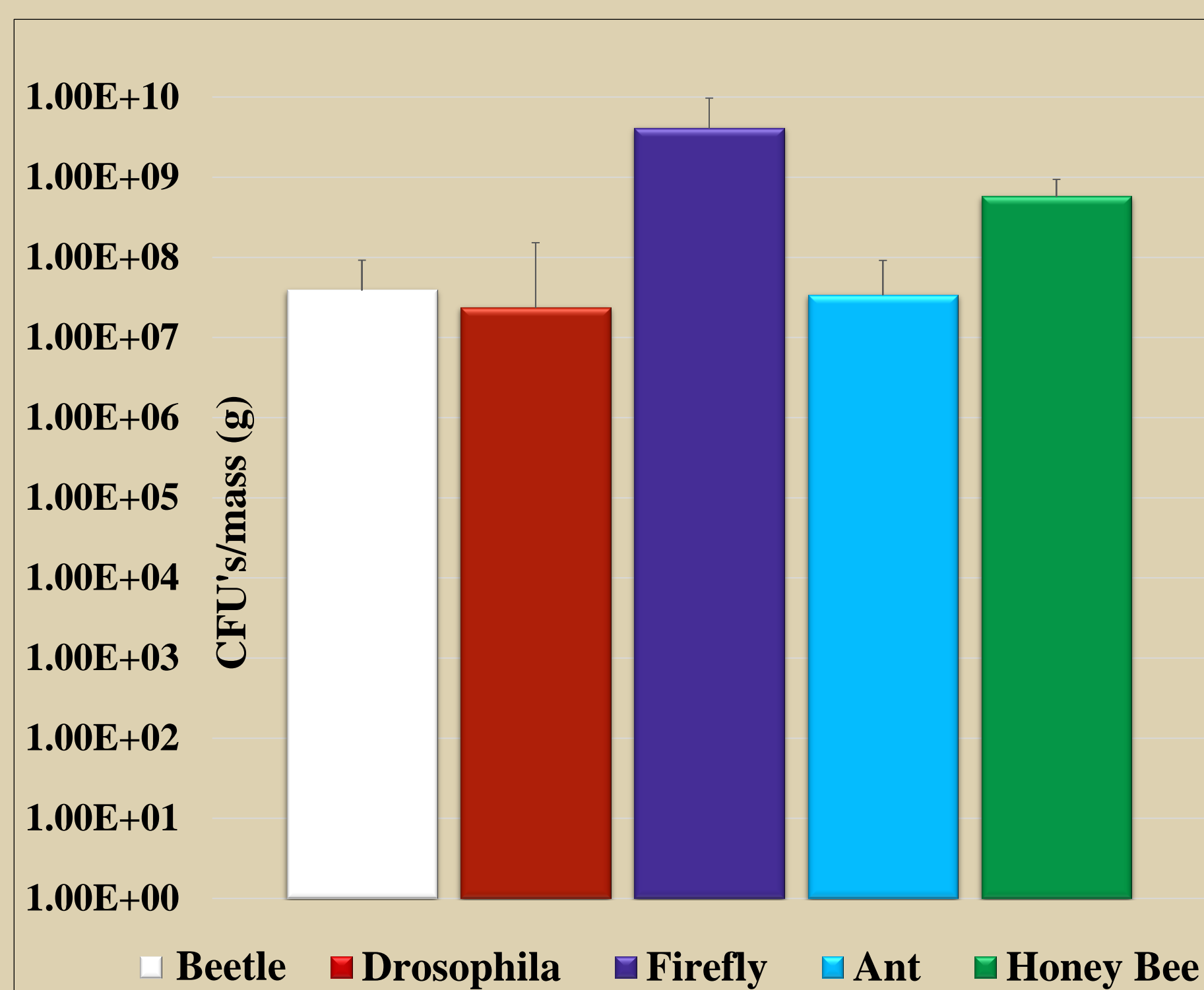


Figure 1: (left) Fireflies had the most CFU's / weight.

Insect	Bacterial Species	% Similar
A1	Fructobacillus	100
A2	Fructobacillus	100
A3	Fructobacillus	100
A4	Fructobacillus	100
A6	Fructobacillus	100
H1	Firm-5 *	99
H2	Firm-5 *	96
H3	Firm-5 *	68
H4	Lactobacillus apis strain 1F1	89
H5	Firm-5 *	91
H6	Firm-5 *	99
D1	Enterococcus haemoperoxidus	100
D2	Enterococcus haemoperoxidus	100
D3	Enterococcus haemoperoxidus	100
D4	Enterococcus haemoperoxidus	100
D5	Enterococcus haemoperoxidus	100
F1	Enterococcus haemoperoxidus	100
F2	Bacillus coagulans	92
F3	Bacillus coagulans	99
F4	Bacillus coagulans	100
F5	Bacillus coagulans	97
F6	Bacillus coagulans	100

Figure 2: (left) This table lists the different species found in the different insects. Notice: insects of the same species had the same LAB.

*Isolate classified at Family level

Results

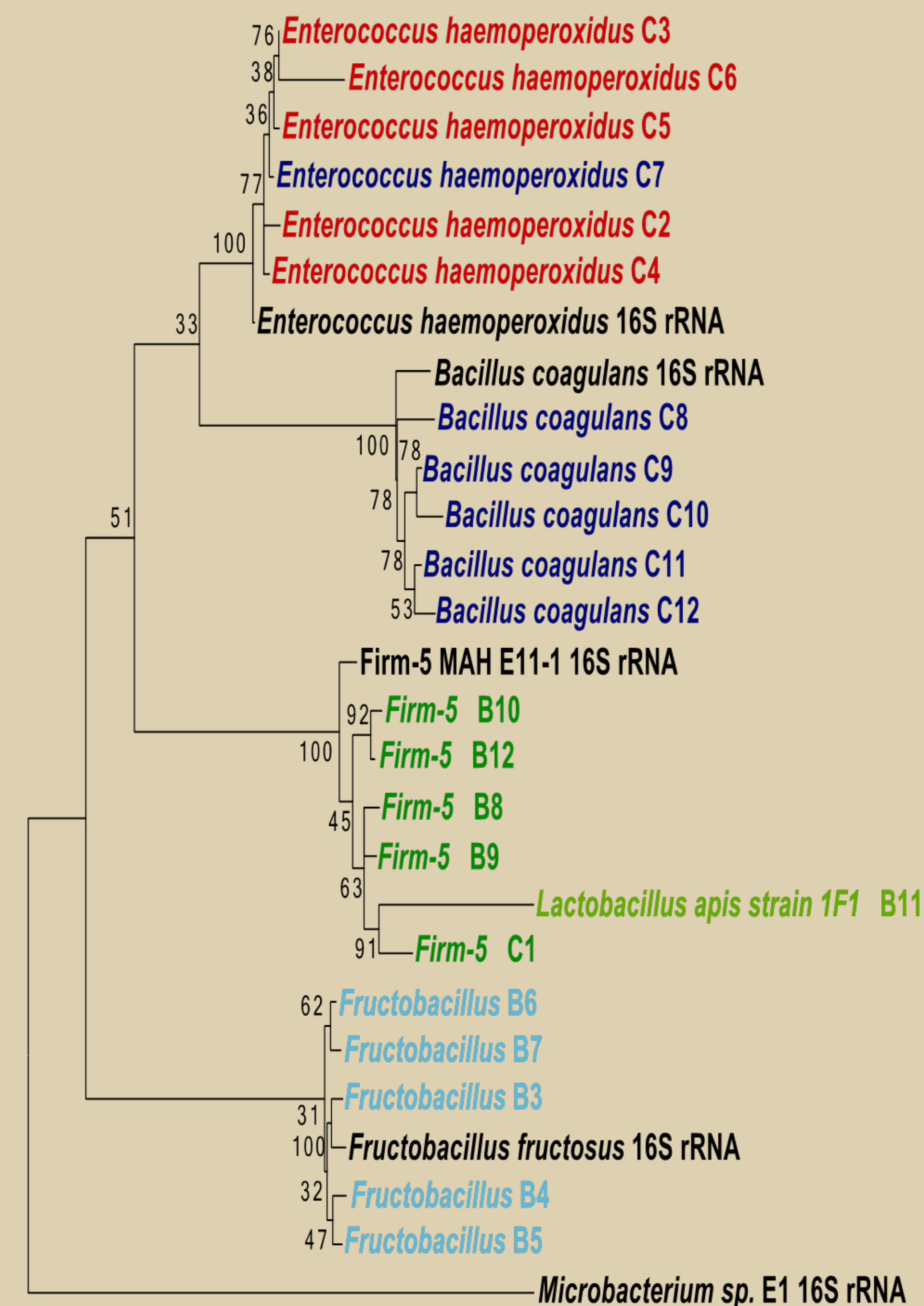


Figure 3: (above) The phylogenetic tree proves the relationships between the LAB's. Sequences in black obtained from NCBI. *Microbacterium* is the outgroup.

Ant
Honeybee
Drosophila
Firefly

Conclusions

- Some insects did not have LAB
 - Pillbug had no growth, beetle had little
- Some insects had more bacteria than others
 - Firefly had the most, Drosophila had the least
- Four families were identified from the DNA sequences
- Different genus' of LAB's were associated with different species of insects.
- Diverse across samples, but similar within insect species

Further Direction

- Do different LAB's have the same effect on the metabolism of their host?
- Would growing the colonies aerobically or on a different media have a different outcome?

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Literature Consulted

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