

# *Bifidobacterium*

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Analysis of infant isolates of *Bifidobacterium breve* by comparative genome hybridization indicates the existence of new subspecies with marked infant specificity

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# *Bifidobacterium*

- Strictly anaerobic Gram-positive
- Colonizes the gastrointestinal tract
- Glycosidases and unique sugar metabolic pathways
- Highly abundant in infants, especially breast-fed
- Health-promoting effects –used as probiotic
- Pictures: [www.microbewiki.kenyon.edu](http://www.microbewiki.kenyon.edu) and [www.21food.com](http://www.21food.com)



# *Bifidobacterium* species

|                        |                       |                             |                           |
|------------------------|-----------------------|-----------------------------|---------------------------|
| <i>B. adolescentis</i> | <i>B. choerinum</i>   | <i>B. infantis</i>          | <i>B. pseudolongum</i>    |
| <i>B. angolatum</i>    | <i>B. coryneforme</i> | <i>B. inopinatum</i>        | <i>B. pullorum</i>        |
| <i>B. animalis</i>     | <i>B. cuniculi</i>    | <i>B. lactis</i>            | <i>B. ruminantium</i>     |
| <i>B. asteroides</i>   | <i>B. denticolens</i> | <i>B. longum</i>            | <i>B. saeculare</i>       |
| <i>B. bifidum</i>      | <i>B. dentium</i>     | <i>B. magnum</i>            | <i>B. subtile</i>         |
| <i>B. boum</i>         | <i>B. gallicum</i>    | <i>B. merycicum</i>         | <i>B. termacidophilum</i> |
| <i>B. breve</i>        | <i>B. gallinarum</i>  | <i>B. minimum</i>           | <i>B. termophilum</i>     |
| <i>B. catenulatum</i>  | <i>B. indicum</i>     | <i>B. pseudocatenulatum</i> |                           |

Krzewinski 1997 –Revision Gavini 2001

# Aim of study

- Isolate and characterize *Bifidobacterium* strains from fecal samples from breast- and bottle-fed infants
- Screen for possible correlations between the host origin and the characteristics of the isolates

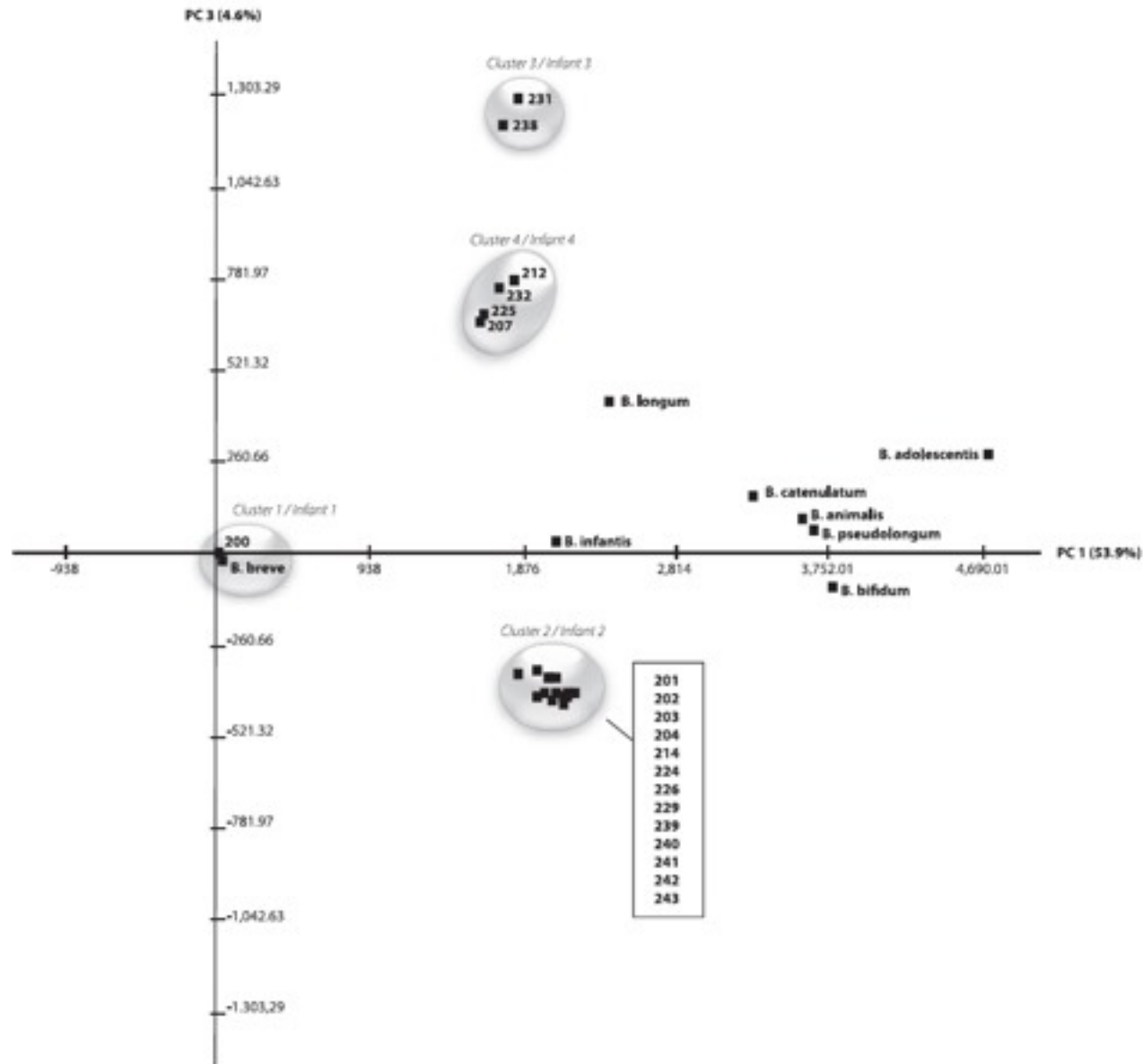
# Materials and Methods

- Comparison of 8 type strains and 20 isolates from infants by DNA-based microarray
- Biochemical characterization and 16S ribosomal sequence analysis
- Bile salt hydrolase activity and production of; lactic acid, ammonia, tyramine and histamine
- Sequencing and Blastn

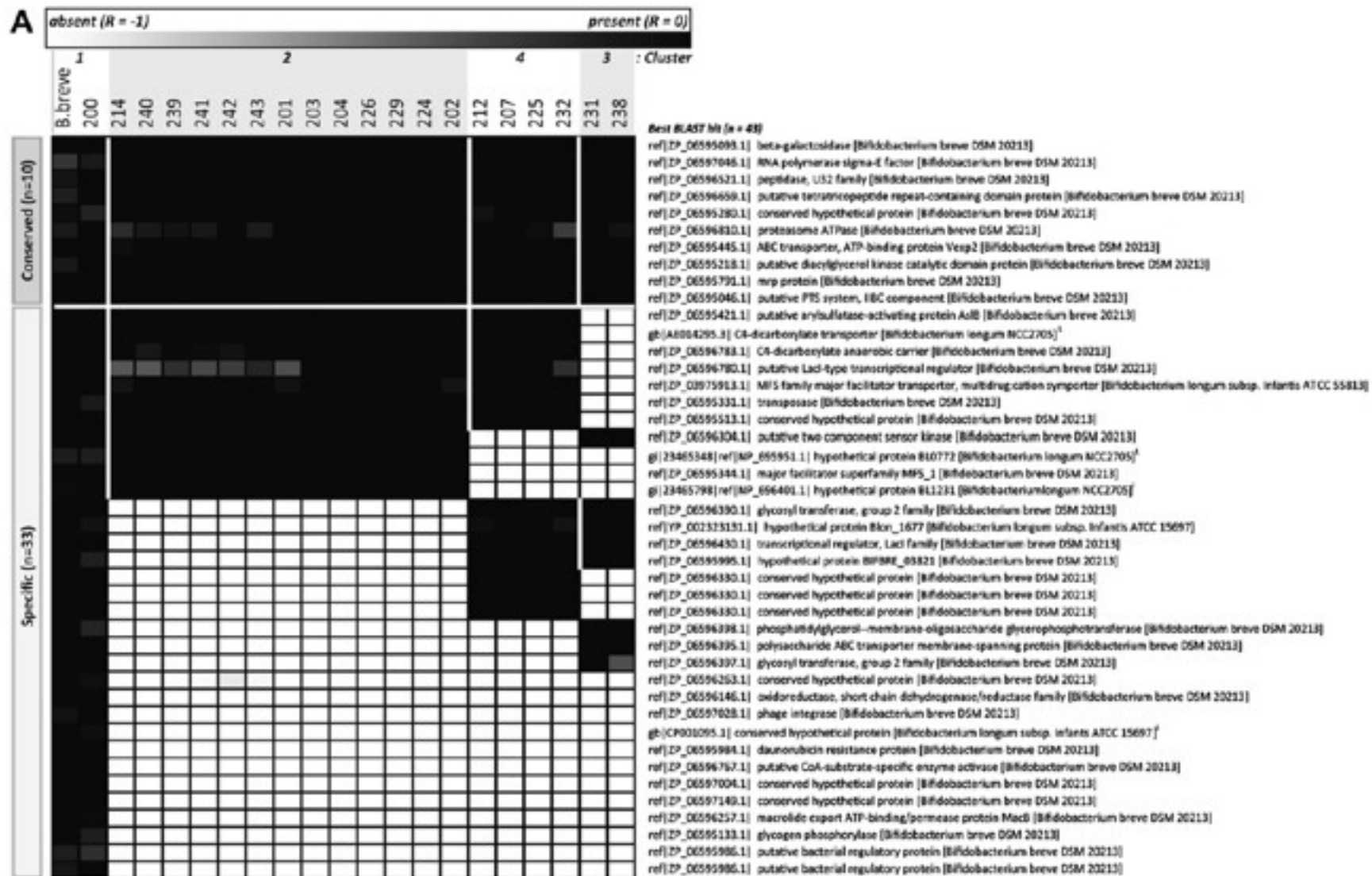
# Results

- Microarray with 2000 clones representing 85% of *B. breve* type strain
- Isolates contain 60-90 % of *B. breve* type strain genes
- All isolates showed biochemical characteristics of *B. breve*
  - All isolates produced L-lactate
  - No isolates produced D-lactate
  - No isolates produced ammonia, histamine or tyramine

# Results: Figure 1

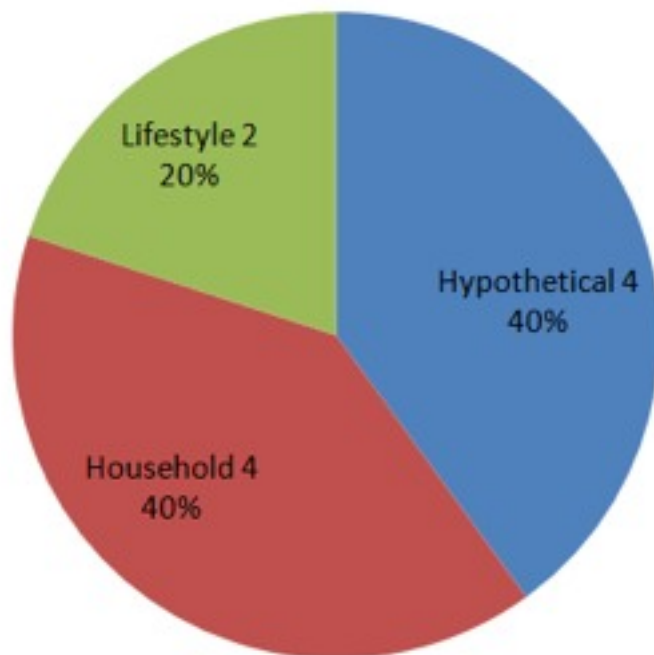


# Results: Figure 2A

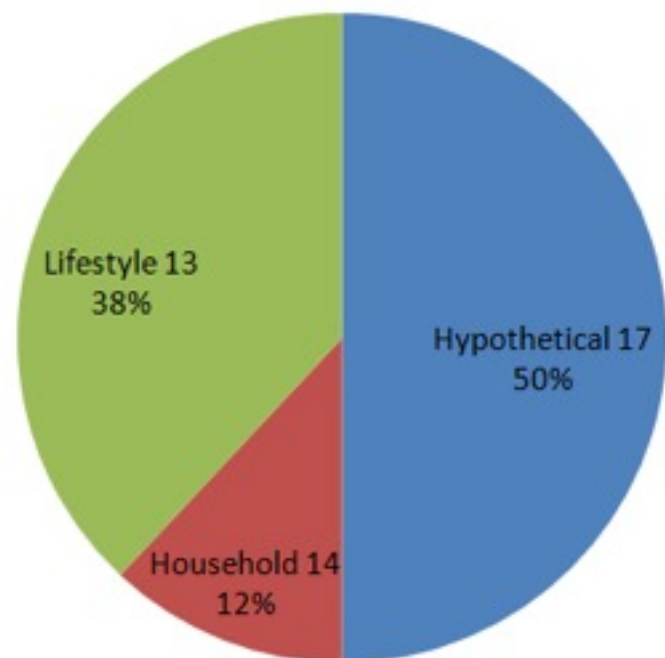


# Results: Figure 2B

**Conserved clones (n=10)**



**Specific clones (n=33)**



# Summary of results

- All isolated strains were characterized as *B. breve*
- One unique strain in each infant
- Specific clones especially showed homology to life style genes
- Conserved clones especially showed homology to housekeeping genes

# Future perspective

- Include larger studygroup to verify preliminary results and for further investigation
- Identification/verification of strain-specific genes as genetic markers
- Investigate if there is a difference in isolates from breast-fed vs. bottle-fed infants

# Critique points

- Why not make a phylogenetic tree?
- Figure in gray scale is not viewer-friendly
- Show homology results from Blast
- How is Best Blast hit defined for figure 2?
- Conclusions: Molecular markers (few data –only 4 infants) and horizontal transfer
- Comment on breast-fed vs. bottle –fed infants

# Critique points

Leblond-Bourget et al., 2009

