

Characterization of the archaeal community of colostrum and fecal samples of Mexican mothers and newborns.

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BACKGROUND:

Studies on the human colostrum microbiota have focused on bacteria, demonstrating their transmission to newborns during breastfeeding.

The composition of archaea in human colostrum remains unknown, as well as whether they are transferred to the newborn during breastfeeding.

METHODS

1. N = 40, mother-neonate pairs from the State of Mexico. Samples consisted of colostrum and neonatal stool.

2. DNA extraction, preparation of 16S rDNA library and high-throughput sequencing.

3. Bioinformatic Analysis



Acknowledgements

Work supported by CONACyT 163235 INFR-2011-01 and CONACyT FORDECYT-PRONACES/6669/2020_Programa Presupuestario F003-Ciencia de Frontera 2019.



RESULTS

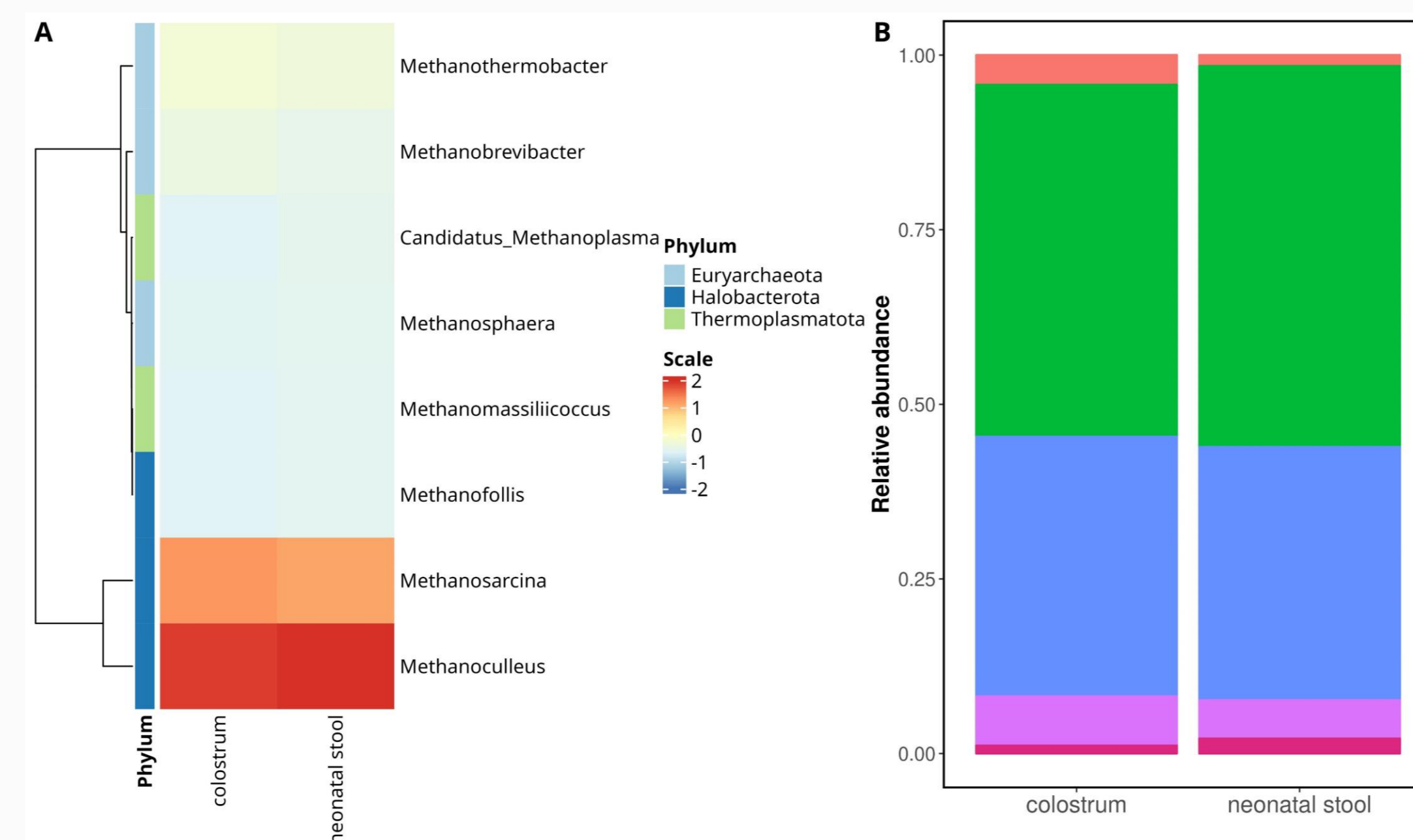


Figure 1. (A) Core microbiota heatmap among samples. (B) Archaeal genus relative abundance.

- Methanoculleus spp. was the most abundant genus in mother-neonate pairs.
- Colostrum and neonatal stool showed similar taxa composition.

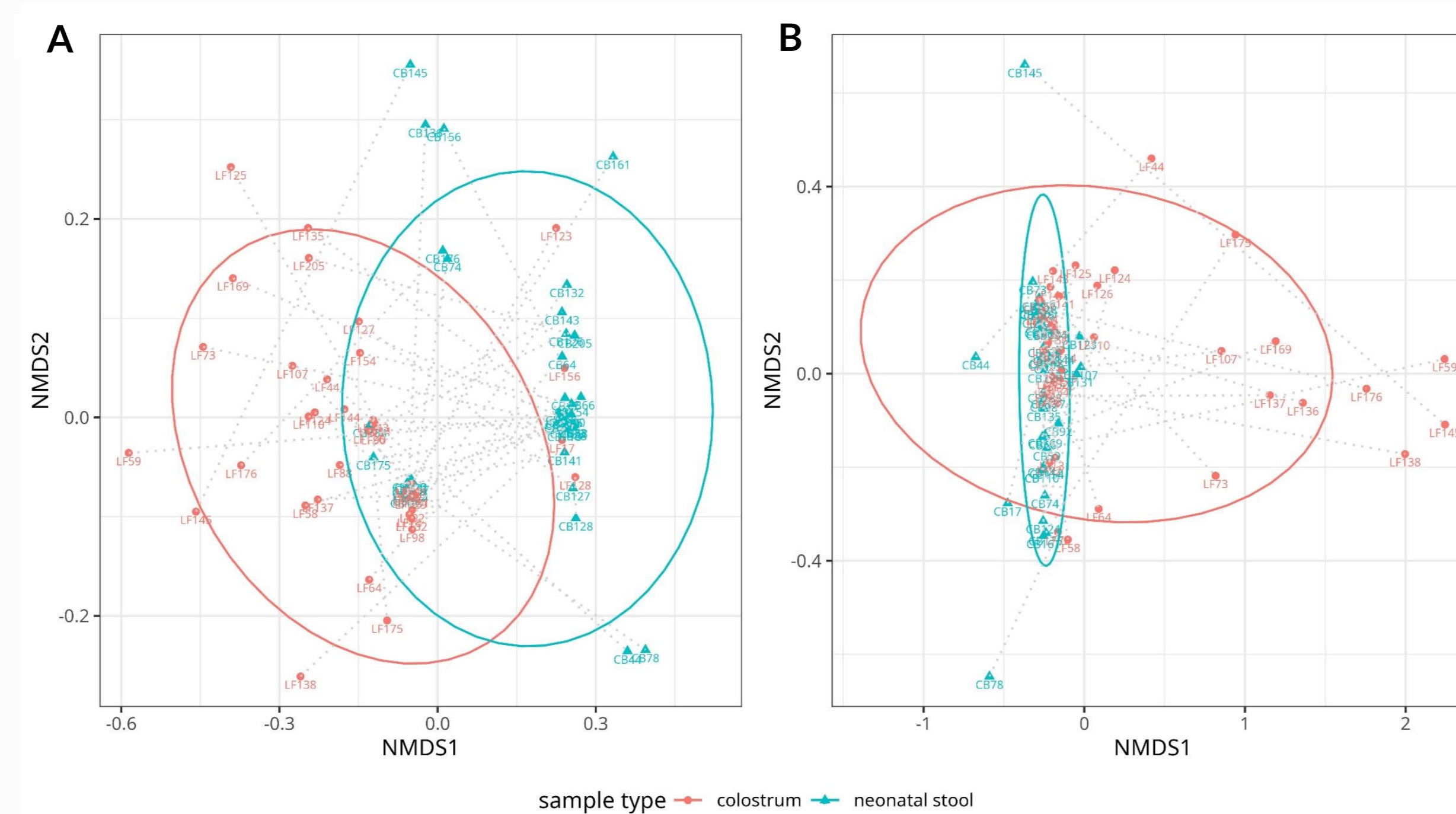


Figure 2. Beta diversity Non-Metric Multidimensional Scaling (NMDS) scatter plots. The graphics show archaeal beta diversity calculated by NMDS ordination based on the UniFrac distance matrix (left, unweighted UniFrac; right, weighted UniFrac).

- Beta diversity analysis showed colostrum's and stool's communities were highly similar (ANOSIM, $p = 0.001$)

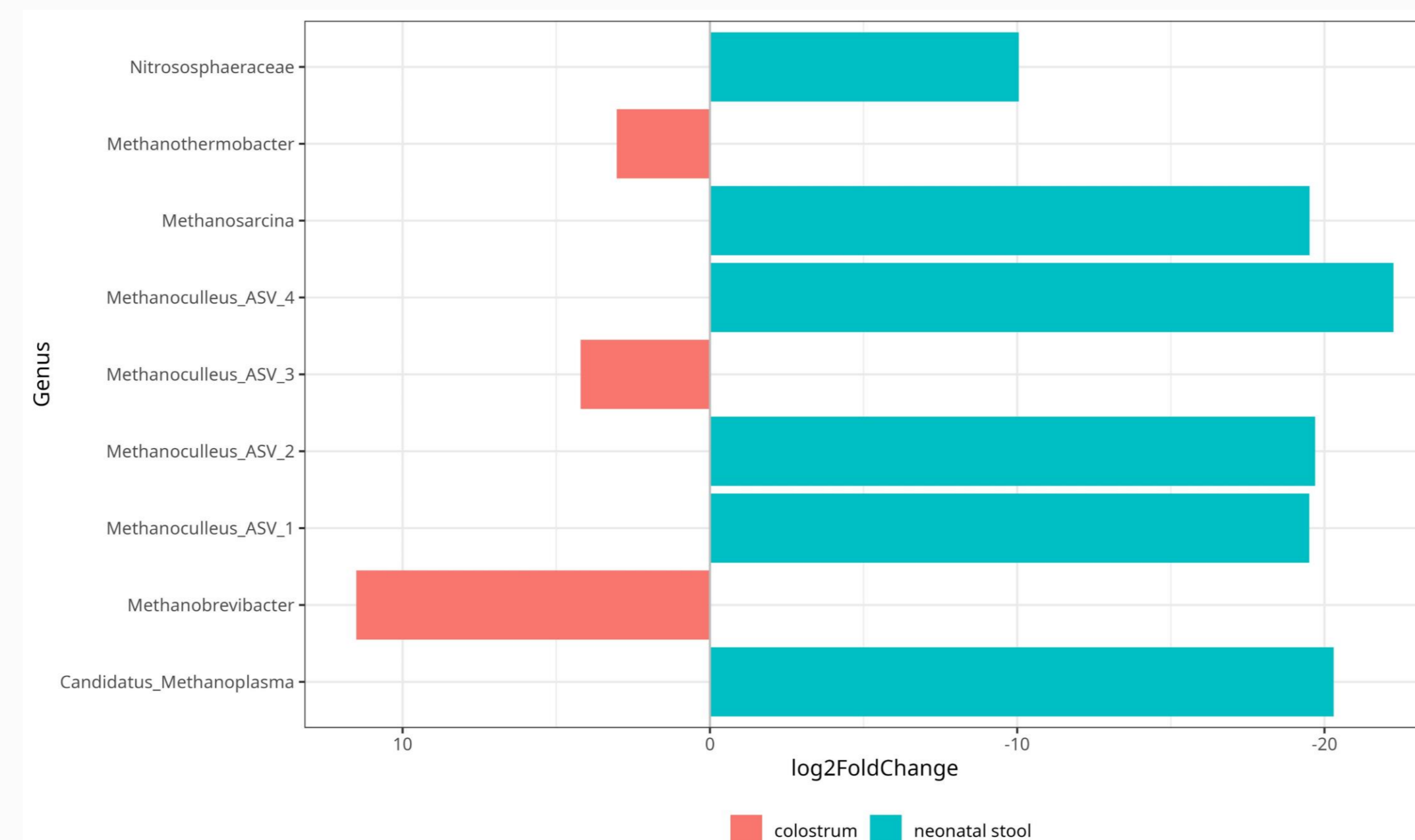


Figure 3. Differential abundance analysis of archaea genera between colostrum and neonatal stool with DESeq2.

- Differential abundance of taxa found between neonatal stool and colostrum suggest other possible origins of archaea to the neonatal gut.

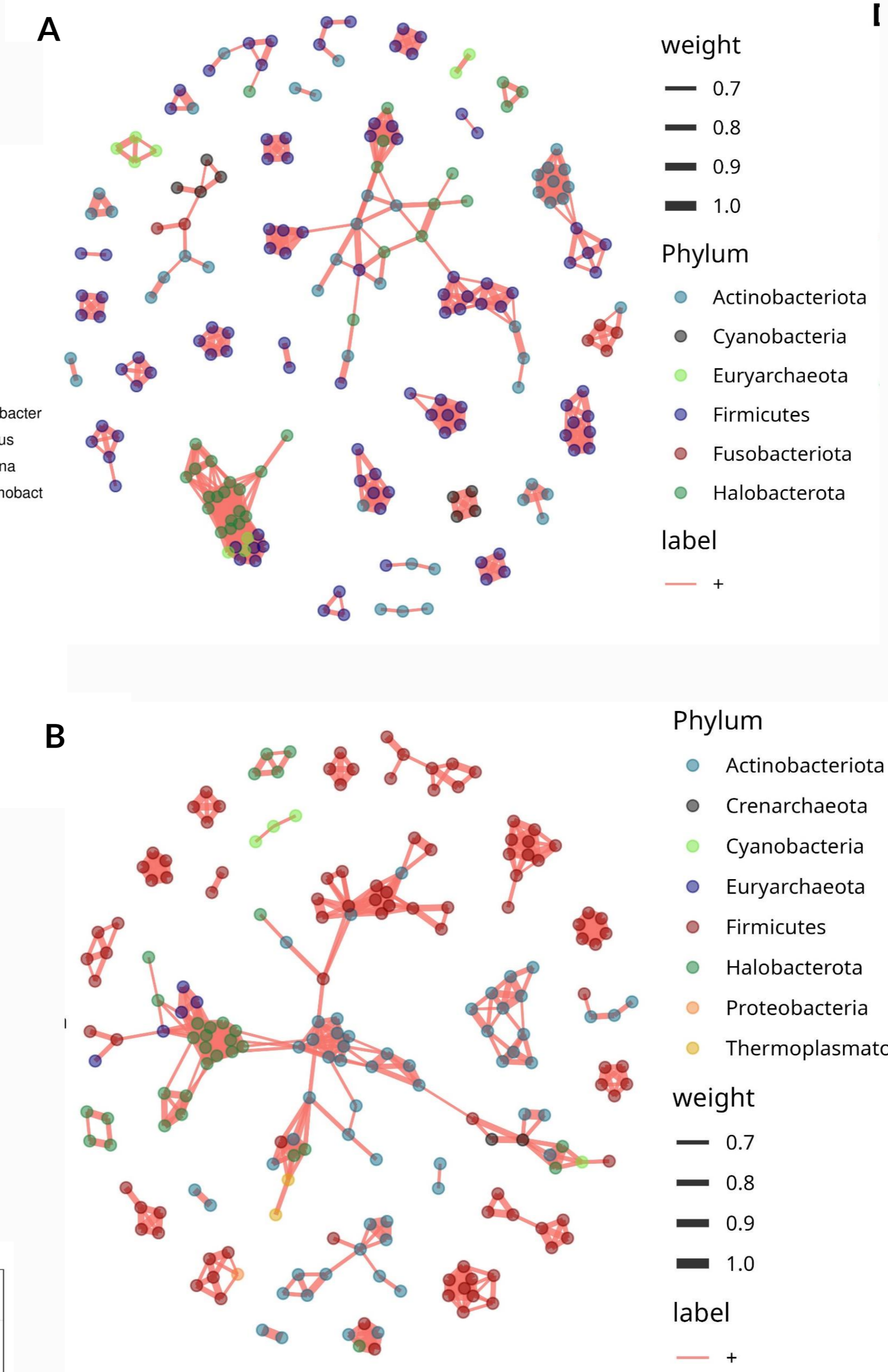


Figure 4. (A) Microbial co-occurrence network of human colostrum. A connection between nodes stands for a strong (Spearman's $\rho > 0.6$) and significant ($p > 0.01$) correlation. (B) Microbial co-occurrence network of neonatal stool. A connection stands for a strong (Spearman's $\rho > 0.6$) and significant ($p > 0.01$) correlation.

- There were 114 (39.6%) edges in common in the co-occurrence networks between human colostrum and neonatal stool.

CONCLUSIONS

- The similarities found in taxa composition, beta-diversity and co-occurrence analysis between colostrum and neonatal stool samples suggest that Archaea are transmitted to the neonate via the mother's colostrum.
- Nevertheless, differential abundances between the sample types suggest other relevant sources for the colonization of archaea to the neonatal stool.
- The main archaeal species found correspond to methanogens.

PERSPECTIVES

- Future studies should explore the functional aspects and the microbiota-host interactions of the archaea present in the neonatal gut.
- Studies involving distinct human populations should improve our understanding of these communities.

Archaea are vertically transmitted during breastfeeding

