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Community-Level Profiling of Gut Bacteria in Sand Flies from a Human Leishmaniasis-Endemic Region: Implications for Disease Transmission and Control

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INTRODUCTION & AIM

- Leishmaniasis is a neglected tropical disease affecting millions worldwide. Sri Lanka reports increasing human cases.

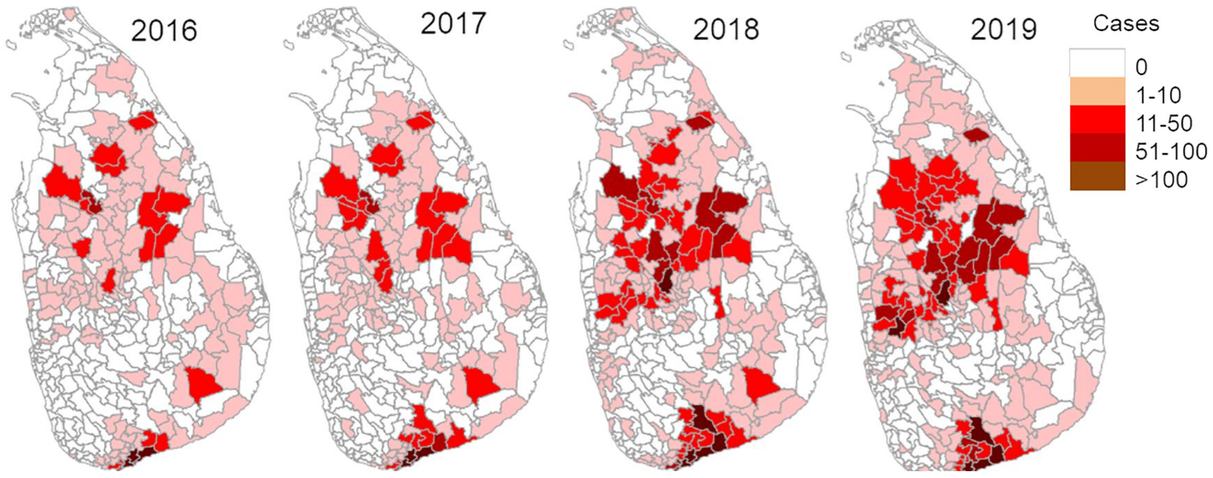
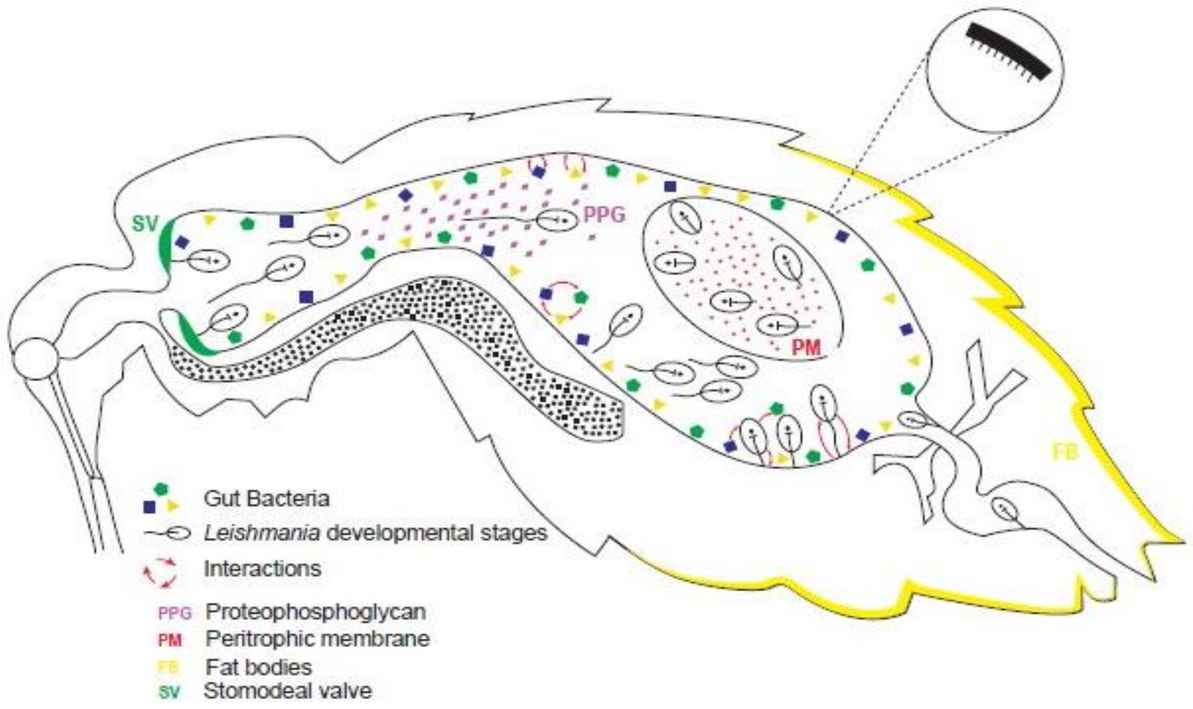


Figure 1. Spatiotemporal distribution of cutaneous leishmaniasis cases in Sri Lanka from 2016–2020 [1].

- Sand fly gut bacteria interact with Leishmania parasites, directly influencing vector competence and transmission.



KNOWLEDGE GAP

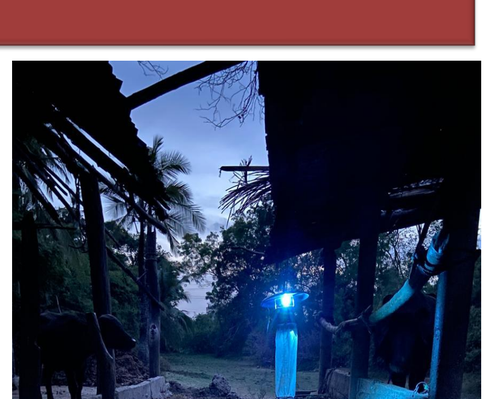
- Gut bacterial communities in sand flies from active endemic regions of Sri Lanka remain uncharacterized using culture-independent methods.

AIM

- To profile the gut bacteria of *Phlebotomus argentipes* and *Sergentomyia punjabensis* from a leishmaniasis-endemic region of Sri Lanka and identify bacterial candidates for microbiome-based vector control.

METHOD

- Study site: Mihintale, Sri Lanka
- 8.389975, 80.5196080
- CDC light trapping (18:00–06:00 h)
- Replicates: Pooled samples by sex (n=50 each)
- Sequencing: NGS 16s rRNA
- Species: *Phlebotomus argentipes* + *Sergentomyia punjabensis*



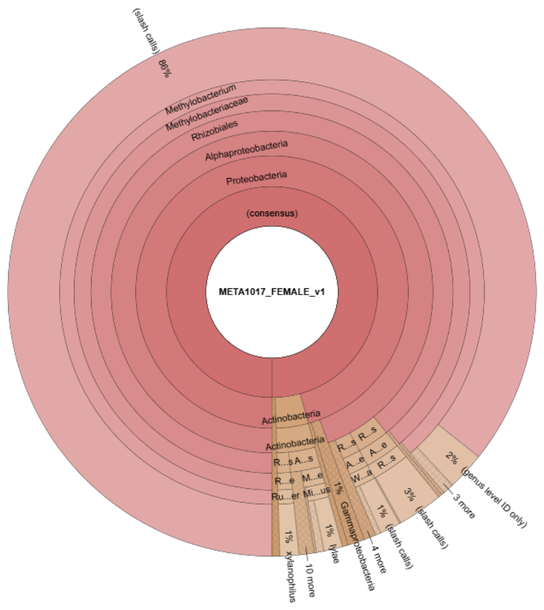
EXPERIMENTAL WORKFLOW

Morphological Identification → Surface Sterilization (0.1% Tween 20,70% Ethanol & PBS) → Gut Dissection

Pooling of Gut Samples & DNA Extraction → 16S rRNA Gene Sequencing(V1–V9 regions)Next-Generation Sequencing

RESULTS & DISCUSSION

Males	**75 genera**
Female	**53 genera**
Shared	**30 genera**



- *Methylobacterium* was the most abundant genus in males (27.01%) and females (28.04%)
- *Wolbachia* was detected exclusively in female sand flies.

CONCLUSION

KEY FINDINGS

- First culture-independent baseline of sand fly gut microbiota from a Sri Lankan endemic region
- *Methylobacterium* dominates (27-28%): merits further investigati on to determine its suitability as a candidate for paratransgenesis
- *Wolbachia* (♀ only) — origin requires cautious interpretation (blood-meal vs endosymbiont)

REFERENCES

- Karunaweera ND, Senanayake S, Ginige S, Silva H, Manamperi N, Samaranayake N, Dewasurendra R, Karunanayake P, Gamage D, de Silva N, Senarath U. Spatiotemporal distribution of cutaneous leishmaniasis in Sri Lanka and future case burden estimates. PLoS neglected tropical diseases. 2021 Apr 23;15(4):e0009346.