

Transgenerational epigenetic memory of salt preference in mixed strains of *Caenorhabditis remanei*

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Introduction

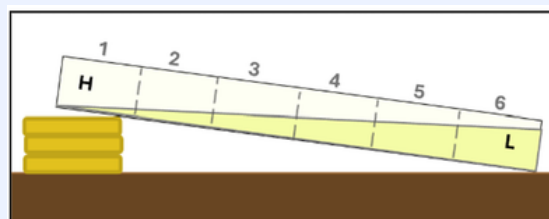
- **Epigenetic inheritance** = Passing on stress experiences (e.g. salinity) to offspring without altering the DNA.
- Studied in hermaphroditic *C. elegans*, but unknown in obligately sexual nematodes.
- *C. remanei* is obligately sexual within a genetically diverse population.

We hypothesise that **parental salt stress** induces a stable **behavioural change** in offspring and that this memory persists for **several generations**.

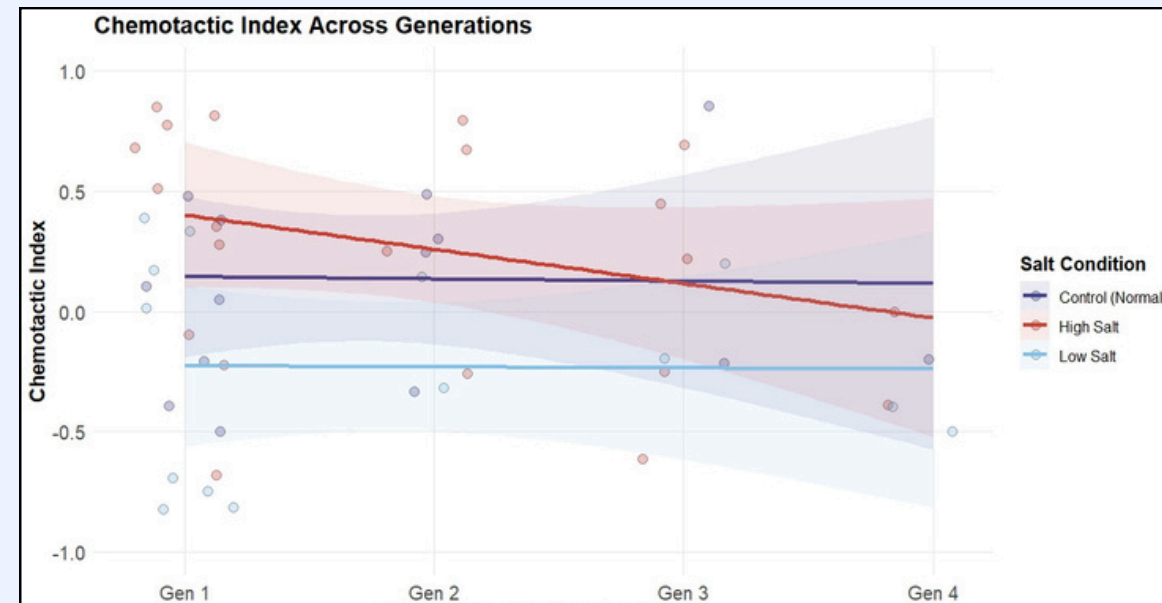
Materials and Methods

- Parents were raised **well fed on High, Low and Normal** salt.
- **Synchronization** for identical age of population.
- **Offspring** were maintained on **Normal** salt to test memory duration.
- Worms placed on a linear salt gradient plate, After 60 minutes, two indices were calculated based on placement:

- **Chemotactic Index:** $\frac{\text{High zones (1+2)} - \text{Low zones (5+6)}}{\text{Total outer zones (1+2+5+6)}}$
- **Mobility Index:** $\frac{\text{Total outer zones (1+2+5+6)}}{\text{Total worms (1+2+3+4+5+6)}}$

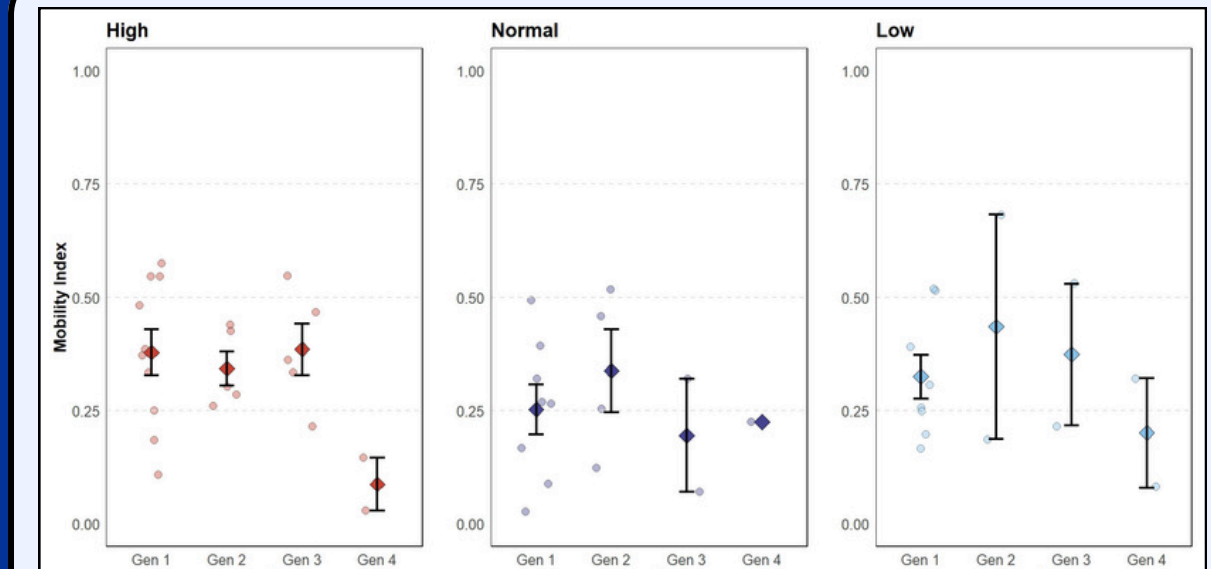


Results Chemotactic index



- A **marginally significant trend** in first generation with ANOVA: offspring of Low salt moved preferentially toward lower salt.
- A **statistically significant decrease** in startpoint of Low salt group compared to Normal in multiple linear regression model.
- Ancestral High salt exposure had **no significant effect**.

Results Mobility index



- Separate One-Way ANOVAs (gen 1 to gen 3) confirmed that the proportion of active worms did **not change significantly** across generations.

All visual results of generation 4 must be interpreted with caution due to low sample sizes

Conclusion

- Transgenerational epigenetic memory, particularly in the Low Salt group, remains **relatively stable** over three generations.
- **Time and successive generations do not negatively impact** the worms' general preference behavior.

While a stable trend is visible, **further replication** is required to make definitive claims about the exact duration of this epigenetic memory.

Follow-up

- **Duration** of the epigenetic memory
- **Differences between sexes** in learned salt chemotaxis and its potential sex-specific inheritance of epigenetic memory
→ Exposing only parental males to high- or low-salt and crossing them with females that were cultivated on a normal salt condition.