**The Ancient Origins of TRP-dependent Menthol Sensing**

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**Introduction**

*Drosophila melanogaster* are not big fans of menthol.

Menthol, and other terpenes, affect the behavior of insects, like *D. melanogaster*.

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- In vertebrates, menthol is sensed by the TRP channels TRPA1 and TRPM8.
- However, the mechanisms of menthol sensing in insects remain unknown.

We hypothesized that insect TRP channels play a conserved role in menthol sensing.

**Results**

TRP channels function in Class IV (CIV) nociceptors to facilitate menthol-evoked rolling.

- CA2+ imaging shows that CIV neurons are activated by menthol.
- CIV neurons, and CIV expression of TRP channels, are both required for rolling.

**The last common ancestor of *D. melanogaster* and humans existed prior the protostome-deuterostome split (>550mya)**

- The function of many TRP channels have their origins in or prior to the last common bilaterian ancestor, *Urbilateria*.
  - Some debate over morphology of whole animal & nervous system , but likely had some sort of photoreceptive eye spot.
  - Genome likely encoded a variety of TRP channels, including channels from the TRPM and TRPA subfamilies.
  - TRPM(s) and TRPA(s) thermal and electrophile sensitivity likely emerged in or prior to urbilaterian 1-5.
  - However, it is unknown if the TRP-menthol sensing mechanisms have equally ancient origins.

*These analyses exclude sarcomerychites.*

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**Conclusions**

These findings, in combination with previous discoveries concerning TRP function, demonstrate that the sensory capacity of TRP channels have origins predating the protostome-deuterostome split (>550mya).