

Sleep contributes to preference for novel food odors in *Drosophila*

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Background

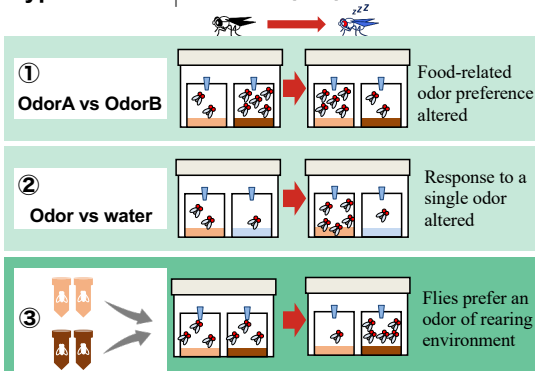
- Function of Sleep
 - Maintenance of cognitive abilities (Stickgold 2005 *Nature*)
 - In *Drosophila*, Olfactory memory retention (Li et al. 2009 *Sleep*)
- *Drosophila* prefers odor of rearing environment (Jaenike 1983)

Q.1 Does sleep deprivation alter preferences of food-related odors in *Drosophila melanogaster* adults?

Q.2 If so, why the preference of food-related odors changes?

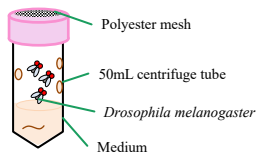
Hypothesis

After Sleep deprivation...



Materials & Method

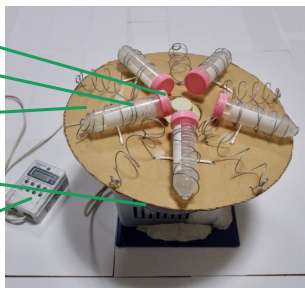
Insect rearing



25°C; Daytime 05:00-19:00;
ACV medium: ACV 20%
added; Broth medium:
Broth 10% added

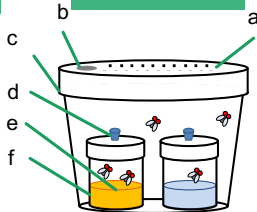
Centrifugal equipment

- 10 holes for ventilation
- 50 mL centrifuge tube
- Wet cotton
- Made of electronic fan
- On/Off timer (1min interval)

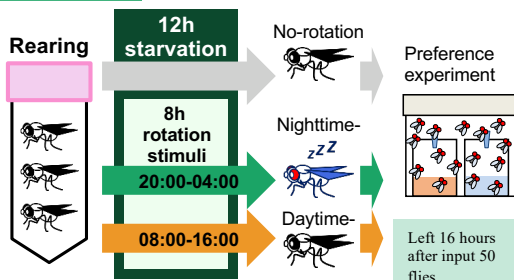


a: 50 vents; b: Input port (Φ8mm); c: 500mL container; d: Flies' entry point (made of pipette tip, Φ2mm); e: odor 10ml; f: odor container (25ml); Environ.: the same as rearing

Experiment box



Operation



Conclusion

Result 1 Sleep has a role in their foraging behavior!



① Odor preference

Increased preference for ACV to Broth

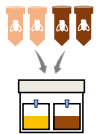


② Response to a single odor

Nighttime-rotated flies
ACV: Increase
Broth: No or negative effect

Result 2

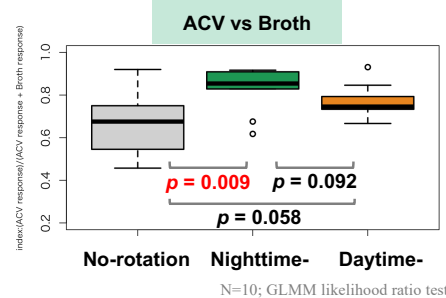
Sleep-deprived flies preferred odors of rearing environment!



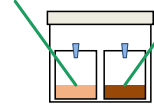
③ Response to an odor of rearing environment

ACV-medium-flies ► Increased response to ACV
Broth-medium-flies ► Increased response to Broth

Exp. 1 | Odor preference (ACV vs Broth)

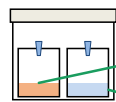
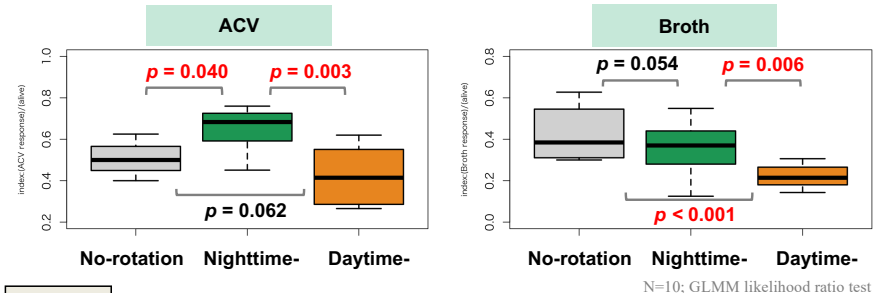


20% ACV solution 10% Broth solution



- Nighttime-rotated flies showed increased preference for ACV to Broth.
- No difference between daytime- and no-rotation flies
⇒ Effect of Rotation itself was not shown.

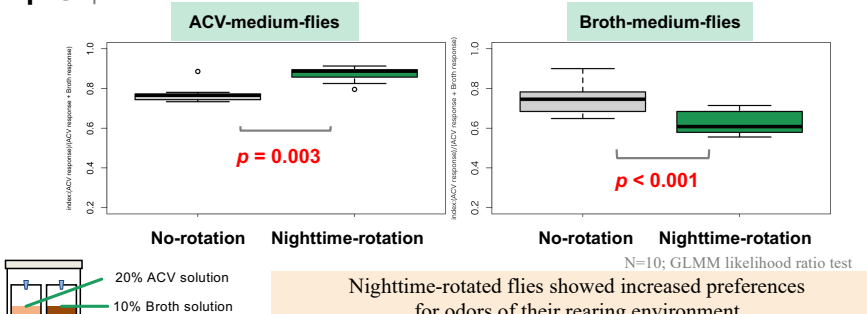
Exp. 2 | Response to a single odor (ACV or Broth vs water)



20% ACV solution
or
10% Broth solution
water

The increased preference for ACV to Broth was attributed to both increased response to ACV and decreased response to Broth.

Exp. 3 | Response to an odor of rearing environment



20% ACV solution
10% Broth solution

Nighttime-rotated flies showed increased preferences for odors of their rearing environment