

Impacts of Energy Drinks On Daphnia

An extension to Ward's Effects of Drugs on Daphnia Kit

Every student has had some exposure to energy drinks. These popular beverages are composed of caffeine, sugar, and sometimes herbal supplements. Do these drinks have the same effect as the controlled level of caffeine? How do they compare with other caffeinated drinks? After recording the effects of Caffeine from the lab, what do you think the effect of the additional ingredients will be on the Daphnia?

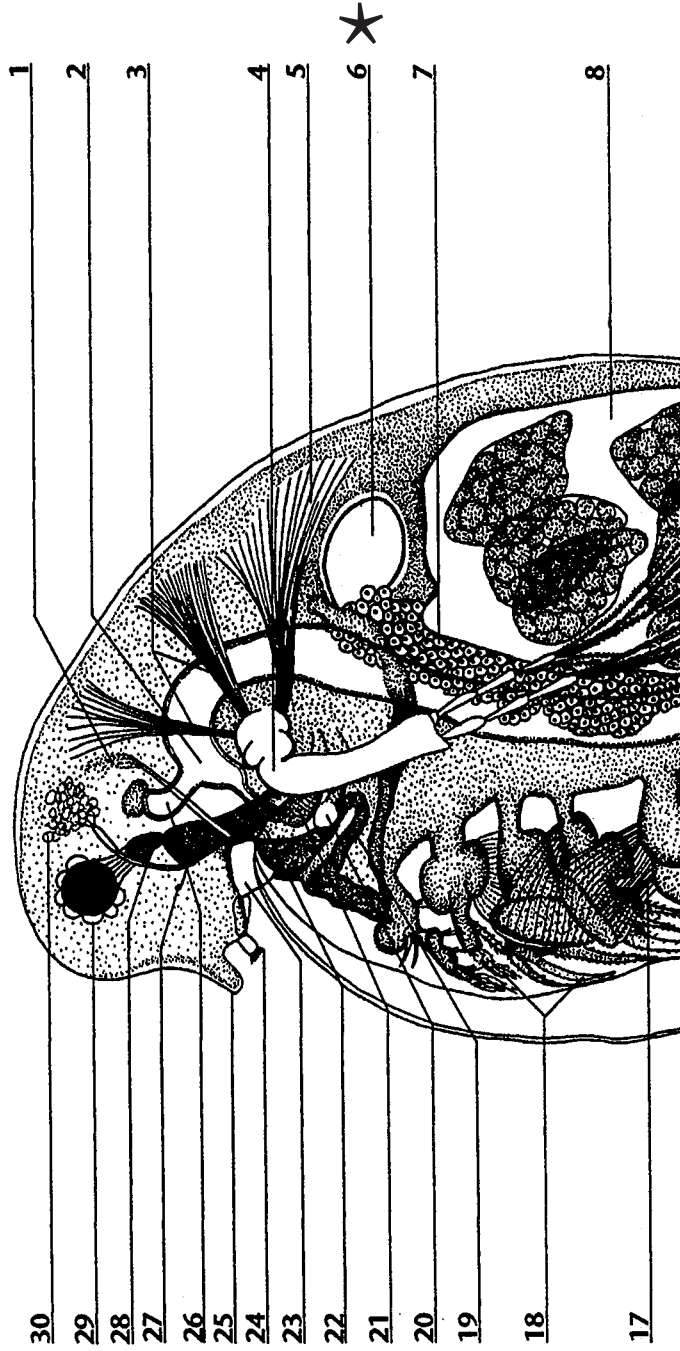
Procedure

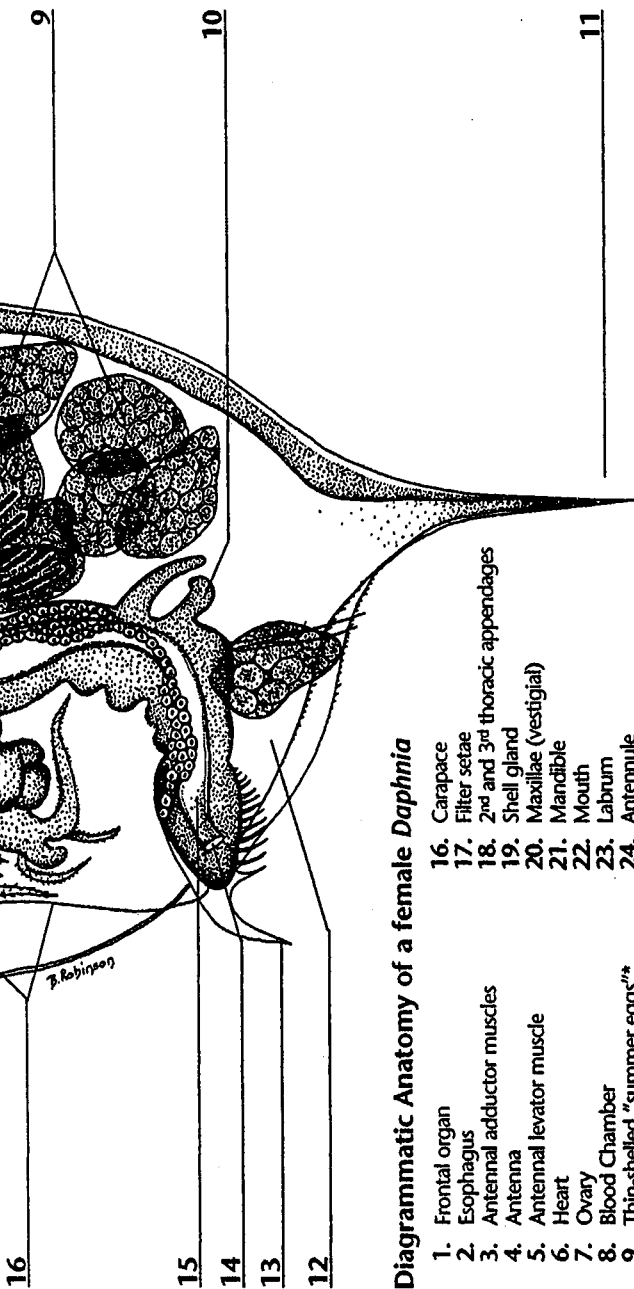
1. Add 2 Daphnia to each of the chambers in the depression slide.
2. Add a cover slip over each chamber and place the slide onto the microscope.
3. Count the heart beats of the control Daphnia for 10 seconds
4. Repeat this procedure 3 times and calculate an average heart rate.
5. Wick 1 drop of energy drink into the second chamber.
6. Wait for 1 minute and measure the heart rate of the treated Daphnia as above.
7. Repeat the measurements after 2 and 5 minutes of exposure.
8. Graph your results.

Treatment	BPM- 1 minute	BPM- 2 minutes	BPM-5 minutes	BPM-10 minutes
Control				
Treatment- 1				
Treatment-2				
Treatment- 3				

Daphnia

Form and Structure

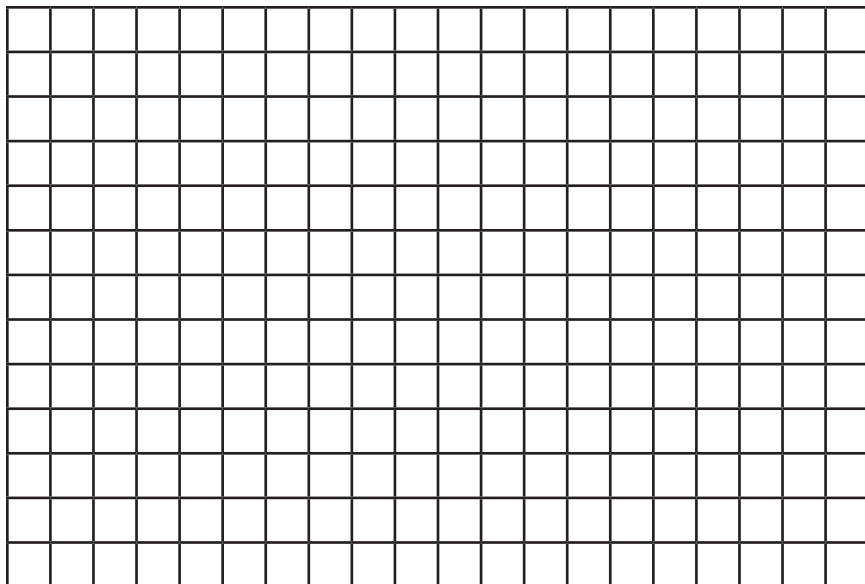




Diagrammatic Anatomy of a female *Daphnia*

- | | |
|----------------------------------|-------------------------------------|
| 1. Frontal organ | 16. Carapace |
| 2. Esophagus | 17. Filter setae |
| 3. Antennal adductor muscles | 18. 2nd and 3rd thoracic appendages |
| 4. Antenna | 19. Shell gland |
| 5. Antennal levator muscle | 20. Maxillae (vestigial) |
| 6. Heart | 21. Mandible |
| 7. Ovary | 22. Mouth |
| 8. Blood Chamber | 23. Labrum |
| 9. Thin-shelled "summer eggs" | 24. Antennule |
| 10. Abdominal process | 25. Rostrum |
| 11. Apical spine | 26. Hepatic caeca |
| 12. Post abdomen | 27. Ocellus or nauplius eye |
| 13. Post abdominal claw (paired) | 28. Optic ganglion |
| 14. Anus | 29. Compound eye with optic nerve |
| 15. Rectum | 30. Nuchal or neck organ |

* See illustrations of "summer eggs" (developing parthenogenically) and "winter eggs" (develop after being fertilized) on page 3. Winter eggs have thick shell and are produced in smaller numbers; brood chamber is molted to form a protective ephippium.



Questions for thought and further exploration:

How did the treated heart rate change compared to your control Daphnia?

What other factors could account for a change in heart rate?

How would you go about testing the effects of other ingredients (Sugar, supplements etc)?

Part Numbers:

Ward's Effects of Drugs on Daphnia Activity	470018-280
Daphnia magna for 30 students	470176-862
Pipettes	470020-860
Depression Slides	470003-480
22 x22 Coverslip	470019-004
Moticam X3	470230-992