Learned helplessness in flies and the roots of depression

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The study is a step toward understanding the biological basis for depression and presents a new way for testing antidepressant drugs, the researchers say. The discovery of such symptoms in an insect shows that the roots of depression are very deep indeed.

"Depressions are so devastating because they go back to such a basic property of behavior," says Martin Heisenberg of the Rudolf Virchow Center in Würzburg, Germany.

Heisenberg says that the idea for the study came out of a lengthy discussion with a colleague about how to ask whether flies can feel fear. Franco Bertolucci, a coauthor on the study, had found that flies can rapidly learn to suppress innate behaviors, a phenomenon that is part of learned helplessness.

The researchers now show that flies experiencing uncomfortable levels of heat will walk to escape it. But if the flies realize that the heat is beyond their control and can't be avoided, they will stop responding, walking more slowly and taking longer and more frequent rests, as if they were "depressed."

Intriguingly, female flies slow down more under those stressful circumstances than males do. It's not clear exactly what that means, but Heisenberg explains, "if we realize that the fly trapped in a strange, dark box, unable to get rid of the dangerous heat pulses, has to find a compromise between saving energy and not missing any chance of escape, we can understand that such a compromise may come out

differently for males and females, as their resources and goals in life are different."

Heisenberg's team now intends to explore other questions, such as: How long does the flies' depression-like state last? How does it affect other behaviors, like courtship and aggression? What is happening in their brain? And more.

Heisenberg says that the findings are a reminder of a lesson that children's books are often best at showing: "Animals have lots in common with us humans. They breathe the same air, share many of the same resources, actively explore space, and have distinct social roles. Their brains serve the same purpose, too: they help them to do the right thing."

More information: *Current Biology*, Yang et al.: "Flies Cope with Uncontrollable Stress by Learned Helplessness." dx.doi.org/10.1016/j.cub.2013.03.054

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