Drosophila Behavior and Gene Expression in Microgravity

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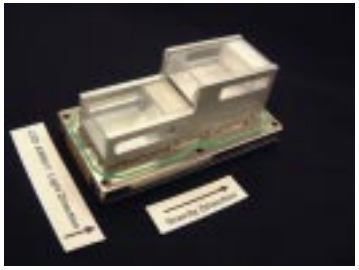
OBPR

•**Strategic Value** Understanding the gene expression changes that underlie adaptation to the microgravity environment, and identifying specific genes with critical roles in this process will help support the long-term presence of humans in space.

•**Platform** This long-duration experiment is designed to investigate gravity perception in *Drosophila* by analyzing behavior and gene expression in wild-type flies and 1-2 gravitaxic mutants over multiple generations. This 90-day experiment can only be performed aboard the ISS.

•**Terrestrial Application** Due to conservation of signaling pathways between *Drosophila* and higher organisms, this study will provide fundamental information on the molecular mechanisms of gravity perception applicable to human beings. This information will translate into medical applications both on Earth and in space, relating to aberrant gravity sensing caused by disease or space travel.

Drosophila melanogaster



Prototype Drosophila cassettes in EMCS Experiment Container

•**Timely Research** This experiment will allow NASA to answer high-profile questions in insect developmental physiology that are of great interest to the scientific community.

•**Readiness for Flight** This experiment is in Experiment Development Phase A for possible flight opportunities aboard the European Modular Cultivation System (EMCS).

•**Vehicle Resources Required** Minimal. Ascent/descent mass and volume, on-orbit power, ambient stowage, cold stowage, temperature-controlled transport, heat rejection, crew time, Experiment Unique Equipment (EUE), data up-link and data down-link capability. Descent frozen/fixed sample return.

•**Scientific Return** Multiple generations of *Drosophila melanogaster* will be developed over a 90-day period using special cassettes inside EMCS experiment containers. On-orbit video allows for behavioral observation during gravitational transitions. Data will be gathered from video recording of on-orbit behavior as well as from returned adult specimens, both fixed and frozen. Questions to be answered include how sensing altered g-forces will lead to altered behaviors and altered gene expression. Genes known to undergo expression changes in response to hypergravity will be compared against similar gene expression changes observed in microgravity, with opposing effects on their expression hypothesized.

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