

Butterfly Protocol

1. To get details on the space shuttle mission timeline, crew and crew activities, please go to <http://en.wikipedia.org/wiki/STS-129>.
2. Three, third instar Monarch Butterfly larvae, larvae food and butterfly nectar will be loaded into the a butterfly space flight habitat approximately 30 hours before launch. Four, 6 day old Painted Lady butterfly larvae, larvae food and butterfly nectar will be loaded into a second butterfly space flight habitat approximately 30 hours before launch.
3. At 28 hours before launch, the two habitats and one associated camera module will be handed over to NASA for loading into the space shuttle. Each habitat and the camera module will be placed in a gallon sized ziplock bag (not closed) placed in a suitcase like container and surrounded by foam. The habitats will be safely packed in this container. The container will be securely stowed in the nose section of the space shuttle during launch and remain there until the habitats and camera module are transferred to the International Space Station. This container will provide no lighting and will hold the habitats at ambient temperature which will be approximately 21 degrees Celsius. The habitat will stay in this dark, ambient temperature environment for approximately 90 hours.
4. At approximately MET (mission elapsed time – measured from the moment the shuttle launches successfully) 2 days 12 hours, a crew member will unstow the habitats and camera module and transfer them from the space shuttle to BioServe's CGBA (commercial generic bioprocessing apparatus) currently on board the International Space Station. The crew member will install the two habitats and two camera modules into CGBA. CGBA will provide the power source to run the habitat lighting and camera module systems. CGBA will also provide the correct temperature for the habitats. The temperature inside CGBA and thus for the habitats will be and will remain approximately 25 degrees Celsius.
5. At the time the crew member transfers the habitats from stowage to CGBA, the astronaut will expose the second set of food for the larvae in each habitat.
6. A 12 hour on/off lighting cycle will be provided to both habitats. The 12 hour on/off lighting cycle for the butterfly habitat will run between 8am-8pm mountain standard time. The butterfly habitats have 6 bright white LEDs for daytime lighting.
7. Within 24 hours of installation, BioServe should begin to receive images from the habitats. Images will be taken from the butterfly habitat every 15 minutes during the daytime 12 hour cycle. Images are uploaded to the teacher/student website once a day. The cameras for the butterfly habitat are color.
8. Identical ground control systems will be set-up for each habitat and run from BioServe offices in Boulder, Colorado. Images from the ground controls will also be uploaded once a day to the teacher/student website.
9. At different stages during the experiment BioServe will attempt to take video of the organisms particularly during significant events i.e., eating, chrysalis formation, butterfly emergence etc. If meaningful video is obtained, it will be posted on the same website as the images.
10. At approximately MET 11 days, a crew member will access the habitats and expose nectar for the soon to emerge butterflies.
11. After this point, the crew will not access either habitat. The organisms will live out their life with any remaining food, water or nectar. If the butterflies do lay eggs and the eggs hatch, unfortunately, there will not be enough food for the larvae to survive to adulthood. We do not expect the butterflies to lay eggs since the conditions in the habitat are not conducive to egg laying.
12. Both habitats will return to Earth on the space flight mission 20A (STS-130) which is currently scheduled to launch in February 2010. It is not expected that the butterflies will be alive at this time.