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AQUATIC HABITAT (AQH), THE AQUATIC ANIMAL EXPERIMENT FACILITY IN SPACE
ENVIRONMENT

Abstract

AQuatic Habitat (AQH) is an aquatic animal experiment facility in space environment. It will be launched by Japanese HTV (H-II Transfer Vehicle) and Russian Soyuz/Progress and installed in the work volume of Multi-Purpose Standard Payload Rack (MSPR) in Japanese Experiment Module (JEM) of International Space Station (ISS). The AQH can breed small freshwater fishes, i.e. Medaka, Zebra fish, for 3 generations (90 days), the longest. To establish long-term and low-crew-load breeding, we developed brand-new mechanism, auto feeders, and water treatment system using a biological filter.

In this presentation, we will introduce overview of functions/characteristics of the AQH, on orbit operation, and the first experiment summary.

AQH Major Specifications:

(1) Experiment Duration: Up to 90 days

(2) Breeding Water Loop: Closed loop

(3) Aquarium: 2 aquariums can be operated simultaneously, inner dimensions15x7x7cm, 600 cc water

(4) Environmental Control

_(a) Water temperature: 25 to 30 deg.C

_(b) Water flow rate : 0 to 0.5 L/min

_(c) O2 supply/CO2 removal: gas exchange by artificial lung

(5) Water Quality Maintenance:

_(a) NH4/NO2 removal by biological filter

_(b) Waste removal: physical filter

(6) Day/night Cycle: Light Intensity of max 1000 Lx with selectable light/dark cycle time

(7) Automatic Feeding: Programmable feeding according to specimen stages up to 300 times of max 20 mg powder foods /1 feeding cassette

(8) Specimen Sampling and Preservation: Specimen sampling in various developmental stages and specimen preservation with fixation, freezing, and/or refrigeration

(9) Specimen Observation: CCD camera (infrared observation available)

(10) Monitor/Operation on ground: Housekeeping data (Water temperature/flow rate/pressure, dissolved Oxygen, pH, lighting status, and feeding status) can be monitored. Water temperature/flow rate, lighting, feeding, and CCD camera can be controlled with command operation.