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BEES IN SPACE: ULMONITOR, THE BEEHIVE REMOTE CONTROL TOOL FOR THE MARS
COLONIES, TESTED WITHIN THE NOAH'S ARK PROJECT CARRIED OUT IN ANALOG SPACE
BASE LUNARES IN PILA, POLAND.

Abstract

Bees are one of the most intensively studied insect species in the history of humankind. Bringing the bees to the future extraterrestrial colonies could be beneficial in many ways, ranging from plant pollination through the production of the substances for food and medical purposes, to the psychological aspects of the astronaut-animal interactions. Considering the limitations of the future Mars colonies' artificial environment, especially in terms of the small area and the intensity of human labor, the whole process of beekeeping should be as little effort consuming and autonomous as possible. Every opening of the beehive for a simple check-up disturbs the delicate microclimate of the hive, excites the swarm, and may cause irreversible damage to the weakened families. Therefore, we decided to include the ULmonitor, the automatic check-up system invented for beekeepers, to the analog missions programme carried out in the LUNARES Research Station, within the Noah's Ark project, dedicated to study and develop the self-sustainable micro-ecosystems for food and medicine production on board. This study focuses on the influence of *Apis mellifera* family isolation in artificial environment on the hive and swarm parameters, and the integration of the ULmonitor and HabOs systems for enabling the analog astronauts to control the hive remotely. The data on the swarm activity and behavior gathered with ULmonitor could have vast applications in the development of AI systems and the direct terrestrial, agricultural output.