

Polypedilum vanderplanki: an anhydrobiotic insect as a tool for space life science

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Some organisms showing no sign of living due to complete desiccation are nevertheless able to resume active life after rehydration. This peculiar biological state is referred to as anhydrobiosis. Larvae of the sleeping chironomid, *P. vanderplanki* living in temporary pools in semi-arid areas on the African continent become completely desiccated upon drought, but can revive after water becomes available upon the next rain. The dried larvae can stand other extreme conditions, such as exposure to 100C, -270C, 100% ethanol, 7kGy gamma-rays and vacuum. Since the chironomid is the highest anhydrobiotic organism known so far, this insect became a useful tool for studying resistance of the multicellular organisms to extreme environments, including space. We have adopted several methods to evaluate DNA damage in cells of *P. vanderplanki* and cloned and analyzed expression of the main agent of genetic stress response. From 2005, dried larvae were included in a number of research programs, including exposition to space environments onboard ISS and long-term exposure to outer space environment outside of ISS (Biorisk project).