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| PI Address 2: bilding 37, Room 1119A, 2101 NASA Parkway PI Web Page: City: Iouston State TX 20 Code: 7058 Comments: 22 Project Type: FLIGHT 0 Solicitation / Funding Source: 99-HEDS-03 Start Date: 07/01/2002 End Date: 09/02/009 No. of Post Docs: 0 No. of PhD Degrees: - No. of Master's Candidates: 0 No. of Master' Degrees: - No. of Master's Candidates: 0 No. of Bachelor's Degrees: - Contact Monitor: Woolford, Barbara Contact Phone: 218-483-3701 Contact Email: barbara i.woolford/@nasa.gov - - - Flight Program: Sistis Sist | Organization Name: | NASA Johnson Space Center | | |
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| No. of Bachelor's Candidates:0Monitoring Center: NASA JSCContact Monitor:Woolford, BarbaraContact Phone: 218-483-3701Contact Email:barbara.j.woolford@nasa.govFlight Program:Shuttle/ISSFlight Assignment:ISS STS-115, STS-116, STS-117. STS-118, STS-120, STS-121 NOTE: End date is now 9/30/2009 per CoI (4/08)Key Personnel Changes/Previous PI:Contact (Marry Reid Center for Environmental Studies) Ott, C. Mark (National Aeronautics and Space Administration-JSC)Grant/Contract No.:NonePerformance Goal No.:Visional Aeronautics and Space Administration-JSC) | No. of PhD Candidates: | 0 | No. of Master' Degrees: | |
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| Contact Email:barbara.j.woolford@nasa.govFlight Program:Shuttle/ISSFlight Assignment:ISS STS-115, STS-116, STS-117. STS-118, STS-120, STS-121 NOTE: End date is now 9/30/2009 per CoI (4/08)Key Personnel Changes/Previous PI:Cruz, Patricia (Harry Reid Center for Environmental Studies) Ott, C. Mark (National Aeronautics and Space Administration-JSC)Grant/Contract No.:NonePerformance Goal No.:None | No. of Bachelor's Candidates: | 0 | Monitoring Center: | NASA JSC |
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| | This study of microorganisms, allergens, and microbial toxins in the spacecraft environment was initiated to ensure the |
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| | health, safety, and performance of crewmembers during flight. As all previous methods evaluating spacecraft ecology utilized culture-based methodology, this study focuses on techniques that can identify most of the previously omitted microorganisms, such as the pathogen Legionella pneumophila, the etiological agent of Legionnaires' disease. Likewise, culturable bacteria and fungi have been the only potential allergens studied; the more potent allergens, such as dust mites, have never been analyzed in spacecraft environments. No previous study has targeted microbial toxins. This study utilizes modern molecular biology, advanced microscopy, and immunochemical techniques to examine air, surface, and water samples for bacteria and fungi (total composition and specific pathogens), allergens (e.g., dust mites), and microbial toxins (e.g., endotoxin and volatile organic compounds). |
| Task Description: | This study of the International Space Station (ISS) will include (1) sampling and analysis of ISS modules immediately prior to launch to develop baseline levels of contamination, (2) direct on-orbit sampling of the ISS and subsequent ground analysis. |
| | This study will reveal previously undetected microorganisms, allergens, and microbial toxins in the spacecraft environment, which we anticipate will result in a more comprehensive health assessment of spacecraft during extended missions. |
| | See also <u>http://www.nasa.gov/</u> |
| Rationale for HRP Directed Researc | h: |
| Research Impact/Earth Benefits: | The results of this study will provide insight into changes that occur in the microbial ecology of semi-closed systems. While this study is designed to predict trends in spacecraft, it can be applied to terrestrial systems such as office buildings and residential homes. The development of specific primers for bacterial enumeration and fungal identification during this study will also advance the ability of ground-based investigators to diagnose the potential sources of microbial contamination and give insight into the causes of "sick building syndrome." |
| Task Progress: | The development of techniques for this flight experiment, operationally named SWAB, has already provided advances in NASA laboratory processes and beneficial information toward human health risk assessment. The first accomplishment of the SWAB experiment was the incorporation of 16S ribosomal DNA sequencing for the identification of bacteria. The use of this molecular technique has increased bacterial speciation of environmental isolates from previous flights three fold compared to conventional methodology. This increased efficiency in bacterial speciation provides a better understanding of the microbial ecology and the potential risk to the crew. Early accomplishments from this grant also included the development of flight hardware that could acquire samples and preserve them for later molecular analysis months later with no substantial loss of sample quality. Using this hardware, sample collection for SWAB was initiated in August 2006. Air and surface samples, including 9 in-flight sessions and multiple preflight samples, were completed in March 2008. ISS water sample collection from the U. S. water regeneration system called the Water Process Assembly (WPA) will begin in 2009. Analyses of air and surface samples have already begun to provide new information. Early analyses focused on the use of molecular-based DNA fingerprinting using repetitive sequence-based polymerase chain reaction (rep-PCR). This study no tonly demonstrated that ISS has a greater diversity of organisms than originally expected, but also provided assays to determine the potential of methicillin resistant Staphylococcus aureus (MRSA) aboard ISS. MRSA has become increasingly common on Earth and pose a treatment problem for infections (DGGE). Unlike other techniques, DGGE does not depend on any microbial growth on culture media allowing a more sustand that, seessement of the ISS. MRSA has become increasingly common on Earth and pose a treatment problem for infections (DGGE). Unlike other techniques, DGGE does not depend on any microbial gro |
| Bibliography Type: | Description: (Last Updated: 03/24/2020) |
| Abstracts for Journals and Proceedings | Ott CM, Castro VA, Garcia VM, John J, Cruz P, Buttner MP, Pierson DL. "A Comprehensive Characterization of Microorganisms and Allergens in Spacecraft Environment." NASA Human Research Program Investigators' Workshop, League City, TX, January 2008. Abstracts, NASA Human Research Program Investigators' Workshop, League City, TX, January 2008. , Jan-2008 |
| Abstracts for Journals and Proceedings | Ott CM, John J, Castro VA, Cruz P, Buttner MP, Pierson DL. "A Comprehensive haracterization of Microorganisms and Allergens in Spacecraft Environment." NASA Human Research Program Investigators' Workshop, League City, TX, January 2007. Abstracts, NASA Human Research Program Investigators' Workshop, League City, TX, January 2007. , Jan-2007 |
| Abstracts for Journals and Proceedings | Ott CM, John J, Castro VA, Cruz P, Buttner MP, Pierson DL. "Characterization of Microorganisms in Spacecraft Environments." 26th International Space Development Conference, Addison, Texas, May 25-28, 2007. Program and Abstracts, 26th International Space Development Conference, Addison, Texas, May 25-28, 2007. , May-2007 |

| Abstracts for Journals and Proceedings | Cruz P, Stetzenbach LD, Klima-Comba AK, Stevens VL, Castro VA, Ott CM, Pierson DL. "Enhanced Detection of Fungi in the Spacecraft Environment." 105th General Meeting of the American Society for Microbiology, Atlanta, GA, June 5-9, 2005. Program and Abstracts, 105th General Meeting of the American Society for Microbiology, Atlanta, GA, June 5-9, 2005. , Jun-2005 |
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| Abstracts for Journals and Proceedings | Ott CM, Castro VA, Bassinger VJ, Fontenot SL, Bruce RJ, Cruz P, Stetzenbach LD, Pierson DL. "A Comprehensive Characterization of Microorganisms and Allergens in Spacecraft Environment." NASA Bioastronautics Investigators' Workshop, Galveston, TX, January 2005. Abstracts, NASA Bioastronautics Investigators' Workshop, Galveston, TX, January 2005. , Jan-2005 |