CURRICULUM VITAE

Name: Fathi Karouia

UCB Address: BioServe Space Technologies
3775 Discovery Dr.
Boulder C0 80309
Voice: 832-338-8698
Email: fathi.karouia@colorado.edu

EDUCATION

University of Houston	PhD	Biology (Cell and Molecular Biology)
International Space University	MS	Space Studies
Louis Pasteur University	MS	Applied Space Technologies
Henri Poincare University	MS	Physics
Henri Poincare University	BS	Physics and Chemistry

PRINCIPAL POSITIONS HELD

2023 - Present	University of Colorado Boulder	Research Faculty	Space
2019 - Present	BMSIS-NASA Ames Research Center	Senior Research Scientist	Astrobiology/Space Biology
2013 - 2019	University of California San Francisco	Researcher (Res. Professor)	Space Bioscience
2011 - 2013	University of California San Francisco	Asst. Researcher (Asst. Res. Professor)	Space Bioscience
2009 - 2011	NASA Ames Research Center	Postdoctoral Fellow	Exobiology
2008 - 2009	University of Houston	Postdoctoral Fellow	Space Microbiology
2001 - 2008	University of Houston	Research Assistant	Space Microbiology
2000 - 2003	NASA Johnson Space Center	Research Associate	Radiation Biology
1999 - 1999	French Space Agency (CNES)	Research Associate	Space Mission Design
1995 - 1996	Henri Poincare University	Research Assistant	Material Physics

OTHER POSITIONS HELD CONCURRENTLY

2019 - Present	European Science Foundation	Consultant	Biology, Biotechnology, and Medicine
2011 - 2019	NASA Ames Research Center	Senior Research Scientist	Space Biology
2013 - 2019	NASA Ames Research Center	ISS Portfolio Lead Scientist	Space Biology
2013 - 2019	NASA Ames Research Center	Project Scientist	Space Biology
2004 - 2006	University of Houston	Science Coordinator	Space Science
2000 - 2001	University of Texas Medical Branch	Research Assistant	Radiation Biology

LICENSE AND CERTIFICATION

2023	NASA TOPS Open Science: Ethos of Open Science
2020	Entrepreneurship Program at the University of California San Francisco
2015	Certification in Project Management
2013	Certification for use of Radioisotopes for Scientific Research
2013	Certification as Ambassador for the International Space Station

HONORS AND AWARDS

2020	Honor Award Nominee	NASA Ames Research Center
2019	Recognition Award	NASA Ames Research Center
2017	Group Achievement Award	NASA Ames Research Center
2016	FILMSS Star Award	NASA Ames Research Center
2014	Space Flight Award	NASA Ames Research Center
2013	Conference Award	National Science Foundation/American Astronomical Society
2012	Conference Award	National Science Foundation/American Astronomical Society
2012	Conference Award	International Council of Science/COSPAR Astrobiology
2012	Conference Award	International Council of Science/COSPAR Planetary Protection
2011	Conference Award	National Science Foundation/American Astronomical Society
2011	Conference Award	NASA Astrobiology Institute

2009	National Research Council Postdoctoral Fellowship (Denied)	The National Academies
2009	NASA Postdoctoral Fellowship	Oak Ridge Associated Universities
2008	Scholarship for Summer Workshop in life Under Extreme Conditions	NASA Astrobiology Institute
2008	Astronaut Candidate	European Space Agency
2007	Science Magazine Program for Excellence in Science Award	The American Association for the Advancement of Science
2004	Nominee	Who's Who Among Students in American Universities and Colleges
2001	Young Graduate Training Program (Denied)	European Space Agency

CURRENT RESEARCH AND CREATIVE ACTIVITIES

KEYWORDS/AREAS OF INTEREST

Astrobiology, Planetary Protection, Space Biology, Biomedical Sciences, Countermeasures Development, Space Life Sciences, Astronaut Health and Performance, In Situ Resources Utilization, Life Support Systems, Multi-Omics, Omics Platform, Space Technology, Bioinformatics, Material Science, Data Science and Analysis, Open Science, Space Projects and Missions, Human Spaceflight and Space Exploration.

SUMMARY

My research focuses on the adaptation of life to extreme environments, with a particular emphasis on space biology and astrobiology. I have a diverse background encompassing planetary protection, in situ resource utilization, life support systems, astronaut health, and space technology development. A key aspect of my work involves unraveling the molecular and cellular intricacies defining the limits of life in space, essential for sustaining prolonged space explorations. My expertise spans space biology, astrobiology, planetary protection, biomedical sciences, and technology innovation for space exploration. I have successfully managed programs and served as a project scientist for space biology and astrobiology projects. This unique skill set aligns seamlessly with the research goals of the Microbiology and Cell Science Department at the University of Florida, particularly in the context of studies conducted in Low Earth orbit, on the moon, and beyond.

FLIGHT PROJECTS MANAGED FOR HUMAN SPACEFLIGHT AND SPACE EXPLORATION:

My professional focus has centered on the comprehensive design, development, testing, and execution of research investigations in collaboration with scientists from academia, NASA, and various organizations, specifically in the realms of human health and space biology. This intricate work involves the extraction of samples from astronauts and the utilization of model organisms, such as microbes, cells, plants, and developmental biology.

A hallmark of my career is the successful management of more than 18 international flight studies conducted aboard the International Space Station. These studies span across all disciplines within the Astrobiology and Space Biology Programs, with a primary emphasis on inquiries into the limits of life and the adaptive mechanisms of life to prolonged exposure in the space environment. This exposure includes conditions such as radiation and microgravity, and the development of effective countermeasures. (For a detailed list of related flight projects and corresponding publications, please refer to the attached documentation.) This unique experience positions me as a candidate with unparalleled expertise in flight implementation, contributing to a distinctive skill set that can significantly enhance the securement of funding for space biology research initiatives.

Astrobiology - Evolutionary Microbiology:

MVP-Cell-02 (SpX-18 and 28)
The proposed research seeks to explore the impact of the space environment on evolutionary processes within the bacterium Bacillus subtilis, utilizing the Techshot MVP for an extended study duration. Various mutant lines were systematically advanced along solid surfaces, fostering continuous selection within the cultures and optimizing the number of generations achievable. Through imaging, adaptive changes in fitness, measured by growth rate, were captured. The identification of evolutionary rates, mechanisms, and selection targets will be accomplished through deep sequencing of the successful strains.

This research endeavors to conduct multi-generational experimental evolution on bacteria aboard the International Space Station. The primary objective is to enhance our comprehension of the evolutionary dynamics and challenges confronted by biological systems during prolonged space exploration and habitation.

ISS Microbiome of the Built Environment:

Microbial Tracking (MT-1) (SpX-5, -6, and -8)
This groundbreaking study, the first of its kind, employed a fusion of culture and molecular-based methods to comprehensively explore the microbial flora on the surface and in the air aboard the International Space Station (ISS) throughout a one-year period. Notably, the study focused on the collection of biological samples from eight distinct locations within the ISS USOS. The outcomes of this research represent a significant advance in our capacity to detect microbial contaminants that have the potential to jeopardize equipment integrity or pose risks to the health of astronauts.

Three-dimensional Microbial Mapping (3DMM) of the ISS Environment (SpX-21)
The objective of this project is to examine swab samples collected from 1,000 locations within the space station, aiming to investigate the spatial correlation between bacteria and their metabolites, which are the chemicals produced during their growth. The project aims to translate molecular information into high-spatial 3D resolution, providing insights into the distribution of microbes and

metabolites within the built environment of the ISS—a nearly closed ecosystem. The insights gained from this project, unraveling the spatial relationship between bacteria and their metabolites within the ISS environment, hold significant implications for areas such as planetary protection, hardware integrity, and astronaut health. Understanding the distribution of microbes and their byproducts can inform strategies to safeguard both equipment and the well-being of astronauts, contributing to the advancement of space exploration initiatives.

Microbiology Research:

Micro-8 (SpX-4)
This investigation delved into the impact of spaceflight on potentially infectious organisms, with a particular focus on understanding the gene expression, morphology, and virulence responses of *Candida albicans*, a human pathogen. This study underscores the importance of examining opportunistic organisms, particularly those that could pose risks to immunocompromised astronauts during space missions.

Micro-9 (SpX-8)
The objective of this study was to evaluate the impact of microgravity on yeast, specifically exploring how changes in density-driven ammonia convection induce alterations in the Msn4- and Sfp1-dependent genetic and cellular differentiation of giant yeast colonies. This research aims to enhance our comprehension of how yeast adapts to extreme environments, providing valuable insights into potential crew health risks during long-term exploration.

Micro-10 (SpX-8)
The research explored the impact of spaceflight on the growth, gene expression, and physiological responses of Aspergillus nidulans, a fungal model organism. The primary focus of the experiment was to examine how microgravity influences the production of secondary metabolites in the fungus. These compounds possess unique properties that could potentially contribute to benefits for human health.

Life Support Systems:

Micro-12 (SpX-15)
The main goal of this study was to acquire a foundational understanding of the physiology of *Shewanella oneidensis*, an electrogenic microorganism capable of respiring on solid electron acceptors, such as metal oxides, in the microgravity environment of spaceflight. These unique organisms play a crucial role in bioelectrochemical systems, offering potential applications in life support processes like wastewater treatment. Moreover, their capabilities hold promise for generating various space-relevant products such as biofuels, food products, and therapeutics.

Cell Biology:

Micro-7 (SpX-3)
This experiment involved the cultivation of human fibroblast cells on the International Space Station (ISS) to examine alterations in miRNA and RNA expression profiles through high-throughput molecular biology techniques. Moreover, the study included an evaluation of how microgravity influences DNA repair, further emphasizing the comprehensive exploration of the impact of both microgravity and radiation on cellular responses.

Micro-11 (SpX-14)
This study delved into the examination of sperm motility in microgravity, employing a comparative analysis that integrated visual observations with morphological, molecular, and metabolomics

data. Significantly, the project extended the scope of previous successful flight studies by incorporating both human and bovine samples, providing a robust foundation for assessing the impact of spaceflight on the male reproductive system. The applied methodologies from this study also pave the way for the translation of findings to mammalian studies.

Bioscience-04 (SpX-16, -21)
The central nervous system (CNS) is an intricate tissue with the primary function of adapting to continual challenges from the environment to maintain its functionality. Understanding the transformations occurring in the CNS during adaptation to weightlessness is crucial for advancing human space exploration. A hypothesis posits that microgravity prompts the proliferation of neural stem cells (NSCs) and oligodendrocytes in the brains and spinal cords of astronauts, potentially contributing to conditions such as hypertension. Upon return to Earth, the energetic state of live cells will be examined, and the secretome of both live and fixed cells will be determined through a proteomics approach.

Micro-15 (SpX-18)
This experiment explored the impact of gravity on the essential characteristics of mammalian stem cells throughout the differentiation process of 3-D cultures of induced pluripotent stem cells (iPSC). The study aims to understand how exposure to the space environment fundamentally modifies the regulation of Oct4, a critical transcription factor for maintaining pluripotency, and how this altered regulation influences the timing, progression, and outcomes of cell differentiation.

Human Research:

ISS Microbial Observatory of Pathogens (MT-2) (SpX-11 to 16)
The ISS-MOP (International Space Station – Microbial Observatory of Pathogenic Virus, Bacteria, and Fungi) project utilized both traditional culture-based methods and cutting-edge molecular techniques to measure microbial contaminants within different ISS modules. The primary objectives of the ISS-MOP project were to identify viral, bacterial, and fungal pathogens and establish potential correlations with crewmembers. The dynamics of viral and microbial pathogens in the spaceflight environment remain largely unknown, presenting a substantial gap in our understanding. This knowledge gap represents a significant opportunity to predict health risks during extended space exploration.

Food Physiology (Co-managed by ISSMP) (SpX-18 to present)
The Food Physiology experiment by NASA aims to contrast the astronauts' existing diet with an "enhanced" spaceflight diet, featuring a greater abundance of fruits, vegetables, and foods rich in bioactive compounds such as omega-3 fatty acids and lycopene (an antioxidant found in tomatoes). This undertaking stands as one of the most extensive and interdisciplinary studies ever conducted on the human diet, immune system function, and the gut microbiome, spanning both microgravity and terrestrial conditions.

PROFESSIONAL ACTIVITIES

MEMBERSHIPS

2017 - present	Member of the American Society for Biochemistry and Molecular Biology
2016 - present	Member of Genetics Society of America
2011 - present	Member of the International Astrobiology Society
2011 - present	Member of the American Society for Gravitational and Space Research

2007 - present	Member of the American Association for the Advancement of Science
2007- present	Member of the Radiation Research Society
2002 - present	Member of the American Society of Microbiology
2002 - 2006	Member of the Mars Society
2001 - 2008	Member of the Biosciences Graduate Society

SERVICE TO PROFESSIONAL ORGANIZATIONS

2023 - 2025	American Society of Gravitational and Space Research	Governing Board
2022 - present	Boosting Spaceflight Underrepresented Researcher Equity	Mentor
2020 - Present	NASA GeneLab Analysis Working Group (Multi-omics, Microbes, and AI/ML)	Member
2018 - present	NASA Human Research Program IWS	Jury
2011 - present	American Society for Gravitational and Space Research	Jury
2010 - present	Society to Advancing Hispanics, Chicanos, and Native Americans in Science	Scientific Committee
2004 - 2006	Biosciences Graduate Society	President
2002 - 2006	The Mars Society	Volunteer and Participant in Mars Analog Expeditions
2002 - 2005	Mars Expedition Research Council	Board Member
2002 - 2004	Biosciences Graduate Society	Vice President
2001 - 2006	Space Generation Advisory Council in support to the United Nations Committee on the Peaceful Uses of Outer space	State Representative

SERVICE TO PROFESSIONAL PUBLICATIONS

2023 - present	Editorial Board Member Frontiers Journal
2018 - present	Editorial Board member Life Journal
2010 - present	Reviewer Conference Proceedings Society to Advancing Hispanics, Chicanos and Native Americans in Science
2007 - present	Reviewer for International Journal of Nanomedicine; Advances in Space Biology and Medicine; International Journal of Astrobiology, and Gravitational and Space Research; NJP Microgravity; Astrobiology; International Journal of Molecular Sciences; Fungal Genetics and Biology; Scientific Reports; Pathogens; Atmosphere; mSphere; Frontiers, Microgravity Science and Technology, and Life.

GOVERNMENT AND OTHER PROFESSIONAL SERVICE

Starting 2024	International Astronautical Congress, Space Life Sciences Symposium, Advancements in Astrobiology and Space Exploration	Co-Chair
Starting 2024	International Astronautical Congress, Microgravity Sciences and Processes Symposium, In Space Manufacturing and Production Applications	Co-Chair
2023	International Astronautical Congress, Space Life Sciences Symposium, Biology in Space	Chair
2023	International Astronautical Congress, Space Life Sciences Symposium, Biology in Space, Interactive Presentation	Chair
2022 - 2023	International Astronautical Congress, Space Life Sciences Symposium, Astrobiology and Exploration	Co-Chair/Rapporteur
2014 - 2016	NASA Human Research Program	Grant Reviewer
2013 - 2014	NASA Earth Space Science in Astrobiology	Grant Reviewer
2013 - 2019	NASA ISS Utilization Office	Grant Reviewer
2005 - Present	National Intercollegiate Soccer Official Association (NCAA)	Professional National Referee
2003 - Present	United States Soccer Federation	Professional Referee
1994 - 1995	Military Duty: French Army	Sergeant in a tank carrier squadron.

PEER-REVIEWED PUBLICATIONS (Citation (C); Impact Factor (IF))

1. Planetary Protection Knowledge Gap Closure Enabling Crewed Missions to Mars. James A. Spry, Bette Siegel, Corien U. Bakermans, David W. Beaty, Mary-Sue Bell, James N. Benardini, Rosalba Bonaccorsi, Sarah L. Castro-Wallace, David Coil, Athena Coustenis, Peter Doran, Lori Fenton, David P. Fidler, Matthew Fields, Brian Glass, Stephen J. Hoffman, Fathi Karouia, Michael J. Kempf, Joel S. Levine, Robert Lindberg, Mark L. Lupisella, Javier Martin-Torres, Rakesh Mogul, Karen Olsson-Francis, Manish Patel, David Pearce, Margaret Race, Aaron B. Regberg, Petra Rettberg, Robert R. Zimmerman, Kathleen Rubins, Ondre Santolik, Kevin Y. Sato, Andrew Schuerger, Elliot Sefton-Nash, Matthew Sharkey, Nitin K. Singh, Silvio Sinibaldi, Perry Stabekis, Carol R. Stoker, Kasthuri J. Venkateswaran, Maria-Paz Zorzano-Mier (Submitted to Astrobiology).

2. Space Flight for All: One Giant Leap for Ethics? Allen Seylani, Aman Singh Galsinh, Alexia Tasoula, Anu R I, Andrea Camera, Jean Calleja-Agius, Joseph Borg, Chirag Goel, JangKeun Kim, Kevin B. Clark, Saswati Das, Shehbeel Arif, Michael Boerrigter, Caroline Coffey, Nathaniel Szewczyk, Christopher E. Mason, Fathi Karouia, Hansjörg Schwertz, Afshin Beheshti, Dana Tulodziecki (Submitted to Nature Communications). C:N/A; IF: 17.69

3. Aging and Putative Frailty Biomarkers Are Altered by Spaceflight. Andrea Camera, Marshall Tabetah, Veronica Castaneda, JangKeun Kim, Aman Singh Galsinh, Alissen Haro-Vinueza,

Ivonne Salinas, Allen Seylani, Shehbeel Arif, Saswati Das, Marcelo Mori, Antonio Carano, Lorraine Christine De Oloveira, Masafumi Muratani, Richard Baker, Victoria Zaksas, Chirag Goel, Eleni Dimokidis, Deanne M. Taylor, Jisu Jeong, Eliah Overbey, Cem Meydan, D. Marshall Porterfield, Juan Esteban Díaz, Andrés Caicedo, Jonathan C. Schisler, Evagelia C. Laiakis, Christopher E. Mason, Man S Kim, Fathi Karouia, Nathaniel J Szewczyk, Afshin Beheshti (Submitted to Nature Communications). C:N/A; IF: 17.69

4. Spaceflight Alters Insulin and Estrogen Signaling Pathways. Begum Aydogan Mathyk, Marshall Tabetah, Rashid Karim, Victoria Zaksas, JangKeun Kim, Anu R I, Masafumi Muratani, Alexia Tasoula, Ruth Subhash Singh, Yen-Kai Chen, Eliah Overbey, Jiwoon Park, Davide Povero, Joseph Borg, Remi V Klotz, Min Yu, Steven L Young, Christopher E. Mason, Nathaniel Szewczyk, Riley M. St Clair, Fathi Karouia, Afshin Beheshti (Submitted to Communications Biology). C:N/A; IF: 6.54

5. Understanding How Space Travel Affects the Female Reproductive System to the Moon and Beyond. Begum Aydogan Mathyk, Alexander M Quaas, Cihan Halicigil, Fathi Karouia, Michael Strug, Brent Monseur, Murat Basar, Steven L Young, Savas Tasoglu, Afshin Beheshti (Submitted to NPJ Microgravity). C:N/A; IF: 4.97

6. Comparative Genomics of Antibiotics Resistant Staphylococcus Species Associated with Space Habitats. F. Karouia, S. Solomon, J.M. Wood, N. K. Singh, C. E. Mason, and K. Venkateswaran. (to be submitted to BMC Genomics). C:N/A; IF: 3.96

7. **Synthetic Biology and Human Health: Potential Applications for Human Spaceflight.** Karouia F, Carr C, Cai Y, Chen Y, Larios-Sanz M, Grenon M, Jones JA, and Santos O. (to be submitted to the International Journal of Astrobiology). C:N/A; IF: 1.67

8. **Microbiome Composition Change at Gross and Discrete Taxonomic Levels in Mice Following Acute Radiation Exposure**. Karouia F, Epperly M, Jones JA, Santos O, and Greenberger J. (To be submitted to Life Journal). C:N/A; IF: 3.8

9. **Genomic characterization and radiation tolerance of *Naganishia kalamii* sp. nov. and *Cystobasidium onofrii* sp. nov. from Mars 2020 mission assembly facilities.** P. Leo, M.de Melo Texeira, A. M. Cahnder, N. K. Singh, A, C. Simpson, A. Yurkov, F. Karouia, J. E. Stajch, C. E. Mason, K. Venkateswaran. IMA Fungus 2023. C:N/A; IF: 5.4

10. **Comparative genomic analysis of *Cohnella hashimotonis* sp. nov. isolated from the International Space Station.** A. C. Simpson, v. V. Ramprasad Eedara, N. K. Singh, Namita Danle, F. Karouia, C. E. Mason, K. Venkateswaran. Front Microbiol. 2023 Jun 15;14:1166013. C:N/A; IF: 5.2

11. **Beneficial effect of in-situ citrate-grafting of hydroxyapatite surface for water treatment.** D Bouazzi, A Mehri, K Kaaroud, H Touati, F Karouia, JM Clacens, A Laghzizil, B Badraoui. Colloids and Surfaces A: Physicochemical and Engineering Aspects; Vol 666, 5 June 2023, 131366. C:1; IF: 5.2

12. **Lab Medicine in Space**, J R. Wiencek, S. Das, A. Beheshti, B E. Crucian, F. Karouia et al., Clinical Chemistry, Vol 69, issue 5, 2023, p442-449. C:N/A; IF: 9.3

13. **Extraterrestrial Gynecology: Could Spaceflight Increase the Risk of Developing Cancer in Female Astronauts? An Updated Review.** Int J Mol Sci. 2022 Jul 5:23 (13): 7465 C:11; IF: 5.6

14. **Microbial Tracking-2, a metagenomics analysis of bacteria and fungi onboard the International Space Station.** Camilla Urbaniak; Michael D. Morrison; James B. Thissen; Fathi Karouia; David J. Smith; Satish Mehta; Crystal Jaing; Kasthuri Venkateswaran. Microbiome. 2022 Jun 29; 10(1): 100. C:15; IF: 15.5

15. **Low-Temperature O_3 Decomposition over Pd-TiO_2 Hybrid Catalysts.** Touati H, Mehri A, Karouia F, Richard F, Batiot-Dupeyrat, Daniele S, Clacens JM. Catalysts 2022, 12 (4), 488. C:3; IF: 3.9

16. **Investigation of Spaceflight Induced Changes to Astronaut Microbiomes.** M. D. Morrison; J. B. Thissen; C. Urbaniak; F. Karouia; S. Mehta; K. Venkateswaran; D. J. Smith; and C. Jaing. Front. Microbiol., 2 Jun 2021, 12:1368. C:29; IF: 5.2

17. **Human Neural Stem Cells Proliferate More in Space, Have a Shorter Cell Cycle, and are Larger than Ground Control Cells After Space Flight: Implications for Long-term Space Travel.** Sophia Shaka, Nicholas Carpo, Victoria Tran, Fathi Karouia, and Araceli Espinosa-Jeffrey. J Stem Cells Res Dev. 2021, 7:069. C:5; IF: 4

18. **Assessing the risk of transfer of microorganisms at the International Space Station owing to cargo delivery by commercial resupply vehicles.** Snehit Satish Mhatre; Jason Wood; Aleksandra Checinska Sielaff; Mora Maximilian; Stefanie Duller; Nitin kumar Singh; Fathi Karouia; Christine Moissl Eichinger; Kasthuri Venkateswaran. Front. Microbiol., 6 Nov 2020; Vol 11. C:12; IF: 5.2

19. **Draft Genome Sequences of *Lactobacillales* Isolated from the International Space Station.** Bharadwaj AR, Singh NK, Wood JM, Debieu M, O'Hara NB, Karouia F, Mason CE, Venkateswaran K. Microbiol Resour Announc. 2020 Sep 24; 9(39). C:2; IF: 0.58

20. **Draft Genome Sequences of *Enterobacteriales* Strains Isolated from the International Space Station.** Bharadwaj AR, Daudu R, Singh NK, Wood JM, Debieu M, O'Hara NB, Karouia F, Mason CE, Venkateswaran K. Microbiol Resour Announc. 2020 Sep 10; 9(37). C:2; IF: 0.58

21. **Validating an automated nucleic acid extraction device for omics in space using whole cell microbial reference standards.** Camilla Urbaniak; Season Wong; Scott Tighe; Arun Kumar; Bo Liu; Ceth Parker; Jason Wood; Nitin Singh; Dana Skorupa; Brent Peyton; Ryan Jenson; Fathi Karouia; Julie Dragon; Kasthuri Venkateswaran. July 2020; Frontiers in Microbiology 11:1909. C:10; IF: 5.2

22. **Crewmember microbiota may influence taxonomy of ISS habitable surface metagenomes**. Aram Avila-Herrera; James Thissen; Camilla Urbaniak; Nicholas A. Be; David J. Smith; Fathi Karouia; Satish Mehta; Kasthuri Venkateswaran; Crystal Jaing. PLoS One. 2020 Apr 29;15(4). C:53; IF: 3.7

23. **Human Neural Stem Cells Flown into Space Proliferate and Generate Young Neurons.** Carlos Cepeda, Laurent Vergnes, Nicholas Carpo, Matthew Schibler, Laurent Bentolila, Fathi Karouia, and Araceli Espinosa-Jeffrey. Appl. Sci. 2019, 9 (19), 4042. C:6; IF: 2.7

24. **Gene Expression Measurement Module (GEMM) for space application: Design and validation**. Peyvan K, Karouia F, Cooper JJ, Chamberlain J, Suciu D, Slota M, and Pohorille A. Life Sci Space Res. 2019 Aug;22:55-67. C:5; IF: 2.73

25. **Characterization of the Total and Viable bacterial and fungal communities associated with the International Space Station Surfaces**. Aleksandra Checinska Sielaff; Camilla Urbaniak; Ganesh Babu Malli Mohan; Victor G. Stepanov; Quyen Tran; Wood JM; Minich J; McDonald D; Mayer T; Knight R; Fathi Karouia; George E. Fox; Kasthuri Venkateswaran. Microbiome. 2019 Apr 8;7(1): 50. C:173; IF: 15.5

26. **Evaluation of Acquired Antibiotic Resistance in *Escherichia coli* Exposed to Long-Term Low-Shear Modeled Microgravity and Background Antibiotic Exposure**. Madhan Tirumalai, Fathi Karouia, Quyen Tran, Victor G. Stepanov, Rebekah Bruce, C. Mark Ott, Duane Pierson, and George Fox. MBio. 2019 Jan 15; 10(1). C:40; IF: 7.78

27. **International Space Station conditions alter genomics, proteomics, and metabolomics in *Aspergillus Nidulans*.** Jillian Romsdahl, Adriana Blachowicz, Abby Chiang, Yi-Ming Chiang, Junko Yaegashi, Stefanie Countryman, Fathi Karouia, Markus Kalkum, Jason E. Stajich, Kasthuri Venkateswaran, and Clay C.C. Wang. Appl Microbiol Biotechnol. 2019 Feb; 103(3):1363-1377. C:29; IF: 5.56

28. **Succession and persistence of microbial communities and antibiotic resistance genes associated with International Space Station environmental surfaces.** Nitin Singh, Jason Wood, Fathi Karouia, and Kasthuri Venkateswaran. Microbiome. 2018 Nov 13; 6(1): 204. C:123; IF: 15.5

29. **Toward Biotechnology in Space: High-throughput Instruments for in situ biological Research beyond Earth**. Karouia F, Peyvan K, and Pohorille A. Biotechnol Adv. 2017 Nov 15;35(7):905-32. C:54; IF: 16

30. **Microbial Characteristics of the International Space Station Environmental Surfaces.** Kasthuri Venkateswaran, Aleksandra Checinska, Nitin Singh, Ganesh B. M. Mohan, Camilla Urbaniak, Adriana Blachowicz, George E. Fox, Crystal Jaing, Jonathan E. Allen, Kenneth Frey, David Smith, Satish Mehta, Nicholas H. Bergman, Fathi Karouia, Clay Wang, Nancy Keller, Duane L. Pierson, and Jay Perry. ICES-2017-131. C:8; IF: 3.26

31. **The Adaptation of E. coli Cells Grown in Simulated Microgravity for an Extended Period is Both Environmental and Genomic.** Madhan Tirumalai, Fathi Karouia , Quyen Tran, C. Mark Ott, Duane Pierson, Rebekah Bruce, and George Fox. NPJ Microgravity. 2017 May 23;3:15. C:33; IF: 4.97

32. **Cellular Responses and Gene Expression Profile Changes due to Bleomycin-Induced DNA Damage in Human Fibroblasts in Space**. Honglu Wu; Tao Lu; Ye Zhang; Yared Kidane; Alan Feiveson; Louis Stodieck; Fathi Karouia; Govindarajan Ramesh; and Larry Rohde. PLoS One. 2017 Mar 1;12(3). C:32; IF: 3.7

33. **Detection of DNA damage by space radiation in human fibroblasts flown on the International Space Station**. Tao Lu, Ye Zhang, Michael Wong, Alan Feiveson, Ramona Gaza, Nicholas Stoffle, Huichen Wang, Bobby Wilson, Larry Rohde, Luis Stodieck, Fathi Karouia, and Honglu Wu. Life Sci Space Res. Volume 12, Feb 2017, P24-31. C:44; IF: 2.73

34. **Transient gene and miRNA expression profile changes of confluent human fibroblast cells in space.** Ye Zhang, Tao Lu, Michael Wong, Xiaoyu Wang, Louis

Stodieck, Fathi Karouia, Michael Story, Honglu Wu. FASEB J. 2016 Jun;30(6):2211-24. C:31; IF: 5.834

35. **Microorganisms, organic carbon and oxidant activity interactions in hyper-arid Mars-like soils: Implications in soil habitability.** Julio E. Valdivia-Silva, Fathi Karouia, Rafael Navarro-González, and Christopher McKay. PALAIOS, 2016, V. 30, 1-9. C:10; IF: 1.60

36. **GEMM: An Automated Instrument for in-situ Gene Expression Measurements on Board the International Space Station.** F Karouia, K Peyvan, D Bajorins, LS Stodieck, AJ Ricco, O Santos, and A Pohorille. Results and Opportunities-The Decade of Utilization, Vol. 114, Science and Technology Series, American Astronautical Society, 2013, pp141-142, ISBN 978-0-87703-594-7. C:N/A; IF: N/A

37. **Long-term exposure of bacterial cells to simulated microgravity**, Karouia F, Tirumalai MR, Nelman-Gonzalez MA, Sams CF, Ott MC, Pierson DL, Willson RC, Fofanov Y, and Fox GE. *Proc. SPIE* Vol 8521, Instruments, Methods, and Missions for Astrobiology XV, 85210K 1-6, 2012. C:3; IF: 1.13

38. **Long-term Effects of Simulated Microgravity on Microbial Gene Expression.** Tirumalai MR, Karouia F, Stepanov V, Tran Q, Pierson D and Fox GE. ISSO V09, pp178-180, 2011. C:3; IF: N/A

39. **Martian Soil Biosensors Based on Dielectric Spectroscopy.** John H. Miller, Jie Fang, David Warnflash, David S. McKay, Jeffrey A. Jones, and Fathi Karouia. ISSO V07, pp61-66, 2008. C:2; IF: N/A

40. **Simulated Microgravity on Microbial Gene Expression**. Fox GE, Willson RC, Pierson DL, Tirumalai MT, and Karouia F. ISSO V07, pp58-60, 2008. C:2; IF: N/A

41. **Paradoxical DNA Repair and Peroxide Resistance Gene Conservation in Bacillus pumilus SAFR-032.**Jason Gioia Madhan R Tirumalai, Shailaja Yerrapragada, Madhan R Tirumalai, Indrani Dasgupta, Lina Bokhetache, Yamei Liu, Prahathees E. Moorthy, Brian Davis McWilliams, Adeola A Olowu, Johnathan Siefert, Fathi Karouia, Kenneth D. Clinkenbeard, Avani Verma, Prince Buzumbo, Hiba Zwiya, Okezie Igboeli, Akif Uzman, Xiang Qin, Huaiyang Jiang, Sarah Highlander, Kasthuri Venkateswaran, George E Fox, George Weinstock. PLoS ONE. 2007 Sep 26;2(9):e928. C:155; IF: 3.7

42. **Biosensors Based on Dielectric Spectroscopy,** John H. Miller, Jaroslaw Wosik, David S. McKay, Jeffrey A. Jones, Fathi Karouia, David Warnflash, Dharmakeerthi Nawarathna, ISSO V05, pp33-38, 2006. C:2; IF: N/A.

43. **A multi-goal Mars analogue expedition (expedition two) to the Arkaroola region, Australia.** Jonathan DA Clarke, Rocky Persaud, Shannon Rupert, M Bishop, A Brown, A Clarke, JP Clarke, R Clarke, N Cutler, S Dawson, K Fitzsimmons, V Gostin, J Heldmann, S Jordan, F Karouia, P Krins, E Martinez, V Matic, G Murphy, A Rupert, N Stansfield, M Tanner, M Thomas, V Waclawik, J Waldie, D Willson. Mars Analog Research, Vol. 111, Science and Technology Series, American Astronautical Society, 2006, pp3-15, ISBN - 87703-529-6. C:5; IF: N/A

44. **PR or Perish? Promotion and Outreach Opportunities in Mars Analogue Research,** Jennifer H. Laing, Reyna Jenkyns, and Fathi Karouia, Mars Analog Research, Vol. 111, Science and Technology Series, American Astronautical Society, 2006, pp39-52, ISBN - 87703-529-6. C:2; IF:N/A

45. **Effect of an artificial RNA marker on gene expression in Escherichia coli,** Tucker DL, Karouia F, Wang J, Luo Y, Li TB, Willson RC, Fofanov Y, Fox GE**:** Applied Environmental Microbiology, 2005 july, 71(7):4156-9. C:7; IF:4.79

46. **Characterization of Evolving Bacterial Populations,** G. E. Fox, M. Travisano, R. Goldman, and F. Karouia, ISSO V02, pp85-86, 2003. C:2; IF:N/A

47. **Molecular Tools to Detect and Monitor Bacterial Populations in the Space Environment.** Karouia F, Larios-Sanz M, Kourentzi K, Willson RC, and Fox GE (manuscript in preparation).

48. **Transcriptional and Physiological Characterization of Escherichia coli K12 MG1655 Grown under Low-Shear simulated microgravity for 1000 Generations.** Karouia F, Tirumalai MR, Nelman-Gonzalez MA, Sams CF, Ott MC, Pierson DL, Willson RC, Fofanov Y, and Fox GE (manuscript in preparation).

REVIEW ARTICLES

1. **Synthetic Biology and Human Health: Potential Applications for Human Spaceflight.** Karouia F, Carr C, Cai Y, Chen Y, Larios-Sanz M, Grenon M, Jones JA, and Santos O. (submitted to the International Journal of Astrobiology). C:N/A; IF:1.47.

2. **Toward Biotechnology in Space: High-throughput Instruments for in situ biological Research beyond Earth.** Karouia F, Peyvan K, and Pohorille A. Biotechnol Adv. 2017 Nov 15;35(7):905-32. C:47; IF:14.23.

BOOKS AND CHAPTERS

1. **Principles of Clinical Medicine for Space Flight,** JA Jones, F Karouia, L Pinsky, O Cristea. Chapter 2: Radiation and Radiation Disorder, Edited by M. Barratt, 2nd Edition. Springer, ISBN-978-1-4939-9889-0, Dec 2019. C:5; IF:N/A.

2. **Radiobiology of Space Radiation,** Jones, J. A., Montesinos C, Karouia, F, Popov D, Boreham D, Cristea C, and Greenberger J. Chap VII: Sporadic High LET Radiation. CMCR-Radiobiology and Methods Public Textbook. Joel. S Greenberger Editor, Pittsburg, PA. June 26th, 2018. C:N/A; IF:N/A.

3. **Comprehensive Toxicology,** Jones, J. A., Karouia, F. O. Cristea, RC Casey, D. Popov, and V Maliev. Ionizing Radiation as a Carcinogen. (2018). 3rd Edition. Volume 7, pp. 183-225. Oxford: Elsevier Ltd. ISBN:9780081006016. C:10; IF:N/A.

4. **Comprehensive Toxicology**, Jones, J. A., Casey, R. C., and Karouia, F. Chapter 11: Ionizing Radiation as a Carcinogen, 2nd Edition, Elsevier, ISBN-13: 978-0-08-046868-6, 2010. C:12; IF:N/A.

5. **Principles of Clinical Medicine for Space Flight**, Jones, J. A., and Karouia, F. Chapter 25: Radiation Disorder, Edited by M. Barratt, ISBN: 9780387988429, 2008. C:13; IF:N/A.

OTHER PUBLICATIONS

1. **Autonomous Lunar Transport Vehicle: Providing a link to scientific research**, MSS **5**, 171 pages, The International Space University Publication, July 2000.

CONFERENCE ABSTRACTS

1. **Artificial Stable RNAs Have Limited Effect on Host Gene Expression**, Tucker, D., **Karouia, F.**, Li, T., Shi, L., Luo, R., Wang, J., Fofanov, Y., Willson, R. C., and Fox, G. E. Environmental Biotechnology at Annual Meeting American Chemical Society, New Orleans, La., March 23-27th , 2003.

2. **Functional Genomic Analysis of E. Coli in a Low-Shear Modeled Microgravity Environment**, D. L. Tucker, C. M. Ott, **F. Karouia**, D. L. Pierson, R. C. Willson, and G. E. Fox, American Society of Microbiology General Meeting, Washington DC, May 17th-May 22nd 2003.

3. **A Pair-wise Correlation Analysis Applied to Gene Expression Data from Two Escherichia coli Strains**, Shi,L., Li, T-B., Tucker, D., **Karouia, F.**, Willson, R. C., Fox, G. E., and Fofanov, Y, 20th annual meeting of Houston Society for Engineering in Medicine and Biology, Houston, TX, April 3-4, 2003.

4. **ImageAnalyzer: A flexible application for microarray image analysis**, Wang J., Luo, Y., Li, T-B., Tucker, D.L., **Karouia, F.** , Fox, G. E., Willson, R. C., and Fofanov, Eighth Annual Structural Biology Symposium, Sealy Center for Structural Biology, Galveston, Texas , May 2-4, 2003.

5. **Microbes in the Spacecraft Environment,**Tucker, DL, Zhu, D, Jackson, GW, Anez, M., Cano, T., Dasgupta, I., Potty, A., **Karouia, F**., Ott, CM, Fofanov, Y., Pierson, DL, Willson, RC, & Fox, GE., **Bioastronautics Investigators' Workshop**, Galveston, TX, January 10-12, 2005.

6. **Shine Dalgarno like Sequences in the upstream region of internal AUG codons in Escherichia coli,** Indrani Dasgupta, Dianhui Zhu, **Fathi Karouia**, Johnathan P. Siefert, and George E. Fox, **11th Annual Structural Biology Symposium**, Sealy Center for Structural Biology, **University of Texas Medical Branch**, Galveston, Texas, May 19-20, 2006.

7. **Whole genome sequence of a Bacillus pumilus strain isolated from a Spacecraft Assembly Facility,** Madhan R Tirumalai, Shailaja Yerrapragada, Jason Gioia, Indrani Dasgupta, Lina Bokhetache, Yamei Liu, Prahathees E. Moorthy, Brian Davis McWilliams, Adeola A Olowu, Johnathan Siefert, Fathi Karouia, Kenneth D. Clinkenbeard, Avani Verma, Prince Buzumbo, Hiba Zwiya, Okezie Igboeli, Akif Uzman, Xiang Qin, Huaiyang Jiang, Sarah Highlander, Kasthuri Venkateswaran, George E Fox, George Weinstock, for the 107th General Meeting of the American Society for Microbiology, 21-25 May, 2007, Toronto, Canada.

8. Raghaven M, **Karouia F**, Fofanov Y, Willson RC, and Fox GE. (2008). **Bacterial Adaptation to Space Flight Environments**," Workshop on the Microbial Ecological Perspectives of Space-Exposed Microbes, Jet Propulsion Laboratory, Pasadena Ca, November 11, 2008.

9. **Detection of metabolic activity by 125I-Iododeoxyuridine incorporation into DNA in Colwellia psychrerythraea over a temperature range from 8°C to -40°C.**Summers D, Diaz-Maldonado H, Duart-Garcia C, **Karouia F**, Santos O, and Trent J. COSPAR Meeting, Bremen, Germany 18-25 July 2010.

10. **Transcriptional and Physiological Characterization of Escherichia coli MG1655 that have been Grown in a Low-Shear Modeled Microgravity Environment for 1000 Generations. Karouia F**, Tirumalai MR, Nelman-Gonzalez MA, Sams CF, Ott MC, Pierson

DL, Willson RC, Fofanov Y, and Fox GE. COSPAR Meeting, Bremen, Germany, 18-25 July 2010.

11. **Microbial contamination detection at low levels by 125I radiolabeling**. Summers D, and **Karouia F**. COSPAR Meeting, Bremen, Germany, 18-25 July 2010.
12. **Transcriptional and Physiological Characterization of Escherichia coli K12 MG1655 Grown under Low-Shear simulated microgravity for 1000 Generations. Karouia F**, Tirumalai MR, Nelman-Gonzalez MA, Sams CF, Ott MC, Pierson DL, Willson RC, Fofanov Y, and Fox GE., IAC-10-A1.7.7,IAC Meeting, Prague, 27 September-1 October 2010.
13. **125I-Iododeoxyuridine Incorporation into DNA in Colwellia Psychrerythraea over a Temperature Range from 8°C to -40°C**. Summers D, **Karouia F**, Diaz-Maldonado H, Duart-Garcia C, Santos O, and Trent J, The American Society for Gravitational and Space Biology Meeting, San Jose, CA, November 2nd-6th, 2011.
14. **Detection of Metabolic Activity by125I-Iododeoxyuridine Incorporation into DNA in Colwellia Psychrerythraea over a Temperature Range from 8°C to -40°C**. Summers D, **Karouia F**, Diaz-Maldonado H, Duart-Garcia C, Santos O, and Trent J. IAC-11, A1.5.11, IAC meeting, Cap Town, 3-7 October 2011.
15. **Instrument for Space Biology Applications and the Monitoring of the Astronaut's Health onboard the ISS**. **Karouia F**, Pohorille A, Peyvan K, Ricco TJ, Danley D, Santos O, and Pohorille A. The American Society for Gravitational and Space Biology Meeting, San Jose, CA, November 2nd-6th, 2011.
16. **Microbial Countermeasures for Human Spaceflight**, **Fathi Karouia**, Society of Scientists Dedicated to Advancing Hispanics/Chicanos and Native Americans in Science Annual conference, San Jose, CA, October 27th- 30th, 2011.
17. **Automated, Miniaturized Instrument for Measuring Gene Expression in Space - the Doors to New Biology in Space.** Pohorille A, Peyvan K, Ricco TJ, Danley D, and **Karouia F**. IAC-11, A1.5.7, IAC meeting, Cap Town, 3-7 October 2011.
18. **Automated, Miniaturized Instrument for Space Biology Applications and the Monitoring of the Astronaut's Health onboard the ISS**. **Karouia F**, Pohorille A, Peyvan K, Ricco TJ, Danley D, Santos O, and Pohorille A. IAC-11, A1.3.6, IAC meeting, Cap Town, 3-7 October 2011.
19. **Detection of Metabolic Activity by125I-Iododeoxyuridine Incorporation into DNA in Colwellia Psychrerythraea over a Temperature Range from 8°C to -40°C**Summers D, **Karouia F**, Diaz-Maldonado H, Duart-Garcia C, Santos O, and Trent J. ISSOL and Bioastronomy Joint International Conference, Montpellier 3-8July 2011.
20. **Automated, Miniaturized Instrument for Measuring Gene Expression in Space**, **Fathi Karouia**, K Peyvan, A Ricco, Andrew Pohorille, Astrobiology Science conference, Atlanta, GA, April 16-20, 2012.
21. **Microbiological Genetic Inventory within the NASA Ames Research Center High Bay Clean Area Before and After its Certification for the Assembly of LADEE**, Fathi Karouia and Orlando Santos, PPP.3-0008-12, COSPAR meeting, Mysore, India, July 14-22nd, 2012.
22. **Gene Expression Measurement Module (GEMM) – a fully automated, miniaturized instrument for measuring gene expression in space**, **Fathi Karouia**, K Peyvan, A Ricco, Andrew Pohorille, F3.3-0003-12, COSPAR meeting, Mysore, India, July 14-22nd, 2012.

23. **Long-term exposure of bacterial cells to simulated microgravity**, **Karouia F**, Tirumalai MR, Nelman-Gonzalez MA, Sams CF, Ott MC, Pierson DL, Willson RC, Fofanov Y, and Fox G, SPIE Optics and Photonics, San Diego, CA, August 12th-16th, 2012.

24. **Gene Expression Measurement Module (GEMM) – a fully automated, miniaturized instrument for measuring gene expression in space**, **Fathi Karouia**, K Peyvan, A Ricco, Andrew Pohorille, TIX-3, ASGSR meeting, New Orleans, LA, Nov 28th-Dec 2nd, 2012.

25. **Microbiological Genetic Inventory within the NASA Ames Research Center High Bay Cleanroom**, Fathi Karouia and Orlando Santos, IPS-3, ASGSR meeting, New Orleans, LA, Nov 28th-Dec 2nd, 2012.

26. **Long-term exposure of E. coli to simulated microgravity and elevated background radiation.** F .Karouia, M.R. Tirumalai, D.L. Pierson, John Ford, and G.E.Fox. TVI-3, ASGSR meeting, New Orleans, LA, Nov 28th-Dec 2nd, 2012.

27. **Gene Expression Measurement Module (GEMM) – a fully automated, miniaturized instrument for measuring gene expression in space**, **Fathi Karouia**, K Peyvan, A Ricco, Andrew Pohorille, NASA Ames Space Science and Astrobiology Symposium, March 12th, 2013.

28. **Microbiological Genetic Inventory within the NASA Ames Research Center High Bay Cleanroom**, Fathi Karouia and Orlando Santos, NASA Ames Space Science and Astrobiology Symposium, March 12th, 2013.

29. **Gene Expression Measurement Module (GEMM) – a fully automated, miniaturized instrument for measuring gene expression in space**, **Fathi Karouia**, K Peyvan, A Ricco, Andrew Pohorille, A.1.5.7, IAC meeting, Beijing, China, September 23rd-27th, 2013.

30. **Gene Expression Measurement Module (GEMM) – the Door to High-Throughput in situ Analysis of Biological Systems in Space.** Fathi Karouia, K Peyvan, A Ricco, Andrew Pohorille, A.1.7.1, IAC meeting, Beijing, China, September 23rd-27th, 2013.

31. **Microbiological Genetic Inventory within the NASA Ames Research Center Cleanroom**, Fathi Karouia and Orlando Santos, A.1.P.39, IAC meeting, Beijing, China, September 23rd-27th, 2013

32. **Current Trends in High Throughput Methods for In-Situ Space Research.** Fathi Karouia, Kia Peyvan, Orlando Santos, and Andrew Pohorille. ASGSR Meeting, Enabling Technology, Nov 3rd-8th, 2013, Orlando, FL

33. **Gene Expression Measurement Module (GEMM)- the door to high-throughput in-situ analyses of biological systems in space.** Andrew Pohorille, Kia Peyvan, Fathi Karouia, and Antonio Ricco. ASGSR Meeting, Enabling Technology, Nov 3rd-8th, 2013, Orlando, FL

34. **Gene Expression Measurement Module (GEMM)- the door to high-throughput in-situ analyses of biological systems in space.** F. Karouia, K Peyvan, A. Ricco, and A. Pohorille. COSPAR Meeting, F3.1.3.14, Aug 2-10, 2014, Moscow, Russia.

35. **Current Trends in High Throughput Methods for In-Situ Space Research**. F Karouia, P Keyvan , O santos, and A Pohorille. COSPAR Meeting, F4.6-8-14, Aug 2-10, 2014, Moscow, Russia.

36. **Impact of Whole Body Irradiation on the Intestinal Microbiome- Considerations for Space Flight**. Karouia F, Epperly M, Karouia F, Jones JA, Santos O, and Greenberger J. COSPAR Meeting, F2.1-17-14, Aug 2-10, 2014, Moscow, Russia.

37. **Gene Expression Measurement Module (GEMM)- the door to high-throughput in-situ analyses of biological systems for astrobiology.** Fathi Karouia, Kia Peyvan, Antonio J. Ricco, and Andrew Pohorille. IAC meeting, A1.5, September 29th- October 3rd, 2014, Toronto, Canada.

38. **Current Trends in High Throughput Methods for In-Situ Space Research.** Fathi Karouia, Kia Peyvan, Orlando Santos, and Andrew Pohorille. IAC meeting, A1.7, September 29th- October 3rd, 2014, Toronto, Canada.

39. **Impact of Whole Body Irradiation on the Intestinal Microbiome- Considerations for Space Flight**. Karouia F, Epperly M, Karouia F, Jones JA, Santos O, and Greenberger J. IAC meeting, A1.4, September 29th- October 3rd, 2014, Toronto, Canada.

40. **Biological Validation of the Gene Expression Measurement Module (GEMM) for Microbial Gene Expression in Space.** Fathi Karouia, Kia Peyvan, Antonio Ricco, and Andrew Pohorille. ASGSR Meeting, Enabling Technology, Oct 23rd-26th, 2014, Pasadena, CA.

41. **The Next Generation of Space Biology Research.** F Karouia, Kia Peyvan, Orlando Santos, and Andrew Pohorille. ASGSR Meeting, Enabling Technology, Oct 23rd-26th, 2014, Pasadena, CA.

42. **Impact of Whole Body Irradiation on the Intestinal Microbiome- Considerations for Space Flight.** F Karouia, MW Epperly, JA Jones, JE Valdivia-Silva, O Santos, and JS Greenberger. ASGSR Meeting, Microbial, Oct 23rd-26th, 2014, Pasadena, CA.

43. **Current Trends of High-Throughput Methods for Planetary Protection Requirements Associated with a Human Mission.** Fathi Karouia, Kia Peyvan, Orlando Santos, and Andrew Pohorille. Workshop on Planetary Protection Knowledge Gaps for Human Extraterrestrial Missions, Moffett Field, CA

44. **Biological Validation of the Gene Expression Measurement Module (GEMM) for Microbial Gene Expression in Space.** Fathi Karouia, Kia Peyvan, Antonio Ricco, and Andrew Pohorille. AbSciCon, June 15-19, 2015, Chicago, IL.

45. **Long-term evolution studies of E. coli MG1655 under the combined stress of Low Shear Modeled Microgravity (LSMMG) and the broad spectrum antibiotic chloramphenicol.** M. R. Tirumalai, F. Karouia, Q. Tran, D. L. Pierson, C. M. Ott, J. Ford, and G. E. Fox. AbSciCon, June 15th-19th, 2015, Chicago, IL.

46. **Intestinal Microbiome: Considerations of Radiation Exposure and Health Effects for Exploration Class Space Flight**. Jeffrey Jones; Fathi Karouia; Micheal Epperly; Carlos Montesinos; Joseph Petrosino; Octav Cristea; and Joel Greenberger. IAA Human in Space Meeting, June 29th-July 3rd, 2015, Prague, Czech Republic.

47. **Intestinal Microbiome: Considerations of Radiation Exposure and Health Effects for Exploration Class Space Flight**. Jeffrey Jones; Fathi Karouia; Micheal Epperly; Carlos Montesinos; Joseph Petrosino; Octav Cristea; and Joel Greenberger. Radiation Research Society Meeting, September 19th-22nd, 2015, Weston, FL.

48. **Cellular response to bleomycin-induced DNA damage in human fibroblast cells in space.** Tao Lu, Ye Zhang, Michael Wong, Louis Stodieck, Fathi Karouia, and Honglu Wu. ASGSR Meeting, Nov 10th-14th, 2015, Alexandria, VA.

49. **Detection of DNA damage by space radiation in human fibroblast cells flown on the International Space Station.** Honglu Wu, Tao Lu, Michael Wong, Louis Stodieck, Fathi Karouia, and Ye Zhang. ASGSR Meeting, Nov 10th-14th, 2015, Alexandria, VA.

50. **Long-term evolution studies of E. coli under combined effects of SIMULATED Microgravity and antibiotic.** F. Karouia, M. R. Tirumalai, Q. Tran, D. L. Pierson, C. M. Ott, and G. E. Fox. ASGSR Meeting, Nov 10th-14th, 2015, Alexandria, VA.

51. **Space Biology Research: Past, Present, and Future**. F. Karouia.ASGSR Meeting, Nov 10th-14th, 2015, Alexandria, VA.

52. **Long-Term Evolution Studies of E. Coli under Combined Effects of Simulated Microgravity and Antibiotic.** Fathi Karouia, Madhan Tirumalai, Quyen Tran, C. Mark Ott, Duane Pierson, Rebekah Bruce, and George Fox. COSPAR Meeting, July 30th- August 7th, 2016, Istanbul, Turkey.

53. **Gene Expression Measurement Module (GEMM) for Microbial Gene Expression in Space: a Step Closer to High-Throughput Astrobiological Studies.** Karouia F, Peyvan K, Ricco AJ, and Pohorille A. COSPAR Meeting, July 30th- August 7th, 2016, Istanbul, Turkey.

54. **The Next Generation of Space Biology Research.** Karouia F, Peyvan K, and Pohorille A. COSPAR Meeting, July 30th- August 7th, 2016, Istanbul, Turkey.

55. **Effects of Spaceflight on Molecular and Cellular Responses to Bleomycin-induced DNA Damages in Confluent Human Fibroblasts.** Tao Lu, Ye Zhang, Michael Wong, Louis Stodieck, Fathi Karouia, Honglu Wu. COSPAR Meeting, July 30th- August 7th, 2016, Istanbul, Turkey.

56. **Transient Gene and microRNA Expression Profile Changes of Confluent Human Fibroblast Cells in Space.** Honglu Wu , Ye Zhang, Tao Lu, Louis Stodieck, Fathi Karouia, Michael Story. COSPAR Meeting, July 30th- August 7th, 2016, Istanbul, Turkey.

57. **Detection of DNA damage by space radiation in human fibroblast cells flown on the International Space Station.** Honglu Wu, Tao Lu, Michael Wong, Alan Feiveson, Louis Stodieck, Fathi Karouia, Ye Zhang. COSPAR Meeting, July 30th- August 7th, 2016, Istanbul, Turkey.

58. **Lessons Learned from the Environmental "Omics" of International Space Station.** Kasthuri Venkateswaran, Aleksandra Checinska, Nitin Singh, Ganesh Babu Malli Mohan, Adriana Blachowicz, George E. Fox, Crystal Jaing, Jonathan E. Allen, David Smith, Nicholas H. Bergman, Fathi Karouia, Clay Wang, Nancy Keller, Duane L. Pierson, and Jay Perry. ASGSR Meeting, Oct 26th-29th, 2016, Cleveland, OH.

59. **Influence of microgravity on the production of Aspergillus secondary metabolites (Micro-10).** Clay Wang, Adriana Blachowicz, David Smith, Fathi Karouia, and Kasthuri Venkateswaran. ASGSR Meeting, Oct 26th-29th, 2016, Cleveland, OH.

60. **Gene Expression Profile Changes in Response to Bleomycin-Induced DNA Damage in Space**. **Honglu Wu, Tao Lu, Yared Kidane, Alan Feiveson, Luis Stodieck, Fathi Karouia, and Ye Zhang.** ASGSR Meeting, Oct 26th-29th, 2016, Cleveland, OH.

61. **Gene Expression Measurement Module (GEMM)-The door to high-throughput in situ analyses of biological systems.** Karouia F, Peyvan K, Ricco AJ, and Pohorille A. Generic Technologies for Nano/Pico Platforms, International Astronautical Congress, September 25th- 29th, 2017, Adelaide, Australia.

62. **Impact of Whole Body Irradiation on the Intestinal Microbiome- Considerations for Space Flight.** F Karouia, MW Epperly, JA Jones, JE Valdivia-Silva, O Santos, and JS Greenberger. Radiation Fields, Effects and Risks in Human Space Mission, International Astronautical Congress, September 25th- 29th, 2017, Adelaide, Australia.

63. **Current Trends of High-Throughput Methods for in situ Space Research. .** Fathi Karouia, Kia Peyvan, Orlando Santos, and Andrew Pohorille. Microgravity Sciences Onboard the International Space Station and Beyond-part 2, International Astronautical Congress, September 25th- 29th, 2017, Adelaide, Australia.

64. **Long-term evolution studies of E. coli MG1655 under the combined stress of Low Shear Modeled Microgravity (LSMMG) and the broad spectrum antibiotic chloramphenicol.** F. Karouia, M. R. Tirumalai, Q. Tran, D. L. Pierson, C. M. Ott, J. Ford, and G. E. Fox. Biology in Space, International Astronautical Congress, September 25th- 29th, 2017, Adelaide, Australia.

65. **Toward Biotechnology in Space: High-throughput Instruments for in situ biological Research beyond Earth.** Karouia F, Peyvan K, and Pohorille A. Enabling Technologies IV: New Analytic Techniques. ASGSR Meeting, Oct 25th-28th, 2017, Seattle, WA

66. **Biology and Biotechnology Experiments on-board the ISS: Looking into the past for a better future.** F. Karouia, L. Guan, and P. A. Vaishampayan. Enabling Technologies III: Model Systems Research. ASGSR Meeting, Oct 25th-28th, 2017, Seattle, WA.

67. **Lessons Learned: ISS-Microbial Observatory Project (Microbial Tracking-1).** Kasthuri Venkateswaran, Aleksandra Checinska, Nitin Singh, Ganesh Babu Malli Mohan, Adriana Blachowicz, George E. Fox, Crystal Jaing, Jonathan E. Allen, David Smith, Nicholas H. Bergman, Fathi Karouia, Clay Wang, Nancy Keller, Duane L. Pierson, and Jay Perry. Microbial I: Microbial Diversity and Antibiotic Resistance. ASGSR Meeting, Oct 25th-28th, 2017, Seattle, WA.

68. **Microbial Tracking-2: Observing Potential Pathogenic Bacteria, Fungi, and Viruses in the ISS.** C jaing, K Venkateswaran, D Smith, S Mehta, D Pierson, F Karouia, A Avila-Herrera. . Microbial I: Microbial Diversity and Antibiotic Resistance. ASGSR Meeting, Oct 25th-28th, 2017, Seattle, WA.

69. **Long-term multi-generational evolutionary studies of bacteria in the spaceflight environment.** C Everroad, Karouia F, B Bebout, A Ricco, and J Koehne. Microbial III: Microbial Adaptation in LEO and Beyond. ASGSR Meeting, Oct 25th-28th, 2017, Seattle, WA.

70. **Investigating the Physiology and Fitness of Shewanella Oneidensis MR-1 under microgravity Conditions**. M Dougherty, L Zea, F Karouia, and J Hogan. Microbial III: Microbial Adaptation in LEO and Beyond. ASGSR Meeting, Oct 25th-28th, 2017, Seattle, WA.

71. **Long-term evolution studies of E. coli MG1655 under the combined effects of Simulated Microgravity and Antibiotic.** F. Karouia, M. R. Tirumalai, Q. Tran, D. L. Pierson, C. M. Ott, J. Ford, and G. E. Fox. Genetic, Epigenetic, and Metabolic Changes in Spaceflight and Simulated Spaceflight Environment. COSPAR Meeting, July 14th- July 22nd, 2018, Pasadena, USA.

72. **Gene Expression Measurement Module (GEMM)-The door to high-throughput in situ analyses of biological systems. .** Karouia F, Peyvan K, Ricco AJ, and Pohorille A.

Astrobiology_Experiments from Mars Analogue, Earth, and Beyond. COSPAR Meeting, July 14th- July 22nd, 2018, Pasadena, USA

73. **Toward Biotechnology in Space: High-throughput Instruments for in situ biological Research beyond Earth.** Karouia F, Peyvan K, and Pohorille A. Influence of Spaceflight Environments on Biological Systems. COSPAR Meeting, July 14th- July 22nd, 2018, Pasadena, USA

74. **Cellular Responses and Gene Expression Profile Changes due to Bleomycin-Induced DNA Damage in Human Fibroblasts in Space.** Honglu Wu; Tao Lu; Ye Zhang; Yared Kidane; Alan Feiveson; Louis Stodieck; Fathi Karouia; Govindarajan Ramesh; and Larry Rohde. Genetic, Epigenetic, and Metabolic Changes in Spaceflight and Simulated Spaceflight Environment. COSPAR Meeting, July 14th- July 22nd, 2018, Pasadena, USA.

75. **Detection of DNA damage by space radiation in human fibroblasts flown on the International Space Station.** Tao Lu, Ye Zhang, Michael Wong, Alan Feiveson, Ramona Gaza, Nicholas Stoffle, Huichen Wang, Bobby Wilson, Larry Rohde, Luis Stodieck, Fathi Karouia, and Honglu Wu. Towards Space Exploration: Radiation Biological Basis. COSPAR Meeting, July 14th- July 22nd, 2018, Pasadena, USA

76. **Transient gene and miRNA expression profile changes of confluent human fibroblast cells in space.** Ye Zhang, Tao Lu, Michael Wong, Xiaoyu Wang, Louis Stodieck, **Fathi Karouia**, Michael Story, Honglu Wu. Genetic, Epigenetic, and Metabolic Changes in Spaceflight and Simulated Spaceflight Environment. COSPAR Meeting, July 14th- July 22nd, 2018, Pasadena, USA.

77. **Genotyping, Phylogeny, and Gene Expression Measurement Module - the Door to High-Throughput In-Situ Analyses of Clinical and Biological Samples in Space.** Karouia F, Peyvan K, Ricco AJ, and Pohorille. Technology Development. ISS R&D Meeting, July 23rd-July 26, 2018, San Francisco, USA.

78. **Microbial Tracking-2: Observing Potential Pathogenic Bacteria, Fungi, and Viruses in the International Space Station.** C. Jaing, J. Thissen, N. Be, A. Avila-Herrera, D.J. Smith, S. Mehta, F. Karouia and K. Venkateswaran. ASGSR Meeting, Oct 21st-Nov 3rd, 2018, Bethesda, MD.

79. **Effects of Microgravity on the Physiology and Fitness of *Shewanella oneidensis* MR-1.** Michael Dougherty, Adam Deutschbauer, Natalie Ball, Morgan Price, Jayashree Ray, Fathi Karouia, Adam Arkin, and John Hogan. ASGSR Meeting, Oct 21st-Nov 3rd, 2018, Bethesda, MD.

80. **Micro-11: Human and Bovine Sperm Function in Microgravity on the ISS.** JS Tash, AJ Feustel, S Aunon-Chancellor, EM Yarns, SS Piper, L Ngo, E Laundy, V Mittal, N Chanliongco, M Julo, LS Stodieck, L Zea, S Doraisingam, F Karouia, G Blanco. Oct 21st-Nov 3rd, 2018, Bethesda, MD.

81. **Shedding of latent herpes viruses in crewmember and International Space Station Environment.** S. Mehta, B Rooney, D. Pierson, C. Jaing, D.J. Smith, F. Karouia, C Urbaniak, K. Venkateswaran, and B. Crucian. ASGSR Meeting, Oct 21st-Nov 3rd, 2018, Bethesda, MD.

82. **Genotyping, Phylogeny, and Gene Expression Measurement Module - the Door to High-Throughput In-Situ Analyses of Clinical and Biological Samples in Space.** Karouia F, Peyvan K, Ricco AJ, and Pohorille. 70th IAC Meeting, Life and microgravity sciences onboard the ISS and beyond, Oct 21st-Oct 25, 2019, Washington, DC, USA.

83. **Micro-11: Microgravity Significantly Alters Human and Bovine Sperm Functions on the ISS.** JS Tash, AJ Feustel, S Aunon-Chancellor, EM Yarns, SS Piper, L Ngo, E Laundy, V Mittal, N Chanliongco, M Julo, LS Stodieck, L Zea, S Doraisingam, F Karouia, G Blanco. ASGSR Meeting, Nov 20th-23rd, 2019, Denver, CO.

84. Experimental evolution of *Bacillus subtilis* 168 in the spaceflight environment. R.C. Everroad, B.M. Bebout, A.M. Detweiler, F. Karouia, J. Koehne, K.R. Martin, A.J. Ricco. ASGSR Meeting, Nov 20th-23rd, 2019, Denver, CO.

85. **Results of the Micro-12 Flight Experiment: Effects of Microgravity on *Shewanella* oneidensis MR-1**. Michael Dougherty, Adam Deutschbauer, Natalie Ball, Morgan Price, Jayashree Ray, Fathi Karouia, Adam Arkin, and John Hogan. ASGSR Meeting, Nov 20th-23rd, 2019, Denver, CO.

86. **Initial Microbial Tracking 2 results reveal bacterial exchange between the astronauts and the International Space Station**. M. D. Morrison, A. Avila-Herrera, J. Thissen, N. Be, C. Urbaniak, D.J. Smith, S. Mehta, F. Karouia, K. Venkateswaran, and C. Jaing. ASGSR Meeting, Nov 20th-23rd, 2019, Denver, CO.

87. **Lunar Life Sciences Payload Assessment, Human Health and Performance**. S. Sun, F. Karouia, M Lerra, M. Parra, H, Ray, A. Ricco, and S Spremo. Lunar Surface Science Workshop, April 28-30, 2020, Denver CO.

88. **Characteristics of Changes within the Microbiome and Development of Suitable Countermeasures for Long Duration Spaceflight**. Karouia F, Epperly M, Jones JA, Santos O, and Greenberger J. 71st IAC Meeting, Radiation Fields, Effects, and Risks in Human Space Missions, Oct 12th- Oct 14th, 2020.

89. Acclimation vs. Adaptation: Evolution Studies of Escherichia coli under Simulated Microgravity. Karouia F, Tirumalai MR, Nelman-Gonzalez MA, Sams CF, Ott MC, Pierson DL, Willson RC, Fofanov Y, and Fox GE. 71st IAC Meeting, Science Results from Ground Based Research, Oct 12th- Oct 14th, 2020.

90. Lunar Life Sciences Payload Assessment. F. Karouia, M Lerra, M. Parra, H, Ray, A. Ricco, S Spremo, and S. Sun. 71st IAC Meeting, Moon Exploration, Oct 12th- Oct 14th, 2020.

91. Comparative Genomics of Antibiotics Resistant Staphylococcus Species Associated with Space Habitats. F Karouia, S Solomon, J.M. Wood, N. K. Singh, C. E. Mason, and K. Venkateswaran. ASGSR Meeting, Nov 5th-6th, 2020.

92. **Human Neural Stem Cells Proliferate More and are Larger Than Control Cells Upon Return to Earth: Implication for Long-term Space Travel.** F Karouia; S. Shaka; N. Carpo; V. Tran; A. Espinosa-Jeffrey. ASGSR Meeting, Nov 5th-6th, 2020.

93. **Fertilization-Critical Motility & Acrosome Reaction of Human & Bovine Sperm are Negatively Impacted by Space Flight on the ISS.** JS Tash, AJ Feustel, S Aunon-Chancellor, EM Yarns, SS Piper, L Ngo, E Laundy, V Mittal, N Chanliongco, M Julo, LS Stodieck, L Zea, S Doraisingam, F Karouia, G Blanco. ASGSR Meeting, Nov 5th-6th, 2020.

94. **Analysis of Spaceflight Induced Changes to the Astronaut Microbiome.** M. D. Morrison, J. Thissen, C. Urbaniak, D.J. Smith, S. Mehta, F. Karouia, K. Venkateswaran, and C. Jaing. ASGSR Meeting, Nov 5th-6th, 2020.

95. **Impact of Space Flight Radiation and Microgravity on DNA Integrity and Fertility Risk of Human & Bovine Sperm on the ISS.** A Mitra, AJ Feustel, S Aunon-Chancellor, EM

Yarns, SS Piper, L Ngo, E Laundy, V Mittal, N Chanliongco, M Julo, LS Stodieck, L Zea, S Doraisingam, F Karouia, G Blanco, and JS Tash. ASGSR Meeting, Nov 5th-6th, 2020.

96. **Inventory, archival, and availability of 1000 microbial genomes isolated from the International Space Station and crew resupply vehicles.** J.M. Wood, N. K. Singh, C. Urbaniak, F Karouia, C. E. Mason, and K. Venkateswaran. ASGSR Meeting, Nov 5th-6th, 2020.

97. **Microbial Tracking-2, a metagenomics analysis of pathogenic bacteria, fungi and viruses onboard the International Space Station.** C. Urbaniak, M. D. Morrison, D.J. Smith, S. Mehta, F. Karouia, C. Jaing, and K. Venkateswaran. ASGSR Meeting, Nov 5th-6th, 2020.

98. Lunar Life Sciences Payload Assessment. S. Sun, F. Karouia, M Lerra, M. Parra, H, Ray, A. Ricco, S Spremo. Lunar Surface Science Workshop. Jan 20th- 21st, 2021.

99. **Intestinal Microbiome Changes Following Whole Body Irradiation.** Karouia F, Epperly M, Jones JA, Santos O, and Greenberger J. COSPAR Meeting, Influence of Spaceflight Environments on Biological Systems, Jan 28th-Februrary 4th, 2021, Sydney, AUS.

100. Long-term evolution and physiological studies of E. coli under simulated microgravity. F. Karouia, M. R. Tirumalai, Q. Tran, D. L. Pierson, C. M. Ott, J. Ford, and G. E. Fox. Genetic, Epigenetic, and Metabolic Changes in Spaceflight and Simulated Spaceflight Environment. COSPAR Meeting, Jan 28th-Februrary 4th, 2021, Sydney, AUS.

101. Lunar Life Sciences Payload Assessment. F. Karouia, M Lerra, M. Parra, H, Ray, A. Ricco, S Spremo, and S. Sun. 72nd IAC Meeting, Moon Exploration Part-2, Oct 25th- Oct 29h, 2021, Dubai, UAE.

102. Comparative Genomics of Antibiotics Resistant Staphylococcus Species Associated with the International Space Station. F Karouia, S Solomon, J.M. Wood, N. K. Singh, C. E. Mason, and K. Venkateswaran. 72nd IAC Meeting, Biology in Space, Oct 25th- Oct 29h, 2021, Dubai, UAE.

103. **Radiation and Microgravity Effect on In Vitro Capacitated Cryopreserved Human & Bovine Sperm on the ISS.** A Mitra, AJ Feustel, S Aunon-Chancellor, EM Yarns, SS Piper, L Ngo, E Laundy, V Mittal, N Chanliongco, M Julo, LS Stodieck, L Zea, S Doraisingam, F Karouia, G Blanco, and JS Tash. ASGSR Meeting, Nov 3rd-6th, 2021.

104. **Analysis of Crew Microbiome Changes during Spaceflight.** M. D. Morrison, J. Thissen, C. Urbaniak, D.J. Smith, S. Mehta, F. Karouia, K. Venkateswaran, and C. Jaing. ASGSR Meeting, Nov 3rd-6th, 2021.

105. Comparative Genomics of Antibiotics Resistant Staphylococcus Species Associated with the International Space Station. F Karouia, S Solomon, J.M. Wood, N. K. Singh, C. E. Mason, and K. Venkateswaran. ASGSR Meeting, Nov 3rd-6th, 2021.

106. Impact of Hindlimb Unloading and Gender on Rodent's Microbiome. Fathi Karouia, Ceth W. Parker, Nitin Kumar Singh, Marie Mortreux, Seward B. Rutkove, Christopher E. Mason, and Kasthuri Venkateswaran. Genetic Epigenetic and Metabolic Changes in Spaceflight and Simulated Spaceflight. COSPAR Meeting, Jul 16th- Jul 24th, 2022, Athens, GRE.

107. Comparative Genomics of Antibiotics Resistant Staphylococcus Species Associated with the International Space Station. F Karouia, S Solomon, J.M. Wood, N. K. Singh, C. E.

Mason, and K. Venkateswaran. Influence of Spaceflight Environments on Biological Systems. COSPAR Meeting, Jul 16th- Jul 24th, 2022, Athens, GRE.

108. Comparative Genomics of Antibiotics Resistant Staphylococcus Species Associated with the International Space Station. F Karouia, S Solomon, J.M. Wood, N. K. Singh, C. E. Mason, and K. Venkateswaran. Life and Physical Sciences Under Reduced Gravity. 73rd IAC Meeting, Sep 18th- 22nd, 2022, Paris, FR.

109. Aging and Putative Frailty Biomarkers are Altered by Spaceflight. F Karouia and the NASA Genelab Frailty AWG. Medical Care for Humans in Space. 74th IAC meeting, Oct 2-6, 2023, Baku, AZR.

110. The Microbiome and the Metabolome of the International Space Station: **The 3DMM Project.** F Karouia, R. Salgado, N Zhao, P Dorrestein, R. Knight, K Venkateswaran. Biology in Space. 74th IAC meeting, Oct 2-6, 2023, Baku, AZR.

111. **Mitochondria and hormone-linked gene alterations in the mammary gland during spaceflight.** B Mathyk, J. Guarneri, F Erenier, J Carnell, F Karouia, and A Beheshti. ASGSR Meeting, Nov 16-18, 2023.

112. **Cosmic Kidney Disease: A Pan-Omic investigation of the health consequence of a trip to Mars and back.** K Siew et al., ASGSR Meeting, Nov 16-18, 2023

113. **Spaceflight induces changes in gene expression profiles linked to insulin and estrogen signaling**. B Mathyk, F Karouia, and NASA genelab Insulin AWG. ASGSR Meeting, Nov 16-18, 2023.