10 to 1: Bugs win in NASA study

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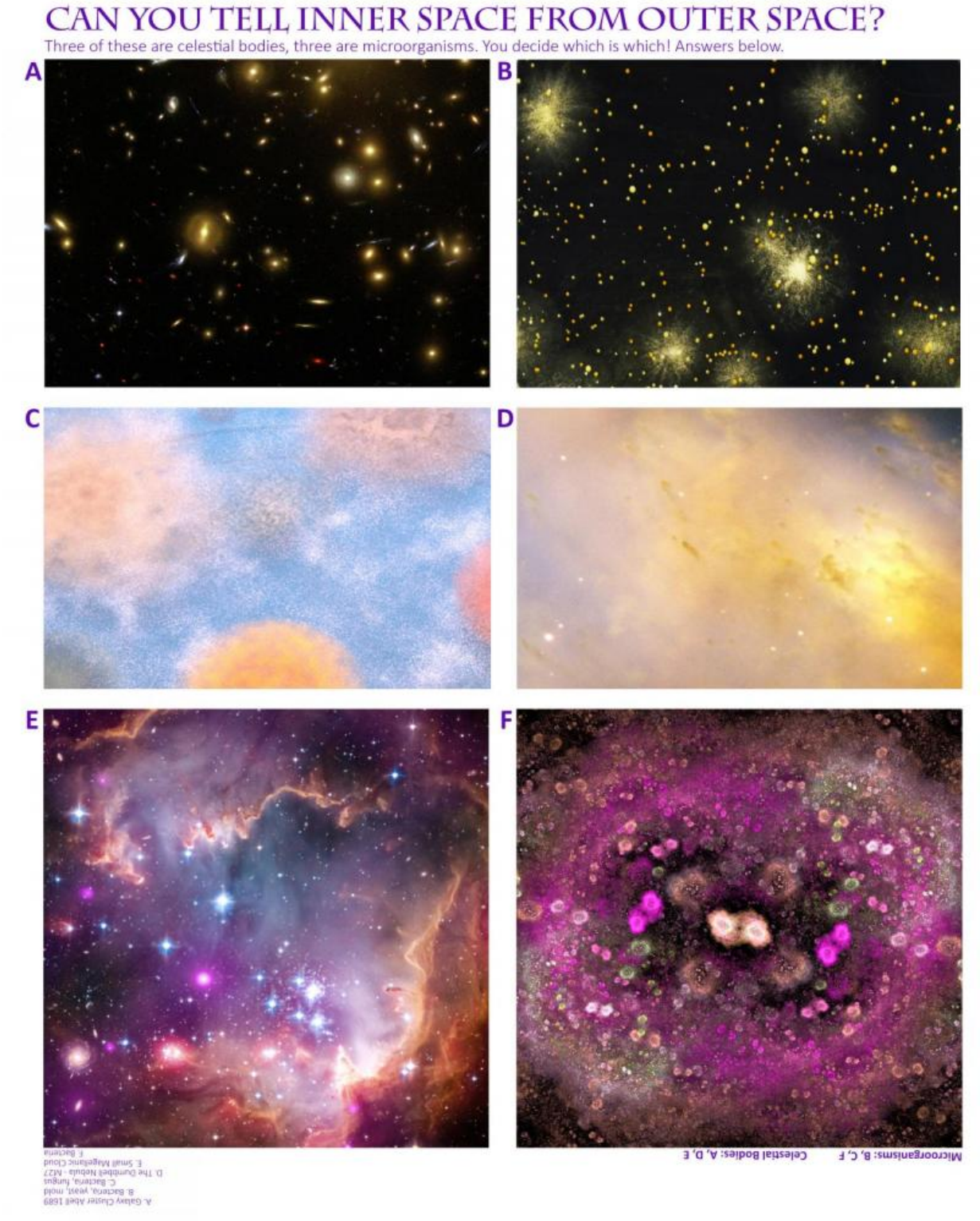

Can you tell inner space from outer space? Featured are images of celestial

bodies and microorganisms. You decide which is which! Credit: NASA

Bugs are winning out, and that's a good thing according to NASA's Human Research Program. As part of NASA's One-Year Mission, researchers are studying how microbes living on astronauts' skin, inside their bodies and on the International Space Station impact their health. To prepare for a journey to Mars, it is important to understand how long-duration spaceflight affects microorganisms because changes to this complex ecosystem could be detrimental to future missions.

There are 10 times more microbial cells than human cells in and on the human body, weighing up to five pounds. Hundreds of species inhabit the body, and some have a beneficial effect on health. They protect humans by competing with other organisms and guarding against pathogens. They also aid in absorption of nutrients and digestion, and can even impact moods and mental states. The absence of these microbes can be harmful.They are reintroduced into the body with fresh fruits, vegetables and probiotics like yogurt; food sources not readily available in space. Literally, the phrase, "you are what you eat," is important to future crews. Loss of these species can lead to altered metabolic function, and in conjunction with reduced immune response, may increase the chance of infection by microorganisms that normally do not harm their host but can when resistance is low.

The Microbiome experiment examines the impact of space travel on both an individual's microbiome, which is the community of microorganisms that literally share our body space, and the human immune system. Researchers are collecting various samples (gastrointestinal, saliva, blood, potable water, perspiration, swabs of the body, and equipment) to determine how microgravity, environment, diet, and stress affect the microbiome and immune system.

By sampling the microbiome of astronauts on Earth while in peak physical health and during subsequent times of stress in space, researchers are able to define human response triggers. Additionally, studying how the microbiome changes over time in the gastrointestinal tract helps predict other changes in immune function.

Response triggers which cause changes in the microbiome increase the risks of contracting diseases. Results from this study could advance research in early detection and prevention of diseases and alterations in metabolic function and immunity. Resulting therapies could mitigate microbiome changes or related health issues for people on Earth who live and work in stressful environments.

So when you take your next bite of food, thank your microbial friends for winning the war in your gut. You're healthier and happier because they're doing their job.

NASA's Human Research Program enables space exploration by reducing the risks to human health and performance through a focused program of basic, applied, and operational research. This leads to the development and delivery of: human health, performance, and habitability standards; countermeasures and risk mitigation solutions; and advanced habitability and medical support technologies.

Provided by NASA