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Articles of Significant Interest in This Issue

A New Tool To Identify V- and Fe-Only-Based Biological Nitrogen Fixation and Methane Production

Biological nitrogen fixation is the largest natural nitrogen input to ecosystems. Three homologous nitrogenase enzymes are the only known catalysts for this reaction. Their ability to reduce substrates other than dinitrogen is critical for distinguishing their activity in the environment. In a recent study, Luxem and colleagues (e00849-20) demonstrated that the hydrogen isotopic composition of a by-product unique to the V- and Fe-only homologues, the greenhouse gas methane, is different from that of other methane sources. Using this fingerprint to identify areas with high V- and Fe-only nitrogenase activity may help shed light on the role of these enzymes in global nitrogen and carbon biogeochemical cycles.

A Place Where Deep-Subsurface Marine Sediment Microbes Can Grow

For most of the vast deep-subsurface marine sediment biosphere, microbes live in a maintenance state, exhibiting little to no growth. It is not known what type of environment allows these microbes to undergo the growth necessary to drive natural selection. Lloyd et al. (e00877-20) found that the sizes of populations of common deep-subsurface microbes increase during burial over the upper few centimeters in marine sediments, whereas those of common seawater microbial groups and of more easily cultured or aerobic microbes decrease. These results were replicated in incubation experiments, suggesting that deep-subsurface clades experience a narrow zone of growth in shallow marine sediments.

Attachment of *Staphylococcus aureus* Synovial Fluid-Induced Aggregates to Orthopedic Materials

Staphylococcus aureus is a common pathogen in infections of periprosthetic joints, where it forms biofilms providing protection from antibiotics and host immunity. Recent reports have shown that *S. aureus* cells rapidly aggregate in synovial fluid. Gupta et al. (e01234-20) found that initial surface coverage by synovial fluid-induced aggregates (SFIA) on titanium, stainless steel, and hydroxyapatite was less than that of nonaggregated planktonic cells. The reverse was seen for polyethylene, which was explained by its greater roughness. Conventionally, initiation of biofilm formation is studied by examining interactions of single cells with surfaces; however, the attachment of preformed aggregates may be an important factor in establishment of biofilm infections.

Extracellular Vesicles Produced by *Bifidobacterium longum*

Bifidobacterium spp. are early colonizers of the intestinal tract in humans. Cell surface-associated adhesive proteins might be a key functional determinant of stable *Bifidobacterium* colonization processes in the intestinal tract. Nishiyama et al. (e01464-20) discovered that *Bifidobacterium longum* cultured in human fecal fermentation broth released a myriad of vesicles into the extracellular environment. The resulting extracellular vesicles (EVs) exported several mucin-adhesive moonlighting proteins that may have promoted *B. longum* adhesion. This study provides new insight into the role of EVs in bifidobacterial colonization processes as they adapt to the intestinal environment.

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The Human Footprint Has Yet To Extend to Enterococci of Magellanic Penguins

Enterococci, commensals of animals and humans, also reside in the guts of penguins. However, many clinical and agricultural isolates have lost CRISPR (clustered regularly interspaced short palindromic repeats) and amassed multiple antibiotic resistances. Prichula et al. (e01662-20) collected 172 isolates from 9 Magellanic penguins that range from the Subantarctic region to the coast of Brazil. Genomes were examined for selection by pharmaceutical pollution or for horizontal exchange with clinical or agricultural strains. Penguins obtain various enterococci from the environment, most probably dietary sources, and possibly also their nests. However, these are strains circulating in remote marine environments and so far lack key features common to those impacted by human practices.