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Astrogenomics: A convergence of disciplines spawning inspiration and innovation

This talk highlights the latest scientific advances emerging at the interface of genomics and astrobiology. Today, astrobiologists have the tremendous energy and enthusiasm of pioneers who are discovering new lands, and genomics is playing an important role in this quest. Genomics is assisting astrobiologists study the origin and evolution of life on Earth as a surrogate for understanding how life could have emerged elsewhere in the universe. Current hypotheses suggest that inorganic compounds such as hydrogen, methane, iron and sulfur were early sources of energy for life on Earth, and microbial genomes, especially from chemoautotrophs that live at extremes of pH, radiation, temperature, aridity and darkness, are being plundered for clues as to the origin of life on Earth and the mechanistic implications for life elsewhere. Detection of extra-terrestrial life will be arguably one of the most important discoveries in human history. Since the metabolic activities of microbes made Earth habitable for plants and animals billions of years ago and because microbes still play an indispensable role in the maintenance of life on Earth today, it is anticipated that microbes will play key roles in terraforming Mars and moons in our solar system. Genomics will be used to tease out the essential genes and metabolisms needed to tailor-make microbes via synthetic biology for functions in extra-terrestrial environments and for planetary biotechnological applications. Thus, even if life is not found elsewhere in our solar system, the coming decades should prove incredibly exciting for astrogenomics, driving inspiration and innovation and stretching the boundaries of what is possible.

Biography

David S. Holmes is director for the Center of Bioinformatics and Genome Biology at the Fundacion Ciencia Y Vida and is also a full time professor at Andres Bello University in Santiago, Chile. He obtained his Ph.D in biochemistry at the California Institute of Technology, USA and has over 200 publications including a scientific citation classic.

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