

CBC SEMINAR ANNOUNCEMENT



Professor Steven A. Benner
Foundation of Applied Molecular Evolution

Re-Inventing Darwinism from the Ground Up

By dragging scientists across uncharted terrain where they are forced to answer unscripted questions, "Grand Challenge" synthesis can drive discovery and paradigm change in ways that hypothesis-directed research cannot. Here, our grand challenge in synthetic biology seeks to reproduce the Darwinism displayed by terran biology, but on a molecular platform different from standard DNA; access to Darwinism is believed by many to distinguish the living state from the non-living state. This recognizes that alien Darwinism, with a natural history (including origins) independent of terran Darwinism, might support Darwinism on a different biopolymer. Here, we explore the possibility that Darwinism can be universally supported by any biopolymer that has just two structural features, (a) an ability to fit into a Schrödingerian "aperiodic crystal", lattice, and (b) a "polyelectrolyte" backbone.

1. Hoshika, S., Leal, N.A., Kim, M.-J., Kim, M.-S., Karalkar, N.B., Kim, H. J., Bates, A.M., Watkins Jr., N.E., SantaLucia, H.A., Meyer, A.J., DasGupta, S., Piccirilli, J.A., Ellington, A.D., SantaLucia Jr., J., Georgiadis, M.M., Benner, S.A. (2019) Hachimoji DNA and RNA. A Genetic System with Eight Building Blocks. *Science* **363**, 884-887.
2. Hoshika, S., Singh, I., Switzer, C., Molt, R.W., Leal, N.A., Kim, M.-J., Kim, M.-S., Kim, H.-J. Georgiadis, M.M., Benner, S.A. (2018) "Skinny" and "Fat" DNA: Two new double helices. *J. Am. Chem. Soc.* **140**, 11655-11660.
3. Zhang, L., Yang, Z., Sefah, K., Bradley, K.M., Hoshika, S., Kim, M.-J., Kim, H.-J., Zhu, G., Jimenez, E., Cansiz, S., Teng, I.-T., Champanhac, C., McLendon, C., Liu, C., Zhang, W., Gerloff, D. L., Huang, Z., Tan, W.-H., Benner, S. A. (2015) Evolution of functional six-nucleotide DNA. *J. Am. Chem. Soc.* **137**, 6734-6737.

Date:	17th May 2019 (Friday)
Time:	11.00am to 12.30pm
Venue:	SPMS Research & Graduate Studies Office Conference Room
Host:	Assistant Professor Chen Gang