

SEMINAR ANNOUNCEMENT

We would like to invite you to attend this virtual seminar hosted by Prof Nicholas Barker:

Date: Tuesday, 1 December 2020

Time: 10:00AM – 11:00AM

Join Zoom Meeting

<https://zoom.us/j/97672466649?pwd=NmNmRm1Va3ZEV24yNTVhNUErMHNSdz09>

Meeting ID: 976 7246 6649

Passcode: 307733

Genetic alphabet expansion technology by creating unnatural base pairs



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Abstract

Genetic information flow in the central dogma relies on only the four nucleobase components, A, G, C, and T, as the genetic alphabet letters in DNA, ruled by the complementary A–T and G–C base pairing formations. In turn, these limited letters constrain the Darwinian evolution of nucleic acids as functional molecules. If we could increase the number of the DNA letters, we could expand the genetic information and increase the functions of biomolecules, opening the door to novel recombinant-DNA technologies. To realize this technology, the development of artificial extra base pairs (unnatural base pairs) that function in replication, transcription, and/or translation as a third base pair is essential. We have developed a series of unnatural base pairs, such as s–y, Ds–Pa, and Ds–Px. Among them, the hydrophobic Ds–Px pair exhibits extremely high fidelity in PCR amplification, and thus we have replicable six-letter DNA molecules. One of our applications of the Ds–Px pair is the generation of high-affinity DNA aptamers (with low pM-range KD) that bind specifically to target molecules, enabling the use of DNA aptamers as an alternative to antibodies. Here, I will present the unnatural base pair systems including the aptamer study, as well as semi-synthetic organism creation.

Biography

Ichiro Hirao received his PhD degree in 1983 from Tokyo Institute of Technology in Japan. In 1984, he started his work at University of Tokyo, as a research associate. In 1992, he became an associate professor at Tokyo University of Pharmacy and Life Sciences. In 1995, he moved to Dr. Andrew Ellington's laboratory at Indiana University, to learn evolutionary engineering methods. In 1997, he returned to Japan to join a JST ERATO project, as a group leader, and started a research to expand the genetic alphabet of DNA. He continued his work at The University of Tokyo, as a professor in 2002–2006 and at RIKEN as a team leader in 2006–2015. His team first developed replicable unnatural base pairs, and in 2007, he founded a spin-off company, TAGCyx Biotechnologies. In 2015, he moved to IBN in Singapore, as a team leader, to expand his research area, Xenobiology.

ALL ARE WELCOME (No registration required)

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Thank you.