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13:00-14:00

Koryu-to Hall, Main Office Bldg., Yokohama & Broadcast online via Zoom  
Zoom meeting URL will be announced on the event day by e-mail.

※This seminar is open only to BDR members.

## Reconstruction of Ancient Evolutionary Pathways of the Central Dogma Machinery

### Summary

How life emerged from simple non-life chemicals on Earth is one of the greatest mysteries in biology. At the core of the extant life system, protein (RNA polymerase, or RNAP) and RNA (ribosomes) synthesize each other. To understand how the mutual synthesis system evolved from primordial peptides and RNA, we have been reconstructing the ancient evolutionary pathway between simple prebiotic peptides and modern gigantic RNAPs, by combining techniques from structural, synthetic, and evolutionary biology.

In our recent research, we reconstructed the ancient protein fold conserved at the catalytic core of RNAP as a short homo-dimeric peptide (43 a.a. residues) containing only seven amino acid types (GAVDEK and R). This might reflect an ancient amino acid repertoire encoded by a primitive genetic code.

Furthermore, with simple mutations, we could transform the core fold of RNAP into different ancient folds conserved in the ribosomal proteins through an unknown intermediate, or a "missing-link" fold. These results indicate that many proteins in the central dogma machinery could have emerged from a common ancestral peptide through simple evolutionary processes.