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プリン・ピリミジンヌクレオチド生合成系の丸ごと解析

Multilateral analysis of purine and pyrimidine nucleotides biosynthetic pathway

○三瓶嚴一 [1,2], 宮澤良太 [1], 山本秀哉 [1], 鈴木咲子 [3], 馬場清喜 [2,4],
中川紀子 [2,5], 海老原章郎 [2], 河合剛太 [2,3]

○Gen-ichi Sampei[1,2], Ryota Miyazawa[1], Hideya Yamamoto[1], Sakiko Suzuki[3],
Seiki Baba[2,4], Noriko Nakagawa[2,5], Akio Ebihara[2], and Gota Kawai[2,3]

([1] 電通大・院情報理工, [2] 理研・播磨研, [3] 千葉工大・工,
[4] 高輝度光科学研究センター, [5] 阪大・院理)

([1] University of Electro-Communications, [2]RIKEN Harima Institute, [3] Chiba Institute of Technology, [4]Japan Synchrotron Radiation Research Institute, [5] Osaka University)

e-mail: sampei@pc.uec.ac.jp, gkawai@sea.it-chiba.ac.jp

The purine nucleotide biosynthesis proceeds by a 14-step branched pathway (Fig.). On the other hand, the pyrimidine nucleotide biosynthesis consists of 6 reactions. Theses pathways are common to most organisms. Moreover we can observe some similar reactions in these pathways. Thus, it is important to compare structures and reaction mechanisms to each other by determining of 3D structure of the enzymes, when the genesis of these pathways is considered. We have determined 32 structures of the enzymes in these pathways from several thermophilic bacteria including *T. thermophilus* HB8, *A. aeolicus* VF5, *G. kaustophilus* HTA426, *S. toebii*, *M. jannaschii*, *T. maritima* and *S. tokdaii* strain7.

In the purine nucleotide biosynthesis, addition of carbon atom and nitrogen atom are repeated in turn. On the steps in carbon addition, compounds which have carboxyl group, for example, formate, bicarbonate and glycine, are utilized as carbon sources. The structural similarity among the proteins concerning these reactions suggests that these proteins are derived from common ancestor. The structural architecture of the proteins as well as the origin and evolution of this pathway will be discussed.

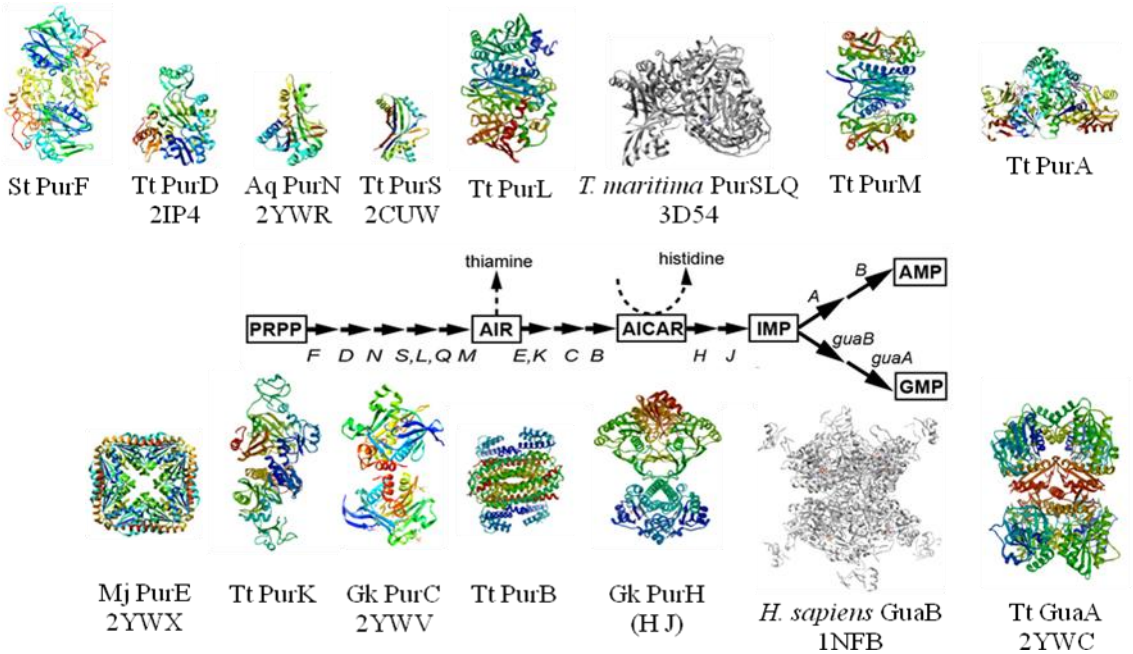

Fig. The purine nucleotide biosynthetic pathway