Photosynthetic bacteria

290(2aF01)

A NEW THERMOPHILIC FILAMENTOUS PHOTOSYNTHETIC BACTERIUM LACKING CHLOROSOMES

Satoshi HANADA, Shin-ichi TAKAICHI[1], Katsumi MATSUURA[2], Kazunori NAKAMURA, Natl. Inst. of Biosci. and Human-Tech., Tsukuba 305-8566, [1]Biological Laboratory, Nippon Medical School, Kawasaki 211, [2]Dept. Biol., Fac. Sci., Tokyo Met. Univ.,Hachi-ohji 192-0364

A new thermophilic filamentous phosynthetic bacterium lacking chlorosomes was isolated from Nakafusa hot spring in Nagano Prefecture in Japan. The isolate contained bacteriochlorophyll *a* as a photopigment and grew at 50℃. The phylogenetic analysis based on 16S rRNA sequence revealed that the isolates belonged to the *Chloroflexus/Deinococcus* group, and the closest relative was *Chloroflexus aggregans*. However, The sequence similarity between the isolate and *C. aggregans* was 84%. The results of quinones, carotenoids and fatty acids composition analyses showed that the isolate differed from *Chloroflexus* spp. These findings suggest the isolate should be proposed as a new genus and species.

291(2aF02)

PHOTOOXIDATION OF CYTOCHROME *C* IN NEW GREEN FILAMENTUS BACTERIUM, STRAIN HLO8, LACKING CHLOROSOME

[1]Mitsunori YAMADA, [2]Satoshi HANADA, [1]Kenji V. P. NAGASHIMA, [1]Keizo SHIMADA, [1]Katsumi MATSUURA ([1]Dept, Biol, Tokyo Metropolitan Univ. Tokyo 192-0397, [2]Natl. Inst. of Biosci. and Human-Tech., Tsukuba 305-8566)

Green filamentous bacteria and purple bacteria are photosynthetic bacteria which may retain ancient photosystems. Spectroscopic analysis of photosystem in the green bacteria has been limited partly because of the presence of chlorosomes in the cell.

A photosynthetic filamentous bacterium, strain HLO8, was isolated from a pink colored biomat found in Nakafusa hot spring. The result of 16S rRNA analysis indicated that strain HLO8 belongs to green filamentous bacteria. However, chlorosome, which is characteristic for *Chloroflexus*, was not detected in this bacterium.

The redox difference spectrum of purified membrane fraction showed that strain HLO8 has the reaction-center bacteriochlorophyll *a* and membrane-bound cytochrome *c* were detected as in *Chloroflexus aurantiacus*. The result of flash-induced kinetic measurments suggested that the membrane-bound cytochrome *c* functions as an electron donor to the photooxydized reaction center.

Strain HLO8 seems useful to analyze electron transfer system of green filamentous bacteria in detail, since it lacks chlorosomes.

292(2aF03)

CRYSTAL STRUCTURES OF PHTOSYNTHETIC REACTION CENTER AND HIGH-POTENTIAL IRON-SULFUR PROTEIN FROM THERMOCHROMATIUM TEPIDUM

[1]Terukazu Nogi, [2]Insan Fathir, [2]Masayuki Kobayashi, [2]Nozawa Tsunenori, [1,3]Kunio Miki

[1]Dept. Chem., Grad. Sch. Sci., Kyoto Univ., Kyoto 606-8502, [2]Dept. Biomol. Eng.,Grad. Sch. Eng., Tohoku Univ., Sendai 980-8579, [3]RIKEN Harima Inst./ SPring-8, Hyogo 679-5148

In photosynthesis of purple bacteria, reaction center (RC) accepts electron from soluble electron carriers. The soluble electron carriers are classified into two major groups, one is *c*-type cytochrome and another is high-potential iron-sulfur protein (HiPIP). We report the crystal structures of RC (2.2Å resolution) and HiPIP (1.4Å resolution) from *Thermochromatium tepidum* and discuss their molecular recognition. *Thermochromaium tepidum* is a thermophilic bacterium which can grow at the highest temperature among all known purple bacteria. We also discuss the thermostability of membrane protein complex by comparing the present structure with those from other mesophiles.

293(2aF04)

THE ELECTRON DONOR IN THE P798 REACTION CENTER OF HELIOBACTERIA

Hirozo OH-OKA, Masayo IWAKI[1], Shigeru ITOH[1], Dept. Biol., Grad. Sch. Sci., Osaka Univ., Toyonaka 560-0043, [1]Natl. Inst. Basic Biol., Okazaki 444-8585

The heliobacteria are gram positive bacteria, whose reaction center (RC) is classified as a type 1. However, it has been unclear whether the RC contains membrane-bound cytochrome *c* (cyt *c*) which donates electrons to P798 as well as F_A/F_B protein on the acceptor side. we analyzed the reaction mechanism on the donor side with intact cells and membranes of *Heliobacterium gestii*. $P798^+$, immediately formed after flash excitation, was rereduced in two phases with $t_{1/2}$ = 3 and 7 ms, respectively. The fast phase was attributable to the electron transfer from cyt *c* to P798, and the slow one was considered as the back reaction. Since the reaction rate from cyt *c* to P798 was much faster in the case of *in vivo* ($t_{1/2}$ = 100 μs), we have studied the effect of ion strength and/or temperature.