新奇光受容タンパク質ベストロドプシンの特異な発色団光異性化反応

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Unique characteristics in chromophore photoisomerization of the novel rhodopsin, bestrhodopsin

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Bestrhodopsins, a novel microbial rhodopsin subfamily, were recently discovered in marine unicellular algae[1)]. Bestrhodopsins are composed of 1–2 rhodopsin domains and a C-terminally fused bestrophin ion channel domain. The retinal-binding pockets in the rhodopsin domains differ significantly from those in other rhodopsins, implying that bestrhodopsins might have characteristic photochemical properties. Here, the chromophore isomerization in a bestrhodopsin was investigated using high-performance liquid chromatography, and novel isomerization properties were found. Moreover, we will describe amino acid residues specific in bestrhodopsins that confer bestrhodopsin-like photochemical properties to another canonical microbial rhodopsin.

Keywords : Photoisomerization; Photo-sensitive protein; Rhodopsin; Retinal; Bestrophin

最近、新奇微生物ロドプシンサブファミリーとして、ロドプシンとイオンチャネルタンパク質ベストロフィンの融合タンパク質であるベストロドプシンが発見された[1)]。ベストロドプシン中の発色団レチナールの結合ポケットは、他の微生物ロドプシンとは大きく異なる特徴を示す。本発表では、ベストロドプシンの示す微生物ロドプシンとして新奇な発色団光異性化反応について報告し、その特性をもたらす構造的要因について議論する。

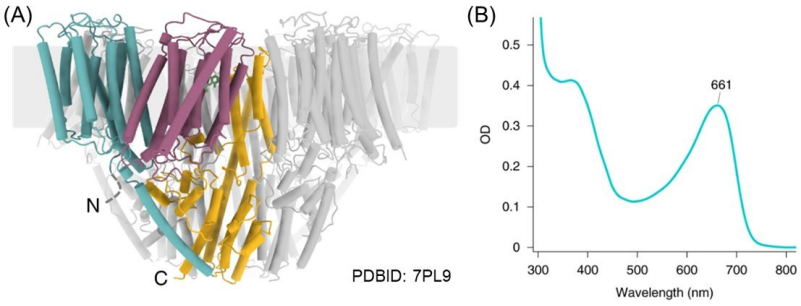

Fig. 1. The pentameric megacomplex consisting of five pseudodimers of rhodopsin domains (green and purple) and five bestrophin domains of bestrhodopsin *Tara*-RRB (A) and its UV–visible absorption spectrum with the red-shifted absorption maximum (B) [1)].

1) Rhodopsin-bestrophin fusion proteins from unicellular algae form gigantic pentameric ion channels. Rozenberg, A., Kaczmarczyk, I., Matzov, D., Vierock, J., Nagata, T. *et al.*, *Nat. Struct. Mol. Biol.* **2022**, 29(6), 592.

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