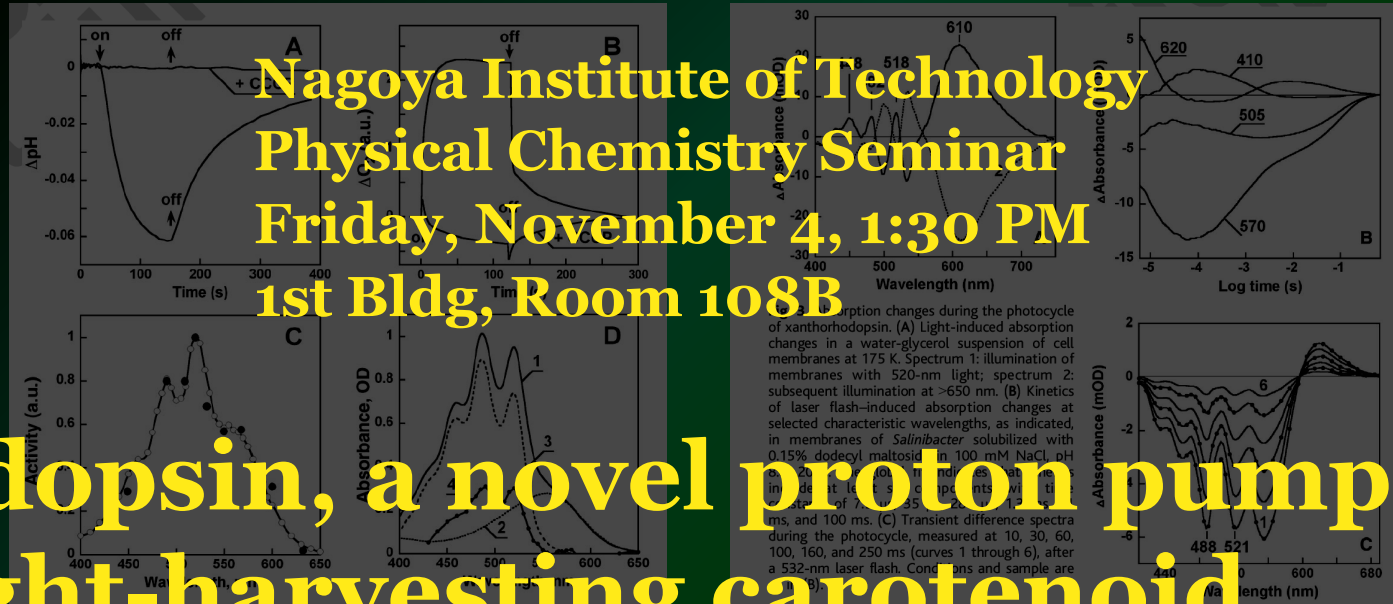
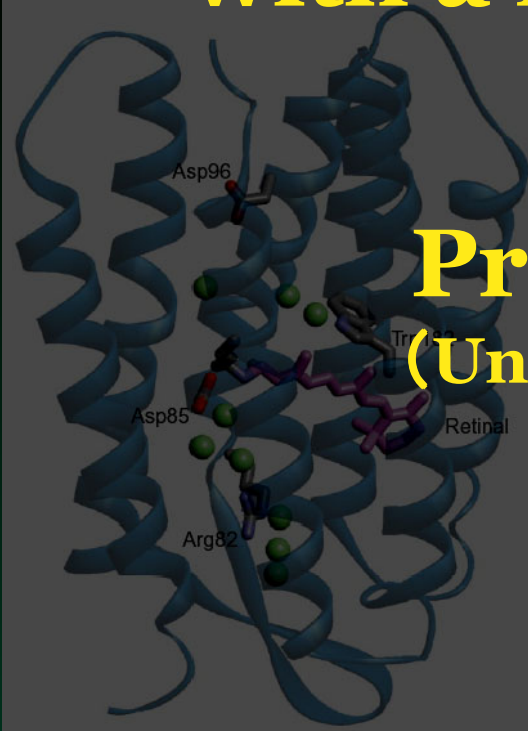




Nagoya Institute of Technology  
 Physical Chemistry Seminar  
 Friday, November 4, 1:30 PM  
 1st Bldg, Room 108B

# Xanthorhodopsin, a novel proton pump with a light-harvesting carotenoid antenna

Professor Janos K. Lanyi  
 (University of California, Irvine, USA)



```

PR SVIALPTFAA...LASTVFFVVERDRVSAKWRTSLTVSGLVT
XR MLQELPTLTF...MTASFVFFVLAR .NNVAPKYRISMVVSAL
BR MLELLPTAVEGVSAQAQITGRPEWIWLALGALMGLGTLVYLVKG .MGVSDPDAKKFYAITTL
1 9

PR GIAFWHYMIMRG.....VWIETGDSPTVFRYIDMLTVPLLICEFYILAAA
XR ...SSWELANLCHMORPELEF...AYRYV...MGL.
BR ...USLLG...G...T...N...A...VA...L...A...LVDA.
57 82 85

PR ...E...L...A...W...V...V...G...G...K...S...A...C
XR ...K...R...P...L...A...G...L...V...I...P...L...Y...S...E...N...A...L...P...G...L...G...L...P...I...P...P...W...L...Y...I...L...F
BR .....D...G...T...I...L...A...L...V...G...A...D...G...I...M...I...G...T...G...L...V...G...A...L... . . . . .TKVYSYRFVNWAI...STAAML...Y...L...V...L...F
118 122

PR NTA.....SPA...V...Q...S...A...Y...N...T...M...M...Y...I...I...F...G...W...A...I...V...E...V...G...Y...F...T...G...Y...L...M...G...D...G...G... . . . . .S...A...L...N...L...N...L...I...Y...N
XR TQLGDTIQR...S...R...V...S...T...L...L...G...N...A...R...L...L...L...L...A...T...W...G...F...Y...P...I...A...Y...M...I...P...M...A...F...P...S...N...T...P...G...T...I...V...A...L...Q...V...G...Y...T
BR FGFTSKAESMRPEVASTFKVLENVTVVLVLSA...V...V...W...L...I...G... . . . . .S...E...G...A...G...I...V... . . . . .P...L...N...I...E...T...L...L...F...M
182 185 194

PR LADFVNAILFGLIIWNVAVKESNA
XR IADVLAKAGYGVLIYNIAKAKSEEGFNVSSEMVEP...
BR VLDVSAKAVGFLILLRSRAIFGSAEAPEPSAGDGAATSD
212 216
  
```

Fig. 4. Alignment of the sequences of xanthorhodopsin (XR), proteorhodopsin (PR), and bacteriorhodopsin (BR). Xanthorhodopsin contains the functionally important residues known for retinal binding and proton transport, including homologs of Tyr<sup>57</sup>, Arg<sup>82</sup>, Asp<sup>85</sup>, Trp<sup>86</sup>, Asp<sup>96</sup>, Trp<sup>182</sup>, Glu<sup>194</sup>, Tyr<sup>185</sup>, Asp<sup>212</sup>, and Lys<sup>216</sup>, with numbering and helical segments (underlined) for bacteriorhodopsin. There are 30 residues (marked red) common to all three proteins (in two cases, they are Asp/Glu correspondences between xanthorhodopsin and bacteriorhodopsin (red plus purple) are somewhat more numerous (58 versus 46) than with proteorhodopsin (red plus purple) (60) but as in proteorhodopsin, the internal proton donor homologous to Asp<sup>96</sup> is Glu. A set of four phenylalanine residues (underlined) of helix E that faces toward the lipid bilayer, might be involved in binding the carotenoid (37).

All inquiries to Hideki Kandori  
 Tel: 052-735-5207  
 kandori@nitech.ac.jp