

Marcus Theory and Photosynthesis

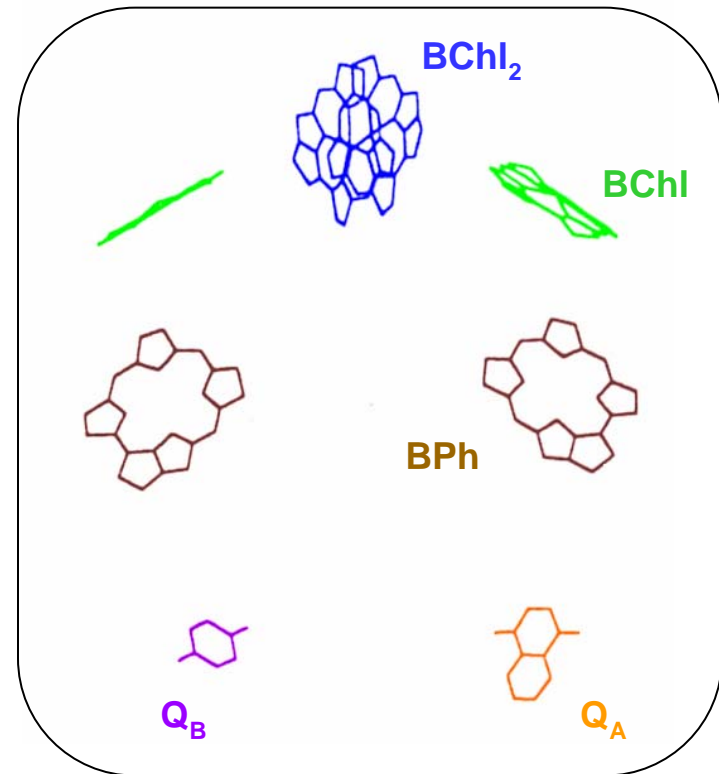
Fundamental question:

Photosynthesis converts light energy into potential energy of charge separation.

How does photosystem prevent charge-hole recombination?

periplasmic space
cyt c

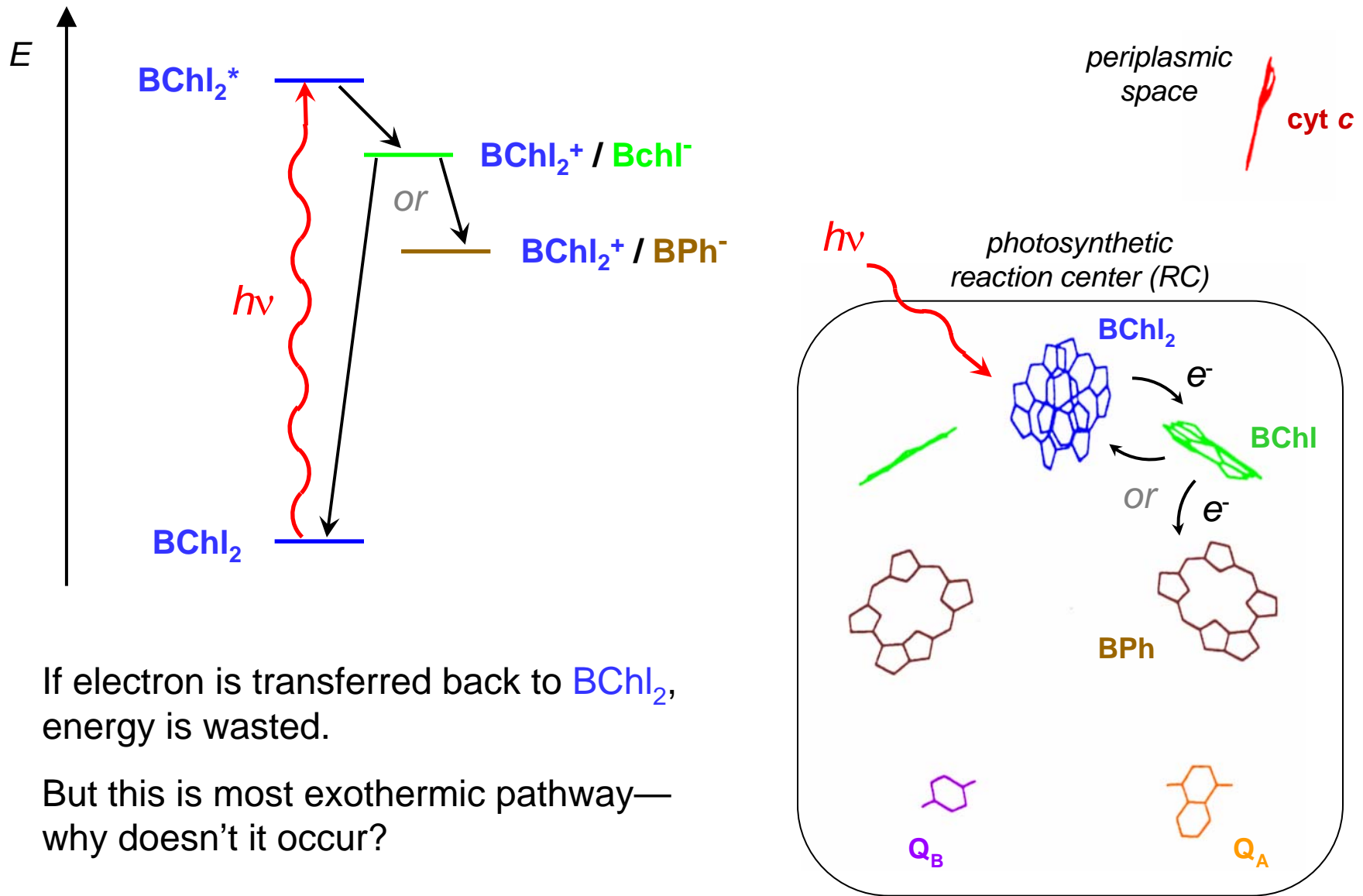
photosynthetic reaction center (RC)



See:

Moser, C. C.; Keske, J. M.; Warncke, K.; Farid, R. S.; Dutton, P. L. *Nature* **1992**, 355, 796.

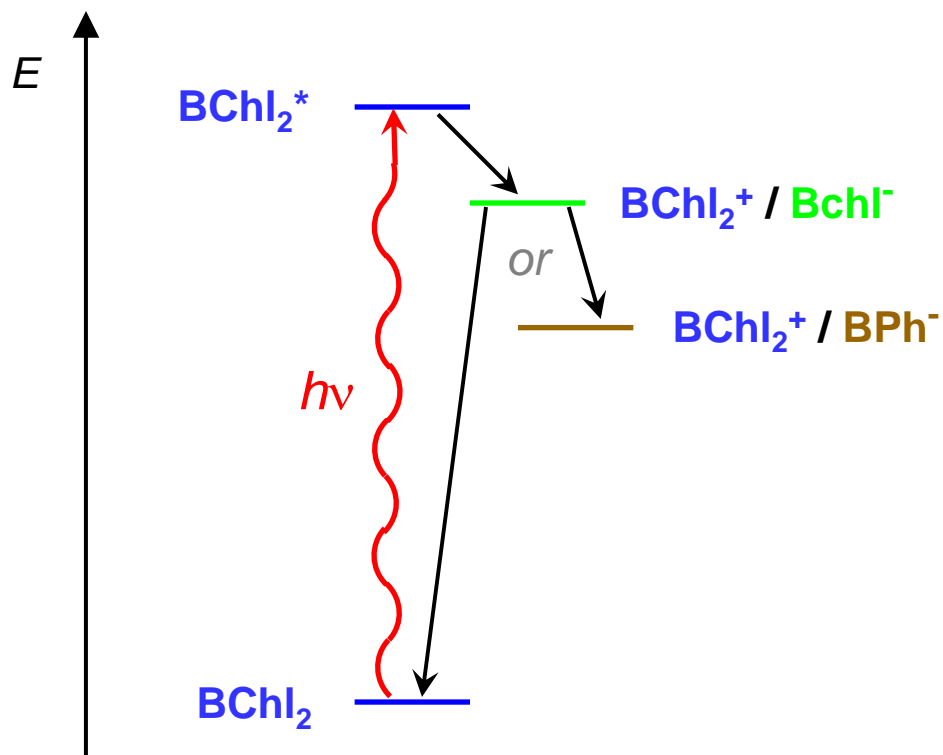
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If electron is transferred back to $BChl_2$, energy is wasted.

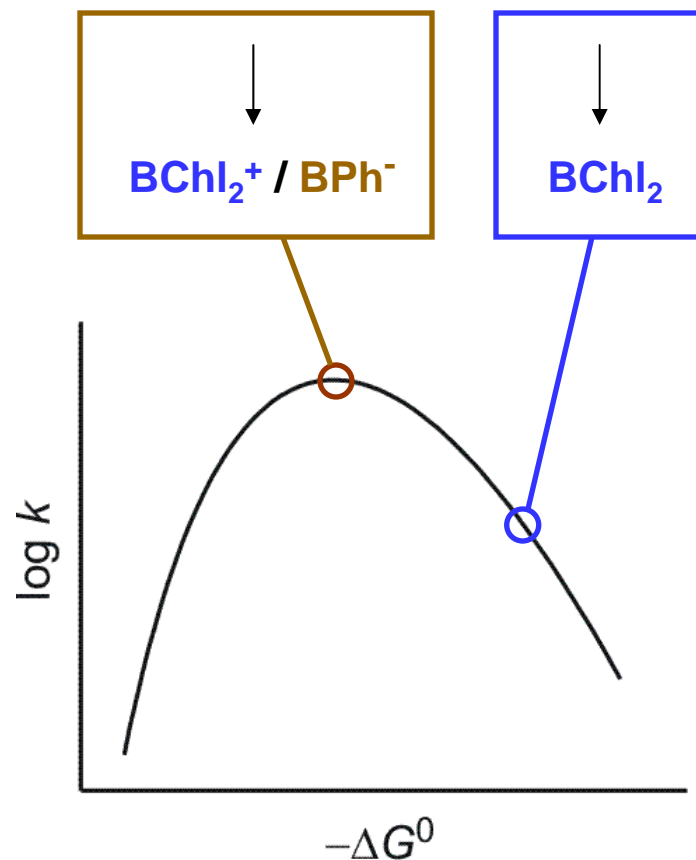
But this is most exothermic pathway—why doesn't it occur?

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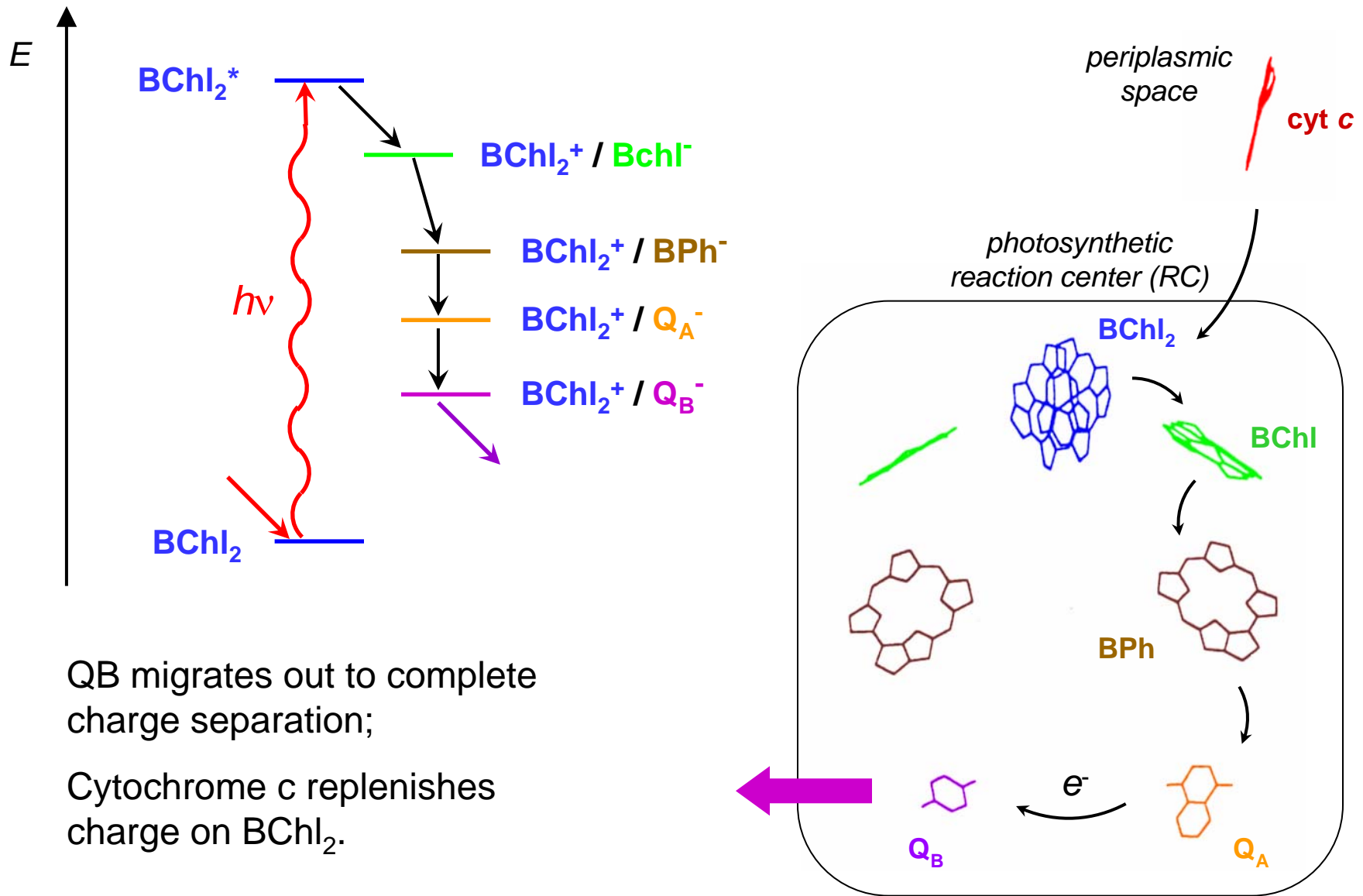
If electron is transferred back to BChl₂, energy is wasted.

But this is most exothermic pathway—why doesn't it occur?



Back reaction designed to occur in Marcus Inverted Region.

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QB migrates out to complete charge separation;

Cytochrome c replenishes charge on $BChl_2$.