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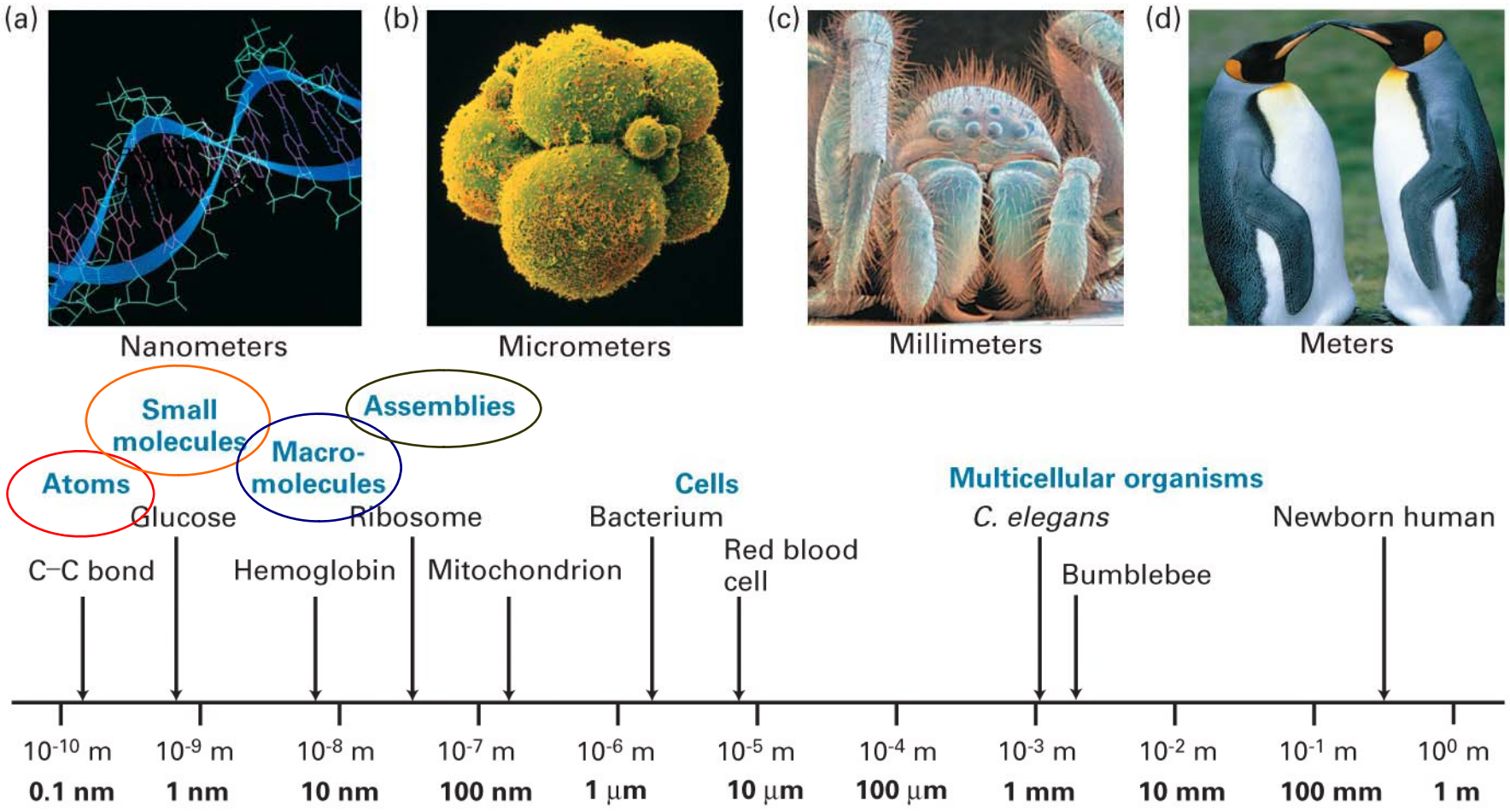
Reference Books

- Physical Chemistry for the Life Sciences
  (Engel, Drobny and Reid)
- Physical Chemistry for the Life Sciences
  (Atkins and de Paula)
- General, Organic, and Biochemistry
  (Denniston, Topping and Caret)
- Biochemistry
  (Berg, Tymoczko and Stryer)

Guideline for biochemistry lectures

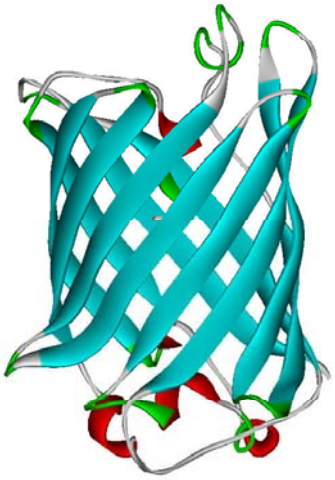


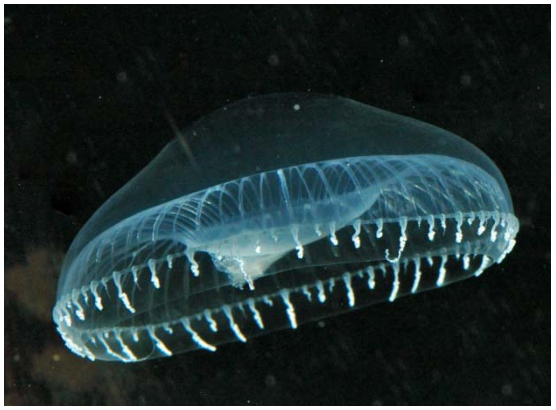
Special Topic

GFP: Green Fluorescent Protein

What is GFP?

- Green fluorescent protein
- 238 amino acids (26.9 kDa)
- Originally isolated from the jellyfish
- GFP from Aequorea vicroris (1EMA)



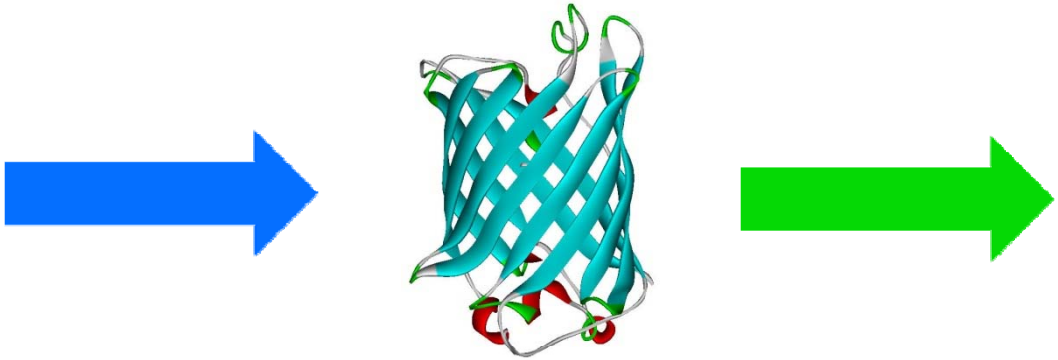


Amino Acid Sequence

>1EMA:A|PDBID|CHAIN|SEQUENCE
MSKGEELFTGVVPILVELDGDVNGHKFSVSGEGEGDAT
YGKLTLKFICTTGKLPVPWPTLVTTFGVQCFSRYPDHM
KRHDFFKSAMPEGYVQERTIFFKDDGNYKTRAEVKFEG
DTLVNRIELKGIDFKEDGNILGHKLEYNYNSHNVYIMA
DKQKNGIKVNFKIRHNIEDGSVQLADHYQQNTPIGDGP
VLLPDNHYLSTQSALSKDPNEKRDHMVLLEFVTAAGIT
HGMDELYK

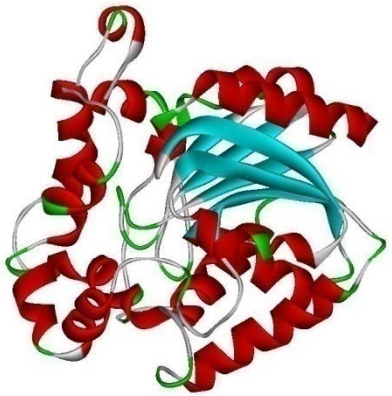
Fluorescence

- Fluoresces green when exposed to blue light
- Major excitation peak: 395 nm
- Minor excitation peak: 475 nm
- Emission peak: 509 nm



Another GFP

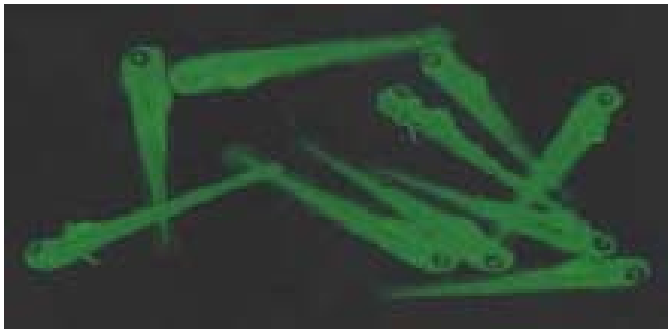
- GFP from sea pansy 海腎 (Renilla reniformis) (2PSE)
- Major excitation peak: 498 nm

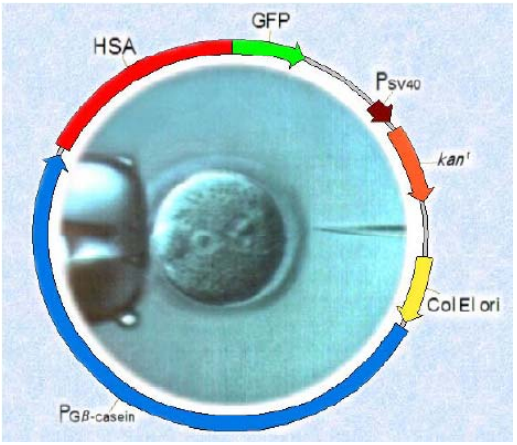


Uses of GFP

- In cell and molecular biology, GFP gene is frequently used as a reporter of expression.
- Biosensors
- Biomarkers
- Fluorescent animals

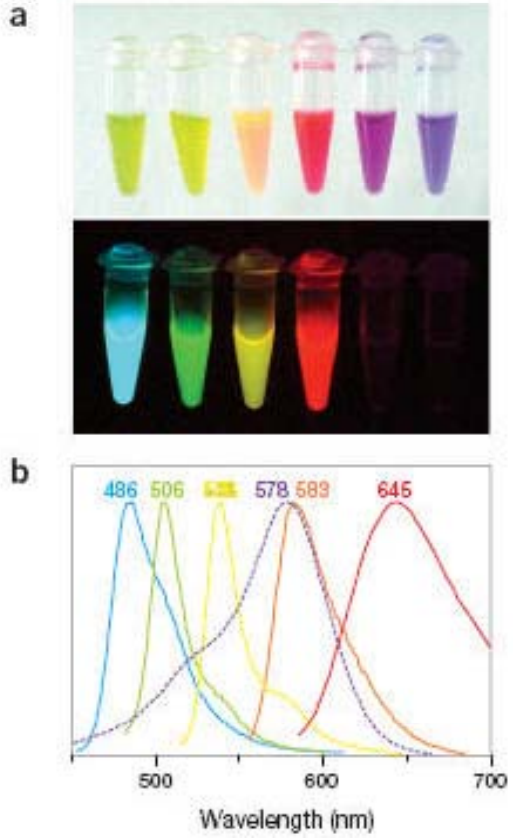
Fluorescent animals

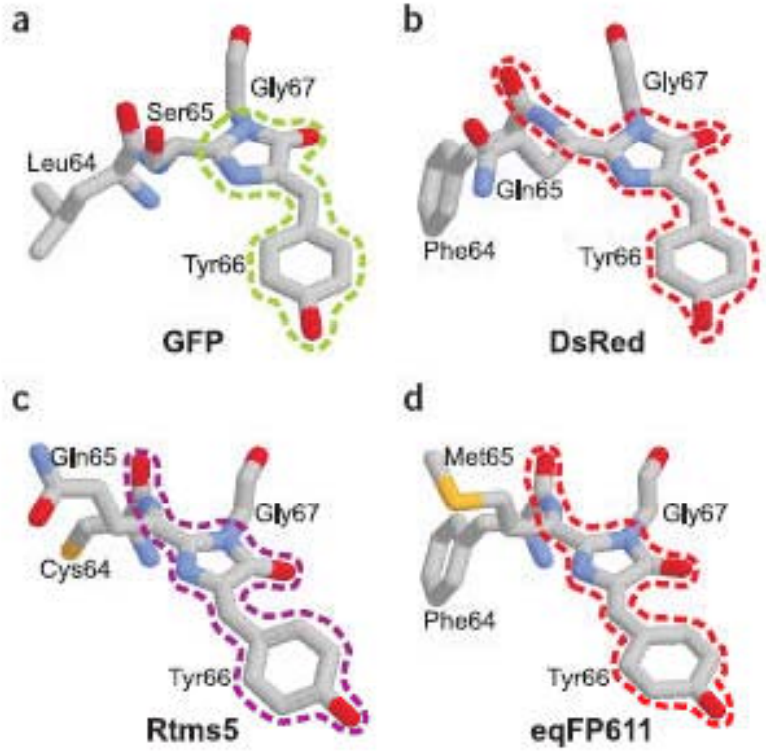




Graphs from 動物基因轉殖技術與實驗，
動物基因轉殖與疫苗發展技術教學資源中心

Other FPs



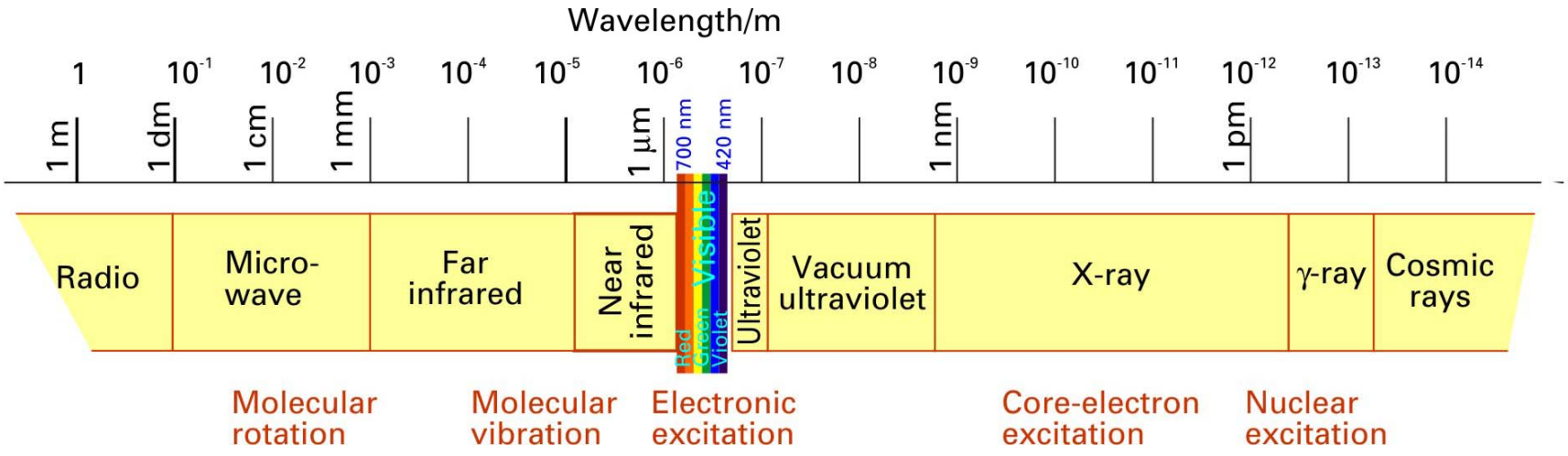


From: Nature Biotechnology, 22, 289 (2004)

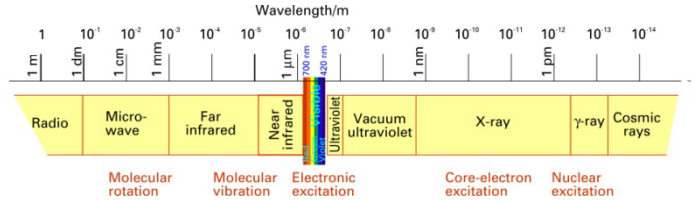
2008 Nobel Prize in Chemistry

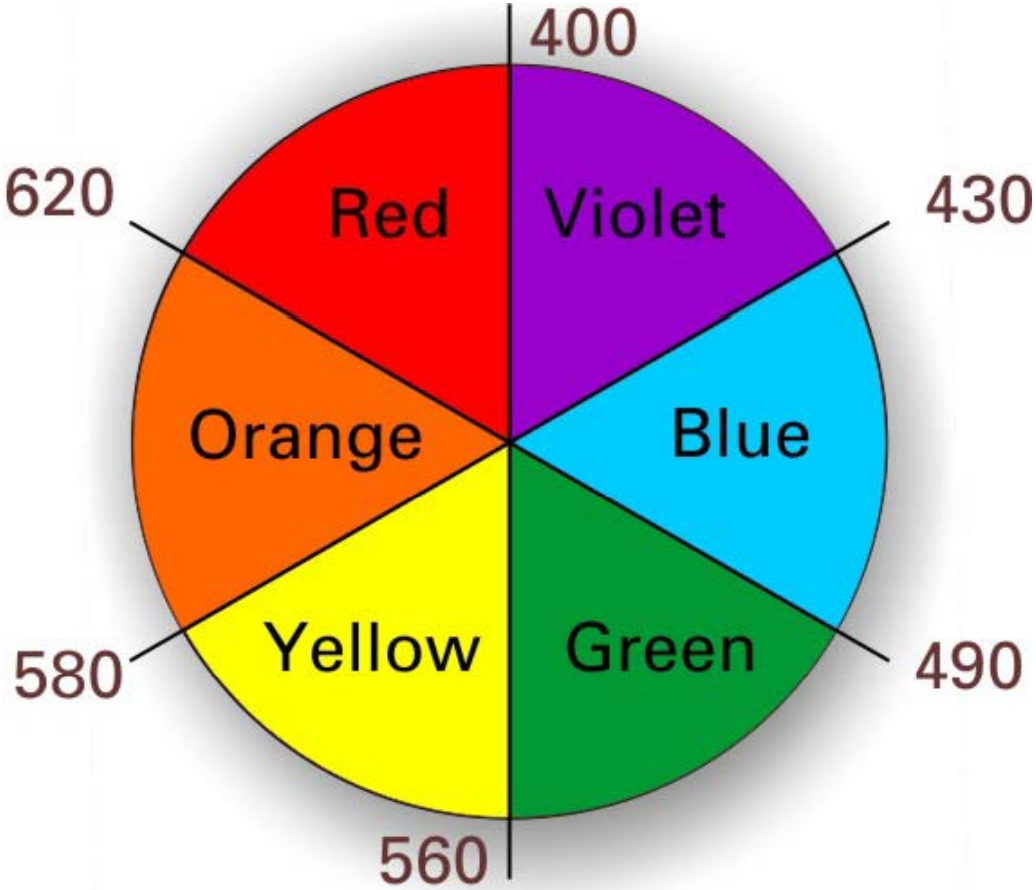
- Martin Chalfie
- Osamu Shimomura
- Roger Y. Tsien

Light

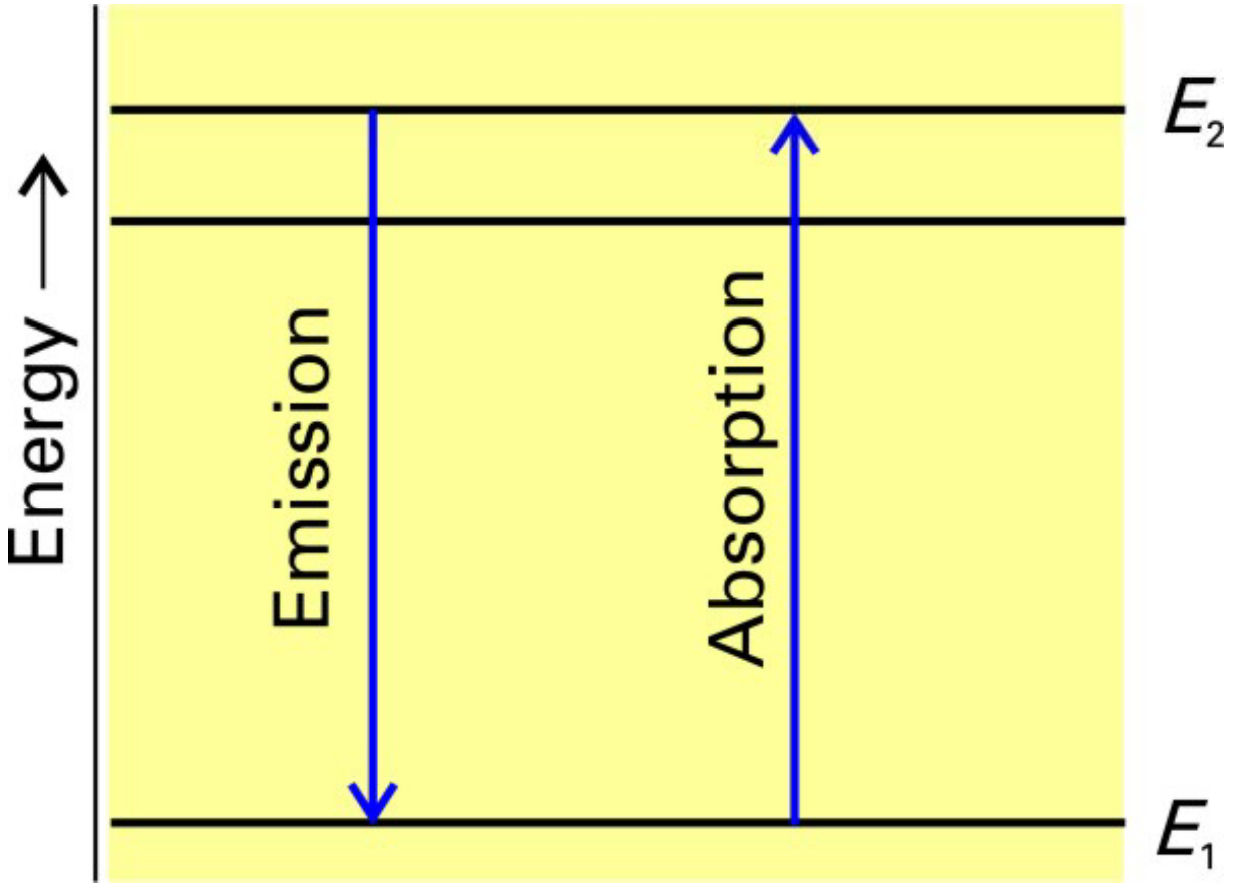


Light

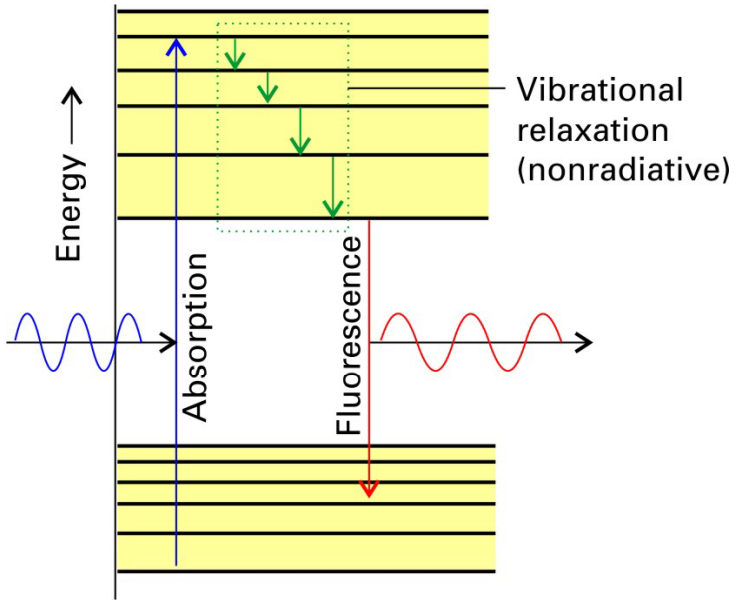


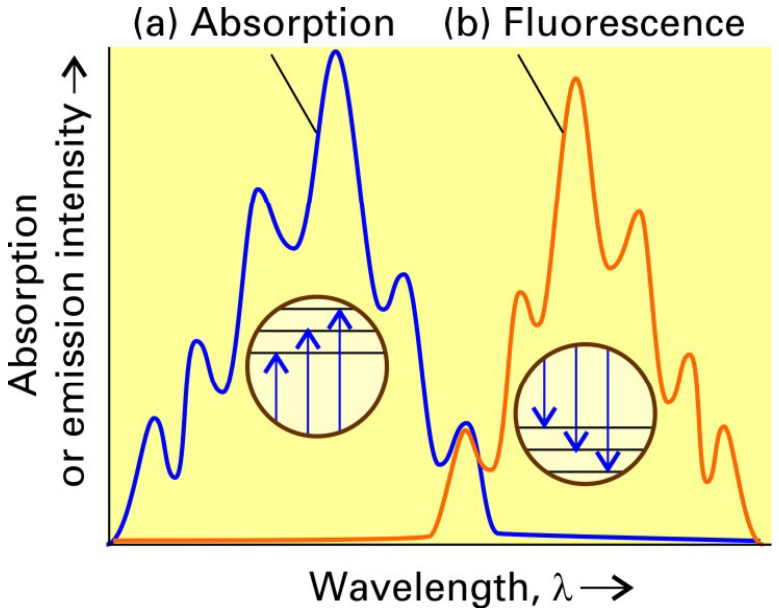


Absorption vs Emission

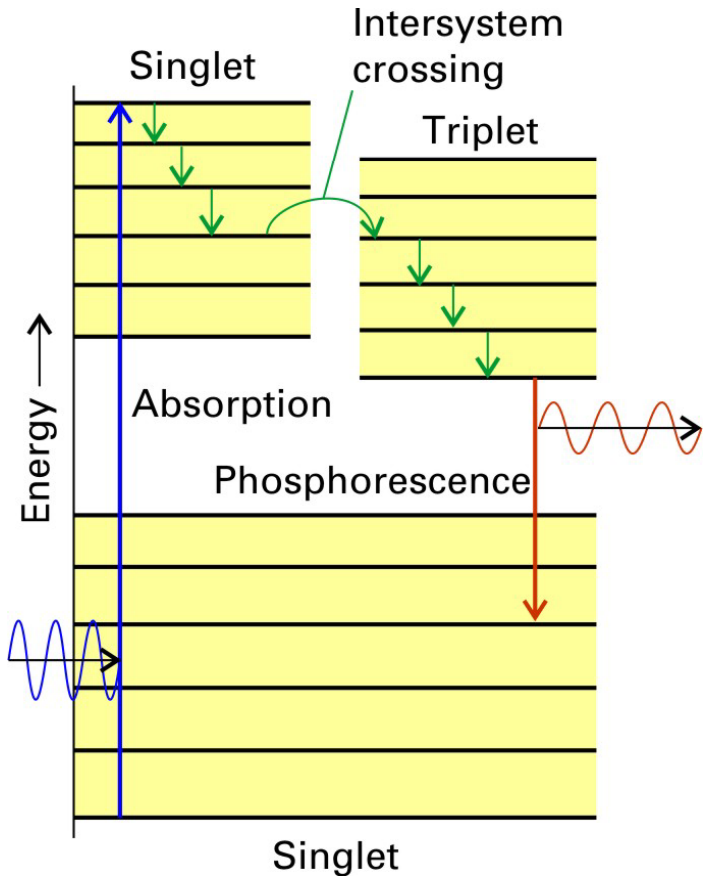


Fluorescence

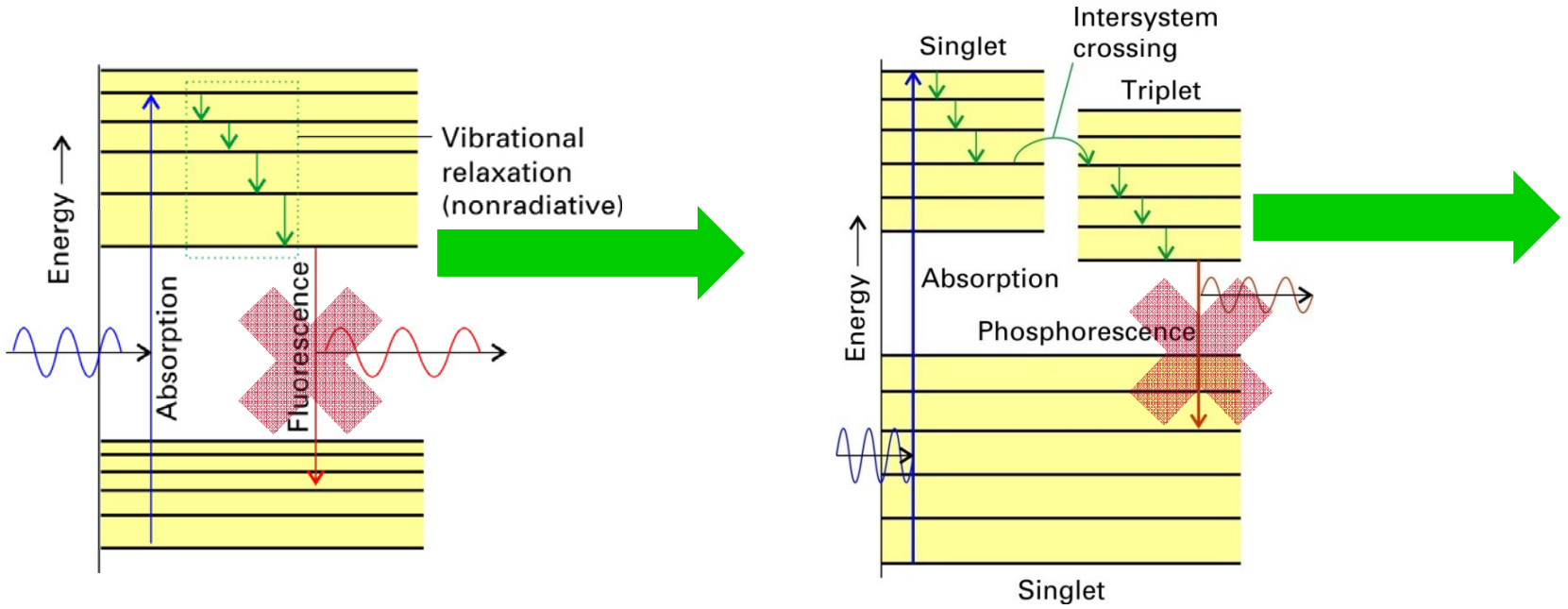




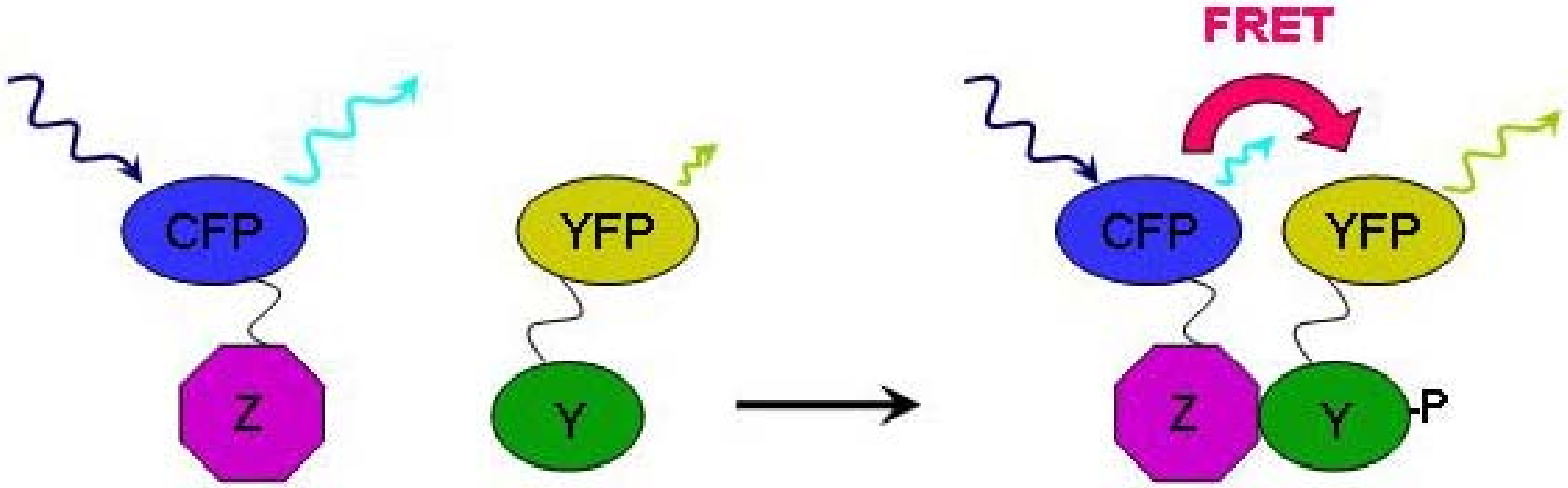
Phosphorescence



Fluorescence quenching



FRET: Fluorescence Resonance Energy Transfer



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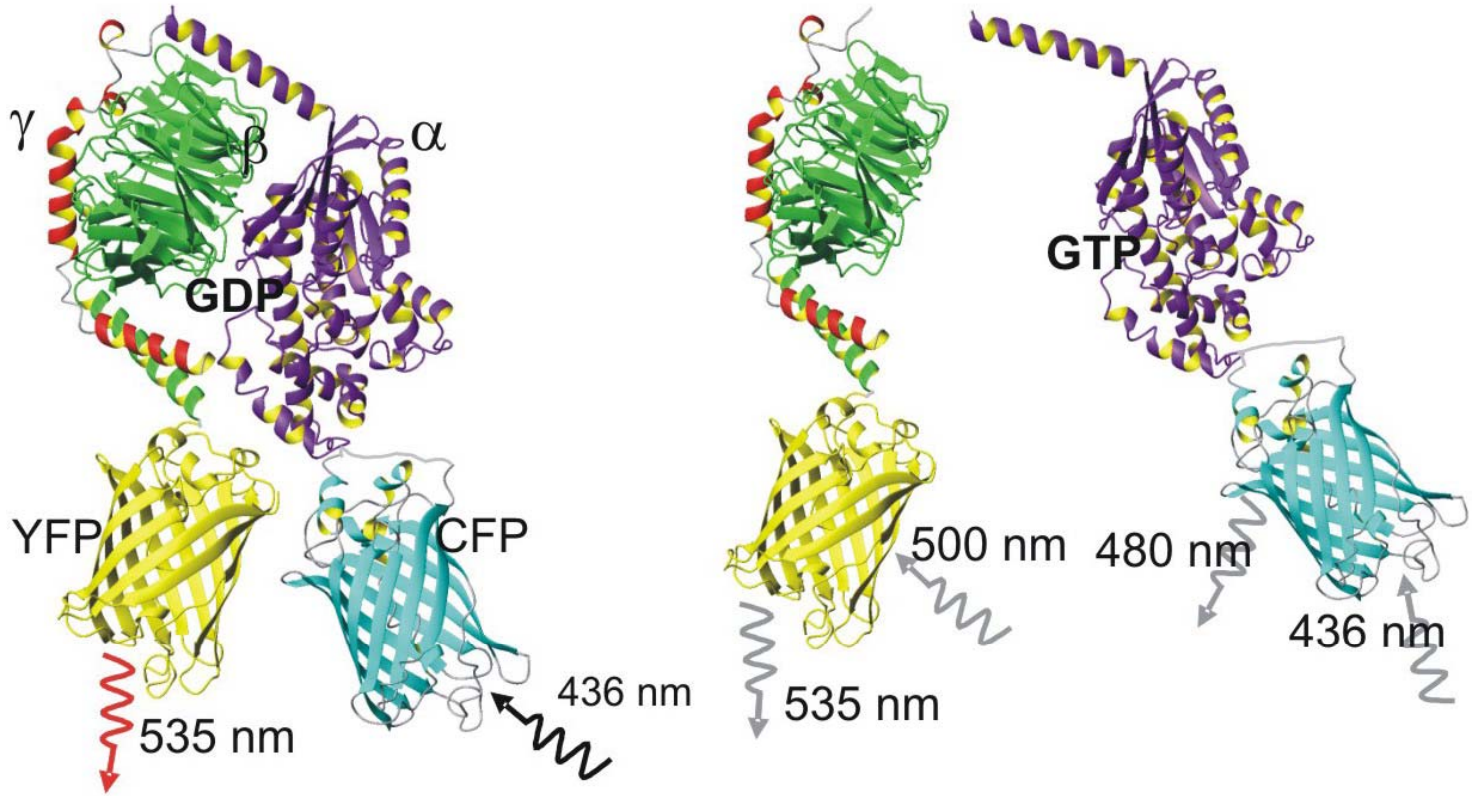

End of Lecture

Slide Downloading

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