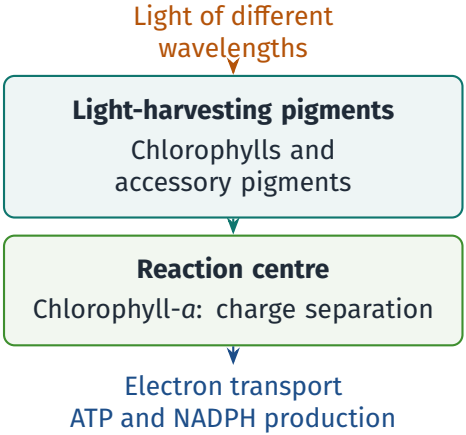
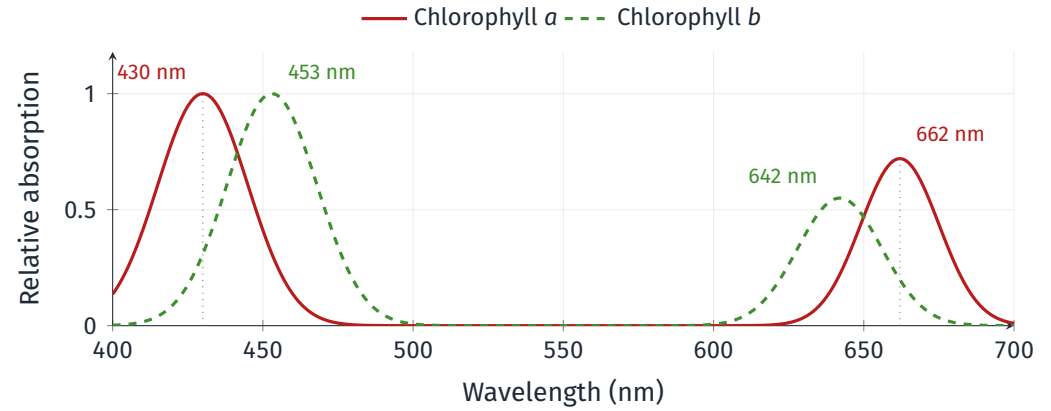
Chlorophyll and accessory pigments

- Pigments absorb light at different wavelengths
- Accessory pigments transfer excitation energy to chlorophyll-*a*
- Reaction-centre chlorophyll-*a* starts electron transfer in plants and most algae
- Pigments and proteins form organised light-harvesting complexes

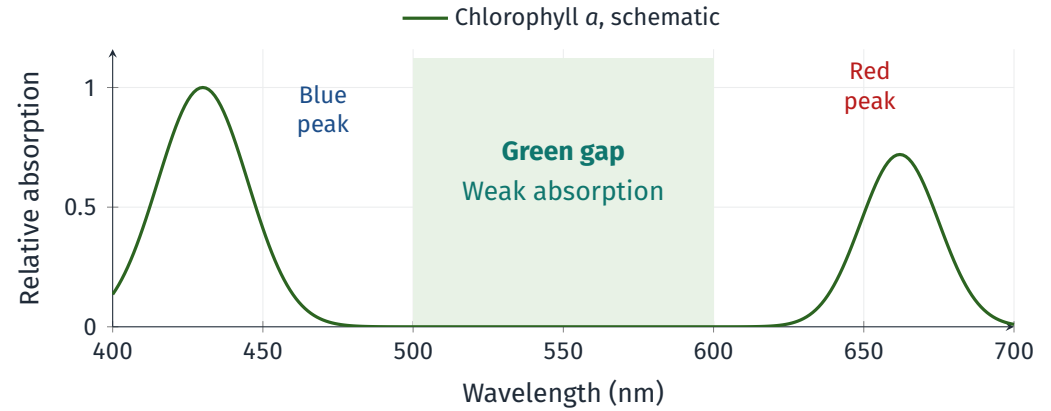


Absorption by chlorophylls a and b



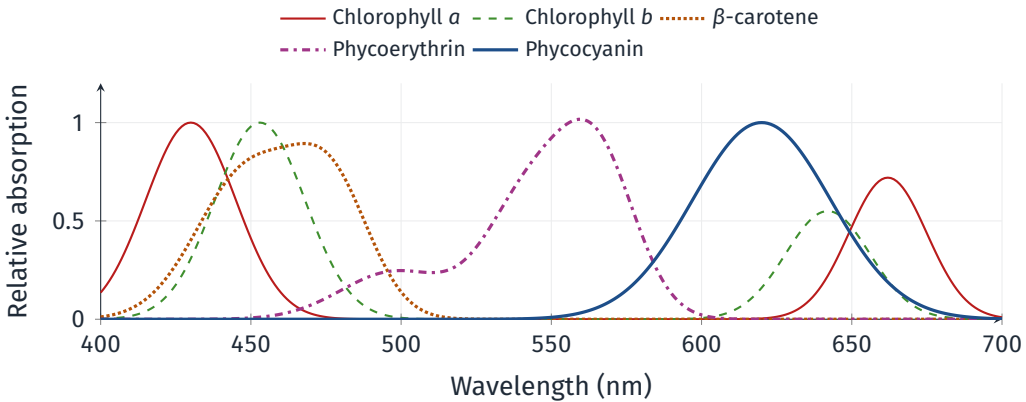
Schematic spectra in diethyl ether; each curve has its own relative scale. Peaks shift when pigments bind to proteins in living cells.

The green gap



Chlorophyll absorbs less strongly in the green region. Reflected and transmitted green light contributes to the colour of leaves and green algae.

Accessory pigments extend light absorption



Illustrative profiles, each scaled independently. Carotenoids mainly absorb blue to blue-green light; phycobiliproteins extend absorption into green, yellow and orange wavelengths.

Three main pigment classes

Class	Examples	Main roles
Chlorophylls	Chlorophylls *a*, *b* and *c*	Light harvesting; chlorophyll-*a* also drives photochemistry
Carotenoids	Carotenes: β-carotene Xanthophylls: fucoxanthin, lutein	Light harvesting and protection against excess light
Phycobilins	Protein-bound pigments in phycoerythrin and phycocyanin	Light harvesting in red algae, cyanobacteria and cryptophytes

- More than forty pigments occur across photoautotrophs
- Binding to different proteins can shift a pigment's absorption spectrum

Pigments in different algal groups

Algal group	Examples of reported pigments
Bacillariophyceae	Chl *a*, *c*; β-carotene; fucoxanthin; diatoxanthin; diadinoxanthin
Dinophyceae	Chl *a*, c_2; β-carotene; peridinin; neoperidinin
Phaeophyceae	Chl *a*, c_1, c_2; β-carotene; fucoxanthin
Raphidophyceae	Chl *a*, *c*; diatoxanthin; diadinoxanthin; heteroxanthin; fucoxanthin
Cryptophyceae	Chl *a*, c_2; α-carotene; diatoxanthin; phycoerythrin; phycocyanin
Euglenophyceae	Chl *a*, *b*; β-carotene; astaxanthin; antheraxanthin; diadinoxanthin; neoxanthin
Chlorophyceae	Chl *a*, *b*; α-, β- and γ-carotene; lutein; siphonaxanthin; siphonein
Charophyceae	Chl *a*, *b*; α-, β- and γ-carotene; various xanthophylls
Prasinophyceae	Chl *a*, *b*; β-carotene; siphonaxanthin; siphonein

After South and Whittick (1987). Pigment combinations vary among species; these are not universal diagnostic lists. Chl = chlorophyll.