Increasing solar energy capture and conversion efficiency

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Transgenic algal strains with higher chlorophyll a/b ratios have smaller antennae sizes.

Chl-protein complexes from algae with different antennae sizes:

- **Large (WT)**: CC-424 (WT)
- **Small**: cbs-3 (Chl b-less)
- **Intermediate**: CR-118, CR-133 (Chl b-deficient)

Raw Chl fluorescence is greater in strains containing more Chl b.

Antennae Size

<table>
<thead>
<tr>
<th>Chl a/b</th>
<th>Large (WT)</th>
<th>Small</th>
<th>Intermediate</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.2</td>
<td>CC-424 (WT)</td>
<td>cbs-3 (Chl b-less)</td>
<td>CR-118, CR-133 (Chl b-deficient)</td>
</tr>
</tbody>
</table>

Chl a/b = 2.2

No Chl b

Chl a/b = 4.9

CPI*

CPII

LOW  HIGH

No Chl b

Chl a/b = 2.2

Chl a/b = 4.9
LHCII distribution is more disperse in transgenics having intermediate antennae sizes.

High resolution hyperspectral imaging and SANS of LHC, PSII and membrane distribution.
Transgenics with intermediate antennae sizes have the highest (2.5 X WT) photosynthetic rates at saturating light.

Similar results were obtained when photosynthesis is expressed on a cell number rather than chlorophyll basis.

Perrine et al., (2012) Algal Research “online”
Thank you

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