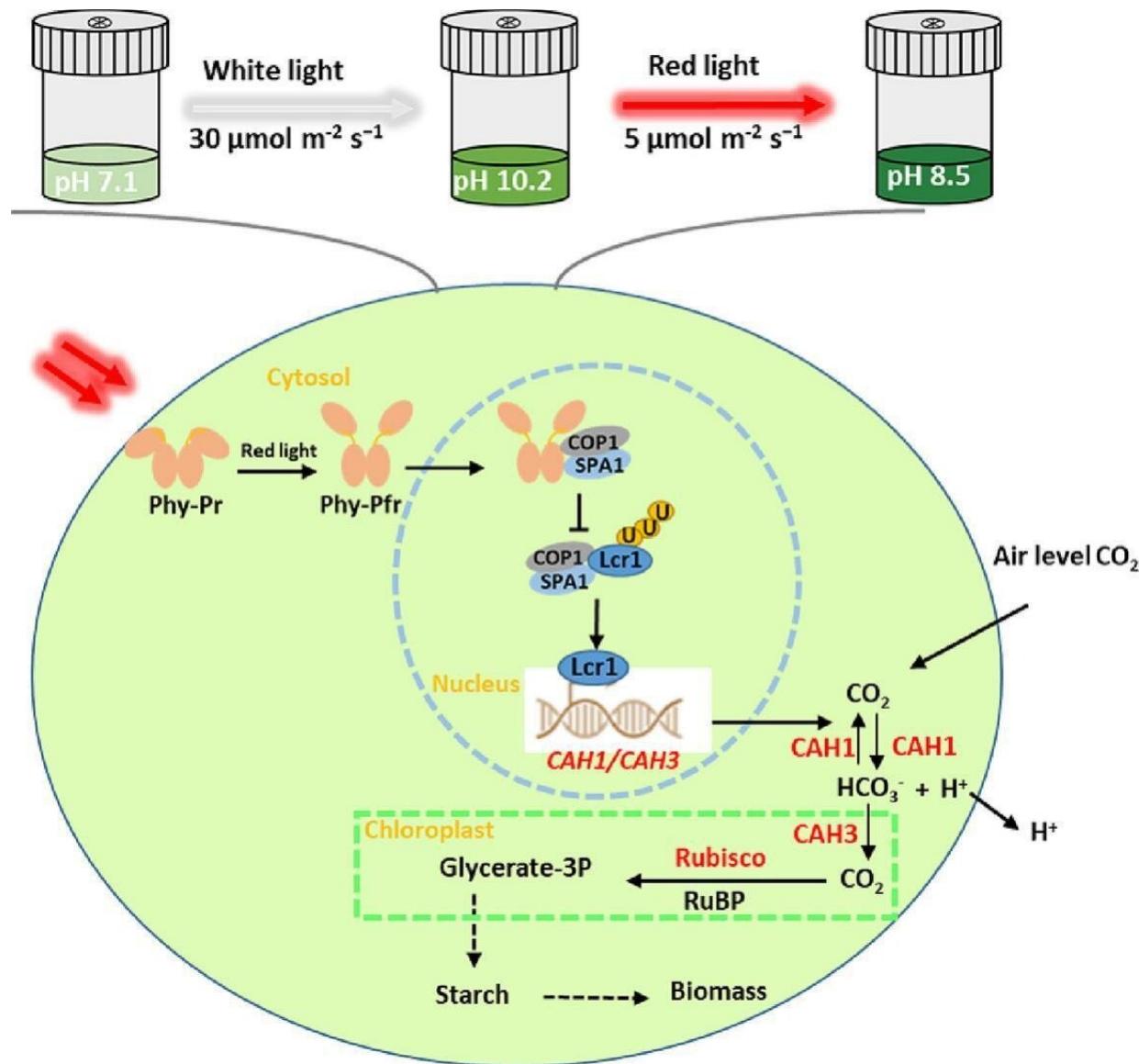


Study proves red light promotes growth of *Haematococcus pluvialis*

March 24 2023, by Liu Jia



Graphical abstract. Credit: *Aquaculture* (2023). DOI:

10.1016/j.aquaculture.2023.739462

Prof. Huang Qing's group from Hefei Institutes of Physical Science (HFIPS) of the Chinese Academy of Sciences (CAS) has made progress on red-light-promoted photoautotrophic growth of *Haematococcus pluvialis* (*H. pluvialis*) and the related carbon fixation mechanism. The study was published in *Aquaculture*.

H. pluvialis is a unicellular green alga that has been widely recognized for its ability to accumulate astaxanthin in large quantities and is currently the best established biological source of natural astaxanthin in nature. Studies have showed that the use of appropriate combinations of red and [white light](#) can promote the growth of *H. pluvialis* and improve astaxanthin production, but the processes and mechanisms in which red light plays a role are not well understood.

In this study, the researchers worked on a new method to promote growth of *H. pluvialis*.

The researchers found that autotrophic growth of *H. pluvialis* was improved after switching the illumination culture mode from white to red light in the late logarithmic phase of growth. They also confirmed that red light could promote enhanced photosynthesis and increase CO₂ fixation rates by regulating the activity of carbonic anhydrases and maintaining the pH of the medium stable between 8 and 9.

Additionally, the researchers revealed the related mechanism: The [red light](#) regulated the transcription factors of carbonic anhydrase gene expression possibly through the phytochrome mediated COP1-SPA1 complex pathway, which upregulated the expression of carbonic anhydrase genes CAH1 and CAH3, and then affected the activity of

carbonic anhydrase.

"Our work provides guidance for more efficient use of light during microalgal culture to achieve photoautotrophy and for potential practical applications in carbon neutralization," said Li Lamei, first author of the paper.

More information: Lamei Li et al, Red light promotes autotrophic growth of *Haematococcus pluvialis* with improved carbonic anhydrase activity and CO₂ utilization, *Aquaculture* (2023). [DOI: 10.1016/j.aquaculture.2023.739462](#)

Provided by Chinese Academy of Sciences

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