Figure 1: Information rich figure.
The 3 strains show different salinity/temperature/light niches
BA120 peaks at ~190 uE, 25C, with niche volume widest at 3-8 PSU
BA124 peaks at ~250 uE, 25C, limited effect of salniity
BA132 peaks at ~280, 25C, widest niche at 3 PSU

Given the distributions one might have wished that the temperature scale went higher to better delimit upper temperature limits; a suggestion for future studies.

Figure 2: information rich figure.
Chl peaks at low light. different temperature effects across strains.

Figure 3. Interesting.
One wonders why Car cell-1 peaks at low light for most strains.

Fig. 6 nice to include both chl-1 and cell-1 specific O2 rates; clearly different.

Abstract
Line 18: 'realistic', not 'real'

introduction;
Line 51: 'morphotypes'?? perhaps 'pigment types'? 'morpho' implies morphology
Same comment on line 63; is 'pigment' part of 'morphology'; maybe 'phenotype'

Materials & Methods:
"The PCY cultures were adapted to the various synthetic environmental conditions for two days. "
How many rounds of cell division occurred during the 2 days of acclimation?
What was the growth state of the cultures before the inoculation into the treatment condition?
Some combinations might have still been in lag phase after 2 days, depending upon the state of the preculture and the severity of the stress.

"The salinity was 120 controlled by salinometer (inoLab Cond Level 1, Weilheim in Oberbayern, Germany). "
Controlled by? Or verified by? Controlled by implies a chemostat type titrator. I think the authors mean they used a salinometer to measure the salinity, not ongoing adjustment of salinity?

What was the photoperiod, and when in the subjective photoperiod were measures taken?

"In order to achieve the most reliable results, test cultures were grown in three replicas and were incubated for one week at 135 each combination of light, temperature and salinity. "
OK, good.
How does this relate to the earlier statement about 2 days?

Figure 1, and first section of results:
Were all replicates initially inoculated at equal cell densities?

Line 142
The flow cytometry was used to establish the initial number of picocyanobacteria cells and to measure the final cells concentration after the incubation period.

It would be more generally useful to express:
mu =(ln(Cellsfinal) - ln(Cells initial))/elapsed time
This assumes steady exponential growth over the entire time window.

Then, ln2/mu = apparent generation time.
Then elapsed time/generation time = number of generations achieved under each treatment.
Or, the ratio of Cellsfinal/Cellsinitial, as a direct measure of the fold change in biomass.

Any of these metrics would give better comparability across studies.

Instead doing statistics on the achieved final number of cells, without clear reference to the starting number of cells, is methodologically odd and makes comparisons with other studies difficult.

The masses of statistical comparisons make the results almost unreadable.
I wonder if the authors should lift out the masses of statistical comparisons into tabular or supplement form, and use a much shorter text to descibe the main quantitative and qualitative findings, with reference to a table of statistical tests.

Discussion:
"Carotenoids have a dual role in the cell: to maintain a high 599 capacity for photosynthetic light absorption and to provide protection against photooxidation '
I do not know of any evidence that carotenoids can serve in photosynthetic light absorption in cyanobacteria.
If that is true it needs to be backed by a citation.

best regards, Doug Campbell