

Review of PeerJ Manuscript #71271 V1
General Comments

Abstract

- Line 32: Suggest adding the region or part of the world where *P. flava* is widespread here, perhaps “the widespread Indo-Pacific gorgonian”
- Line 36: Suggest change to “DOC addition did not significantly...”
- Lines 43-44: Suggest change to “...more affected by DOC eutrophication.”
- Line 44: Change to “...under the expected increasing temperature scenarios, it is also likely...” – make temperature singular and add “it”
- Line 46: Suggest change to “This study contributes to our understanding of...”

Introduction

- Lines 50-52: It's worth mentioning that gorgonians are an informal group – they are not monophyletic
- Lines 50-56: A lot of different groups are introduced very quickly here. I suggest trying to make this as smooth and straightforward as possible since to a non-expert, this is likely very confusing. Specifically, I suggest removing any unnecessary words and starting with the largest taxonomic group and working smaller. However, I think you can probably avoid mentioning some of these groups all together. I think you can skip Anthozoa and perhaps even Cnidaria – the main information you want to get across is the difference between hard and soft corals, what gorgonians are, and how these three groups relate to one another taxonomically. This is the opening of your paper and I think you are bogging the reader down with a lot of taxonomic detail that is not all strictly necessary to understand your study.
- Line 52: Suggest providing some definition of “considerable size” i.e. >1 m in height and width, or similar
- Line 58: Suggest changing the period on this line to a semicolon to help the reader follow
- Lines 63-64: I've never heard the holobiont referred to as an “equilibrium” and I think this phrase will not be clear to non-experts. I would call it what it is – a relationship or symbiosis. Perhaps change to “...the ecological functioning of many gorgonian species is strongly dependent on the relationship between coral hosts and associated microbes, including Symbiodiniaceae algae.” It is also important to mention that Symbiodiniaceae are algae, for non-experts.
- Lines 79-80: You have not explained what bleaching is, you need to add some text to this paragraph defining/explaining bleaching.

- Line 90-91: Suggest changing to “especially species more dependent on heterotrophic filter feeding”
- Line 92: What do you mean by simpler? Less diverse? Similarly, on line 94 I suggest replacing “degradation” with a more specific term for what declines – coral cover? Biodiversity?
- Line 101: Delete “While” and the beginning of the sentence.
- Line 126: Here it may improve clarity to describe *Xenia* as “the fleshy, pulsating octocoral” to help distinguish it from gorgonians
- Lines 128-129: Suggest altering this to “As a single factor, however, DOC enrichment...”
- Line 141: “investigate” should be in the past-tense, and the past tense should be used when discussing the presented work throughout the manuscript
- Line 142: “affect” should be past tense
- Line 142: suggest removing “water”
- Line 143: Avoiding using “zooxanthellate”, following the Symbiodiniaceae Style Guide by Parkinson et al. “Symbiotic” is an alternative, or you can say “...the ecophysiology of the Symbiodiniaceae-associated gorgonian *Pinnigorgia*...”
- Lines 144-145: Suggest changing to “...we measured the effects of DOC and a subsequent stepwise increase in temperature on coral samples in a 45-day manipulative experiment.”
- Line 146: typo in hypothesized
- Line 147: Suggest changing to “...effects of DOC enrichment and high temperatures would negatively impact gorgonian ecophysiology.”
- Lines 155-157: You have already clearly stated your hypotheses, this repetitive sentence at the end of the paragraph can be deleted.

Materials & Methods

- Line 165: Suggest adding “two” before “temporal stages”
- Lines 164-176: The authors have greatly improved the description of their methods, but there are still some confusing aspects. I suggest that they talk through each stage one at a time with all relevant information. For example, following the sentence one line 166-167, I would include a statement about 12 tanks being used in this period, 3 tanks per treatment including the control and include the concentration for the control as well. Then I would move on to the second stage and add a statement after the sentence on line 167-169 that says four additional tanks were added at this stage to control for temperature.

- Lines 178-182: The purpose of separating the back and front portions of the tank is unclear – was the water filtered in the back? What this a way to create some kind of controlled flow regime?
- Lines 196-197: Suggest moving this information about the control DOC levels to the start of the methods, where you outline your different treatments. Might be worth repeating again here too to remind the reader.
- Line 213: Just to make sure this is clear, you did not take an equal number of fragments from each donor colony, correct? Rather, they were harvested randomly and thus different numbers of fragments came from each donor? If I am misunderstanding this, this part of the text needs to be changed.
- Lines 215-216: I don't think stating that the same conditions were maintained in this big tank is sufficient, but rather, measurements of the different parameters from this tank need to be reported. Perhaps these are included in one of the two other papers published from this study? If that is the case, I think you can just add a sentence saying "Temperature, salinity, irradiance, flow and water chemistry parameters measured in the donor tank are reported in Author et al year". Otherwise, I think you need to provide the mean and variance values for the parameters in the supplemental to show that they were the same in this tank as in your experimental tanks. This is critical since you use fragments kept in this big tank during phase one in your temperature controls in phase two.
- Lines 223-225: The fragments were assigned randomly, correct? I suggest adding "randomly" to this sentence.
- Line 240: How did you achieve complete darkness while still maintaining temperature? From the light measurement, it sounds like the chambers were placed back into the experimental tanks to act as a water bath. Did you do this for the dark measurements as well, and if so how did you keep the chambers dark? Some kind of cover? Foil?
- Line 244: I suggest adding how you corrected the fluxes with the background seawater control
- Line 249: I did not understand what the authors meant here until I finished reading the manuscript and did not see the word "*Cladocopium*" anywhere. I suggest removing this from this section and bringing it up either when you mention why you used *P. flava* (line 209-211) or down into the discussion. If you choose the latter, you can mention the fact that *P. flava* has been found to consistently associates with *Cladocopium*, thus symbiont identity does not play a role in the interpretation of your results (or something similar). *Cladocopium* should also be italicized as it is a genus.
- Line 251: Suggest adding "...performed at the end of the experiment on day 45..." to help the reader follow

Results

- Lines 320-323: Please reference the figure showing the Symbiodiniaceae data when reporting these results. Please also clarify that cell density was measured only at the end of the experiment and all treatments experienced the same temperature increase.
- Line 323: You refer to the low and high DOC treatments – yet these are named by concentration in the methods. It's confusing to switch up your naming system.
- Line 324: Figures should be in the order they appear in the text. Here, the second figure mentioned is labeled Fig. 4. It should be Fig. 2 (or Fig 3 if you add an earlier reference to the symbiont density figure).
- Lines 328-330: Here you seem to report results that contradict those in the previous subsection. Earlier you show that there are no sig differences across different DOC treatments, yet here it states that the 20 mg per L concentration was different from the others. I would not point out this difference if it is not statistically significant. Further, it's a bit confusing to have DOC results reported in the temperature section.
- Line 330: Should read "O₂ production was strongly reduced..."
- Line 330-331: The sentence here is not clear, what mean values were negative? O₂ production? The English in the section needs some revision.
- Line 337: This should be changed to "...and none of the evaluated factors..."
- Line 344: You mention results for interactions earlier in the manuscript (see line 336) – why are they not included in this section?
- Line 346-439: Are these the significant results presented in Figure 4? If so, please reference the figure here. Are you saying here (and in the figure) that the 10 mg DOC treatment and the temp control are different from each other, or all other treatments?

Discussion

- Line 380-391: To me, it makes more sense to bring this up earlier as part of the paragraph that ends on line 375. These two results (reduced O₂ production and reduced symbiont density) go hand in hand. I suggest discussing them together and then moving on to compare these results to those in the literature.
- Line 399: Mixotrophy is not the same as trophic plasticity. Mixotrophy is the use of multiple nutritional pathways (heterotrophy and autotrophy). Trophic plasticity is the ability to change the nutrient resources you rely on. Please delete mixotrophy here. Also, "if" should be deleted here.
- Line 400: The authors responded to one of my previous comments by saying they avoided the use of the phrase "zooxanthellae". Please ensure this is consistent throughout the manuscript. The comma on this line should also be deleted.
- Line 404-405: This is not a complete sentence, please merge with the previous sentence.

Line 406-407: You do not have any direct evidence that *P. flava* increased heterotrophy in your experiment. The most compelling data you have are that your fragments grew, however you only show the change in surface area over the entirety of the experiment, and it is not possible to tell if the growth occurred throughout the experiment or just during the first phase. Even if the corals continued to grow during the second phase, it was only 24 days with a slow temperature ramp. For all you know, your corals could have started to starve at the end of your experiment when stress was maximized. I think increased heterotrophy could possibly explain your results, but I certainly don't think you can make the statement you do here.

Lines 407-408: Again, you are overstepping. We measure thermal stress in the field in degree heating weeks that accounts for heat stress over a six week period – if you want to suggest that heterotrophic prevents bleaching in *P. flava*, I suggest comparing the degree heating weeks in your experiment to the degree heating weeks when bleaching is observed in gorgonians, soft corals, and/or hard corals. My suspicion is that you did not accumulate enough degree heating weeks in your experiment to trigger visible bleaching. You already know that your corals are losing Symbionts – a sign of initial bleaching!

Lines 423-425: The English needs to be revised here

Lines 434-439: This contradicts with your idea earlier that *P. flava* uses heterotrophy to prevent bleaching.

Line 445: Suggest adding “a significant decrease in” prior to “growth under DOC **enrichment** and warming combined”