This article reports the effect of phosphate enrichment on boring microorganisms in live corals, for the first time. The results of the study show a visible reduction of filaments abundance in the most recently-calcified apical part of phosphate-enriched nubbins. Authors suggest that euendolithic microorganisms could not keep up with coral growth, so they became diluted in the apex areas as nubbins grew with phosphate enrichment. These results are of importance and should be published (after minor revisions). The role of euendolithic microorganisms in live corals remains poorly understood despite their potential impact on coral health. Results of this study represent a step towards advancing our understanding on how environmental factors can affect them.

General comments:

My main general comment is related to the last paragraph of the discussion section. The authors should put the results of their study more into perspective of what they really mean in a coral reef that experiences several simultaneous forms of pollution. Controlled aquaria experiments have the advantage of testing a single factor while holding the other constant, which reduces the many confounding factors that make understanding causation in non-experimental descriptive studies difficult. Thus experimental studies, such as the present study, are very important in understanding coral reef ecology. However reefs often experience several simultaneous forms of pollution. For example, eutrophic reefs are generally affected by terrestrial run-off rich in nitrates and ammonia in addition to phosphate. Organic matter is also a globally important constituent of pollution of nearshore coral reefs because most of the nutrients are discharged to the sea in particulate form (e.g. dead and decaying plants; human and animal waste). Also, much of the dissolved inorganic nutrients can be taken up and converted into particulate forms within hours to days.
Both nitrogen and organic matter have been demonstrated to influence microbial euendoliths and their bioerosion rates of dead carbonate substrates (Carreiro-Silva et al 2009; 2012). These studies have shown that nutrient effects are specifically different for eukaryotic chlorophytes and prokaryotic cyanobacteria and fungi: nitrogen stimulates mostly green algae, whereas the addition of phosphorus stimulates cyanobacteria, and organic matter stimulates fungi. Although there are differences in community composition in dead and living carbonate substrates, the authors should make use the results of these studies to relate to their observation in live corals. Do the so called "advantages" of the observed decrease in euendoliths abundance with increased coral skeletal growth/decreased skeletal density still hold true on most eutrophic reefs where phosphorus is not the sole pollutant?

Specific comments:

Last sentence of the abstract – the abstract should include a proper conclusion. Summarize the main conclusion of this study and include it here.

Page 1, line 18 of the introduction section – include Carreiro-Silva et al. (2012) Carreiro-Silva et al (2012) Phosphorus and nitrogen effects on microbial euendolithic communities and their bioerosion rates. Mar Poll Bull 64: 602–613

Page 2, line 25 of the introduction section – I read Dunn et al. (2012) and verified that the authors do not refer specifically to microbial euendoliths. They suggest an increase in internal bioerosion under phosphate enrichment, but only cite studies on the relationship between eutrophication, skeletal density and macroborers (worms, molluscs and sponges). None of the papers cited include microborers. Please clarify this.

Page 2, line 5 of the Methods section - How many slides per nubbin? If you had 3 nubbins but only looked at a total of 5 slides per treatment, this means that you had more slides of some coral nubbins than others. Did you measure variability in the area colonized by euendoliths within the same coral (i.e. multiple slides of the same coral nubbin)? In dead carbonate substrates, there is quite a lot of variability on the surface area colonized by euendoliths within the same experimental substrate. Please assure the reader that the low replication you have is enough to draw your conclusions.

Page 1, line 8 of the results section – it would be interesting to see the actual pictures of slides showing the large differences in euendoliths in the apex areas of corals exposed to different treatments.

Page 1, line 14 of the discussion section - Green banding has been suggested to be caused by algal blooms within the coral skeleton during periods of coral paling (the partial loss of pigmentation) (Carilli et al. 2010). Coral paling allows more light to penetrate through the translucent coral tissue into the coral skeleton benefiting the euendolithic algae. Could the lack of banding observed in this study be related to the constant culture conditions in the laboratory (i.e. absence of physical stresses that could cause paling – such as increases sea-water temperature, UV light, etc) instead of representing species-specific differences? For how long were the corals cultured in the laboratory after being collected from the Red Sea? Did you make these same observations in skeletons of *S pistillata* in the field?

Page 2, line 3 of the discussion section – See my comments on Dunn et al (2012) interpretation above.

Page 2, line 12 of the discussion section - Zooxanthellae pigments normally absorbs > 95% of ambient photosynthetically active radiation, so the loss of pigment has been suggested to stimulate growth of the endolithic algae due to increased access to light

(Fine et al., 2005). Is it possible that the increased zooxanthellae photosynthetic efficiency and growth rates under increased phosphate might have also contributed to the observed decreased in microbial euendoliths in the coral apex? (i.e. less light available for microbial euendoliths)

Page 2, line 16 of the discussion section - There was no direct negative effect of phosphate on euendoliths, they merely did not increase proportionally to the increase in coral skeletal growth, and this resulted in reduced filament abundance in relation to the total coral area. Please revise this statement.

Page 3, line 14 of the discussion section - The main source of the inorganic nutrients inside coral skeletal pore-waters is regeneration by microbial euendolithis themselves, as suggested by Muller and Risk (1983) and Ferrer and Szmant (1988), not the overlying water column.

Page 3, line 18 of the discussion section – A recent study by Carreiro-Silva et al (2012) has demonstrated that nitrogen not phosphorus is the main limiting nutrient to euendolithic chlorophytes. The addition of phosphorus did not increase colonization by green algae above control levels in that later study. Please add to the discussion the different roles of P and N on microbial euendoliths in dead substrates described in Carreiro-Silva et al (2012) and how this could relate to your observations on live corals.

Page 4, line 2 of the discussion section - Polluted reefs generally include different inorganic and organic nutrients not only phosphates. Therefore you cannot make such broader generalizations. Please refer to my general comments above.

Technical corrections:

Page 1, line 6 of the Methods section - replace “eutrophicated” with “eutrophic reefs”

Page 2, line 22 – replace “details” with “detail”

Page 2, line 24 – replace “thin sections selected” by “selected thin sections”

Page 1, line 5 of the results section – replace “made” by “composed”

Legend of Figure 3 – Replace “Tuckey” with “Tukey”