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Comment

Interactive comment on “Molecular biology techniques and applications for ocean sensing” by J. P. Zehr et al.

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This manuscript sets out to provide a non-technical overview of a variety of molecular techniques and their application to the study of the microbiology and biogeochemical cycling within the ocean. An aspiration of this paper is to indicate a range of techniques which might be adapted for use on remotely-operated sensor platforms.

This is a very broad area of research, on which a huge amount has been published relating to the techniques themselves and also their application to address scientific questions. Undoubtedly this review was going to be an ambitious task, especially considering the technical background of the intended audience. Overall this review succeeds in its aspirations. I would, however, make the following recommendations for the authors to consider:

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1) I would endorse the observations made in an earlier comment by G. Griffiths and would encourage the authors to take on his suggestions. In particular his point about Figure 1 is extremely valid. It may be worth, as part of Fig 1, identifying the relevant section number alongside the description of the technique. For example 'Quantitative PCR (qPCR) [3]' or 'Denaturing Gel-Electrophoresis [5]' and so forth. This would certainly assist the non-specialist reader to relate the text and figure together.

2) The use of an on-line dictionary was mentioned in this first short comment as well. The authors might consider a brief glossary of terms at the end of their paper. Terms such as 'fosmid' are not defined currently. If the authors intend this to be a comprehensive introduction to the subject then a short glossary would help an interested reader to follow the manuscript from start to finish without consulting external sources.

3) The authors might also consider the inclusion of other summary figures to assist with the text explanations. The description of the basic PCR reaction and the concept of degenerate primers (page 629) might be assisted with a diagram? Similarly the description of real-time PCR using hybridisation probes may also benefit from a diagram. If the authors feel that this would make the overall manuscript too long then perhaps they could cite some general texts (books, book chapters) which might assist the reader in addition to the more general review articles cited.

4) Section 2 - PCR techniques. I think that this section is useful. Is it worth including the comment that the principle of PCR underlies many of the other techniques as well, rather than treating it as a separate process? My feeling is that this is not as apparent as it might be.

5) In the flow chart in Figure 2 the restriction digest steps are not identified. This figure should be modified to indicate at what point the restriction digests, which are identified within the text, take place to generate appropriate 'fingerprints'

6) Page 632, line 20 onwards - I feel this section of text requires some clarification.

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7) Summary section - ultimately not all of the techniques described within this review will be appropriate for automation and deployment on sensor platforms. The authors do offer some insight into which of these techniques might be most appropriate for sensor development. I wonder if it is worth including a short discussion of any specific challenges that lie in sensor development (in addition to power supply); for example sample isolation, signal to noise ratios, the sensitivity and idiosyncrasies of microarray methods, problems associated with the limited lifespan of fluors used in fluorescence detection and so forth. Perhaps this is to be covered in another article within the special edition?

In conclusion this is a very useful article, presenting as it does an overview of the discipline which sensor developers will undoubtedly find of benefit when considering the future development of technology for the marine environment.

Interactive comment on Ocean Sci. Discuss., 5, 625, 2008.

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