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Interactive comment on "The snails' tale at deep-sea habitats in the Gulf of Cadiz (NE Atlantic)" *by* L. Génio et al.

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We would like to acknowledge the comments and useful suggestions of the anonymous reviewer and we hope to respond satisfactorily to its criticism.

R2: I find this ms rather frustrating as though there is evidence it has been rewritten from the original there has been no account of the comments I made in my original brief review.

AU: An account of the changes made in the initial version and reply to the first comments of the reviewers was uploaded on the 21st Feb 2013.

R2: Broadly I like the paper and the authors show they have some very sound data on the distribution of gastropods in the Gulf of Cadiz. They interpretation of the depth

variation in the distribution of gastropods is but could have been reinforced by citing Ron Etter's paper on depth variation in molluscs (Etter & Rex 1991 DSR 37:1251-1261 and Etter et al. 2005 Evolution 59: 1479-1491).

AU: Thanks, these are very interesting papers. We added the following text in section 4.2. Species replacement with depth: "According to Etter et al. (2005) the bathyal zone may play an important role in generating deep-sea biodiversity because the strong gradients and great biotic and abiotic heterogeneity at these depths might impose different selective regimes that increase the probability of population differentiation and speciation. In fact, the potential for gastropod radiation within the deep-sea is highest in the upper bathyal region (Etter and Rex, 1990)."

R2: However, I do not think the authors have really thought through the concept of dispersal. Distance dispersed in one generation is larval life length times current flow. This emphasises one of the main problems in categorising larval types. There has always been the assumption that planktotrophic larvae disperse the greatest distance and this may be the case in nutriment rich shallow water (but still very debatable). In an oligoitrophic environment such as the deep sea lecithotrophic planktonic development is most likely to give the widest dispersal because of the maternal investment in yolk for the developing embryo. This has been beautifully demonstrated by Shilling and Manahan 1994 BiolBull 187: 398-407(but regularly ignored) who demonstrated that planktonic lecithotrophs may have the widest dispersal but that this may be partially counterbalances by the greater predation risk (see also Young et al. 1997 Biodiversity and Conservation 6, 1507- 1522).

AU: In order to accommodate the reviewer concerns (and besides other smaller changes throughout the text) in the introduction we replaced "Species with a feeding pelagic larval stage (planktotrophic larvae) are assumed to extend their distributions to wider geographical ranges. By contrast, non-planktotrophic species, which develop using a maternal energy source (e.g. lecithotrophic species, brooders, intracapsular development), have little potential of long-distance dispersal, and therefore,

have more restricted distributions (Sasaki et al., 2010)." by "A feeding pelagic larval stage (planktotrophic larvae) is frequently assumed to favour widespread geographical distributions while larval retention would be more compatible with non-planktotrophic species, which develop using a maternal energy source (e.g. lecithotrophic species, brooders, intracapsular development) (Sasaki et al., 2010). However both long distance dispersal (enabling high rates of habitat occupancy) and self-recruitment owing to local larval retention (enabling high local abundances) are possible in planktotrophic and lecitotrophic dispersers (Shiling & Manahan, 1994; Young 1999, 2003; Pradillon et al, 2001; Swearer et al. 2002). Yet for brooders dispersal is often limited by the foraging range of adults."

R2: Current speed and direction should also be taken into account as should the 'age' of the species based on the premise that a 'long' lived species with planktonic development may have a much wider distribution that a species with a 'young' age and benthic development for example. I fell the authors have not really produced a balanced account taking these factors into their argument and it appears rather superficial. I should say this is not unique to them!

AU: We also would like to emphasize that the concrete data that we have to work with are the species distributions and their respective developmental modes. In that way our objective is to interpret the species distributions as the final (realized) outcome of dispersal and not dispersal itself. In that sense we chose not to infer on larval transport or discuss extensively the influence of currents, also because oceanographic circulation in the Gulf of Cadiz rather complex (involves four different water masses), is subjected to strong seasonal and interannual variability, and results in very different transport distances and directions according to location of the source populations and whether the transport is surficial or demersal (unpublished data on biophysical coupling oceanographic models, manuscript in preparation on the dispersal of chemosymbiotic model species). Moreover we can only infer on possible source populations from the known distribution of the species. The emphasis of this manuscript

is therefore on the abundance-occupancy relationships of the species which we discuss in relation to their reproductive modes. Nevertheless we included the following texts concerning the oceanographic circulation: In Material and Methods (study area): "The oceanographic circulation is dominated by the exchanges through the Strait of Gibraltar (Ambar et al., 2002), and by the formation of meddies and recirculation of the Mediterranean Outflow Water (Quentel et al. 2011) that interacts with the seafloor at intermediate depths (mostly coinciding with the CP bathymetric strip)." In Discussion – 4.2: "Regional oceanographic circulation is an important point to be taken into account. In the GoC, the influence of the Mediterranean Outflow Water in particular, may be pertinent for explaining the highest species turnover observed at 1100-1300 m which coincides roughly to the deeper limit of this water mass. The formation of typical meddies (Quentel et al., 2011) may indeed act as a retention mechanism and/or hinder vertical movements of larvae."

R2: In my original comments I also took issue with the use of the term 'strategy' which they continue to use although it is the wrong usage. A 'strategy' is a though-out process whereas all the reproductive, feeding or behavioural patterns in marine invertebrates are a result of stochastic evolution with no thought involved. The word to use is 'adaptation' or 'pattern'. It is very unfortunate that this word has crept in from the American literature where, I presume, it sounds very buzzy! See Vance 1973 American Naturalist)

AU: We disagree with the reviewer; the term "strategy" is used in many seminal texts of ecology and evolution (eg. Evolutionary Stable Strategies model, r vs. K strategies, etc), of course it is a personification and cannot (is not) taken literally. We prefer not to use "adaptation" as a synonym of strategy (some authors may even differentiate between strategic and tactic adaptations. Terminology is always a subject of debate and disagreement among different authors. However, this is not a major issue for us, and therefore we eliminated the term from the ms by rephrasing or simply replacing "dispersal strategies" or "developmental strategies" by "developmental modes" and

“feeding strategies” by “feeding habits”.

Interactive comment on Biogeosciences Discuss., 10, 3707, 2013.