

Interactive comment on “Stable isotopes in barnacles as a tool to understand green sea turtle (*Chelonia mydas*) regional movement patterns” by M. Detjen et al.

Anonymous Referee #2

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The study described in this manuscript investigates variation in isotopes of oxygen and carbon in the shells of barnacles that live in association with sea turtles. The objective is to match isotopic variation in the shells with predicted values in the Pacific Ocean to assess the range of migration by the host turtles. Though not the first time this idea has been proposed, the study provides potentially new insight on the movement of sea turtles in the Pacific. However, in my opinion there are a few significant core issues and a number of technical editing corrections that need to be addressed before this manuscript is ready for publication.

1. A clearer description of where shell material was taken from the barnacles is needed. Using barnacle anatomical terms would help (e.g. base [bottom], aperture

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[top], paries [wall plate]). If I understand correctly the milled sections were taken at distances measured from the base of a paries. Was material used from the surface or deeper within the paries? Was sampling done in the middle of the paries or at the lateral edge? [this makes a difference since the paries have a growing margin along the base and along their sides]? Were the barnacles of similar size (i.e. age?) The size range of 1.5 – 2.5 mm is mentioned in the discussion but reporting sizes of specimens in the results section would be useful. It should also be noted that nothing is known about growth rates in this species of barnacle.

2. I did not understand the number of samples (rows) reported in table 1. From the text the authors state that 9 barnacle samples from 3 different turtles were ultimately analyzed so I would expect either 3 or 9 rows of data but the table reports 6 rows of data. The mismatch needs clarification. It would also be most useful to arrange the rows of data by each turtle sampled and either list the number of barnacles sampled for each turtle or list each sample in its own row (9 rows isn't much more than 6).

3. The authors make the link with isotopic ratios and water temperature but doesn't salinity also affect isotopic ratios? Maybe salinity is uniform enough that it is of no concern but possibilities for its influence should be discussed. Also more explanation is needed on the parameters and formula used for the paleotemperature equation (after Epstein et al. 1953?) and is this based on parameters for mollusk shells or modified for barnacles (sensu Killingly & Newman 1982 [should be cited]) as discussed in Killingly & Lutcavage 1983? Would it be possible for figures 1 and 2 to show multiple solid line isopleths (contours) of temperature (or oxygen isotope ratios) along with the shaded predicted migration region?

Epstein, S., R. M. Buchsbaum, H. A. Lowenstam, and H. C. Urey. 1953. Revised carbonate-water isotopic temperature scale. *Bulletin of the Geological Society of America* 64:1315-1326.

Killingly, J. S., and W. A. Newman. 1982. ^{18}O fractionation in barnacle calcite: a

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barnacle paleotemperature equation. Journal of Marine Research 40:893-902.

4. Technical edits: Pg. 4656 Line 23 . . . migration patterns, as well as fine-scale . . .
Pg. 4657 Line 12 Because of their intimate connections, species that are associates of
particular hosts have been used . . . Line 22 As obligate commensals, these barnacles
. . . Pg. 4658 Line 6-9 This sentence does not read well. Perhaps splitting it into two
would help. Line 13 “would have” this phrase does not make sense to me Line 14 . . .in
the barnacle *Platylepas hexastylus*, an epibiont of turtles, collected . . . Pg. 4659 Line
5 It is not customary to cite conference proceedings. I suggest using “(unpublished
data)” in place of Gomez et al. Line 9 “axis of growth” rather than “growth trajectory”
Line 11 I don’t know what is meant by “endoskeleton”. Inner layer of shell? Barnacles
have a thin exoskeleton around their body but no endoskeleton. Pg. 4660 Line 10 “the
edge” does this mean basal margin? Lines 11-13 growth axis of the barnacle shell not
the barnacle Line 14 Do you have a reference to cite for the Vienna Pee Dee Belemnite
scale? Line 19 . . . spanned three orders of magnitude . . .

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