

## ***Radiocarbon dating of pearls and coral***

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Radiocarbon dating relies on an understanding of where an organism gets its carbon from. Carbon in terrestrial organisms tends to reflect atmospheric carbon dioxide levels at the time the organism was alive, and we have good records of those levels going back for thousands of years.

Marine organisms like shells and coral are much more complicated, as they could have taken on 'old' carbon from the waters around them that doesn't reflect the actual time they were alive. Although we can correct for this if we know the geographical source of the coral, it still complicates things. If you were going to date one of the pearls it would be good to know more about it, as pearls can be saltwater or freshwater, so could have the same issues as coral, but may not have.

To complicate things further, both pearls or coral could have partially recrystallised since they died, taking on carbon of another age, but a good radiocarbon lab should be able to detect this and adjust the pretreatment protocols to deal with this (or advise against dating if it's not likely to give a reliable result). Using Uranium-Thorium dating may be more accurate than carbon dating, or both methods could be applied.

Coral has an additional issue in that some species can live for thousands of years (so you could get very different dates from the same piece depending on what part of the coral you sampled), so before dating the coral it might be useful to identify the species if possible.

If we dated either the pearl or the coral, the date could fall into 3 categories:

- a relatively recent date (e.g. within the last few hundred years)
- the expected age of 500-200 BCE, or slightly older than it.
- a much older date than expected. An old pearl or piece of coral could have been collected from a beach, for example. Remember that we're dating when the organism was alive, and not when the collection was formed. It is more likely that an old piece of coral could have been hanging around for years, washed up on a beach etc, than a pearl would have been. Partly because pearls would have been more likely to have been collected by humans if they were seen whereas coral could easily have been ignored, but also because the natural weathering processes for samples being in contact with sand or water would be more likely to destroy a pearl completely but could just have slowly worn down a much larger piece of coral to leave smaller pieces. Coral could also have the 'inbuilt-age' mentioned earlier, for a long-living species, that a pearl would not have, or they could both be affected by 'old' marine inputs.