World Academy of Science, Engineering and Technology
International Journal of Biotechnology and Bioengineering
Vol:10, No:05, 2016

Enzymatic Repair Prior To DNA Barcoding, Aspirations, and Restraints

Authors : Maxime Merheb, Rachel Matar

Abstract : Retrieving ancient DNA sequences which in return permit the entire genome sequencing from fossils have extraordinarily improved in recent years, thanks to sequencing technology and other methodological advances. In any case, the quest to search for ancient DNA is still obstructed by the damage inflicted on DNA which accumulates after the death of a living organism. We can characterize this damage into three main categories: (i) Physical abnormalities such as strand breaks which lead to the presence of short DNA fragments. (ii) Modified bases (mainly cytosine deamination) which cause errors in the sequence due to an incorporation of a false nucleotide during DNA amplification. (iii) DNA modifications referred to as blocking lesions, will halt the PCR extension which in return will also affect the amplification and sequencing process. We can clearly see that the issues arising from breakage and coding errors were significantly decreased in recent years. Fast sequencing of short DNA fragments was empowered by platforms for high-throughput sequencing, most of the coding errors were uncovered to be the consequences of cytosine deamination which can be easily removed from the DNA using enzymatic treatment. The methodology to repair DNA sequences is still in development, it can be basically explained by the process of reintroducing cytosine rather than uracil. This technique is thus restricted to amplified DNA molecules. To eliminate any type of damage (particularly those that block PCR) is a process still pending the complete repair methodologies; DNA detection right after extraction is highly needed. Before using any resources into extensive, unreasonable and uncertain repair techniques, it is vital to distinguish between two possible hypotheses; (i) DNA is none existent to be amplified to begin with therefore completely un-repairable, (ii) the DNA is refractory to PCR and it is worth to be repaired and amplified. Hence, it is extremely important to develop a non-enzymatic technique to detect the most degraded DNA.

Keywords : ancient DNA, DNA barcodong, enzymatic repair, PCR
Conference Title : ICIB 2016 : International Conference on Industrial Biotechnology
Conference Location : Paris, France
Conference Dates : May 16-17, 2016