Version 3

Jun 15, 2021

Laboratory Protocols for Ancient and Modern Dental Calculus DNA Processing (Fellows Yates et al. 2021) V.3

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ABSTRACT

Collection of protocols used for Fellows Yates *et al.* "The evolution and changing ecology of the hominid primate oral microbiome". Bioinformatics analysis can be found on GitHub at https://github.com/jfy133/Anthropoid_Calculus_Microbiome_Evolution/.

This collection describes the laboratory procedures used for sampling, (ancient) DNA extraction, library construction and preparation for Illumina sequencing of ancient and modern dental calculus samples.

Sampling

- Dental calculus Field-Sampling Protocol (Warinner Version)
- Dental Calculus Field-Sampling Protocol (Sabin version)

Extraction

- Ancient DNA Extraction from Dental Calculus with Consolidant Removal
- DNA Extraction from Modern Dental Calculus

Library preparation

- Non-UDG treated double-stranded DNA library preparation for Illumina sequencing of ancient dental calculus
- (Non-UDG treated) double-stranded modern dental calculus DNA library preparation for Illumina sequencing
- Full-UDG treated double-stranded ancient DNA library preparation for Illumina sequencing of ancient dental calculus (reduced input DNA)

Indexing

- Illumina double-stranded DNA dual indexing for ancient DNA

Preparation for Sequencing

- Amplification and Pooling

DOI

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Fellows Yates, J. A. *et al.* (2021) 'The evolution and changing ecology of the African hominid oral microbiome', *Proceedings of the National Academy of Sciences of the United States of America*, 118(20), p. e2021655118. doi: 10.1073/pnas.2021655118.

KEYWORDS

ancient DNA, palaeogenetics, dental calculus, microbiome, oral microbiome, oral, tooth, DNA, illumina, extraction, sampling, library construction

IMAGE ATTRIBUTION

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GUIDELINES

Working in an Ancient DNA Laboratory

Some of the protocols in this collection **require** working in dedicated ancient DNA laboratories to limit modern DNA contamination.

- All steps of the protocol should take place in a clean room facility specifically designed for ancient DNA.
- The researcher performing lab work should wear correspondingly suitable lab-wear, such as:
  - full-body suit with hood (e.g., Tyvek)
  - hairnet
  - face mask
  - two pairs of clean gloves
  - clean shoes
  - protective glasses
- Sample processing should be carried out in separated work benches with integrated UV irradiation (e.g. Dead Air PCR work bench)
- Surfaces and equipment should be regularly decontaminated with e.g. bleach solution or Thermofisher's DNA AWAY (or similar) and irradiated with UV.

Please see the following for more detailed guidance:

Llamas, B. et al., 2017. From the field to the laboratory: Controlling DNA contamination in human ancient DNA research in the high-throughput sequencing era. STAR: Science & Technology of Archaeological Research, 3(1), pp.1–14. Available at: https://doi.org/10.1080/20548923.2016.1258824.

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Preparation for Sequencing

- Amplification and Pooling

FILES

Dental Calculus Field-Sampling Protocol (Warinner Version)
Version 1
by James Fellows Yates, Max Planck Institute for the Science of Human History

Dental Calculus Field-Sampling Protocol (Sabin version)
Version 2
by Zandra Fagernäs

Ancient DNA Extraction from Dental Calculus with Consolidant Removal
Version 1
by Franziska Aron

DNA Extraction from Modern Dental Calculus
Version 1
by Franziska Aron

Non-UDG treated double-stranded DNA library preparation for Illumina sequencing of ancient dental calculus
Version 1
by James Fellows Yates, Max Planck Institute for the Science of Human History

(Non-UDG treated) double-stranded modern dental calculus DNA library preparation for Illumina sequencing
Version 1
by James Fellows Yates, Max Planck Institute for the Science of Human History

Full-UDG treated double-stranded ancient DNA library preparation for Illumina sequencing of ancient dental calculus (reduced input DNA)
Version 1
by Franziska Aron

Illumina double-stranded DNA dual indexing for ancient DNA
Version 2
by Christina Warinner, Max Planck Institute for the Science of Human History

Amplification and Pooling
Version 1
by Franziska Aron

Citation: James A Fellows Yates, Irina Velsko, Franziska Aron, Courtney Hofman, Christina Warinner (06/15/2021). Laboratory Protocols for Ancient and Modern Dental Calculus DNA Processing (Fellows Yates et al. 2021). https://dx.doi.org/10.17504/protocols.io.bvuan6se