Genomic Diversity Laboratory  
Department of Ecology and Evolutionary Biology  
University of Michigan

ANCIENT DNA LABORATORY GUIDELINES  
Room 78, Ruthven Museum

The overarching concern regarding the University of Michigan Ancient DNA (aDNA) Laboratory is that of sterility. Given the efficacy of the laboratory methods involved, together with the fact that “ancient” tissues generally contain only small amounts of (potentially degraded) DNA, even a small degree of contamination can corrupt a data matrix and squander irreplaceable tissue samples. In an attempt to avoid jeopardizing current and future studies, we therefore must follow strict procedures to attain and preserve the goal of a sterile working environment. Here are a few guidelines to both keep the laboratory clean and provide a safeguard for your own important data:

Please Stay Out  
The most straightforward way to prevent contamination of the aDNA Laboratory is to keep entry to a minimum. Doors should be locked at all times. Janitorial staff will not enter these rooms; neither should you, unless you are actively processing aDNA.

No Contemporary DNA Allowed  
The aDNA Laboratory was constructed for the processing of aDNA only. Under no circumstances should fresh tissues or DNA ever enter the premises.

aDNA Laboratory Consumables  
Consumables should never be brought into the aDNA Laboratory from the GDL; instead, one should have dedicated aDNA Laboratory consumables (water, chemicals, gloves, pipette tips, etc.) that should reside in the aDNA Laboratory at all times. The importance of this cannot be overemphasized, as this is one of the likeliest vectors of contamination.

aDNA Laboratory Equipment  
Sterility of the aDNA Laboratory requires systematic cleaning procedures. All surfaces used in the laboratory (i.e. PCR workstation, extraction hood) should be wiped down with a 10% bleach and 70% ethanol solution before AND after each use. Equipment (pipettes, tips) should be irradiated under the UV light for 30 minutes, again both before AND after use. The pipettes in the aDNA Laboratory are dedicated for use there; they should never leave the aDNA Laboratory, nor should any other pipettes enter the rooms.

Minimizing Contamination On Your Person  
If you are doing work in the aDNA Laboratory, it is good practice to proceed there directly on arrival rather than first spending time in the GDL (where multiple contaminants could potentially be picked up). Extraneous clothing (hats, coats, etc.), bags, or books should never enter the aDNA Laboratory rooms. Gloves should be worn at all times, and long hair should be tied back. A dedicated aDNA Laboratory lab coat (stored in the laboratory) should be worn when performing any laboratory work.

Trash  
As mentioned above, the janitorial staff will not enter the aDNA Laboratory rooms; it is therefore up to the researchers to remove the waste. After completing work in the
aDNA Laboratory, simply remove the trash and place it in the hallway outside the room. This should be done every day that the aDNA Laboratory is used, even if projects require the use of the aDNA Laboratory over several days.

Publishable aDNA Laboratory Results

“Ancient” DNA studies over the past few years have almost become routine. However, risks of contamination are also now routinely known, including the potential reviewers of your paper(s). Although required procedures will vary from journal to journal, most reviewers are going to require some sort of indication that 1) lack of contamination can be demonstrated, and 2) the results are replicable. Regarding the first requirement, it is absolutely necessary to include negative blank controls throughout all aDNA laboratory procedures, from DNA extraction to PCR amplification. Not only does this lend quantified credence to your results, it also serves to monitor when/where contamination occurs if it indeed does occur. In this vein, it is good practice to extract a maximum of 8-10 samples at a time; if contamination is discovered, processing only a few samples at a time will mean that other irreplaceable samples will not be compromised. Regarding the second requirement, it is often compulsory that some degree of replication has been performed on the part of the investigator. Not only does this work to eliminate contamination, it also guards against “allelic dropout” for diploid loci (e.g. microsatellites). The exact degree of replication required will vary, with some reviewers requiring replication from the extraction stage through to the sequencing/genotyping stage, while others will only require the latter. It is therefore up to you to figure out what will be required, and plan your sampling and laboratory work with this in mind. If you do publish data generated in part through use of the aDNA laboratory, you should mention this in your paper’s Acknowledgements section; the greater use the laboratory enjoys, the more likely we will keep it and (potential) money may be funneled in to purchasing/maintaining equipment.

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