

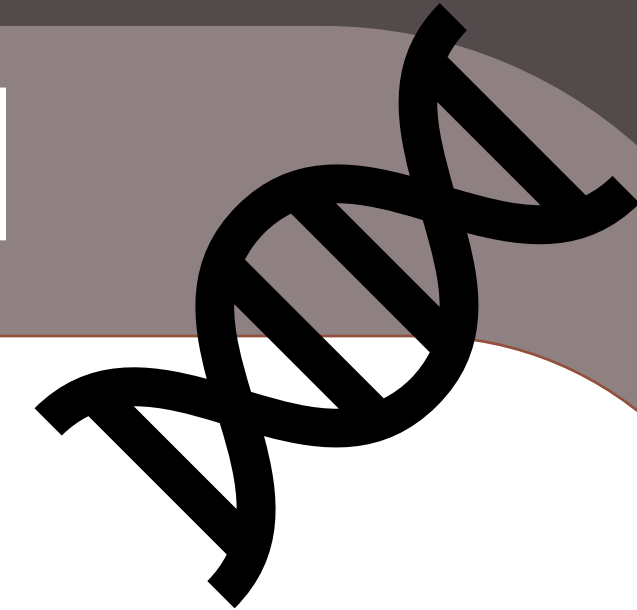


# Development of an Affordable, Manual Method of DNA Extraction from Bones and Teeth



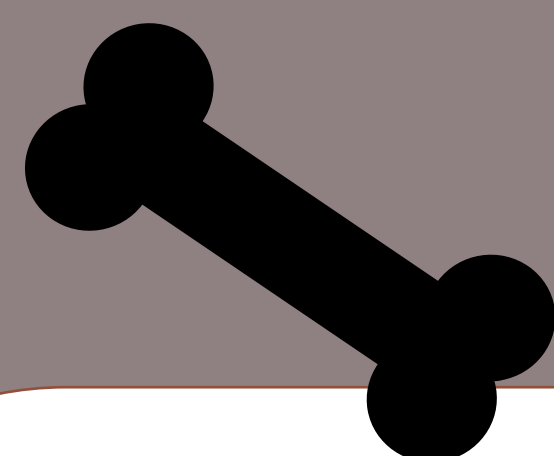
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## Background



- Few DNA extraction kits are developed to work on solid tissues (e.g., bones and teeth).
- Solid tissue DNA extractions can be used to identify epigenetic markers that may indicate certain disease states, such as osteoporosis or dental caries.
- A high-quality DNA extraction is suspected if calcium is chelated from bone prior to using a traditional DNA extraction kit.

## Methods



- Bones and teeth were collected from 48 post-mortem rats.
- 24 rats were treated with morphine and 24 were treated with saline for 2 weeks.
- Samples were stored with EDTA and without EDTA.
- Samples were stored at 4°C or room temperature.
- Solvent was changed three times per week.

## EDTA solution chelates calcium from bone for DNA extraction

## Results

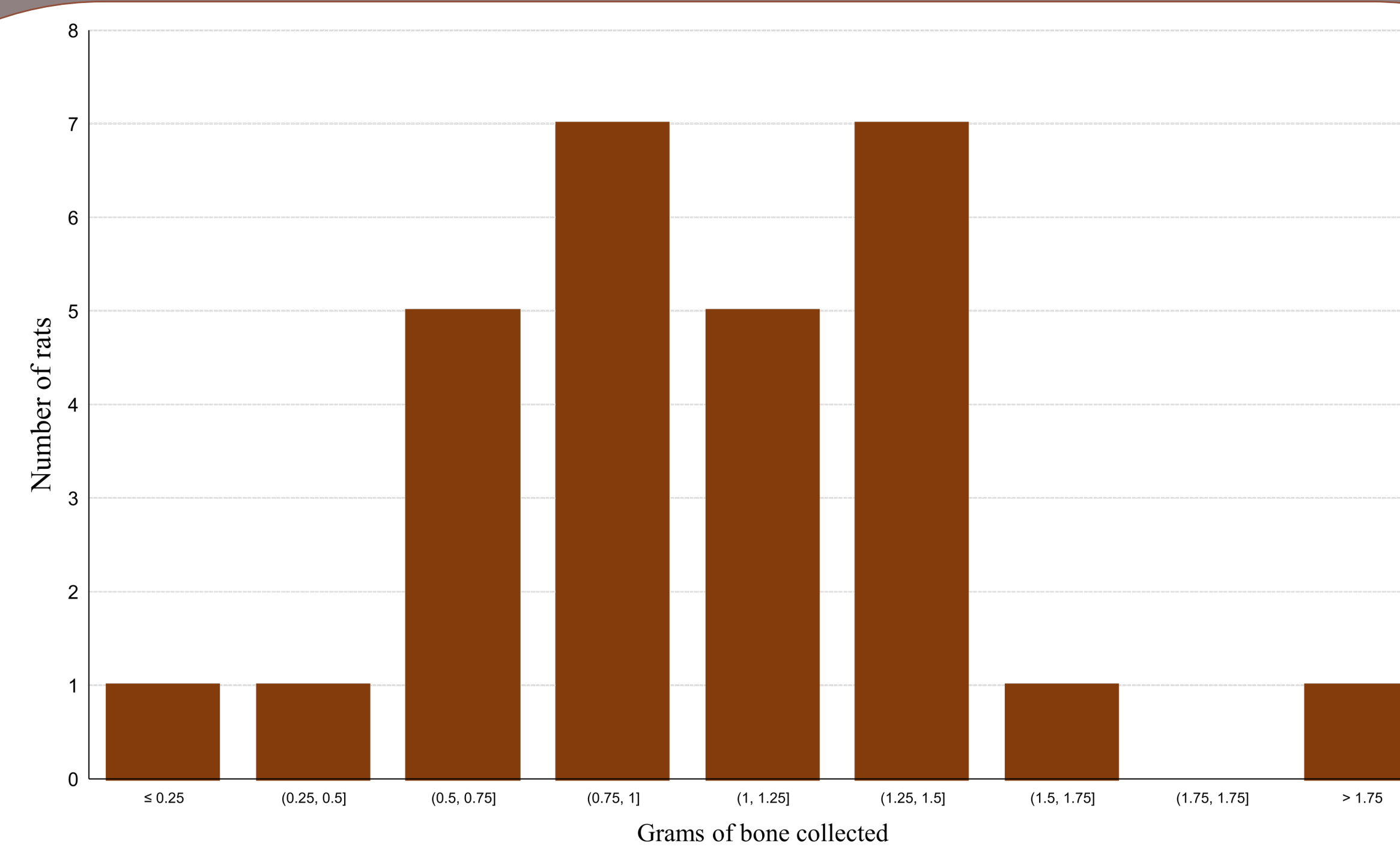


Figure 1.

Demonstrating the range of the combined weight (g) of femurs, tibias, and teeth that was able to be collected from individual rats.

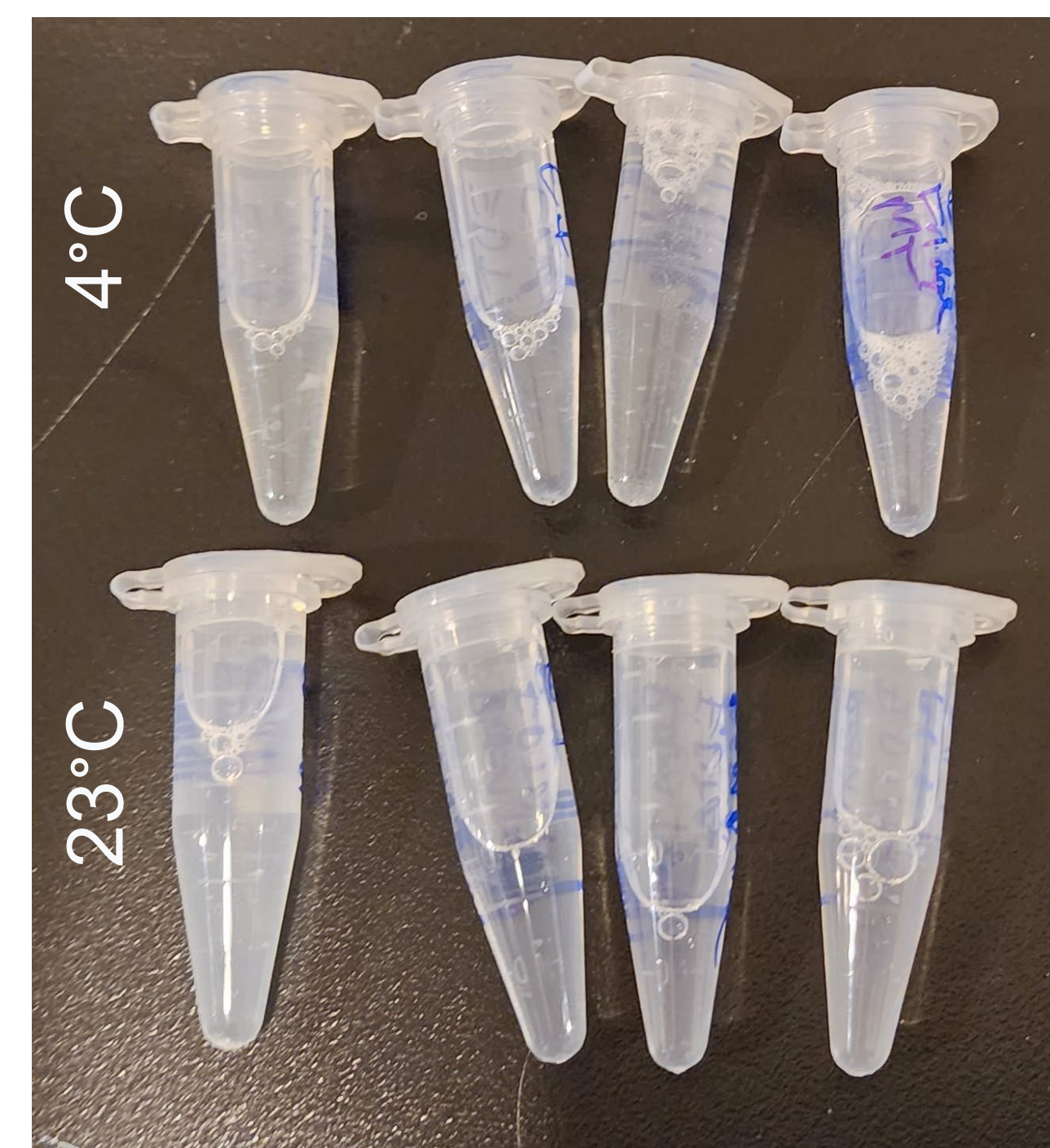


Figure 2.

EDTA solutions removed from the final day of soaking for calcium removal. Top row samples are taken from solutions at 4°C and bottom row samples are from 23°C

## Obtained DNA Extraction Kits

Company	Product	Catalog Number
Beckman Coulter	GenFind V3 Readent Kit-50	C34880
Beckman Coulter	DNAAdvance	A48705
cytiva life sciences	Tissue and cells genomicPrep Mini Spin Kit	28904275
cytiva life sciences	Nucleon BACC Genomic DNA Extraction Kits	RPN8501
cytiva life sciences	Sera-Xtracta HMW DNA kit	29429140
Fortis Life Sciences	Pure Tissue DNA Kit	EB-TDK-50
New England BioLabs	Mondarch Genomic DNA Purification Kit	T3010S
New England BioLabs	Monarch HMW DNA Extraction Kit for Tissue	T3060S
Omega Bio Tek	E.Z.N.A. Tissue DNA Kit	D3396-01
Omega Bio Tek	Mag-Bind® Blood & Tissue DNA HDQ 96 Kit	M6399-00
Omega Bio Tek	E.Z.N.A. MicroElute Genomic DNA Kit	D3096-00
Perkin Elmer	Chemagic DNA Cyte Pure Kit	CMG-196
Promega	Wizard Genomic DNA Purification Kit	A1120
Wizard SV Genomic DNA Purification System		A2360
Promega	MagaZorb DNA Mini-Prep Kit	MB1004
Promega	ReliaPrep gDNA Tissue Miniprep System	A2051
Promega	Wizard HMW DNA Extraction Kit	A2920
Qiagen	DNEasy Blood and Tissue Kit	69504
Qiagen	QIAamp Fast DNA Tissue Kit	51404
Qiagen	Puregene Tissue Kit	158063
Qiagen	QIAGEN Genomic-tips 20/G	10223
Qiagen	MagAttract HMW DNA Kit	67563
Qiagen	QIAamp UCP DNA Micro Kit	56204
Qiagen	QIAamp DNA Mini (or micro) kit	51304
Sigma-Aldrich	Extract-N-AMP Tissue PCR Kit	XNAT2-1KT
Takara	NucleoSpin Tissue	740952.5
Takara	NucleoMag Tissue	744300.1
Takara	NucleoSpin® 96 DNA RapidLyse	740110.1
Takara	NucleoBond HMW DNA	740160.2
Takara	NucleoSpin Tissue XS	740901.5
Thermo	DNA Extract All Reagents Kit	4403319
Thermo	MagMax DNA Multi-Sample Kit	4413020
Thermo	JetFlex Genomic DNA Purification Kit	A30700
Thermo	GeneJet Genomic DNA Purification Kit	K0721
Thermo	PureLink Genomic DNA Mini Kit	K182001
Thermo	ChargeSwitch gDNA Mini Tissue Kit	CS11204
Zymo	Quick-DNA Miniprep	D3024
Zymo	Quick-DNA miniprep plus	D4068
Zymo	Quick-DNA Magbead Plus Kit	D4081
Zymo	Quick-DNA HMW MagBead Kit	D6060
Zymo	Quick-DNA Microprep Plus Kit	D4074

## Conclusion

- Cloudy EDTA solutions suggests successful removal of calcium from bone via EDTA calcium chelation.
- Calcium chelation, followed by the use a commercially available DNA extraction kit may allow for high quality DNA extraction from bones and teeth.

