

# mitoBench & mitoDB: Novel interactive methods for population genetics on mitochondrial DNA



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† See abstract in MGE abstract book or <http://bit.ly/2vBwKx> for full author-list.

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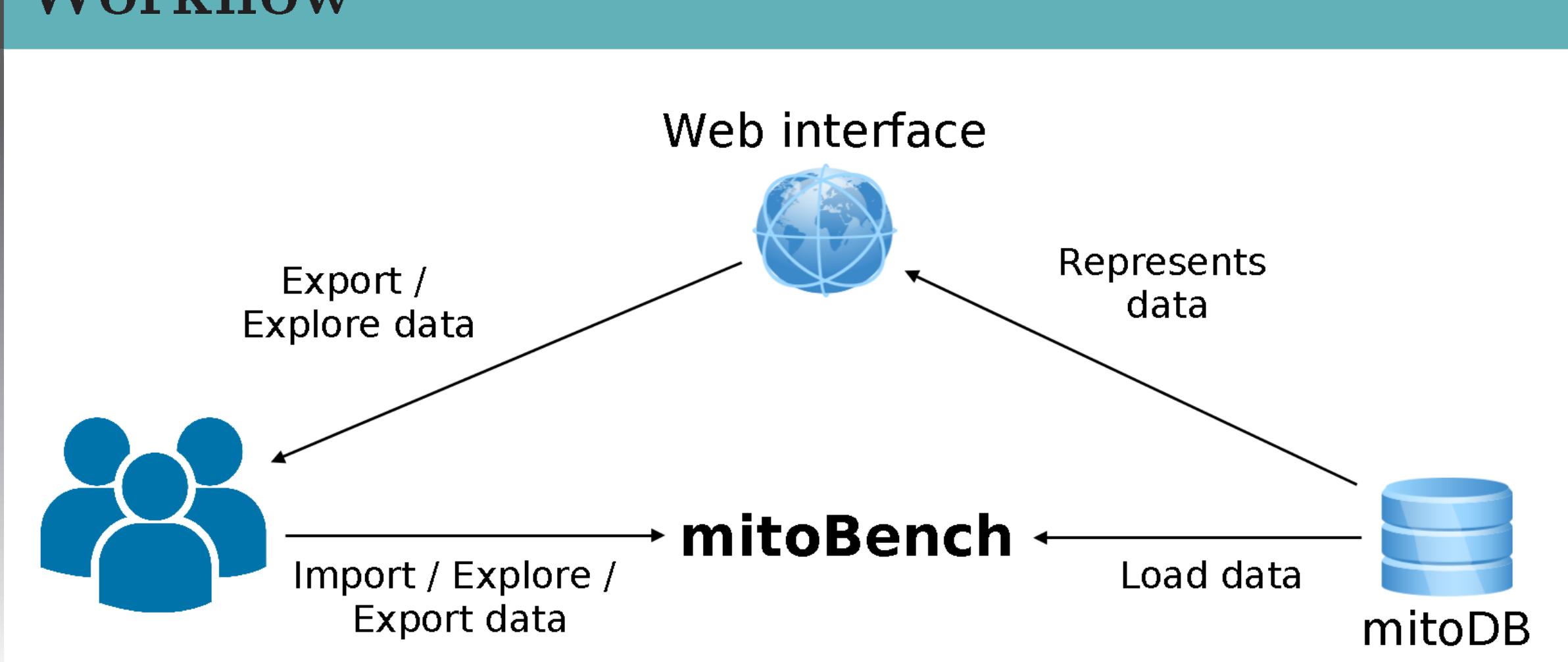


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## Motivation & Goals

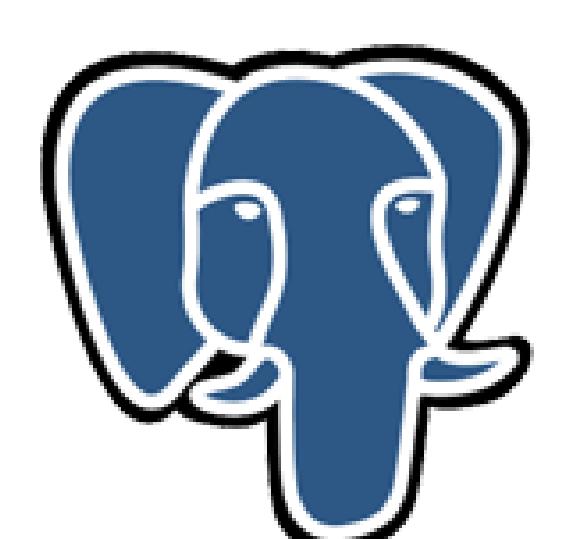
- Mitochondrial DNA (mtDNA) is often the only proxy available to study extinct populations and their relationship with modern populations
- Tools for the analysis typically rely on different file formats → requiring manual interaction with the data for downstream analysis
- mitoBench: workbench to ease file conversions, methods to interactively analyze and visualize human mitochondrial data
- mitoDB: database for human mitochondrial genomes to provide a central reference that can be easily accessed via the workbench and a web-frontend

## Workflow



## mitoDB

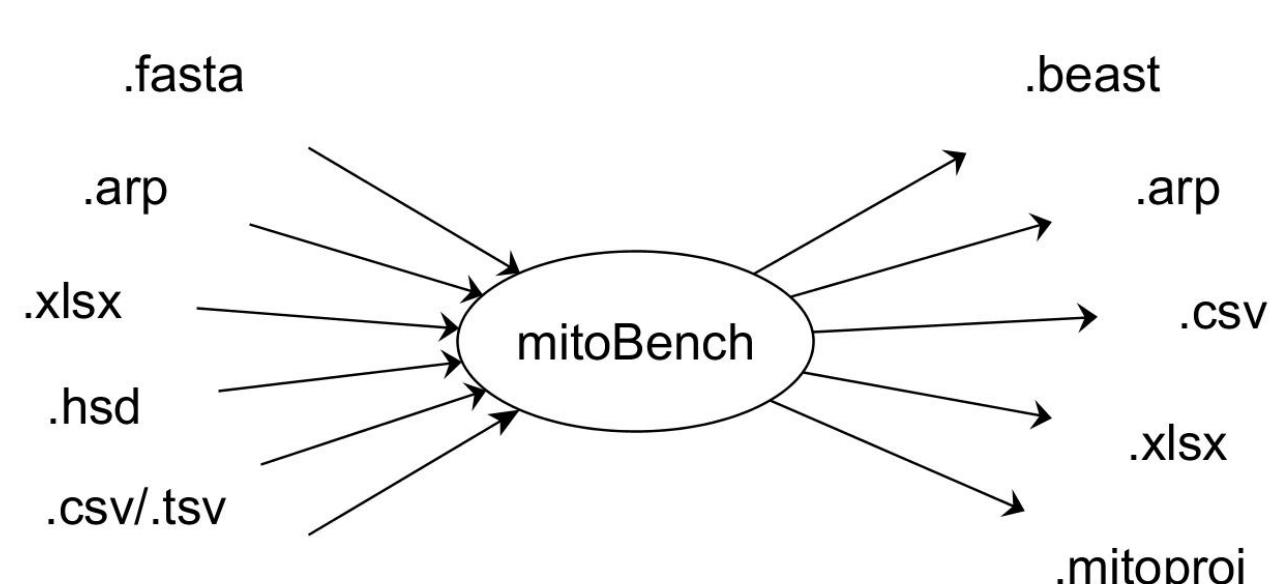
- Database: Providing meta-information (Location, language, Sequence data, ...)
- Web-Frontend: Browsing data, searching for locations, quick look at database contents
- Data Curation: Users can rate samples in the web based on their experiences with data
- Access: Web-Frontend (exporting) and mitoBench (analysis)



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## mitoBench

### File conversions



⇒ connect the workbench with existing analysis methods/resources such as BEAST<sup>1</sup>, Arlequin<sup>2</sup>, PhyloTree<sup>3</sup> and others

### Data representation as Table

ID	MTSequence	Haplogroup	Time Period	continent	country	country_region	culture_type
K2975	GATCA...	R	Roman Period	Africa	Egypt	Beni Suef	Ancient
K2974	GATCA...	U	Ptolemaic Period	Africa	Egypt	Beni Suef	Ancient
K2972	GATCA...	T1a5	Ptolemaic Period	Africa	Egypt	Beni Suef	Ancient
K2916	NNNCA...	R0	Pre-Ptolemaic Period	Africa	Egypt	Beni Suef	Ancient
K2972	GATCA...	IVV1a2a	Roman Period	Africa	Egypt	Beni Suef	Ancient
K2918	GATCA...	J2b2a	Roman Period	Africa	Egypt	Beni Suef	Ancient
K2918	GATCA...	T1a	Ptolemaic Period	Africa	Egypt	Beni Suef	Ancient
K2988	GATCA...	T1a	Ptolemaic Period	Africa	Egypt	Beni Suef	Ancient
K2937	GATCA...	J2b2	Ptolemaic Period	Africa	Egypt	Beni Suef	Ancient
K2963	GATCA...	M1a1	Pre-Ptolemaic Period	Africa	Egypt	Beni Suef	Ancient
K2985	GATCA...	R2J7	Pre-Ptolemaic Period	Africa	Egypt	Beni Suef	Ancient
K2987	GATCA...	J2a1a1	Pre-Ptolemaic Period	Africa	Egypt	Beni Suef	Ancient
K2953	GATCA...	R0a1a	Roman Period	Africa	Egypt	Beni Suef	Ancient
K2932	GATCA...	T	Roman Period	Africa	Egypt	Beni Suef	Ancient
K2928	GATCA...	HV21	Ptolemaic Period	Africa	Egypt	Beni Suef	Ancient
K2930	GATCA...	M1a1	Roman Period	Africa	Egypt	Beni Suef	Ancient
K2962	GATCA...	M1a1	Pre-Ptolemaic Period	Africa	Egypt	Beni Suef	Ancient
K2969	GATCA...	M1a1	Pre-Ptolemaic Period	Africa	Egypt	Beni Suef	Ancient
K2983	GATCA...	HV1b2	Pre-Ptolemaic Period	Africa	Egypt	Beni Suef	Ancient
K2979	GATCA...	T1a	Pre-Ptolemaic Period	Africa	Egypt	Beni Suef	Ancient
		U3b	Roman Period	Africa	Egypt	Beni Suef	Ancient

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### Data filtering / Statistics

- Haplogroup filtering / frequencies
- Mutation filtering / frequencies

⇒ allows analysis of Haplogroup distribution between different groups

### Exemplary study: Analysis of 90 ancient Egyptian mummy mtDNA genomes<sup>4</sup>

→ Did Haplogroup frequencies change over time? If so, how?

