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Intermediate

Classic DH-Problems Short Pieces in Python

For Beginners

Learn Python like a Native

Unit 5 : The (R)Evolutionary Idea

Programming:

- Evolutionary algorithms
- Constraints solving
- Optimization
- Trees
- DEAP-Library

Modelling:

- Leitfehler
- Mutations
- Variants

Developing:

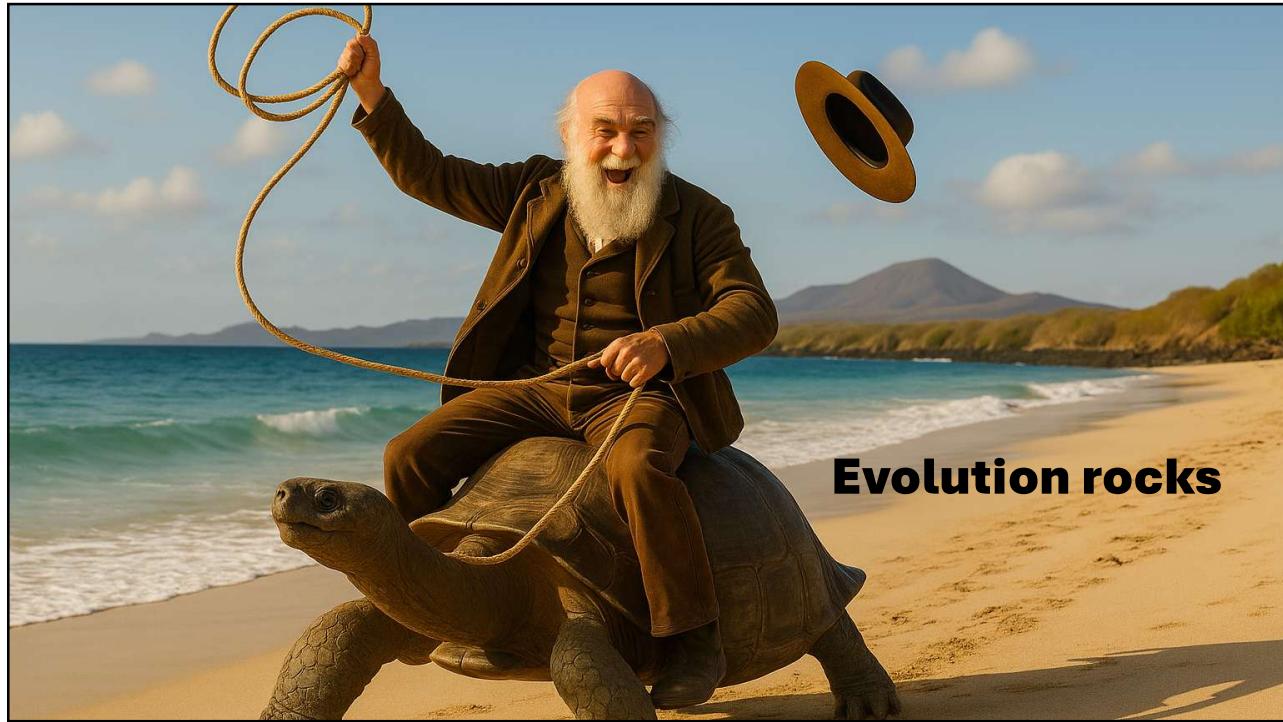
- Pipelines

Architecture:

- Pipelines
- Folders

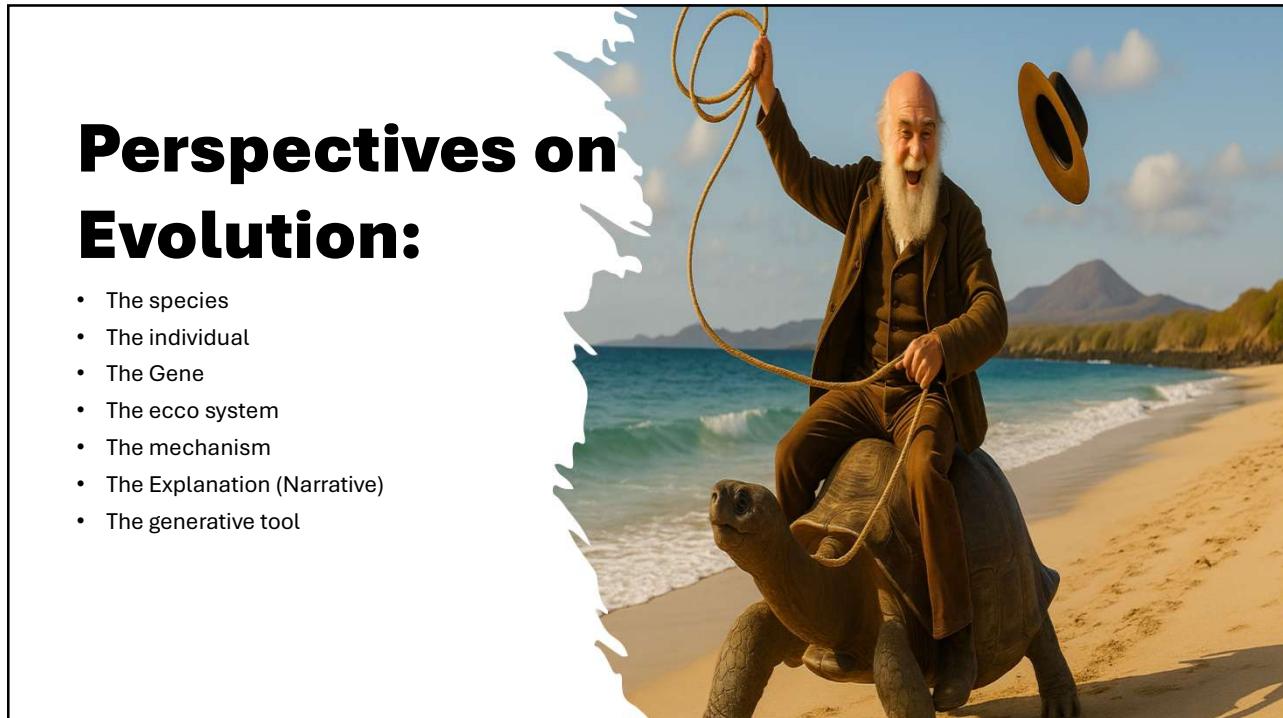
Professional Knowledge:

- Pair Programming



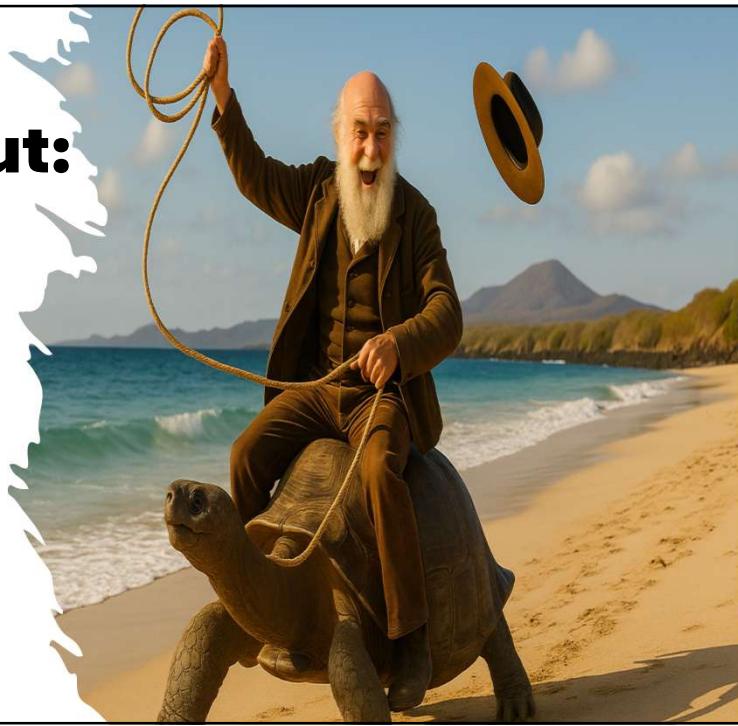
Perspectives on Evolution:

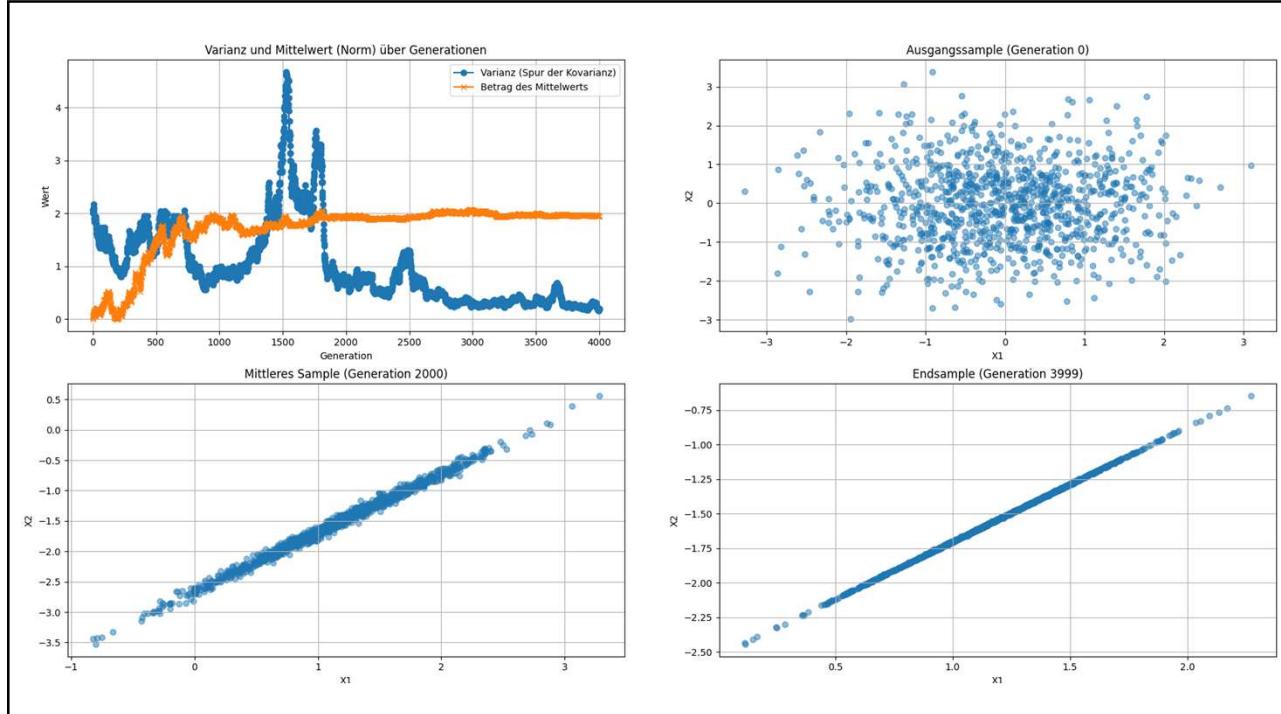
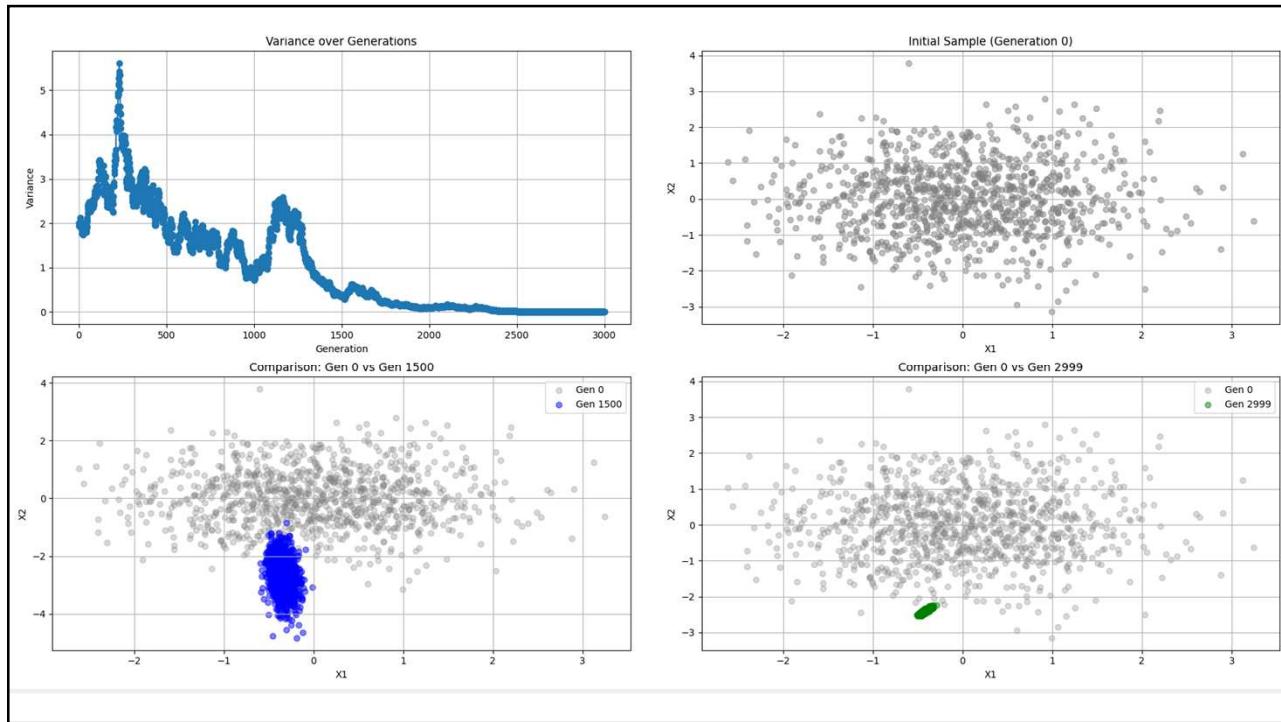
- The species
- The individual
- The Gene
- The ecco system
- The mechanism
- The Explanation (Narrative)
- The generative tool

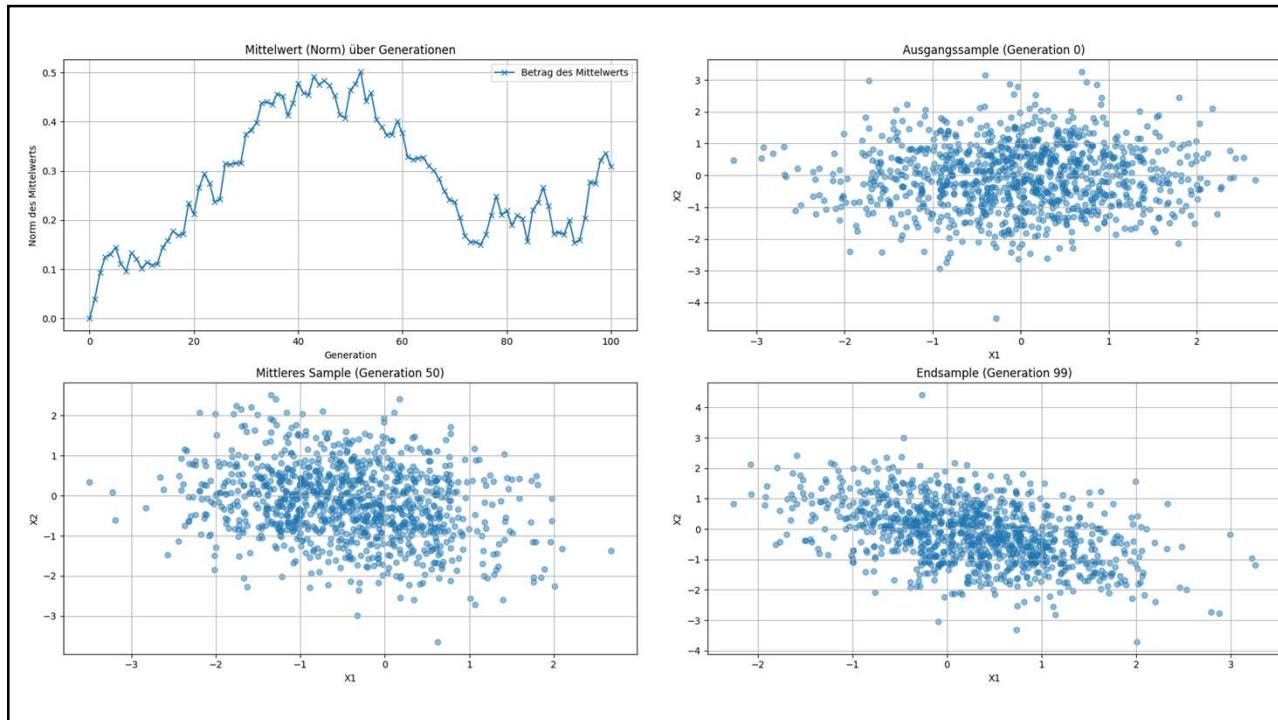


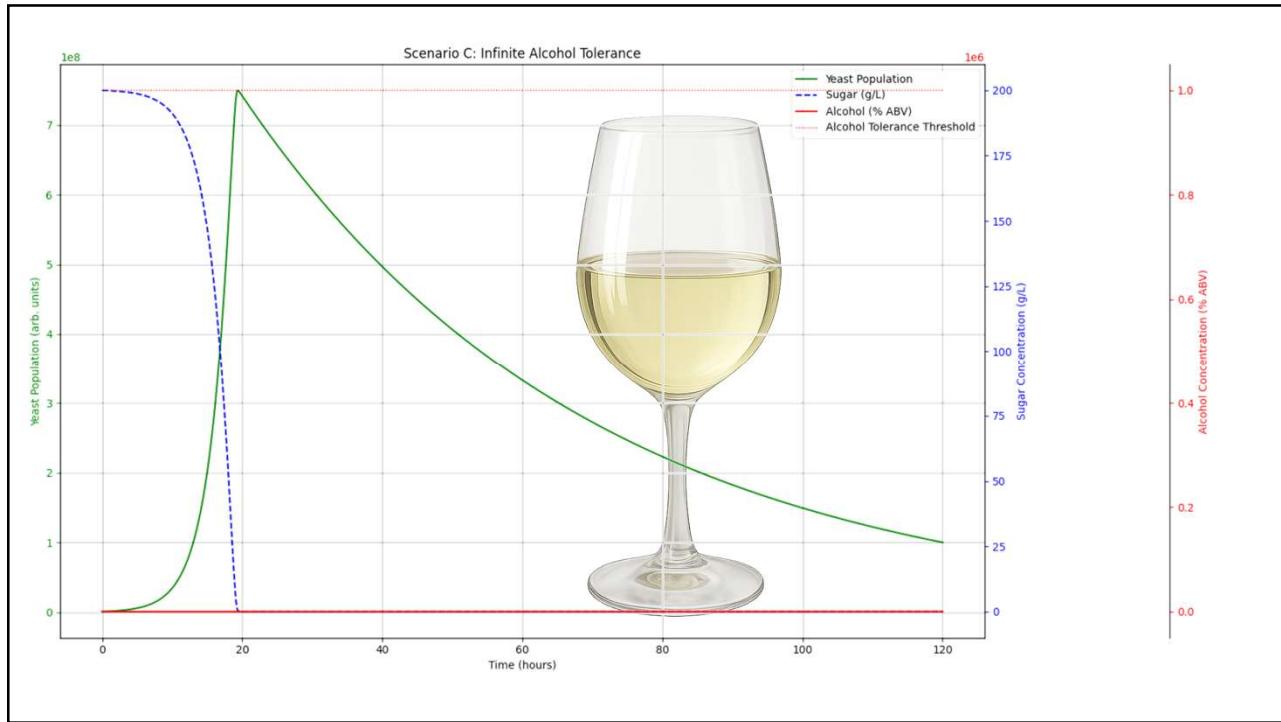
What is left out:

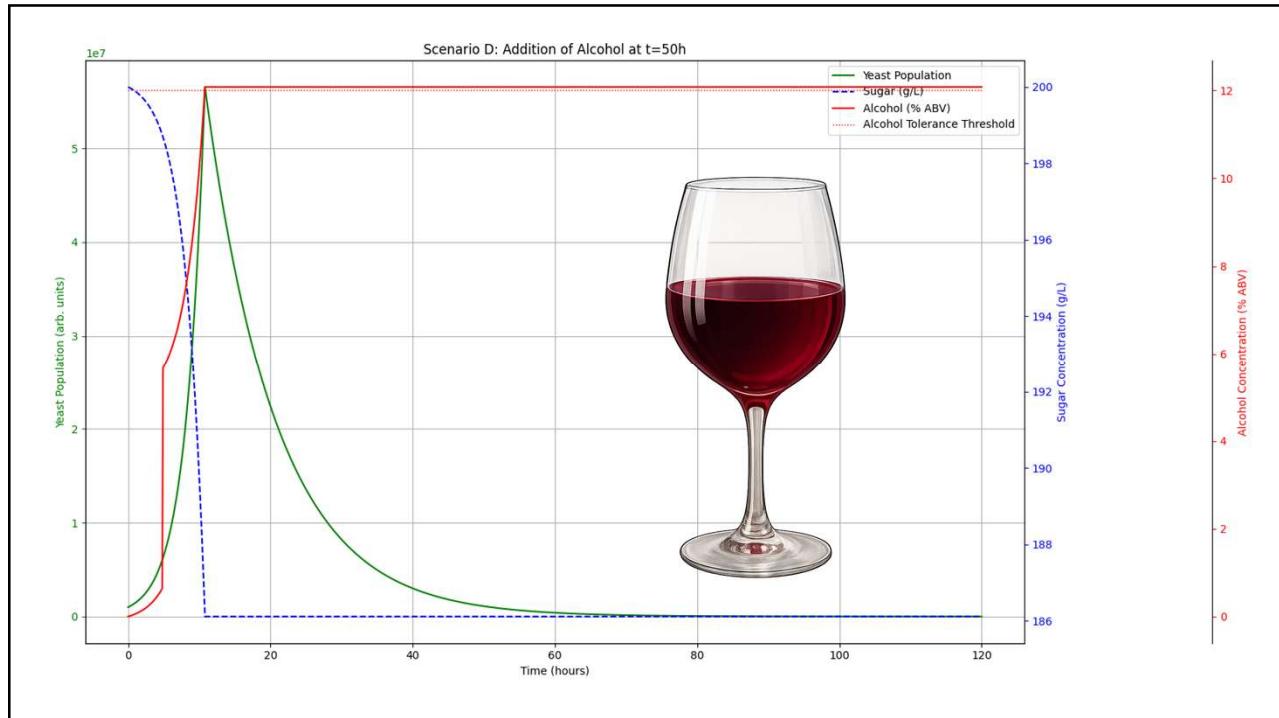
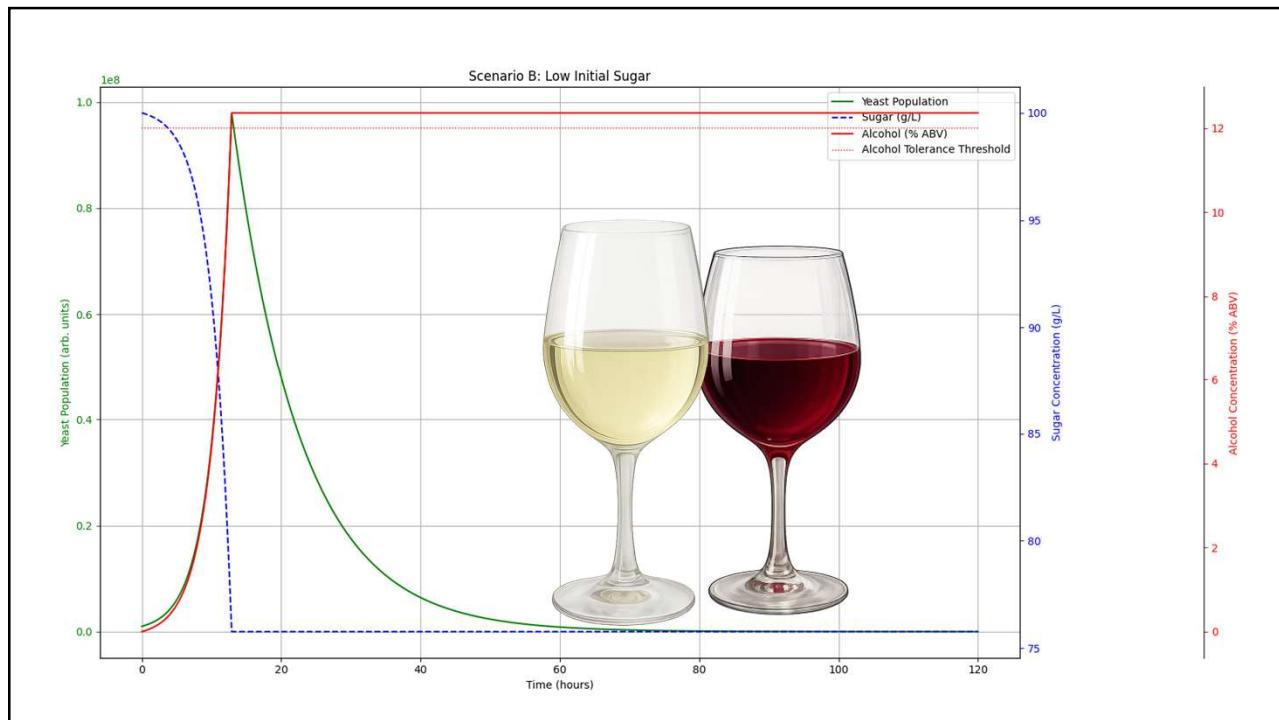
- **DETAILS!!**
- The chromosome
- The actual biology
- Dominance of Alleles
- The egoistic gene
- Specific Algorithms

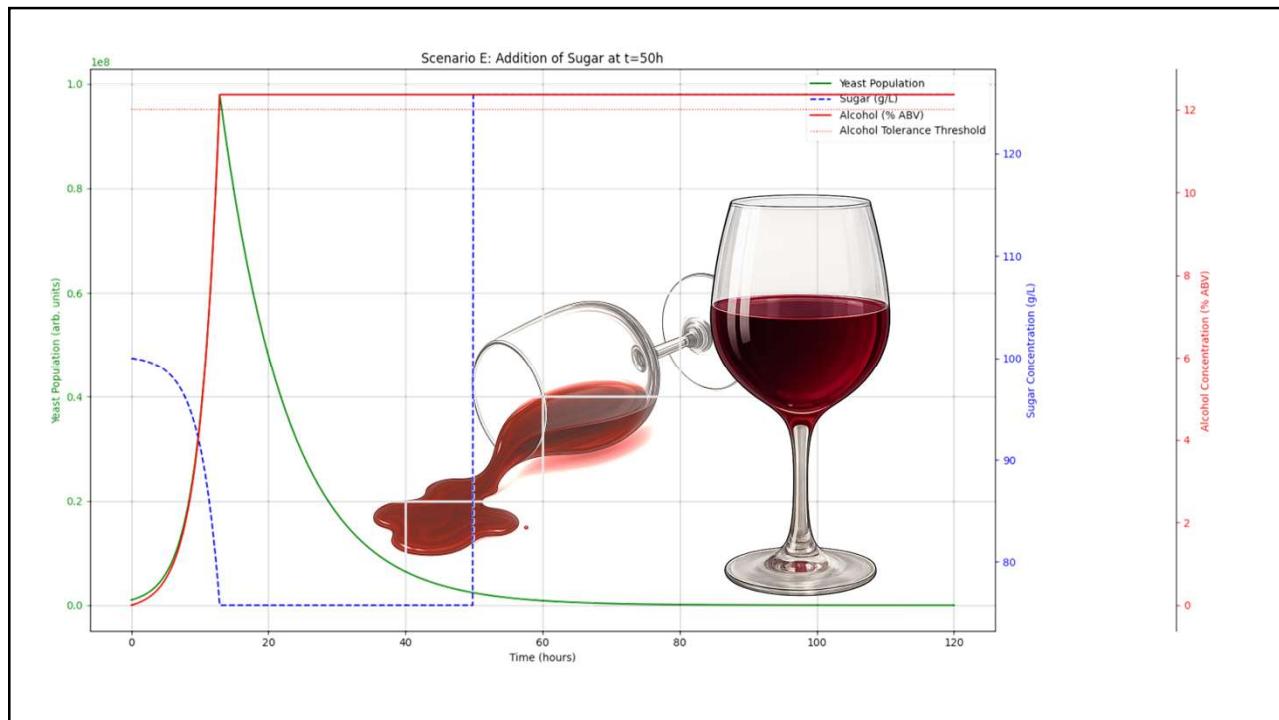


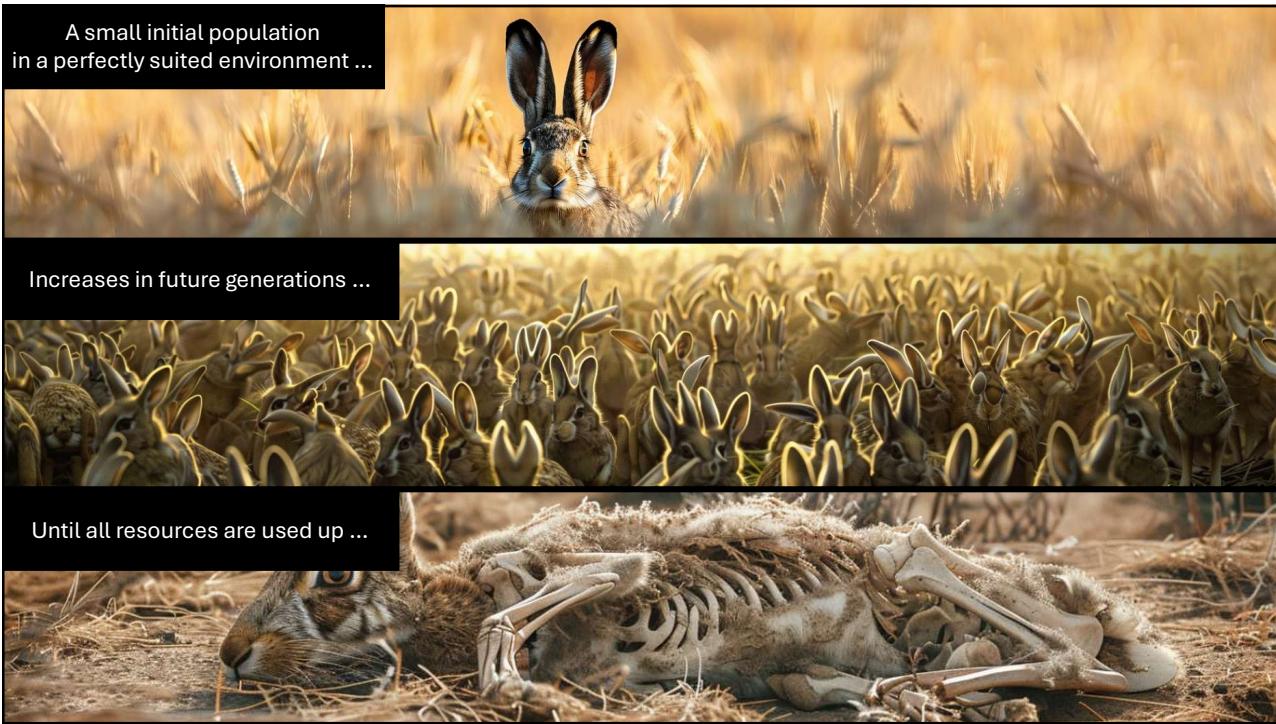


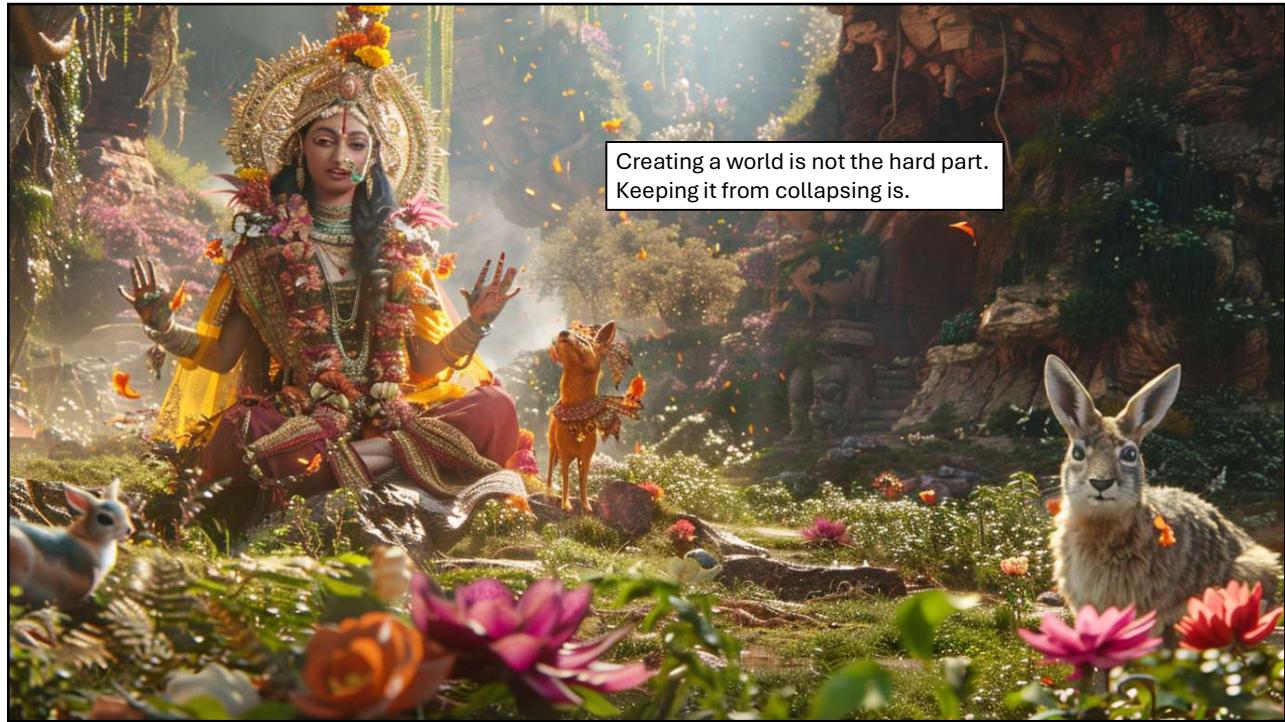


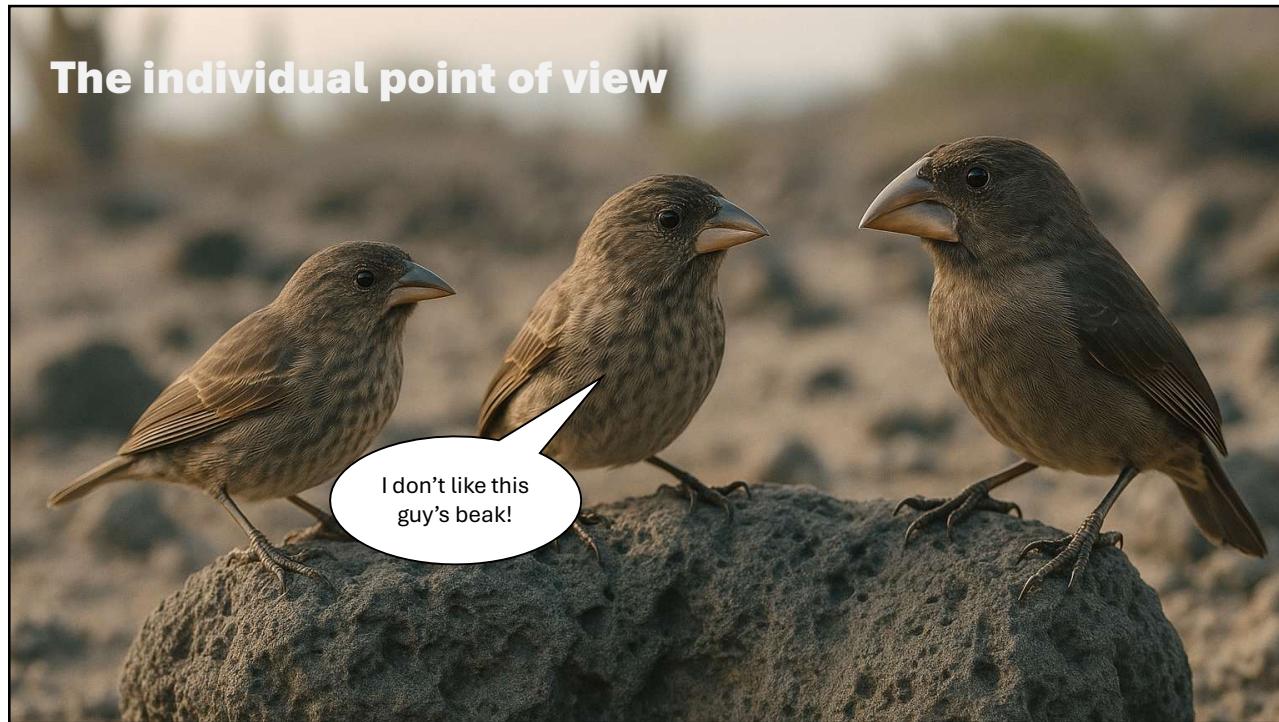


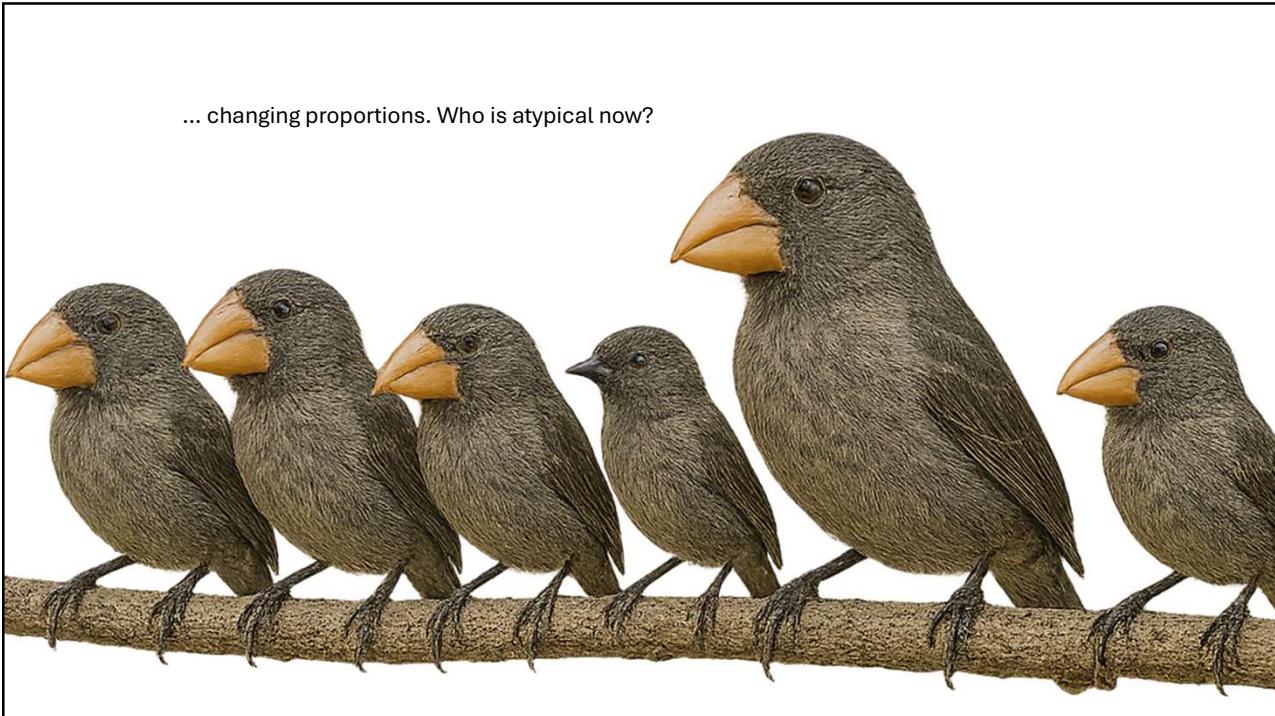


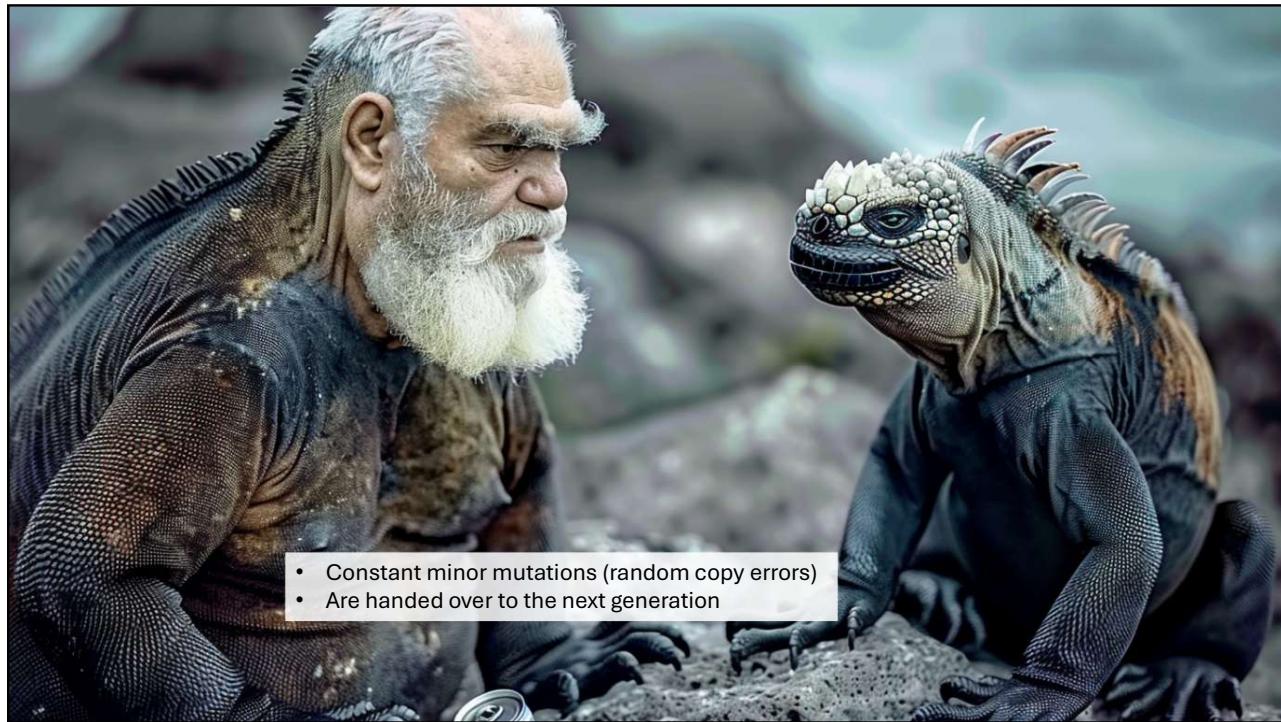




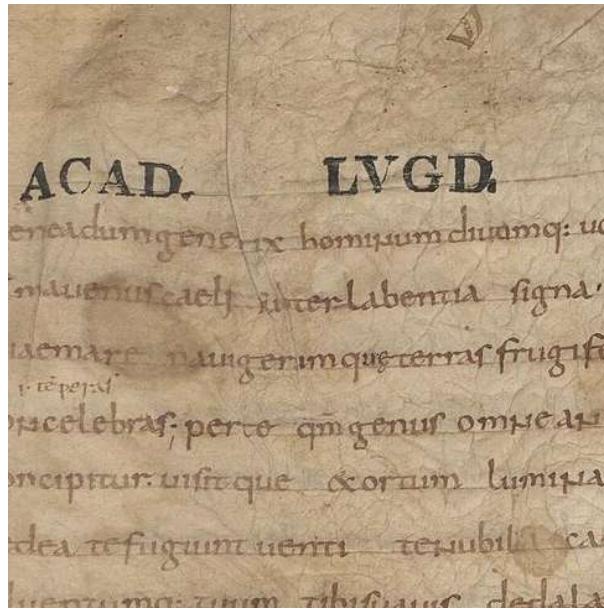








Luctretius: De rerum natura

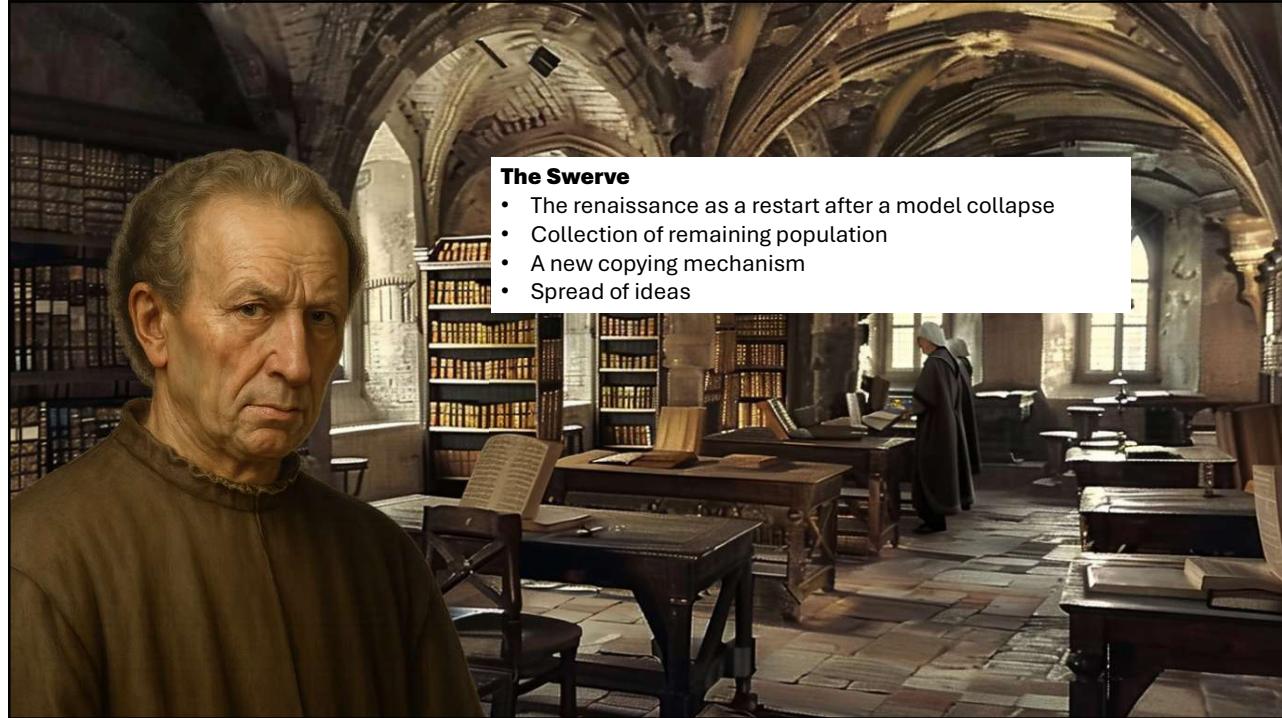


9th century



1563



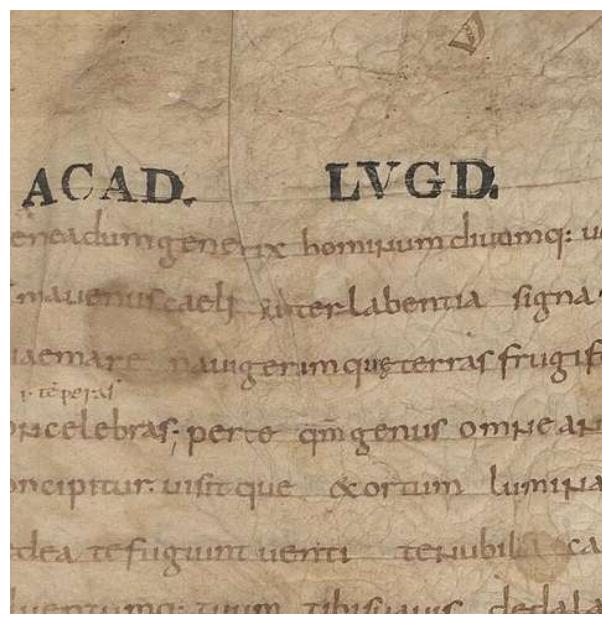


Text tradition as Evolution

- Variants “evolve” from an original
- Variants are a population
- Variants belong to different generations
- Each generation is produced by copying older sources
- The copying process has random mutations
- Younger texts have shifted from the original



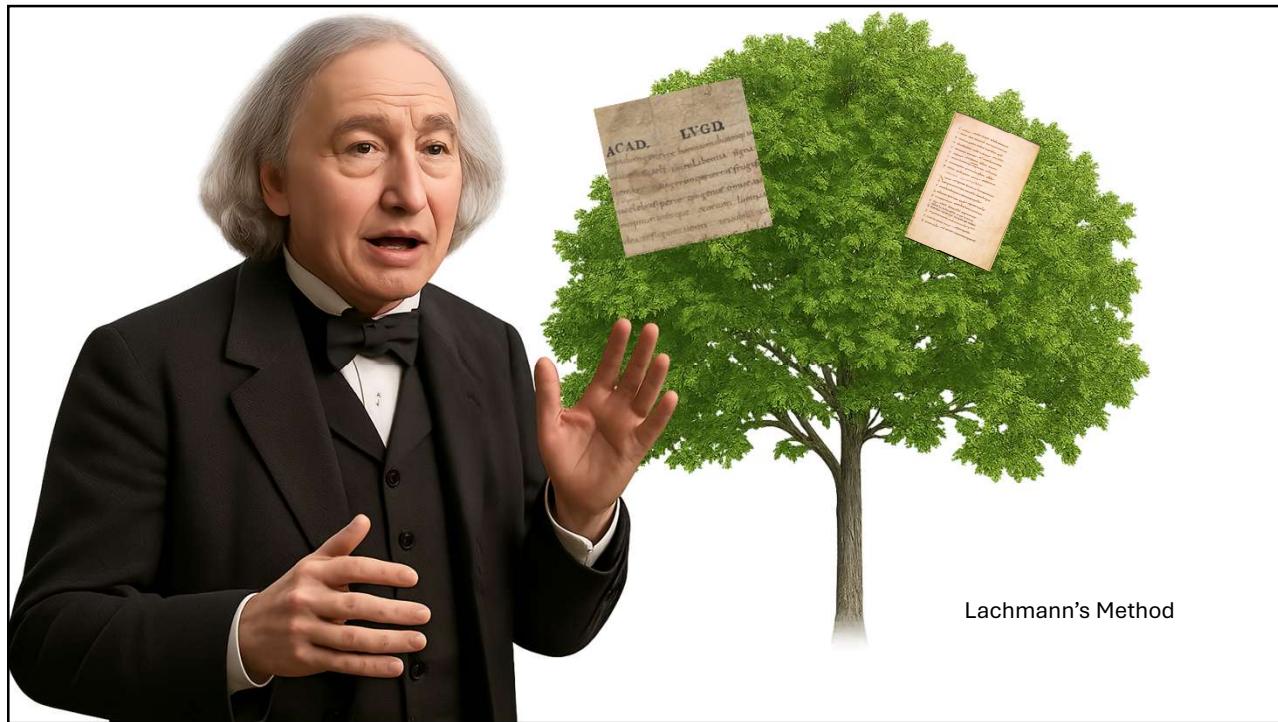
Luctretius: De rerum natura

9th century

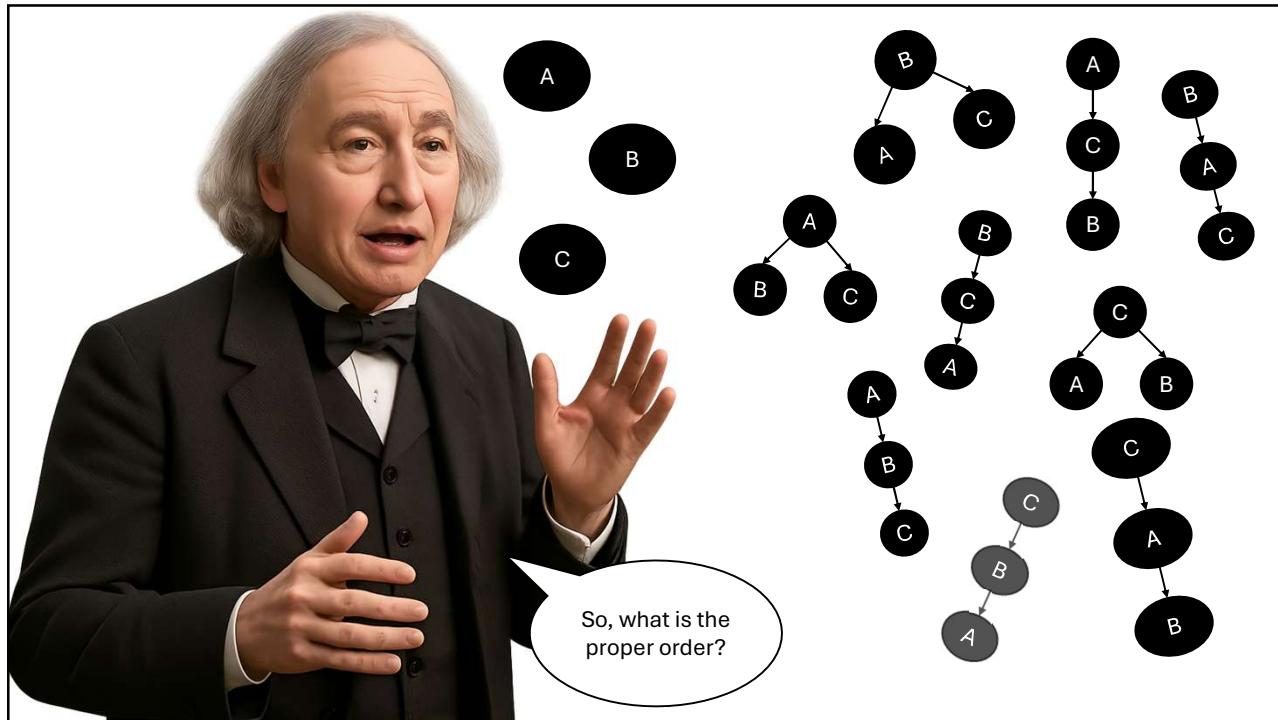
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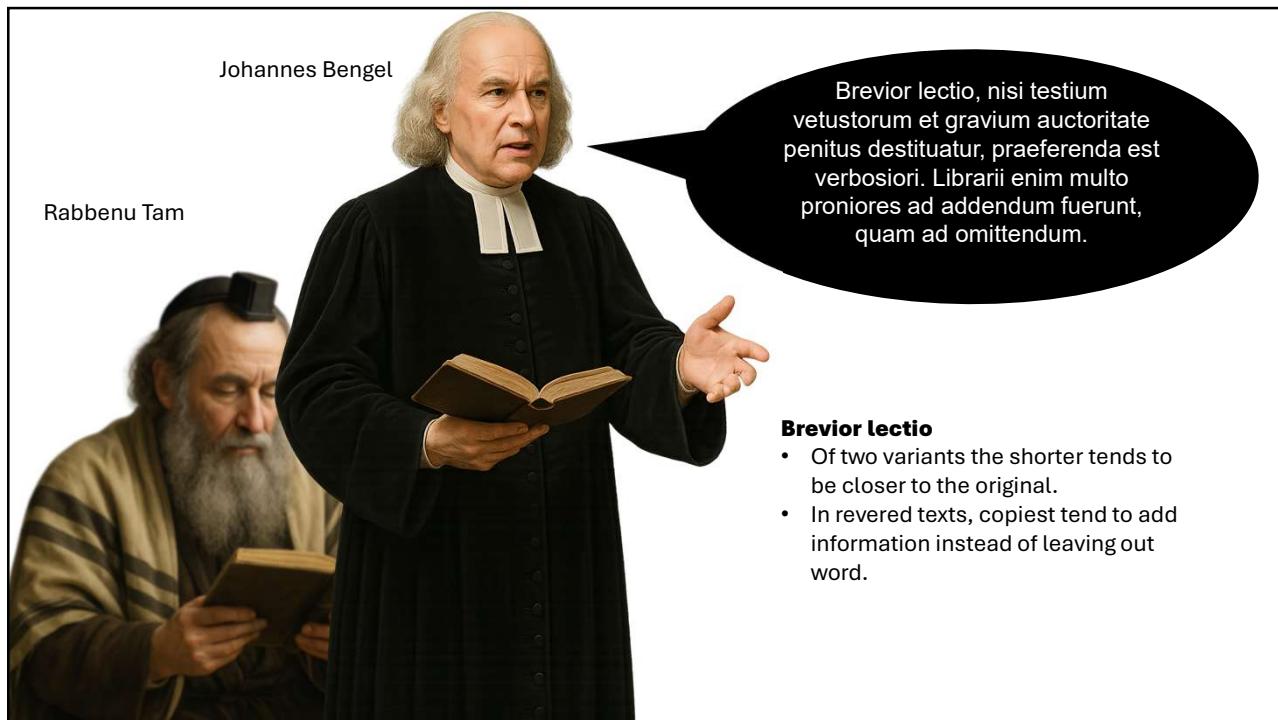
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9th century



Lachmann's Method

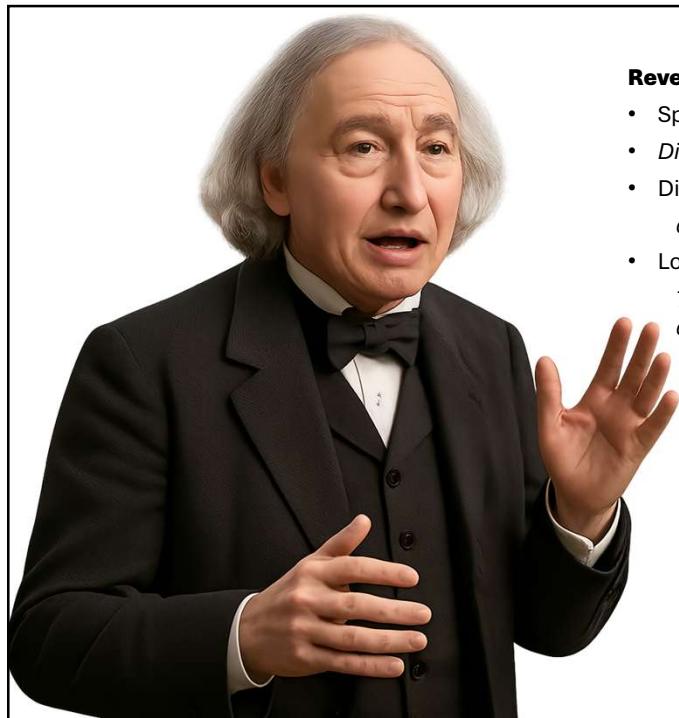


**Brevior lectio**

- Of two variants the shorter tends to be closer to the original.
- In revered texts, copiest tend to add information instead of leaving out word.

**Lectio difficilior potior**

- The variant, that is harder to read and understand, is most likely the one closer to the original.
- Later copies tend to include reading assistance for difficult parts.

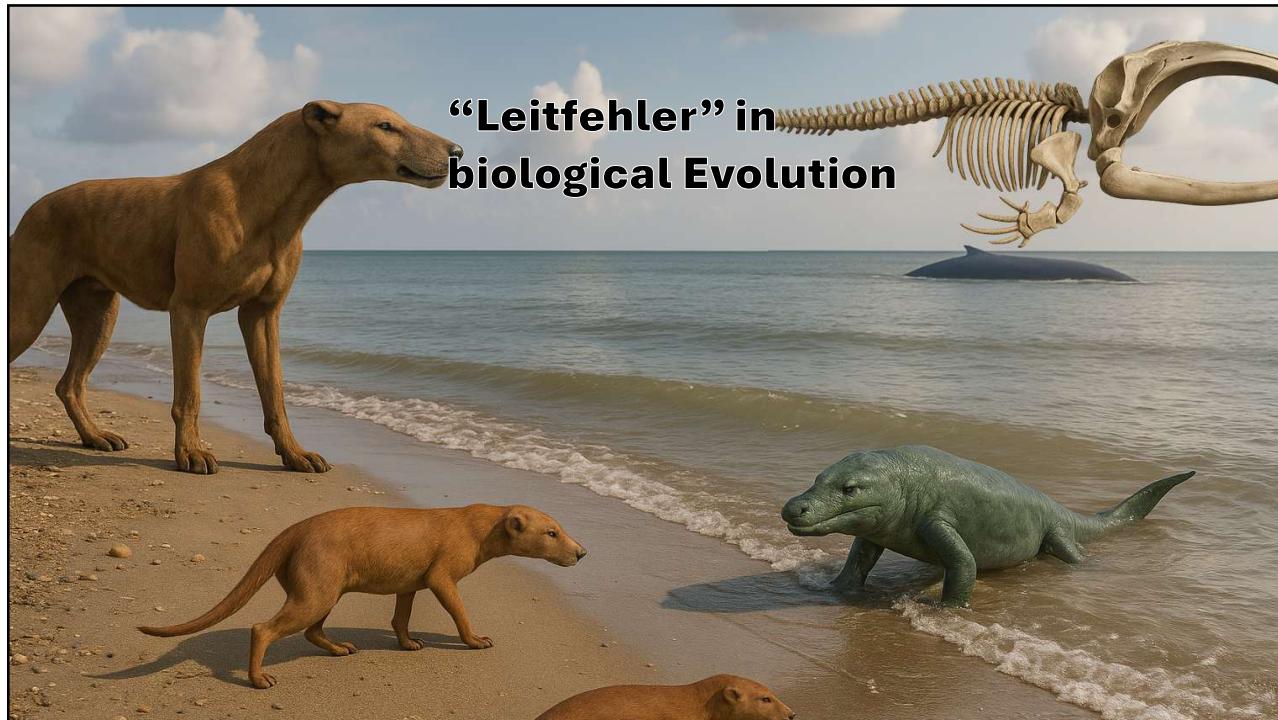


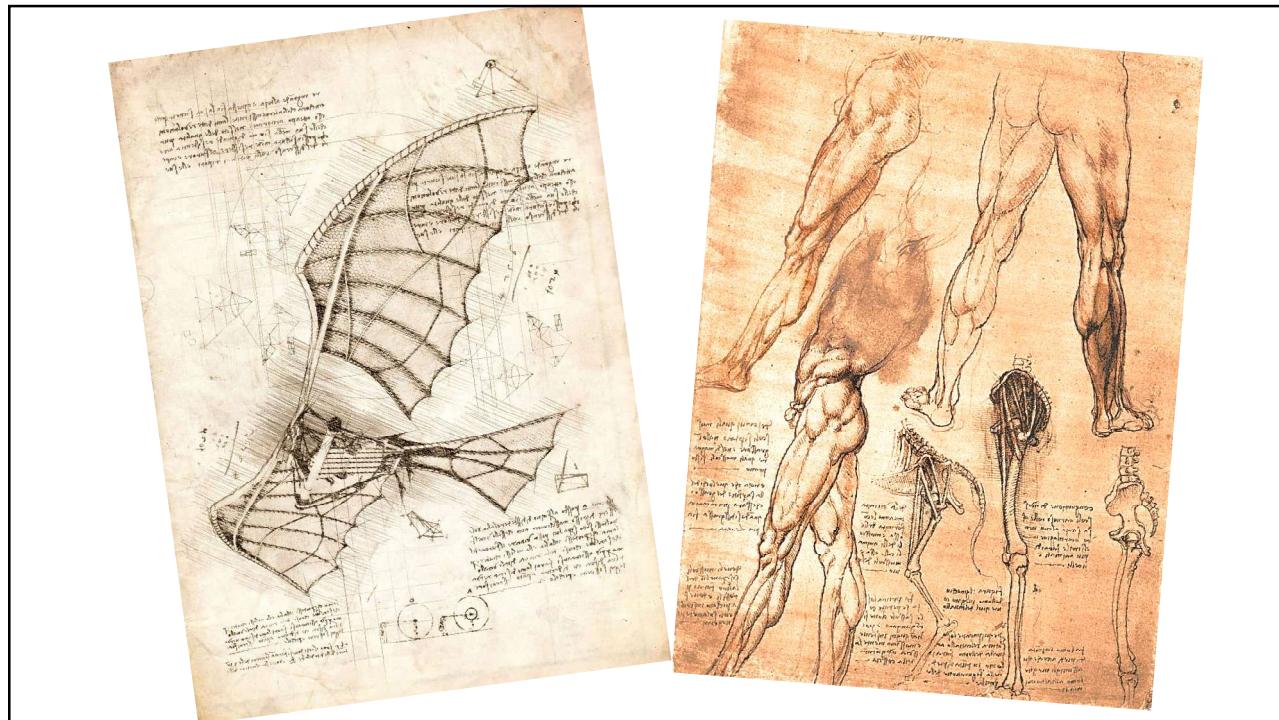
Reversible mutations:

- Spelling errors and orthographic changes.
- *Dittography* (doubling of elements)
- Dialectical change:
der Bach → die Bach → der Bach
- Lossless structural changes:
The dog was called by him. → He called the dog. → The dog was called by him.

Irreversible mutations

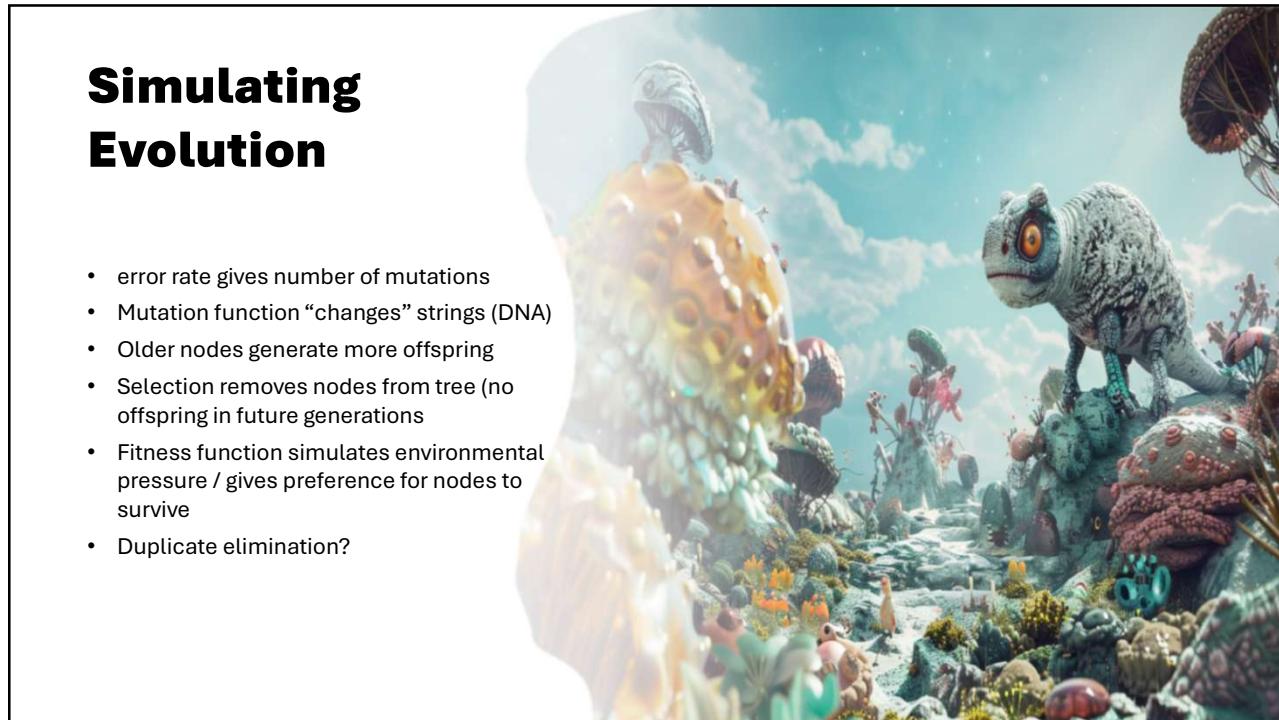
- *Haplography* (omission of parts)
- *Hypernym*: *Poodle → Dog → ?*
- Structural change with loss:
He called the dog. → The dog was called.
- Semantic transfer: *Dirne (Mädchen)*
Prostitute

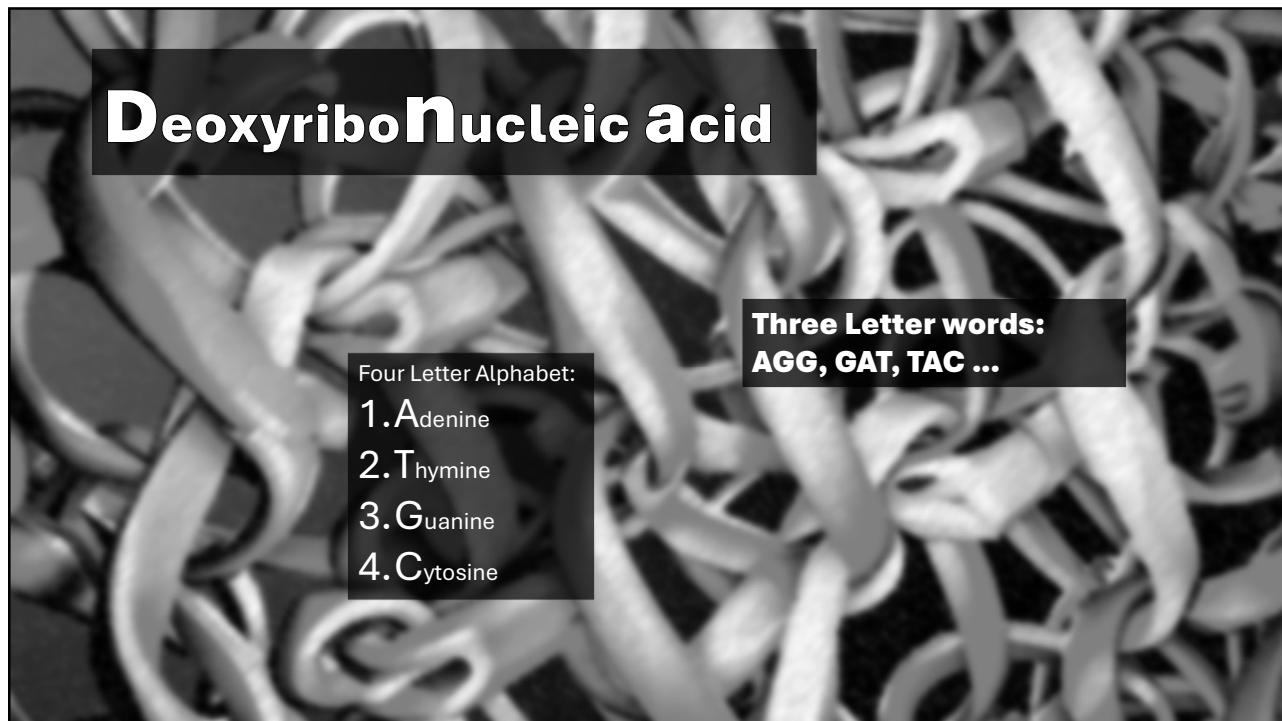
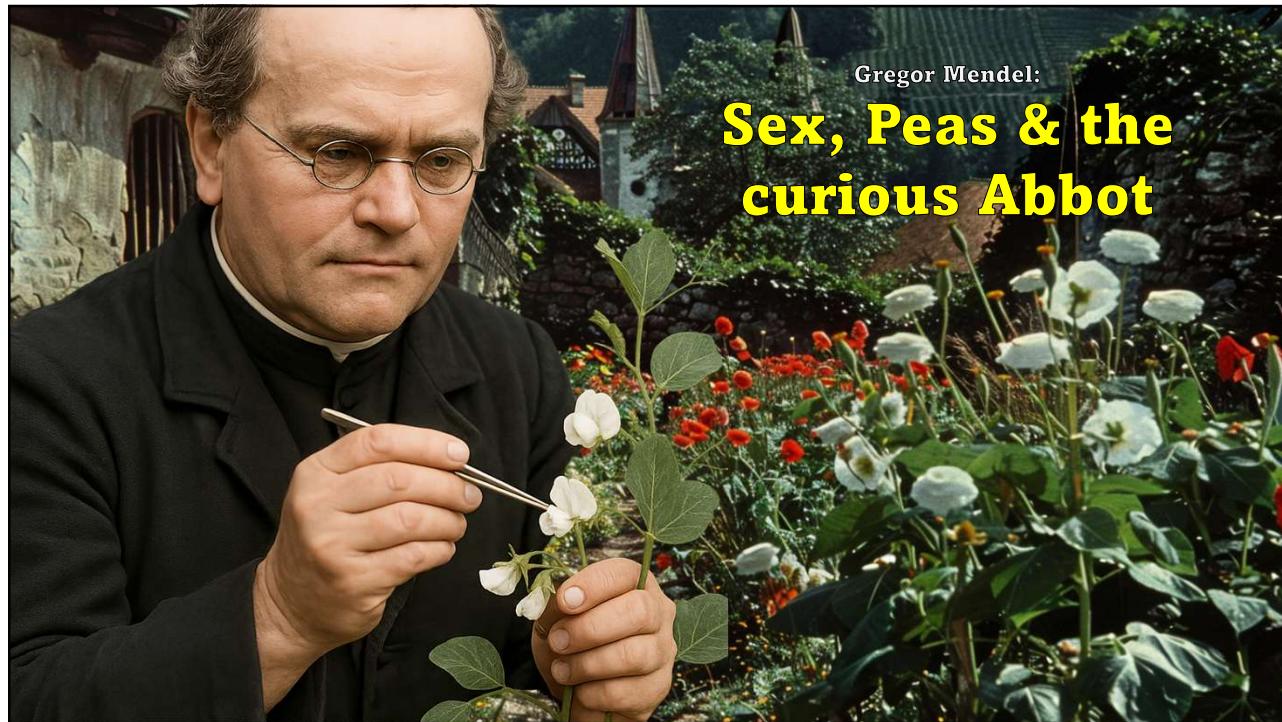


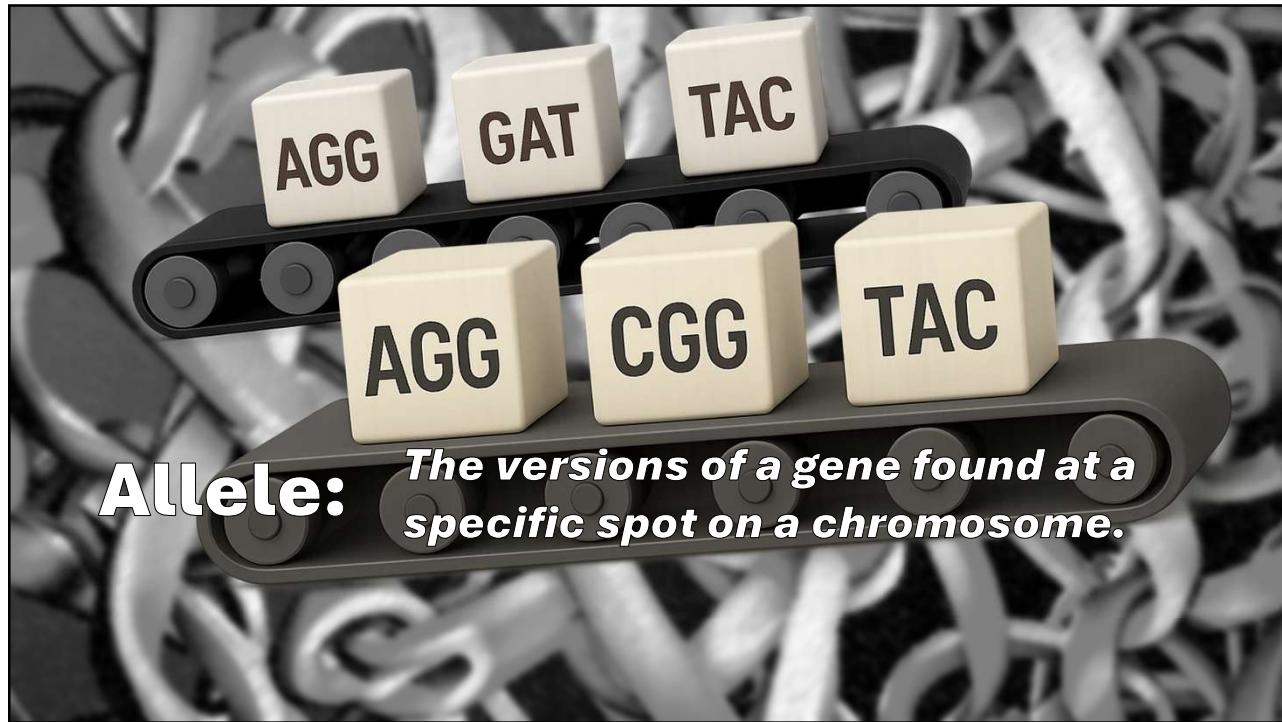
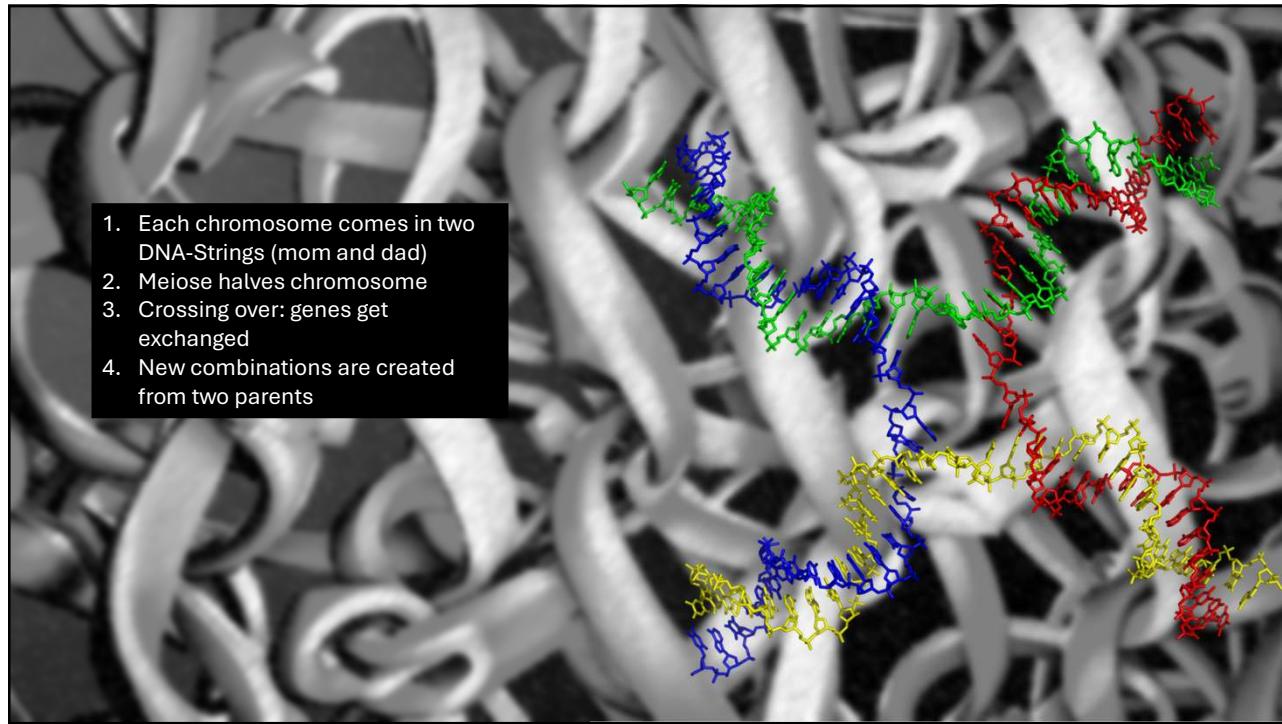


Simulating Evolution

- error rate gives number of mutations
- Mutation function “changes” strings (DNA)
- Older nodes generate more offspring
- Selection removes nodes from tree (no offspring in future generations)
- Fitness function simulates environmental pressure / gives preference for nodes to survive
- Duplicate elimination?



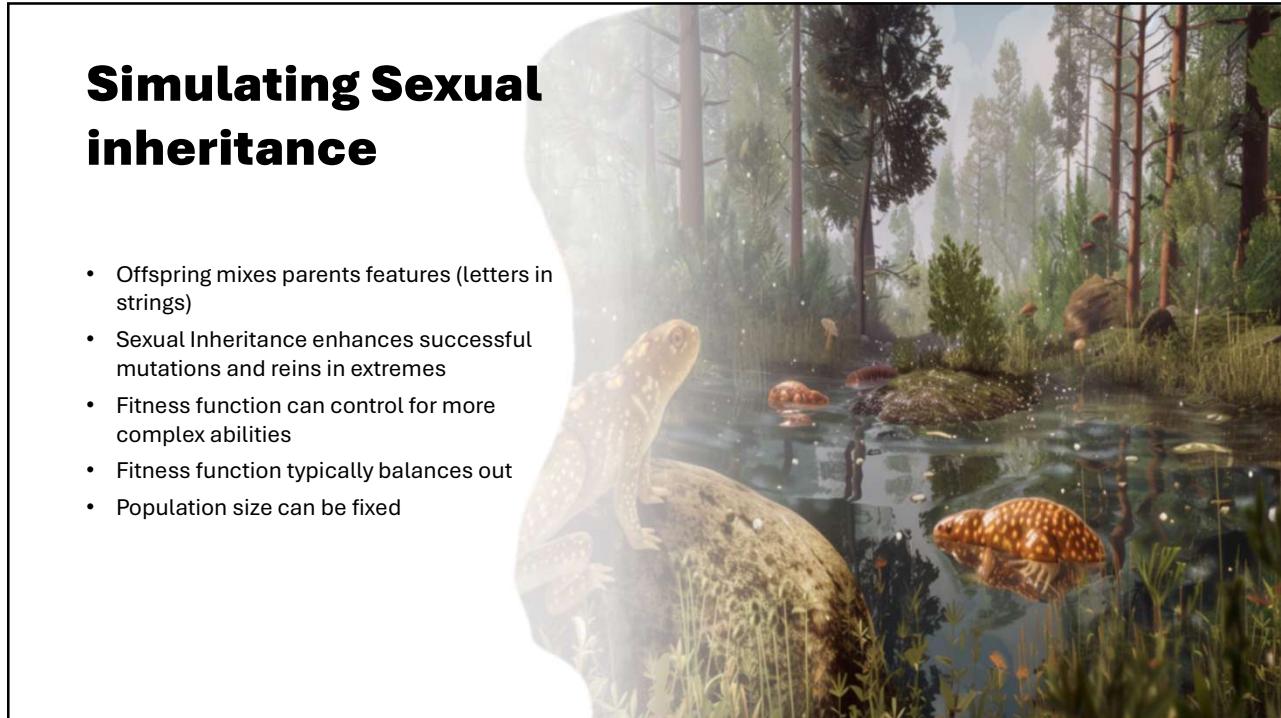


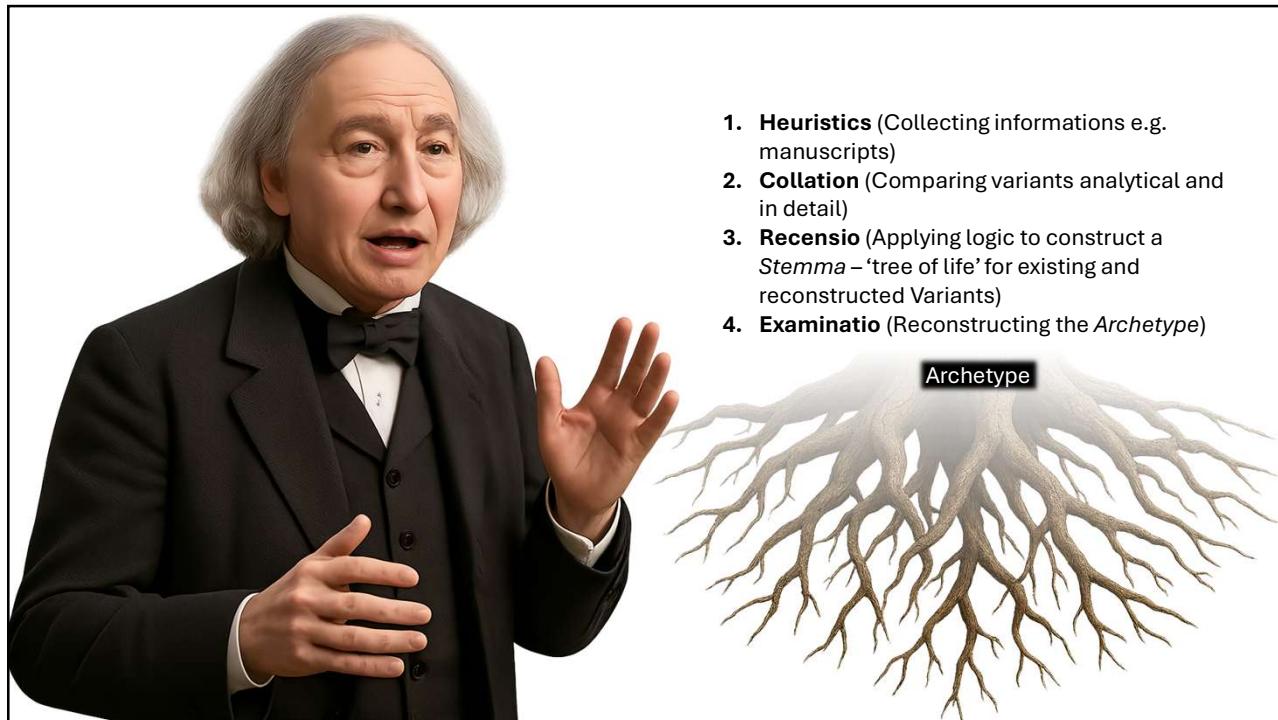




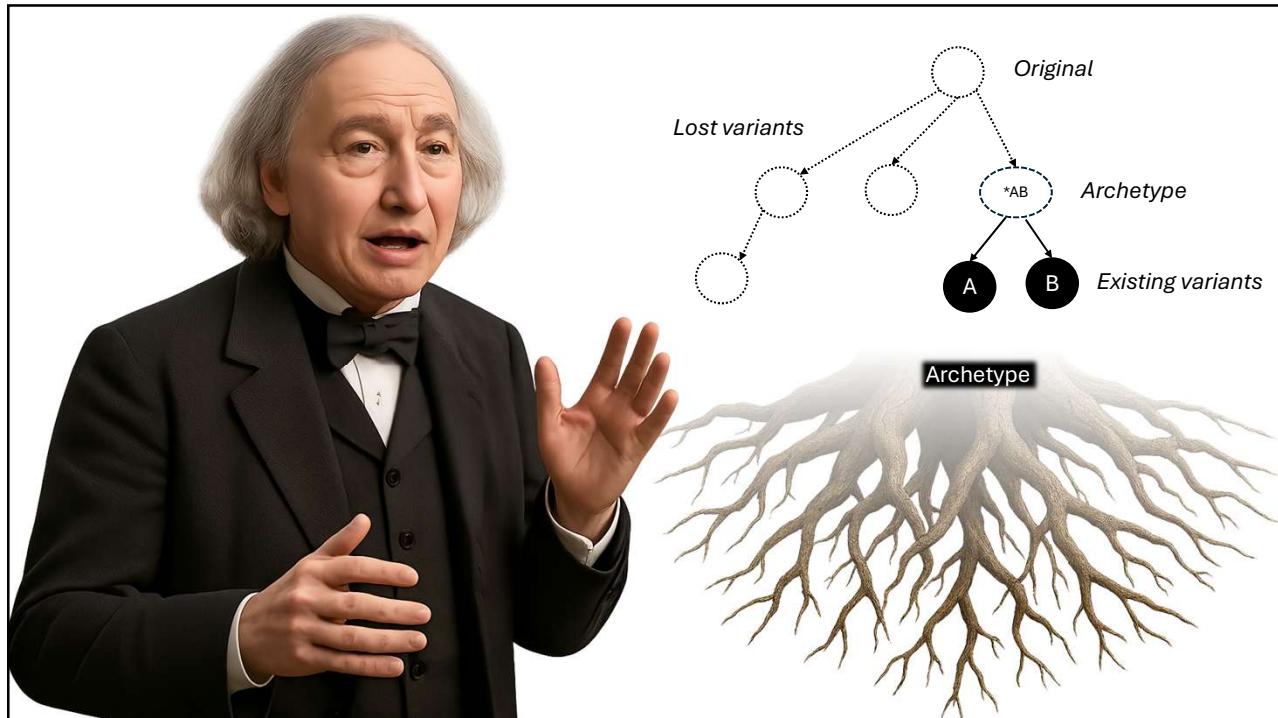
Simulating Sexual inheritance

- Offspring mixes parents features (letters in strings)
- Sexual Inheritance enhances successful mutations and reins in extremes
- Fitness function can control for more complex abilities
- Fitness function typically balances out
- Population size can be fixed





1. **Heuristics** (Collecting informations e.g. manuscripts)
2. **Collation** (Comparing variants analytical and in detail)
3. **Recensio** (Applying logic to construct a *Stemma* – ‘tree of life’ for existing and reconstructed Variants)
4. **Examinatio** (Reconstructing the *Archetype*)





Constraints

Optimization

