

# Introduction to the omics sciences and bioinformatics



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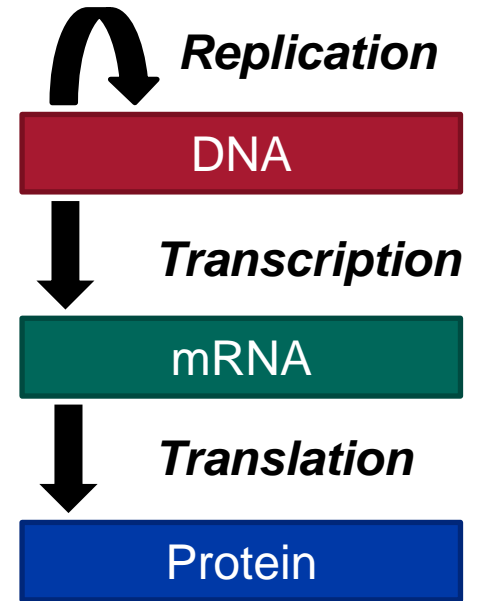
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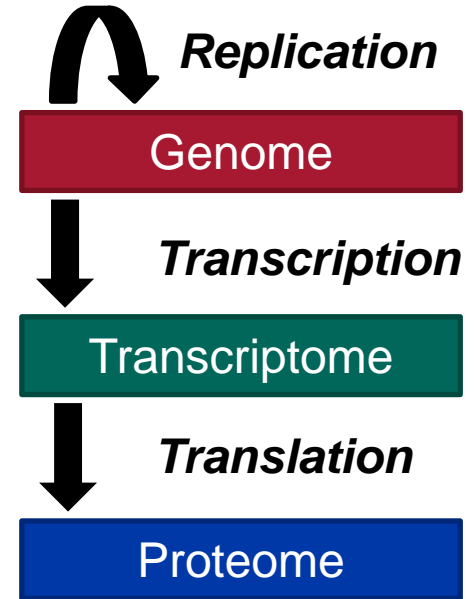
# Central Dogma of Molecular Biology

- Technological limitations → single molecules
- Development of simple paradigm
- Last 20 years → Rapid technological development



# Central Dogma of Molecular Biology 2.0

- New Technologies
  - Next Generation Sequencing (NGS)
  - Advances in Mass Spectrometry
  - Advances in NMR technologies
- Single molecule → Entire complement of a cell's biomolecules
- -Omics → Birth of OMICS



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- Who are you gonna call? → Computer Scientists!
- Computer Science (CS) → Working on the data problem for decades
- Application of CS to Biology → Bioinformatics

# Bioinformatics

- Applying CS to Biology
- First Age (Late 1980s → 2010)
  - Laying foundational data storage resources, ex. NCBI
  - Development of core tools, ex. BLAST
- Second Age
  - Integration of Tools → Pipelines for Data Analysis
  - Adapting and developing tools in lockstep with experimental biology

# This series of training sessions

- NGS now as routine as PCR
  - Basic data analysis skillset → From niche to necessity
  - Excel doesn't cut it in 2022
- Modern life scientists → Needs knowledge of omics / bioinformatics
- This series will introduce you to bioinformatics and the three main domains of omics sciences



# Caveats

- Only an introduction / starting point
- For applications in research → Consult the literature
- Practical tutorials → Uses reduced datasets
  - Real world data → increased analysis time
  - Only for hands-on experience with tools
  - Always consult the literature multiple times