



# Evolution of Coding Sequences

• Proper unit evolution is a trip let of nucleides – a condon

• **Mutations happen at the DNA level**

Selection happens (by and large) at the protein level

- **Synonymous** (protein sequence **unchanged**) and **non-synonymous** (protein sequence **changed**) substitutions are fundamentally different

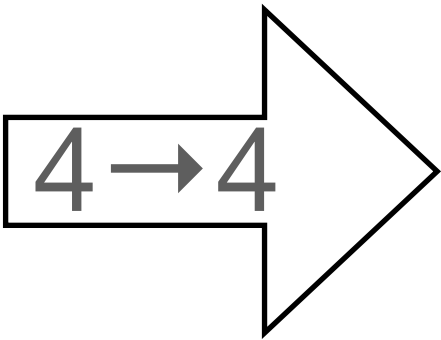
Coding DNA  
sequence

RNA

Transcription/  
Assembly



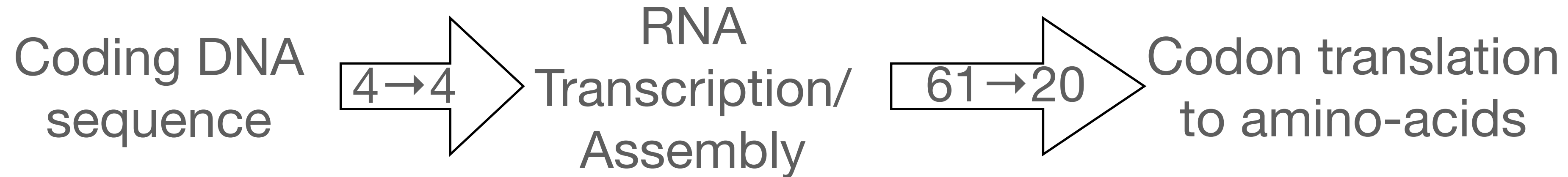
Codon translation  
to amino-acids



61 → 20

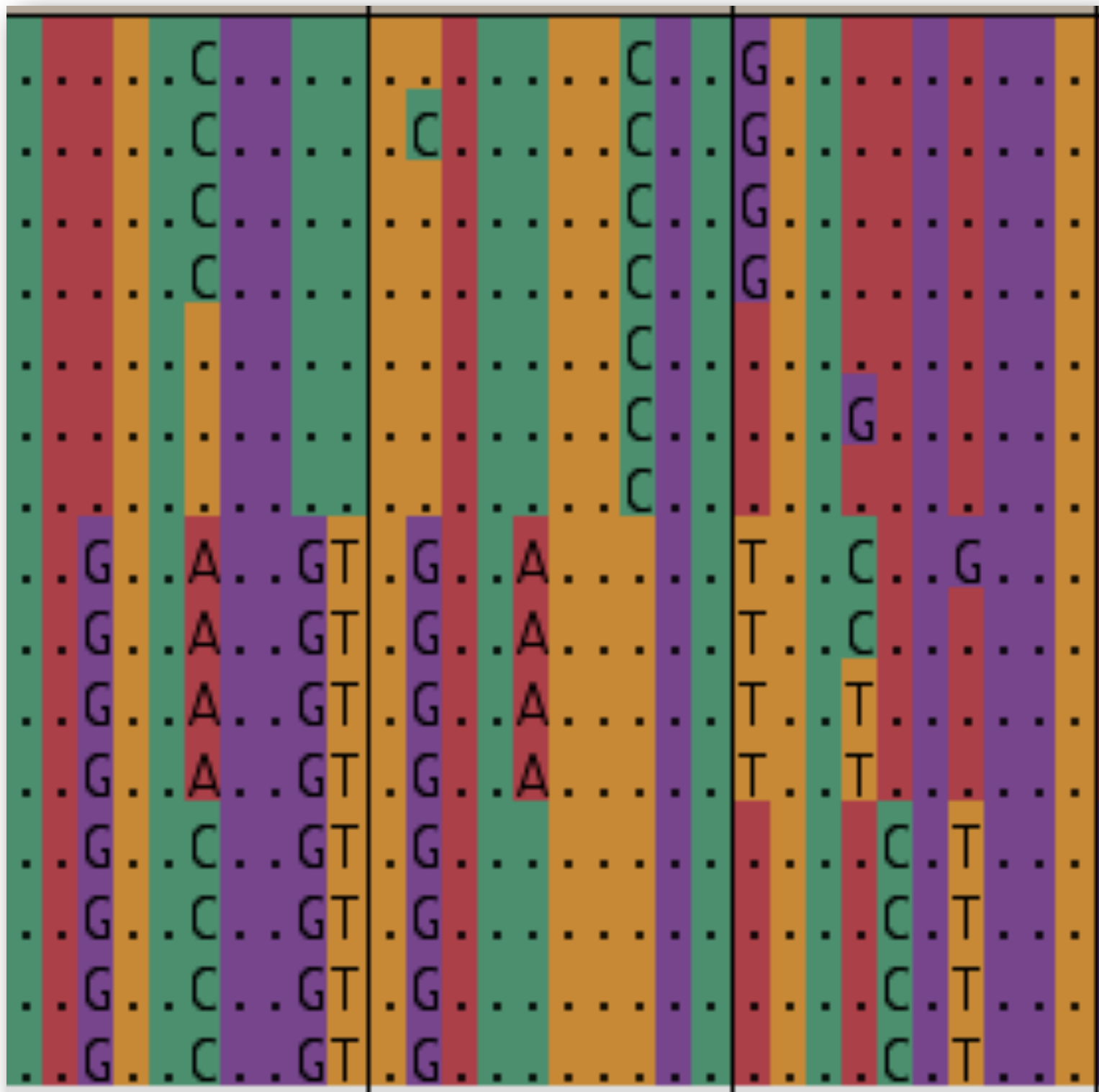
34

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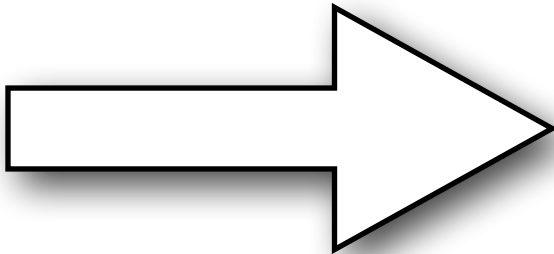


- Proper unit of evolution is a triplet of nucleotides — a **codon**
- **Mutation** happens at the DNA level
- **Selection** happens (by and large) at the protein level
- **Synonymous** (protein sequence **unchanged**) and **non-synonymous** (protein sequence **changed**) substitutions are fundamentally different

**Conservation at the amino-acid level in:  
measles, rinderpest, and peste-de-petite ruminant viruses nucleoprotein.**



*Nucleotides*



*Amino acids*