01 – DNA AND PROTEINS

1.5a - DNA PCR Technology

DNA Technology

COPY

- PCR

SEQUENCE

- Gel electrophoresis
- Capillary gel electrophoresis

ANALYSE (compare, DNA profiles, electropherograms, etc)

- Gel electrophoresis
- Capillary gel electrophoresis

MODIFY (genetic engineering)

- recombinant DNA
- CRISPR
- Designer proteins

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DNA Extraction

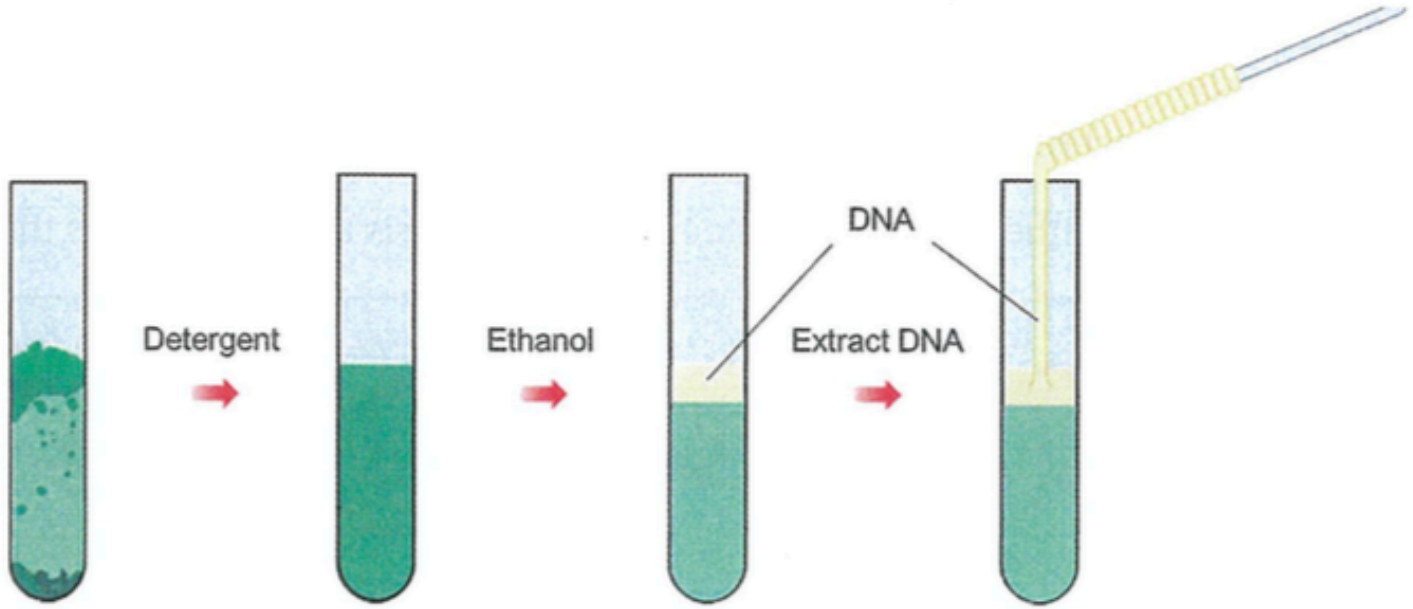

Figure 1.41: Simple DNA extraction from peas.

3

PCR

Polymerase Chain Reaction

- Common laboratory process in vitro (in test tube)
- Process that makes many copies of one segment of DNA (amplify)
- Allows scientists to do analysis on even small segments of DNA

USES:

1. Forensics

2. Gene Therapy

3. Evolutionary relationships & Gene study

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Steps of PCR

Ingredients:

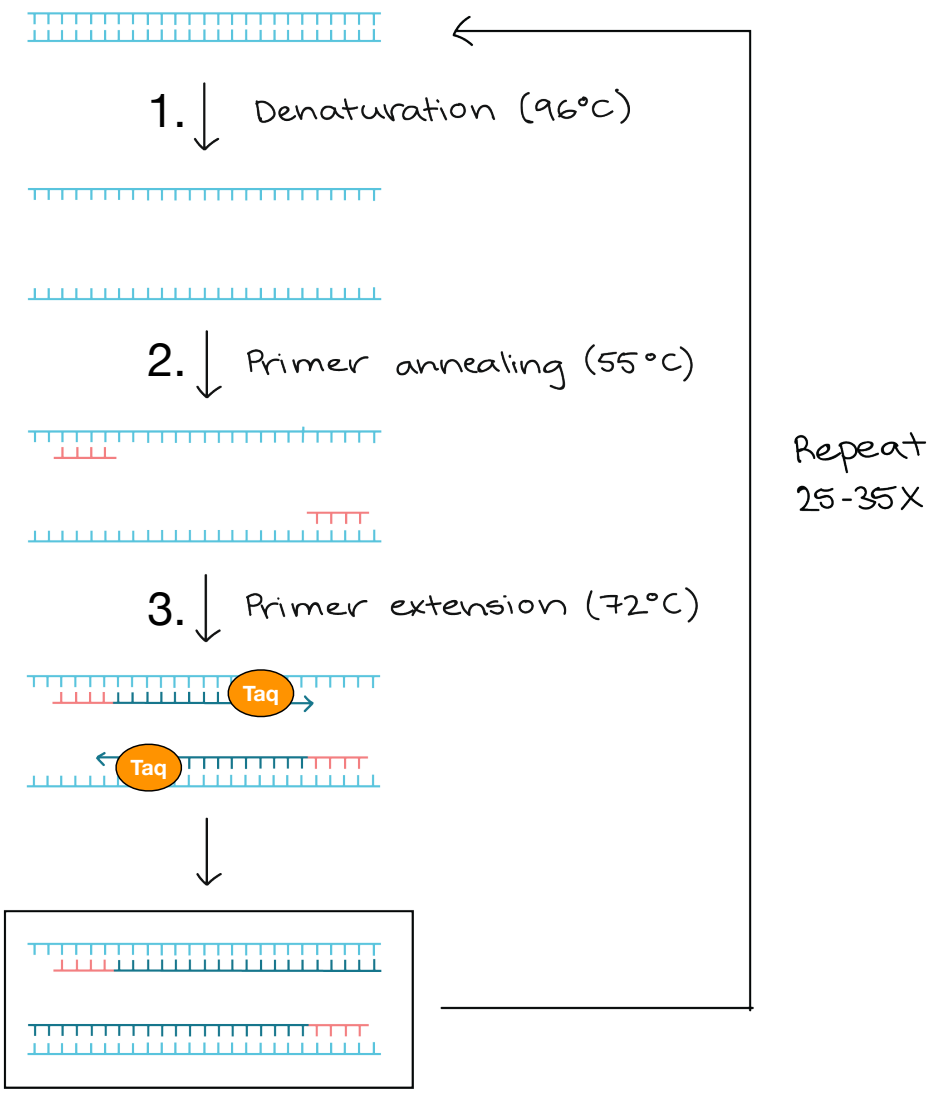
1. template (target) DNA
2. nucleotides
3. primers
4. Taq polymerase *(heat resistant!)*

Basic Steps:

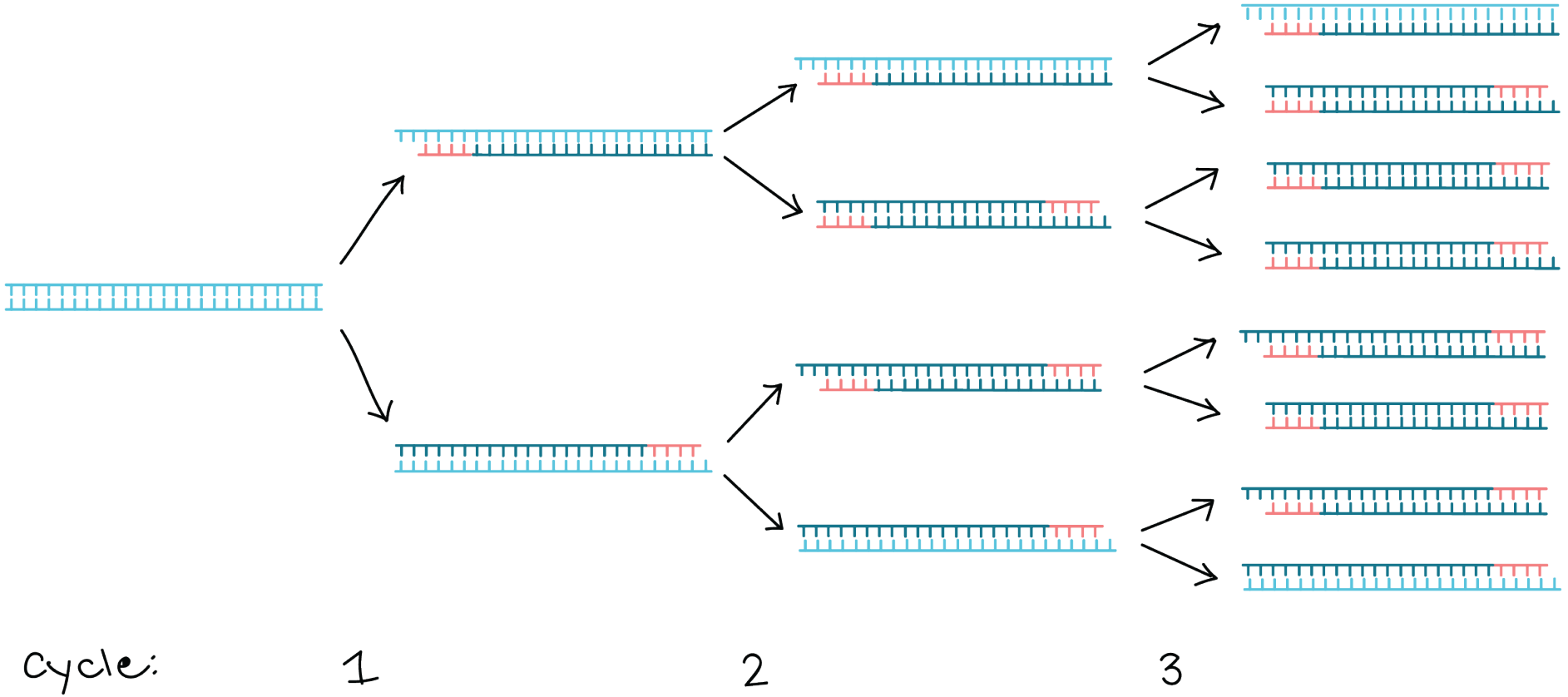
1. **Denaturation** (96°C)
   - heat everything up to denature the DNA strands = single stranded template

2. **Annealing** (55-65°C)
   - cool reaction so primers can bind to DNA single strands

3. **Extension** (72°C)
   - raise the temp so that *Taq polymerase* can extend primers synthesizing new strands of DNA



Cycling PCR

Cycle Repeats 25-35 times

- about 5 min per cycle
- can create billions of copies in short time!