



CRC

for

Premium

Quality

Wool

Polymerase chain reaction (PCR)

Produced for the CRC for Premium Quality Wool undergraduate program by;
Dr Phil Vercoe, The University of Western Australia.



Polymerase Chain Reaction (PCR)

- Used to amplify specific regions of DNA
- Used in Forensic Science because it can amplify DNA from minute amounts of DNA (hair shaft, blood speck, semen)

CRC

for

Premium

Quality

Wool



Polymerase Chain Reaction

- **Basically three steps**
 - **denaturation**
 - melting strands apart
 - **annealing**
 - joining primers to template
 - **extension**
 - DNA Polymerase used to synthesize new strand

CRC

for

Premium

Quality

Wool



PCR

- **Three main ingredients**
 - **template**
 - **primers (synthetic oligonucleotides)**
 - short bits of single stranded DNA complementary to regions of the template DNA
 - **heat stable DNA Polymerase**
 - Taq Polymerase - isolated from *Thermus aquaticus* which survives 100°C

CRC

for

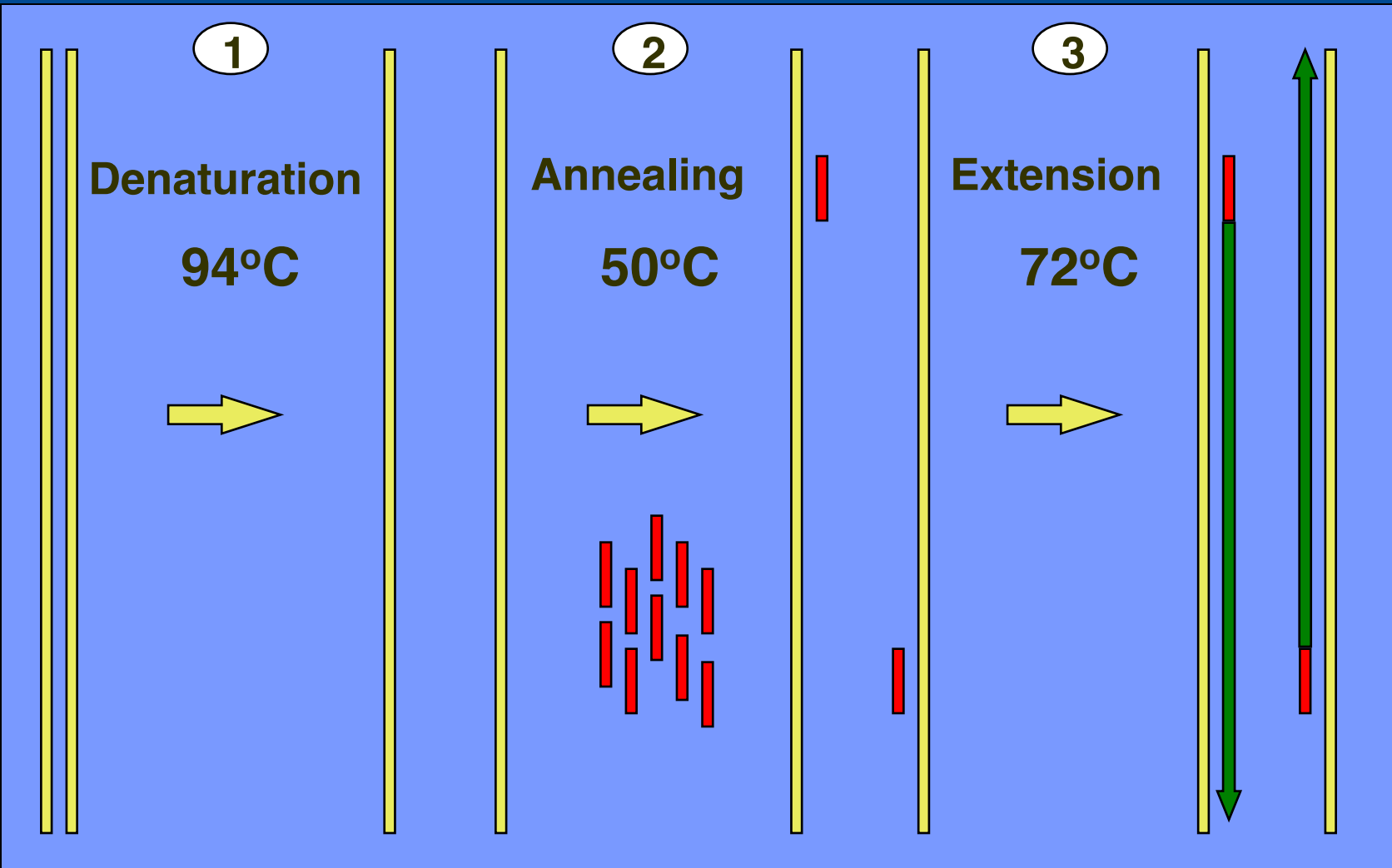
Premium

Quality

Wool



Cycle 1

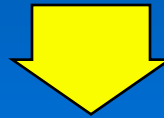


CRC
for
Premium
Quality
Wool



Annealing and Extension Up Close

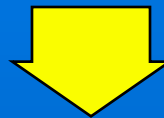
GGATGCTATACTGCTAGCTAACCCGATGCC



Add Primer

CGATATGACG

GGATGCTATACTGCTAGCTAACCCGATGCC



Add DNA
Polymerase

CGATATGACGATCGATTGGGCTACGG

GGATGCTATACTGCTAGCTAACCCGATGCC

CRC

for

Premium

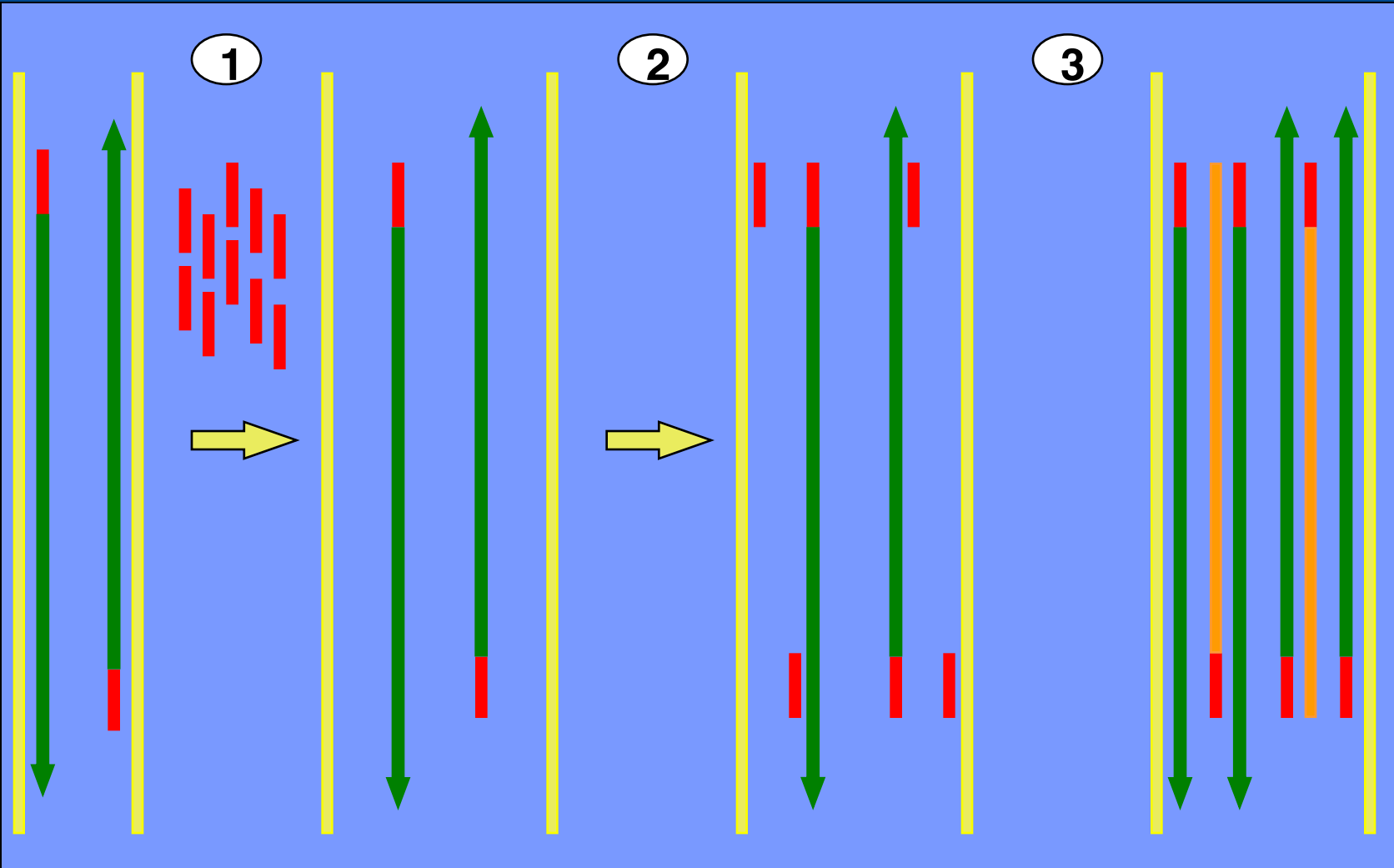
Quality

Wool



Cycle 2

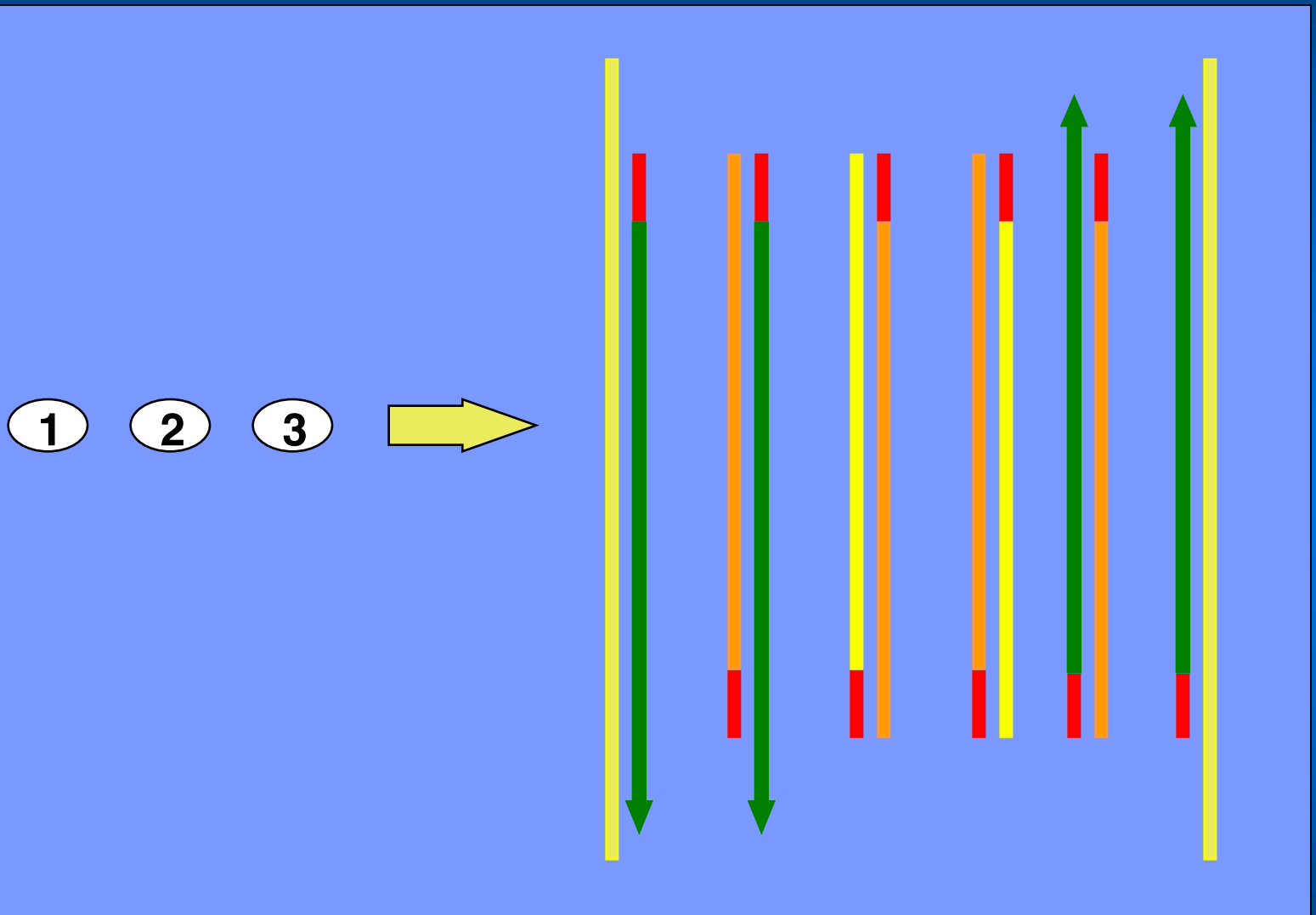
CRC
for
Premium
Quality
Wool





Cycle 3

CRC
for
Premium
Quality
Wool



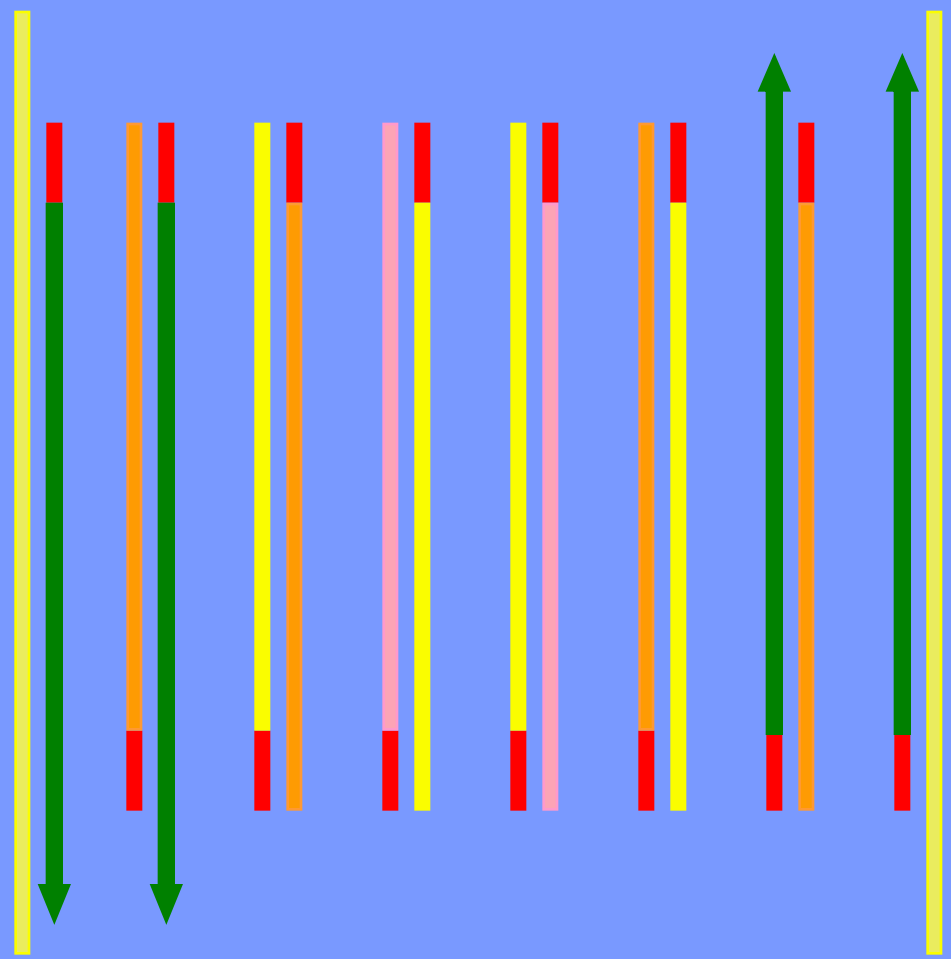


Cycle 4

CRC
for
Premium
Quality
Wool



16 strands, 8 with both ends identical





PCR

- **After 4 more cycles**
 - 256 strands
 - 240 strands will have both ends identical (i.e. the region defined by the two primers)
 - Need 20 to 30 cycles to get effective amplification
 - Theoretically can amplify a region of DNA from a single DNA molecule

CRC

for

Premium

Quality

Wool