



**wellcome
connecting
science**

**Welcome to the
Wellcome Genome Campus**

A reminder – the important bits



If the alarm sounds for more than one minute, please evacuate. Your host will guide you to the nearest assembly point



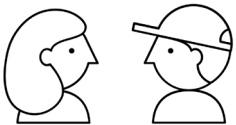
If you feel unwell or suffer an accident, let your host know and they will summon appropriate first aid



Please stay together and with your host(s) at all times during your visit



All buildings on the Campus are non-smoking



Be respectful of your hosts, speakers, tour guides and each other

Genome Academy

Timetable

- Carry out DNA barcoding
 - Practical work
 - Bioinformatics
- Hear about current research
- Experience the sequencing facilities
- Tour labs and data centre
- Consider the ethics of genomics
- Meet staff

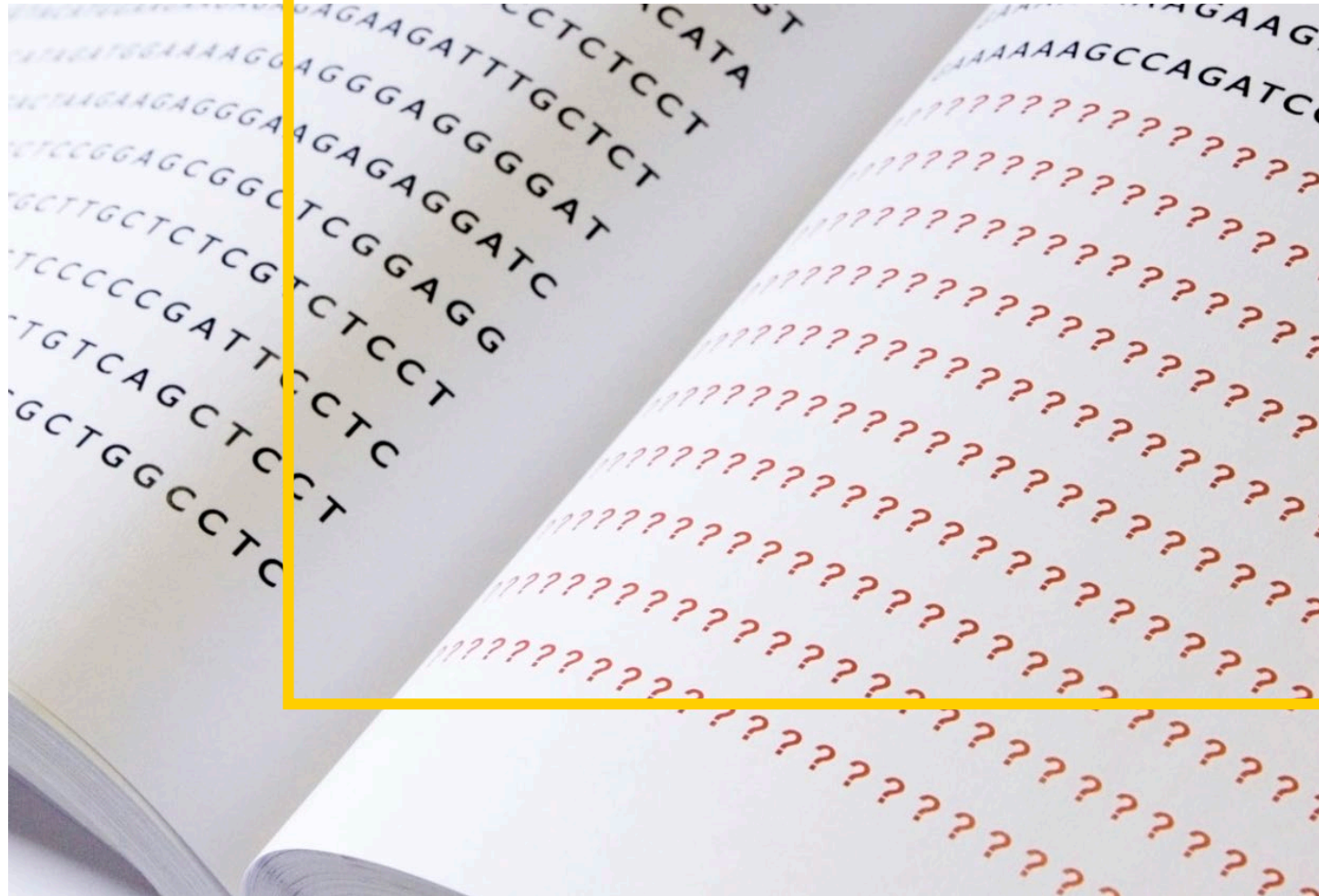


Plan for today

- Refresher
- Gel electrophoresis for DNA discovery
- Open lab experience
- Sequencing lab tour
- Lunch
- Identifying invertebrates
- Talk 'BIOSCAN'
- Creating a phylogenetic tree
- Reflections



Refresher on Day 1



Voting handsets

We will use voting handsets through the session to ask questions

Please leave these on your desk when the session ends



How many pairs of chromosomes are found in human somatic cells?

- A. 22
- B. 23
- C. 24
- D. 26



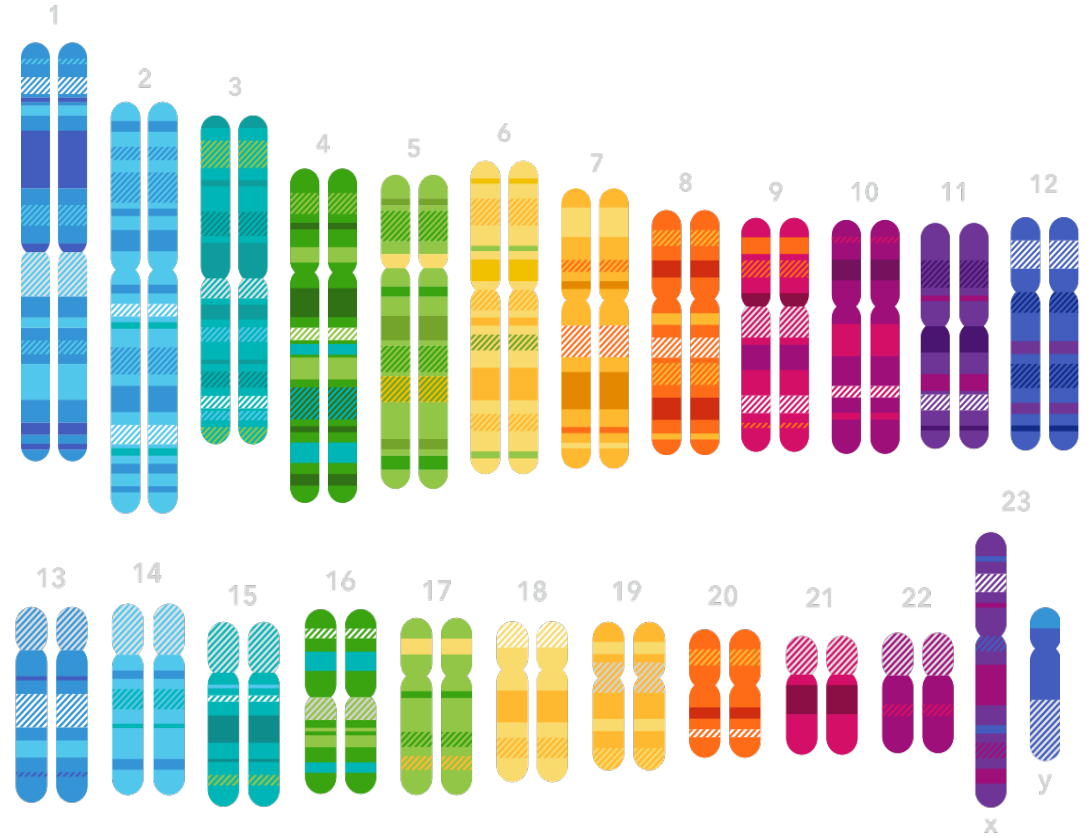
What is a genome?

A genome is **the entire genetic material of an organism**



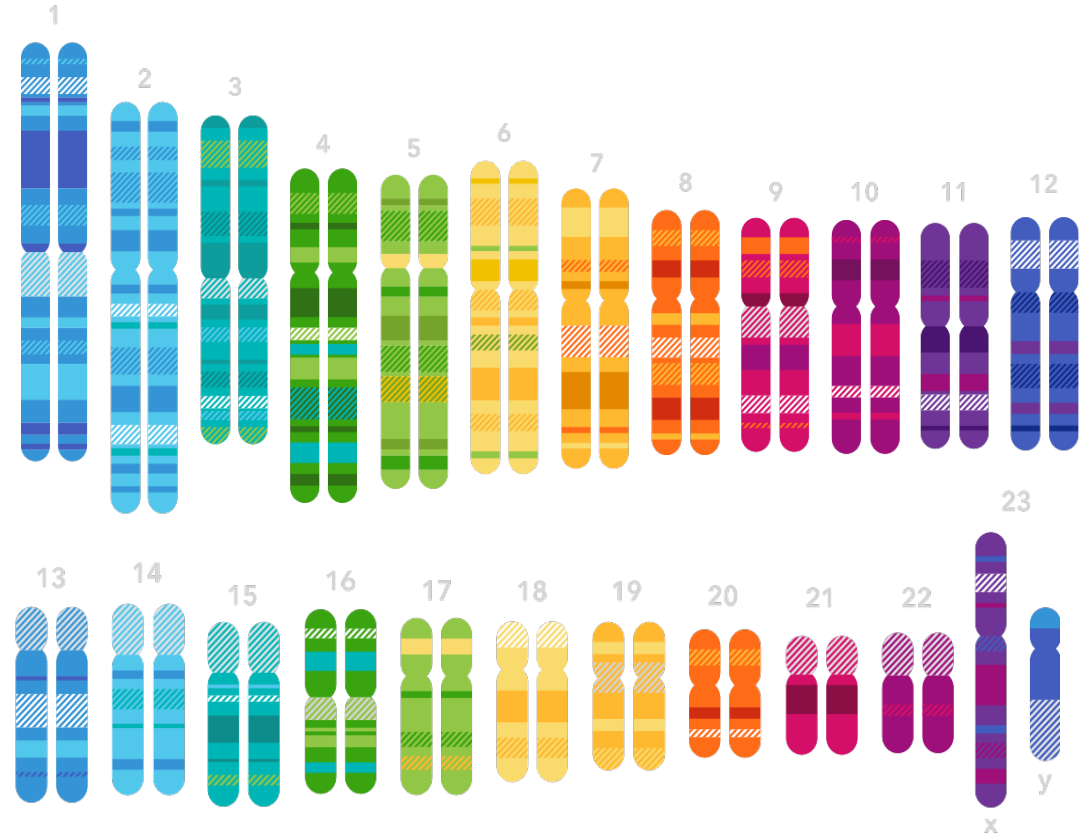
How long is the DNA from one human body cell (a human genome)?

- A. ~ 0.6 metres
- B. ~ 1.2 metres
- C. ~ 2.0 metres
- D. ~2.5 metres



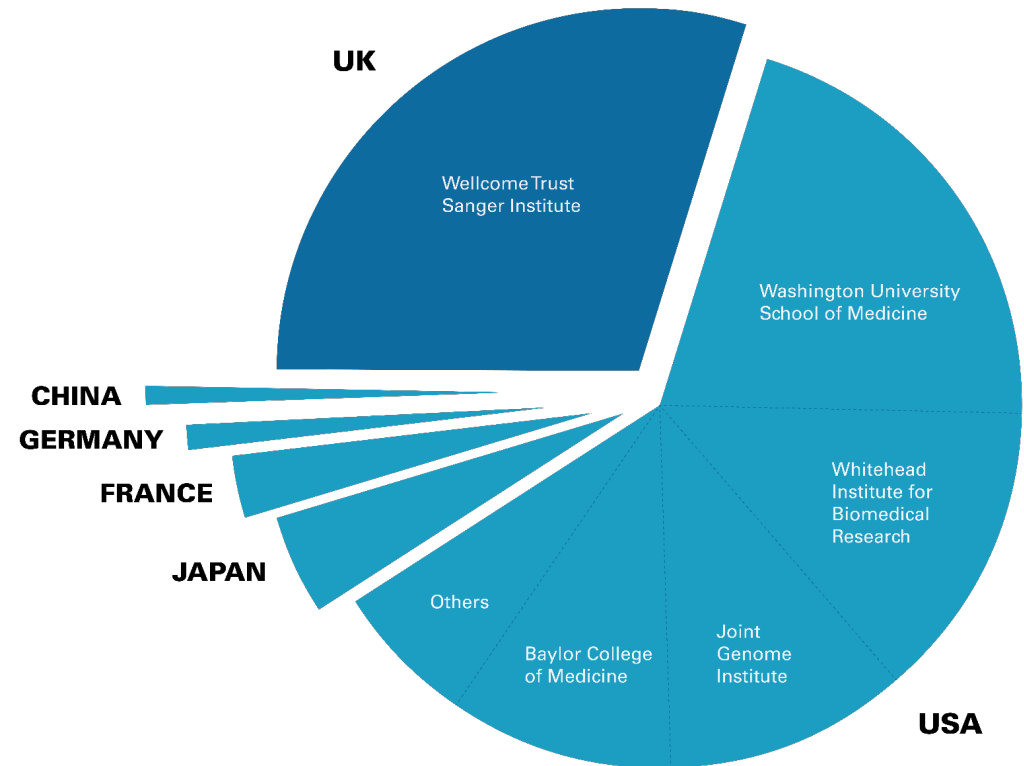
What is the mass of the DNA from one human body cell (a human genome)?

- A. ~ 6 milligrams
- B. ~ 6 micrograms
- C. ~ 6 nanograms
- D. ~ 6 picograms



In which year was the finished version of the Human Genome published?

- A. 2001
- B. 2003
- C. 2005
- D. 2007



What percentage of animal species are invertebrates?

- A. 5%
- B. 25%
- C. 50%
- D. 75%
- E. 95%



What percentage of insect species have not been named or characterised?

- A. 30%
- B. 50%
- C. 70%
- D. 90%



What is a DNA barcode?

A DNA barcode is **an equivalent DNA sequence that is unique for each species.**

It was proposed as a DNA-based method for assisting in identification of organisms by Paul Hebert in 2003.



ATGGTC



ATGGTC

Same DNA barcode = same species



ATGGTC

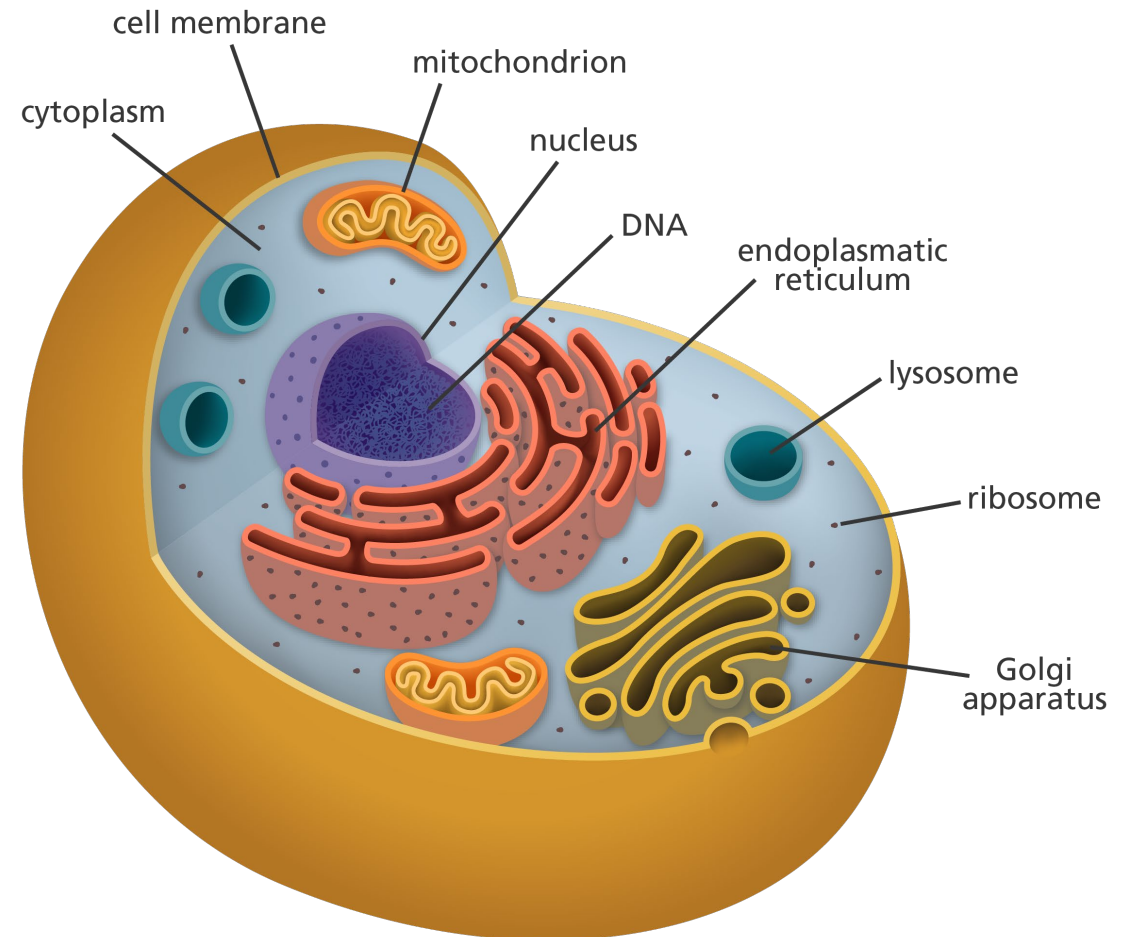


GTGCG

Different barcode = different species

In which organelle of an animal cell is the DNA barcode gene (cytochrome c oxidase subunit I) found?

- A. Mitochondrion
- B. Nucleus
- C. Endoplasmic reticulum
- D. Lysosome
- E. Golgi apparatus



Which project at the Wellcome Sanger Institute is using DNA barcodes to identify 1 million flying insects?

- A. Bioexploration
- B. Biomonitoring
- C. Bioinvestigation
- D. Bioscan



Which technique is used to dispense small volumes accurately?

- A. Micropipetting
- B. DNA extraction
- C. Centrifugation
- D. PCR
- E. Gel electrophoresis

20 μ l	15 μ l	10 μ l	5 μ l	2 μ l
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
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Which technique is used to separate a mixture of biomolecules by size?

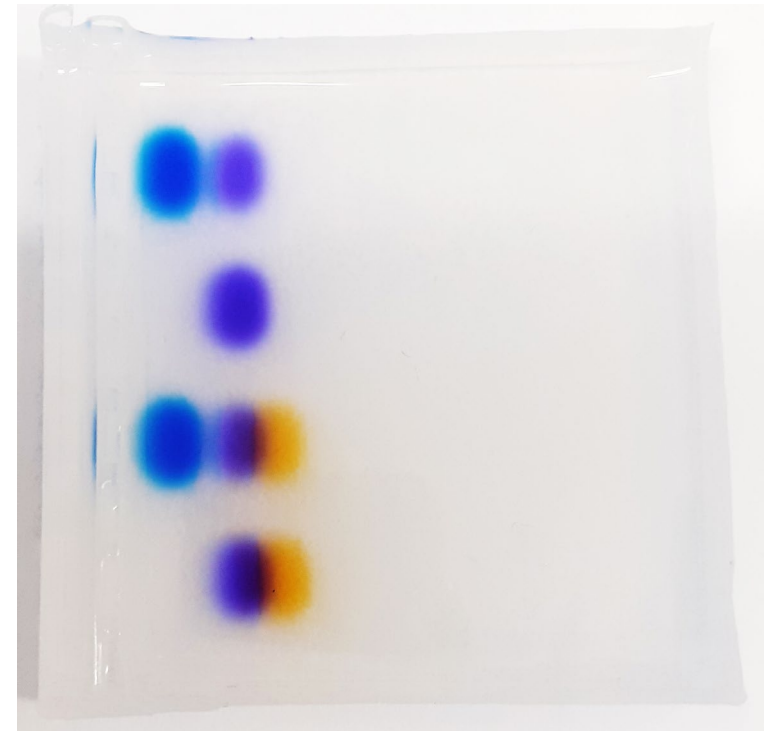
- A. Micropipetting
- B. DNA extraction
- C. Centrifugation
- D. PCR
- E. Gel electrophoresis

Dye solution 1

Dye solution 2

Dye solution 3

Dye solution 4



How does gel electrophoresis work?

Gel electrophoresis allows separation of a mixture of biomolecules (often DNA) by size.

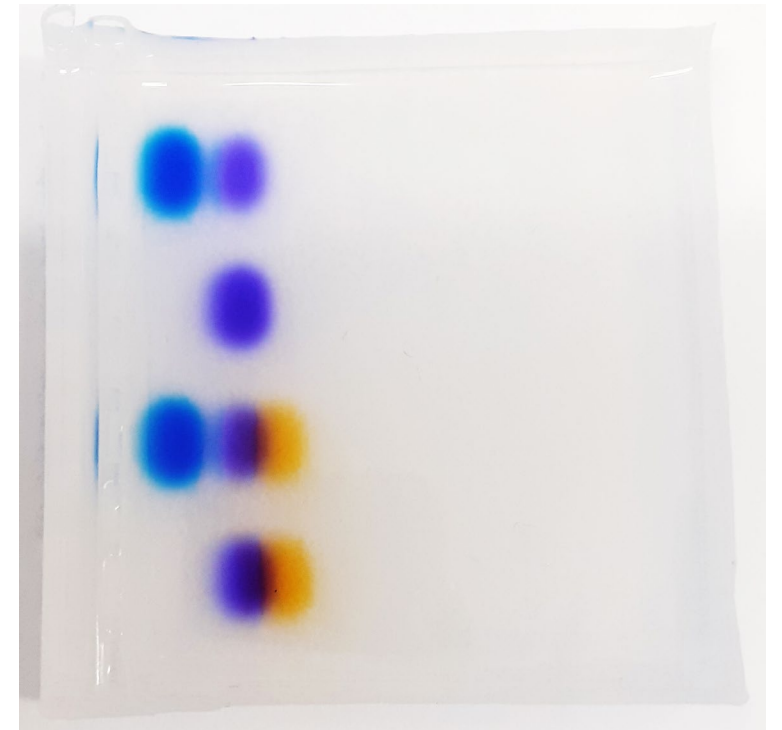
It **uses an electrical current to move the biomolecules through the agarose gel**. DNA is negatively charged, so it moves toward the positive electrode.

Dye solution 1

Dye solution 2

Dye solution 3

Dye solution 4



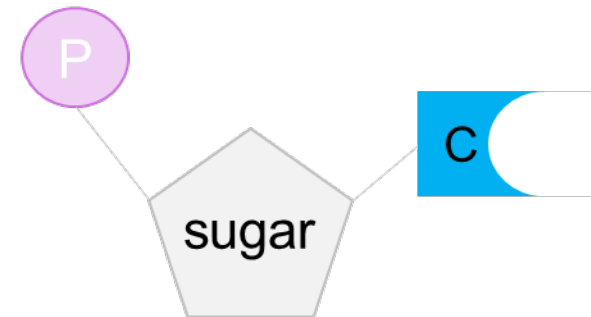
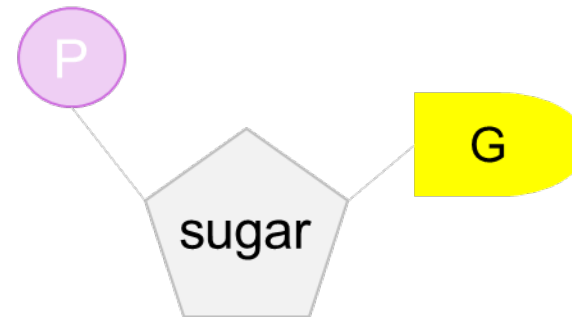
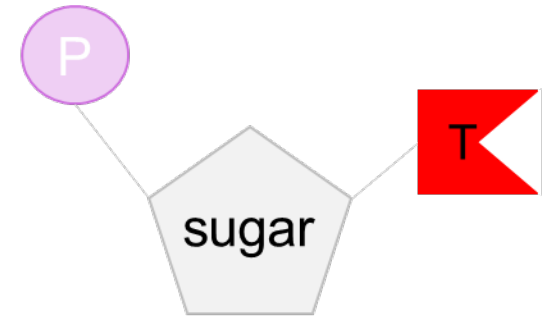
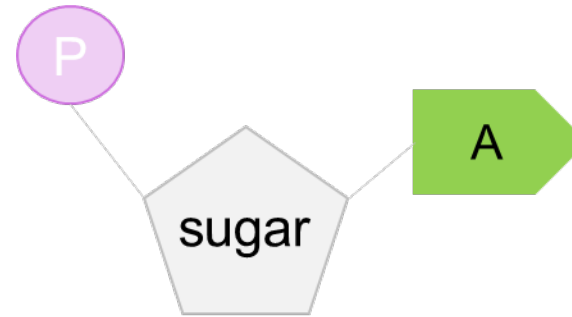
Which technique is used to make copies of DNA?

- A. Micropipetting
- B. DNA extraction
- C. Centrifugation
- D. PCR
- E. Gel electrophoresis



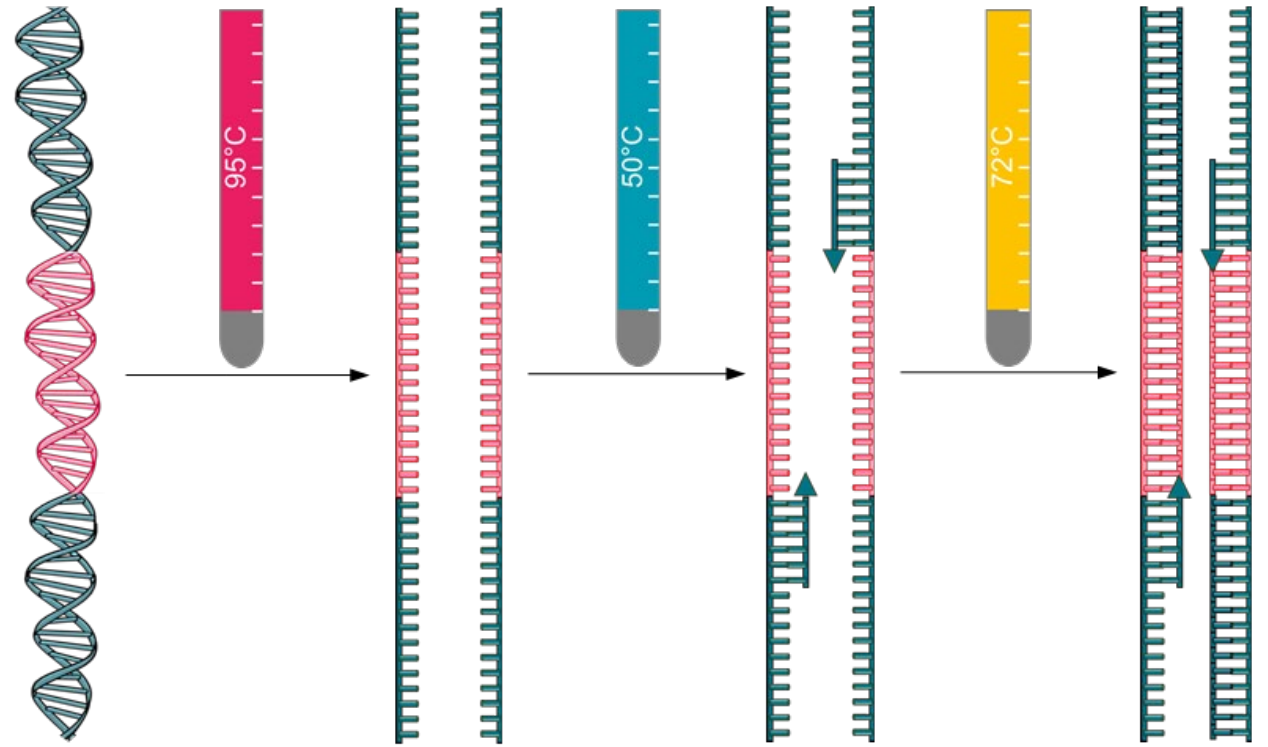
Which nucleotides pair together in DNA?

- A. A and C, G and T
- B. A and G, C and T
- C. A and T, C and G



Which is the correct order for the 3 stages of PCR?

- A. Annealing, denaturing, extension
- B. Annealing, extension, denaturing
- C. Denaturing, annealing, extension
- D. Denaturing, extension, annealing
- E. Extension, annealing, denaturing
- F. Extension, denaturing, annealing



Next practical activities

Today you will check your success using gel electrophoresis and use some pre-sequenced invertebrate DNA to develop skills in bioinformatics.

