

**A Level Biology A**  
**H420/02 Biological Diversity**

**Question Set 4**

- 1 (a) Two species of chimpanzees, the chimpanzee and the bonobo, are the closest living relatives of humans.

Fig. 19.1 is a diagram representing the current classification of chimpanzees and humans within the Family Hominidae.

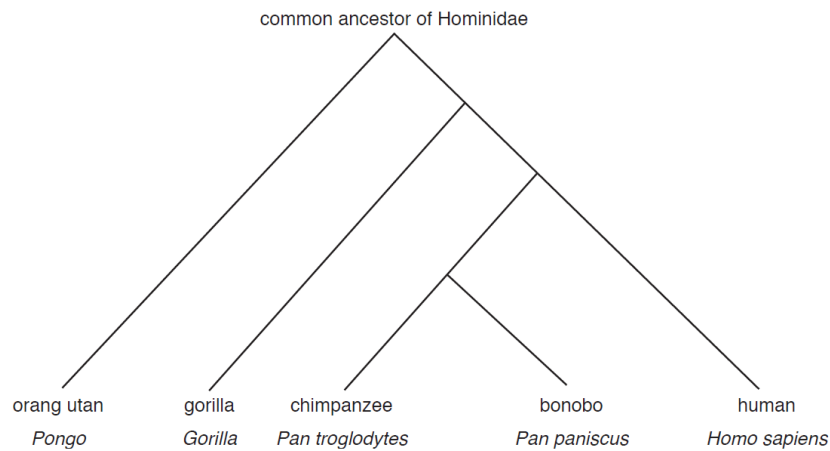


Fig. 19.1

Humans and chimpanzees are currently classified within the same family.

Chimpanzees were once classified separately from humans in the Family Pongidae alongwith gorillas and orang utans.

Fig. 19.2 shows a human hand and a chimpanzee hand.

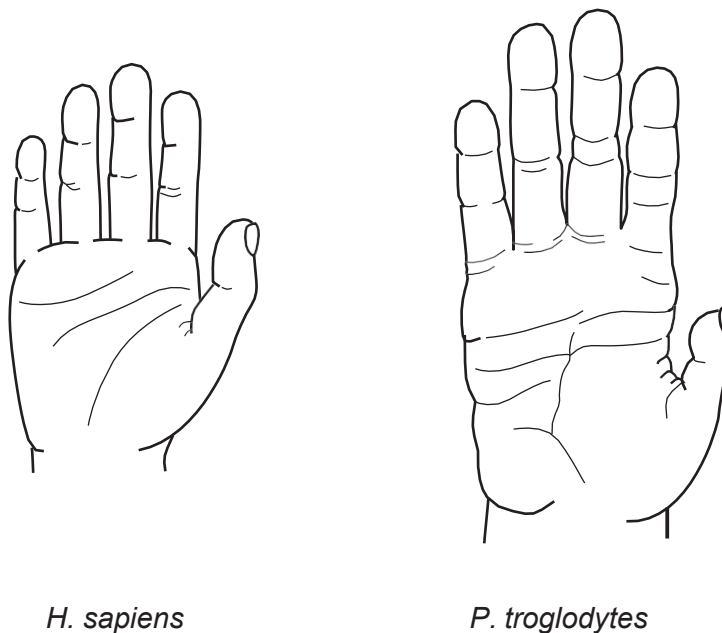


Fig. 19.2

Describe **two** differences between the two images that could have been used to classify humans and chimpanzees in separate families.

- 1 (b) (i) Differences between the nucleotide base sequences can be used to estimate the length of time since two species diverged from one another.

The greater the number of differences, the greater the length of time that has elapsed since the two organisms were part of the same species.

Fig. 19.3 shows the line of best fit for the differences in DNA between pairs of primate species plotted against the number of years since the two species diverged from a common ancestor.

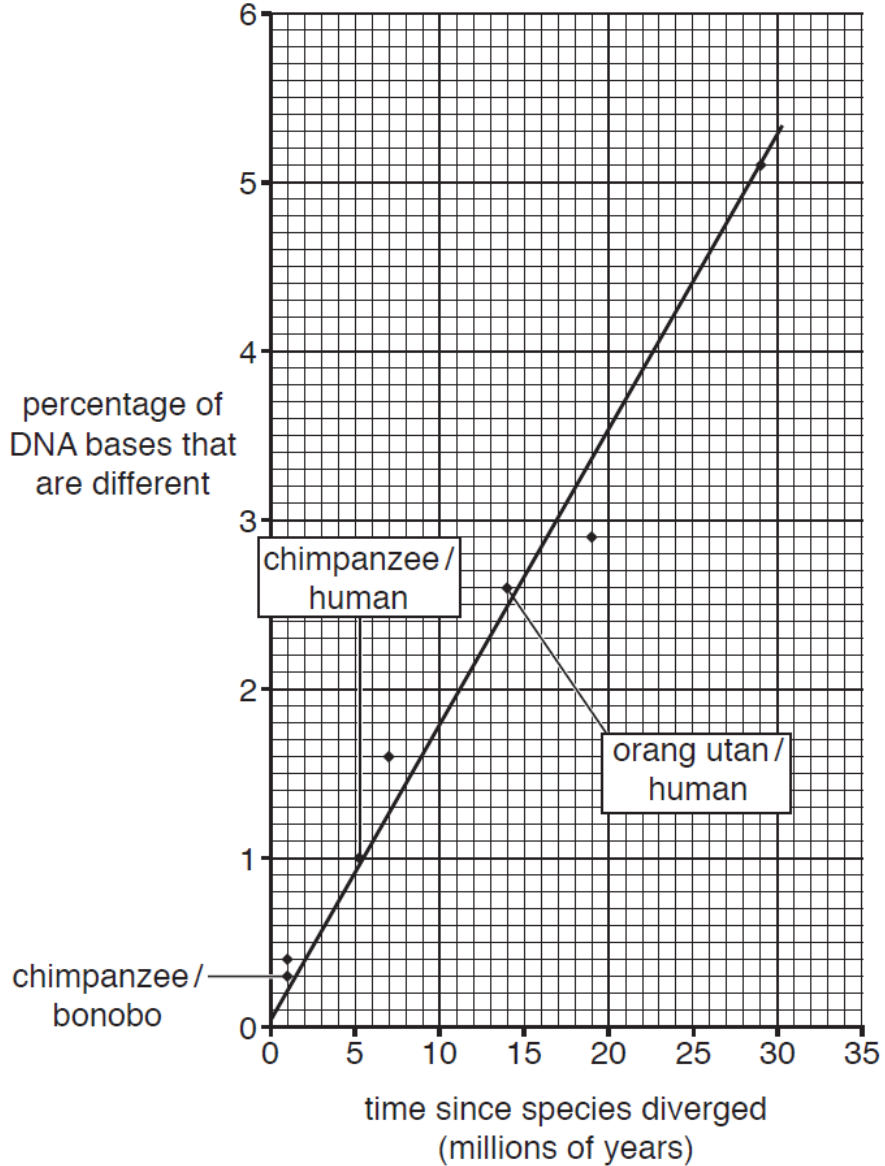


Fig. 19.3

Calculate the rate of DNA change using the data in Fig. 19.3.

Give your answer to **three** significant figures.

Rate = .....

[2]

- (ii) The mutation rate in mammals can vary by as much as 20% between species.

Use Fig. 19.3 to calculate the time since the phylogeny of humans diverged from chimpanzees, and the range over which this estimate may vary.

*time since divergence* = .....

*range* = .....

[2]

- (iii) Some scientists have suggested that humans and chimpanzees should be reclassified as belonging to the same **genus**.

Evaluate their suggestion using evidence from Figs. 19.1 to 19.3 and your own knowledge of the scientific basis for the classification of organisms.

[6]

- (iv) One type of gene is known as a homeobox gene.

The base sequences of homeobox genes in humans and chimpanzees are almost identical.

What conclusions about the evolutionary relationship between humans and chimpanzees can be drawn from this piece of evidence?

[1]

**Total Marks for Question Set 4: 13**

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