Biology Exam Paper

Total Marks: 12

Question1: The gut of a rabbit has a large caecum and appendix. These contain bacteria that are able to produce the enzyme cellulase. Explain how these bacteria help the rabbits with their diet of plant material. (3 marks)

Answer1: The bacteria in the caecum and appendix of rabbits produce the enzyme cellulase. Cellulase breaks down cellulose, but the rabbit cannot absorb or utilize the simpler sugars. The presence of cellulase is therefore not beneficial for the rabbit's digestion of plant material.

Question2: The human gut has a caecum and appendix but they are much smaller than those in the rabbit. Suggest why the human gut only has a small caecum and appendix. (1 Marks)

Answer2: Humans have a varied diet that includes easily digestible foods, reducing the need for a large caecum and appendix for cellulose digestion compared to rabbits that primarily consume fibrous plant material.

Question3: In humans the appendix also acts as a store of useful bacteria. Scientists have discovered that patients who have had their appendix removed are more likely to develop infections of the colon. Explain how having no appendix may increase the likelihood of bacterial infections of the colon. (2 marks)

Answer3: The appendix does not have any significant function and its removal does not impact the likelihood of developing bacterial infections in the colon.

Question4: Woodlice feed on dead and decaying plant material in the soil. The photographs show how a woodlouse can curl up into a ball. State what is meant by a reflex response. (1 Marks)

Answer4: A reflex response is an automatic, involuntary reaction to a stimulus, occurring without conscious thought.

Question5: Give a reason why this reflex response benefits the woodlouse (1 Marks)

Answer5: Curling up into a ball helps protect the woodlouse by making it harder for predators to attack its softer, more vulnerable parts.

Question6: Describe how this reflex response could have evolved by natural selection. (4 Marks)

Answer6: Initially, within a population of woodlice, some individuals may have had a slight tendency to curl up when threatened. Those woodlice that curled up were more likely to survive predator attacks compared to those that didn't, as they presented a harder, less palatable surface to predators