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Examiners' Report/ Principal Examiner Feedback

Summer 2014

Pearson Edexcel International GCSE in Biology (4BI0) Paper 2B

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Principal Examiner's Report June 2014 International GCSE Biology – 4BI0 2B

Question 1

The comprehension this year was about bees. Candidates found certain questions less challenging than others and it was pleasing to note that very few candidates left blank spaces indicating that the concepts were accessible to most.

Part (a) asked for a basic definition and credit was only given if answers made it clear that the source of pollen was the anther and the destination was the stigma. Many confused pollination with fertilisation or seed dispersal. Part (b) expected candidates to think about reasons why bees collect nectar and most were helped by the passage to suggest that they used nectar to make honey. The better candidates also mentioned that honey contains a named carbohydrate that provided and energy source for respiration. The term fertile was understood by the vast majority but suggesting how having 'extra genetic variation' in part (d) may help the bees to combat disease was much more challenging. The examiners gave credit for answers that made it clear that mutation is the cause of the variation, allowing the existence of different alleles that provide resistance and enable bees to survive. It was disappointing that so many candidates continue to confuse the term immune with the term resistant.
Many candidates simply reiterated the stem of the question stating that having different genes helps the bees to combat disease. Answers that did this were not credited

In part (e), the correct answer of 16 was often seen, but so were a number of incorrect alternatives, 23 and 46 being common. Part (f) was the most difficult question for candidates. That said, it was pleasing to note that some appreciated that what determines genetic variation in worker bees is the number of different drones the queen mates with because each drone has a different set of alleles. Credit was also given for appreciating the meiosis in egg production also helps to determine genetic variation, though this answer was seldom seen and when it was, it was clear that the concept was poorly understood. Candidates lost credit if they used the generic term bees as opposed to drones.

Finally, in part (g), there were many good suggestions for why a colony might be used for selective breeding, including disease resistance, ability to collect honey and nectar, fecundity and docility. Weaker candidates produced responses that were unworthy of credit such as 'work ethic, colour and size'.

Question 2

This question examined understanding of the nitrogen cycle. Part (a) was challenging but the better candidates appreciated that process A was nitrogen fixation, process B was decomposition, process C was nitrification and process D was denitrification. Candidates who added the word 'bacteria' to these terms were also credited. It was pleasing to note that most candidates studying this specification are aware that bacteria and fungi are the groups of organisms that act as decomposers. There were weak answers claiming that animals and plants act as decomposers.

Part (c) worked really well as a discriminator as questions that test synoptic connections often do. The examiners rewarded answers that described how nitrate is actively taken up by root hair cells and used to make plant protein which is then eaten and digested by protease enzymes before being assimilated into animal protein. Answers ranged both in terms of factual content and quality of expression. Sadly, some candidates wrote about fixation of nitrogen gas by root nodules but this did not prevent access to the other points in the mark scheme.

Finally, part (d) asked candidates to think about the differences between organic and inorganic fertiliser. Many candidates appreciated that organic waste is cheaper, renewable and is less likely to be involved with eutrophication. Some even stated that organic fertiliser improves soil structure. Sadly, many candidates fail to answer in a precise informative style and phrases such as, 'less harm to the environment', were frequently seen but not credited.

Question 3

This question examined student understanding of a practical investigation. Candidates are getting better at identifying variables and heart rate as the dependent variable in this investigation was named by many. Similarly, correctly named controlled variables were often credited, the most common being the species or gender of *Daphnia*, the temperature and the volume of solution in which the animal was placed. It was also pleasing to note how many candidates appreciated that increasing the time for counting allowed the possibility of inaccurate counts due to counting errors, and that counting in 15s meant that there was the opportunity to obtain measurements more quickly, to take more readings and to reduce possible harm to the *Daphnia*. Almost all appreciated that caffeine increases the heart rate and many knew that adrenaline is the hormone that does this in humans. ADH and insulin were the most common incorrect answers.

Question 4

This question examined student understanding of the structure and function of the eye. Most correctly recalled the lens as part A, though some named it as the pupil, presumably because the label line travels through this part of the eye. Most correctly named part B as the cornea. The most common incorrect answer was to name it as the sclerotic. Most correctly named part C as the retina. Answers that named this part as rod cells, cone cells, fovea or receptor cells were not credited.

Part (b) (i) was well answered with most appreciating that a tissue is made from the same cell type that carry out the same function. Answers that claimed a tissue is 'made from cells, or 'made from lots of cells' were not credited. Part (b) (ii) discriminated very well. The better candidates appreciated that the radial muscles of the iris would contract or conversely the circular muscles would relax, resulting in pupil dilation and more light entering the eye. Many mistakenly thought the ciliary muscles were involved, and many failed to mention the antagonistic role of the muscles in their answers.

Question 5

This question examined the role of the placenta and the dietary needs of pregnant women. In part (a) (i), most were able to recall that the placenta allows exchange of nutrients and gases, though some wrongly believe it also allows exchange of blood. The role of the amniotic fluid in protecting the fetus from physical damage was also well known. In part (a) (iii), there was the usual confusion between antibodies and antibiotics. Most recalled that a human body cell from a fetus would contain 46 chromosomes and most are aware that the male sex chromosomes are XY. A surprising number ticked XX and YY. Part (c) (i) was well answered with most candidates appreciating that calcium, vitamin D and protein are important components for bone development. Vitamin C and iron were common errors. In part (c) (ii), the examiners credited answers that made it clear that the reasons why a pregnant woman needs more energy than a non-pregnant woman is because she has more weight to carry and that the fetus is growing, a process that requires energy for respiration. There were many generalised responses that indicated 'mum needed more energy to carry baby' or simply stated 'mum needs more energy' or 'the mother needs energy for herself and the baby'.

Part (c) (ii) discriminated very well. Some had no idea why the daily intake of iron is higher for a pregnant woman, many writing about the need for iron in bone development. The better candidates were able to make the link between the dietary need for iron to make haemoglobin in red blood cells so that oxygen could be transported for respiration.

Question 6

This question examined understanding of the procedures used in micropropagation. In part (a) examiners credited answers that gave relevant detail. Cutting the stem was not credited, but cutting the stem with a sharp instrument such as a scalpel was credited. Similarly, transferring tissue sample alone was not credited, but transferring tissue samples using tweezers was credited. Credit was also available for appreciating the instruments or the samples need to be sterile. In part (b) marks were given for a correct named mineral linked to its correct function. The most common correct answers made reference to nitrate (nitrogen was not credited) for amino acids and magnesium for chlorophyll production. This is not surprising as these are the minerals named in the specification. Examiners also credited correct combinations of other nutrients such as phosphate for DNA, calcium for cells walls and glucose or sucrose for energy. Answers to part (c) had to relate to micropropagation as opposed to growing plants in glasshouses. The better candidates made responses that gained all three marks usually by making reference to sterility, temperature, light, water and plant growth regulators.

Question 7

This question examined understanding of temperature regulation in a large mammal. Part (a) discriminated very well and the best answers showed excellent understanding, usually by making reference to the large surface area of the ears which increase heat loss. The fact that the ears have a good blood supply and that vasodilation will also assist heat loss was also credited, as was the cooling effect of use the ears as fans. In part (b) examiners were looking to credit candidates who appreciated that a high body temperature would denature enzymes and this would have a detrimental impact on vital chemical reactions in the body.

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