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Principal Examiner Feedback

January 2016

Pearson Edexcel IAL
in Biology (WBI04)
Paper 01 - The Natural Environment and Species Survival

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Overview

Students generally made a good attempt at answering the questions on this January's paper. All of the mark points were seen and full marks were seen for each of the items. Students clearly know some parts of the specification very well and in great detail, particularly photosynthesis, changes that occur to a body after death and body defence mechanisms.

Question 1

The multiple choice questions in this paper were generally answered quite well and there was no one distractor that was consistently chosen incorrectly.

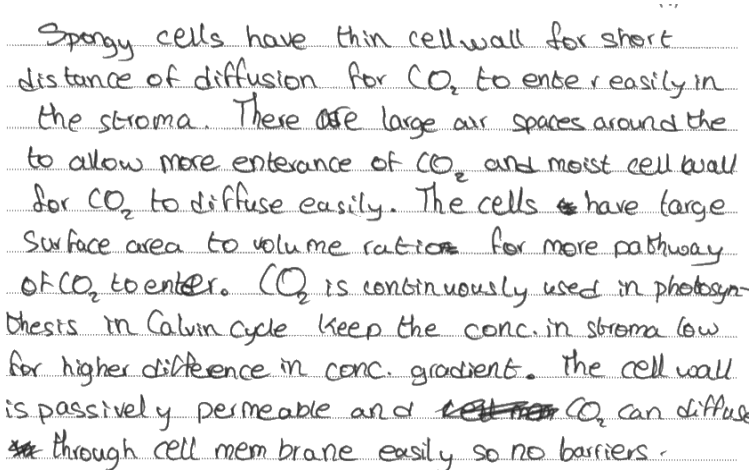
Q01(c) did not cause problems to the students who read the question properly and offered a reason that did not simply repeat the stem of the question.

Students know the part of the specification concerning hospital codes of practice very well, so Q01(d) scored well provided the response concerned the use of antibiotics and not other aspects of hospital practices.

Question 2

We saw some very accurate definitions of the term **tissue**, with students taking care to make it clear that several cells compose a tissue. We saw some good attempts by students to answer Q02(b); this part of the specification has not been tested in this context for a long time.

Most students could identify the adaptations of the spongy mesophyll but the better responses explained why these features improved the rate of diffusion. One example is shown below.


Spongy cells have thin cell wall for short distance of diffusion for CO_2 to enter easily in the stroma. There are large air spaces around the to allow more enterance of CO_2 and moist cell wall for CO_2 to diffuse easily. The cells have large surface area to volume ration for more pathway of CO_2 to enter. CO_2 is continuously used in photosynthesis in Calvin cycle keep the conc. in stroma low for higher difference in conc. gradient. The cell wall is passively permeable and ~~[illegible]~~ CO_2 can diffuse through cell membrane easily so no barriers.

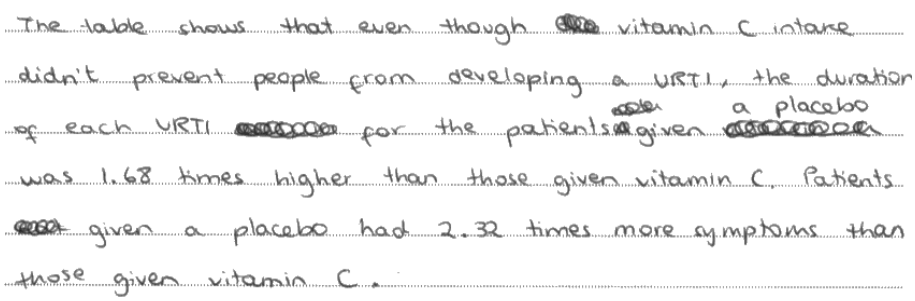
We know from past series that students can write some very detailed accounts of the light-independent reaction and this January was no exception; we saw good accounts in Q02(c) of mark points 3, 4 and 5. However, only the students who noticed the slightly different approach used in this question scored all four marks.

Q02(d) saw a range of responses with the mark points 1 and 3 being the most frequently awarded. Students who did not score well tended to just list the uses of the ions without linking their use specifically to photosynthesis, as asked in the question.

Question 3

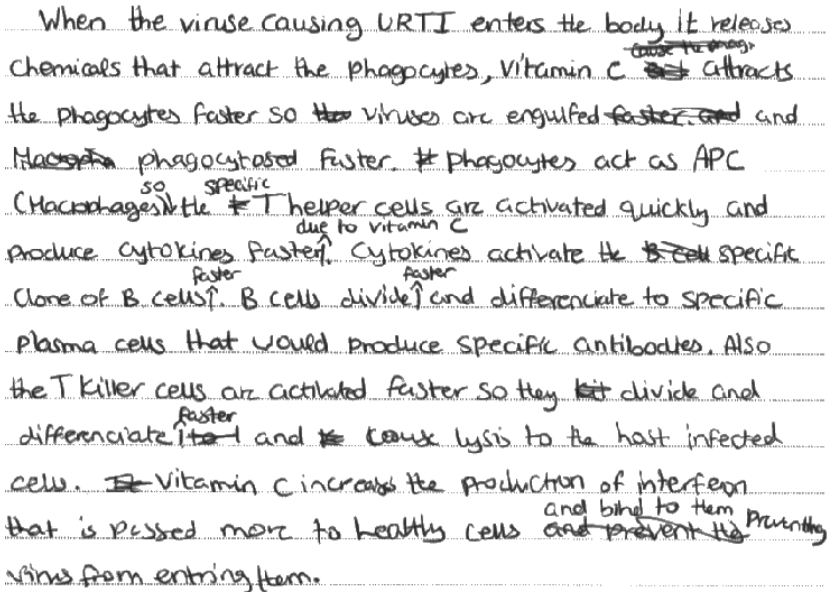
The majority of students knew that a placebo was used as a control group, scoring one out of the two marks. Fewer could explain another use of the placebo is to eliminate psychological effects.

Responses to Q03(a)(ii) were surprising. The item carried three marks but very few students gave three effects, despite the table clearly having four columns, each column concerning a different effect. With a question of this kind, students should be aware that their response needs to concern the effect of, in this case, the Vitamin C and not the placebo. This is illustrated below.


The table shows that even though vitamin C intake didn't prevent people from developing a URTI, the duration of each URTI for the patients given a placebo was 1.68 times higher than those given vitamin C. Patients given a placebo had 2.32 times more symptoms than those given vitamin C.

We saw a range of responses for Q03(a)(iii) but there were two common errors. A common misconception was the idea that having a different number of people in a group caused unreliability. Poor exam technique was a problem as many responses did not make it clear if the comments were justifying reliability or unreliability.

We have seen in previous series that students can describe aspects of both the non-specific response and the immune response. This series was no exception. Disappointingly some of students did not actually answer the question asked in Q03(b). The question specifically asked about the effect of Vitamin C so the answer had to relate to the improvements listed in the table. Below is an example of the type of response that we wanted to see.


When the virus causing URTI enters the body it releases chemicals that attract the phagocytes, Vitamin C attracts the phagocytes faster so viruses are engulfed and phagocytosed faster. Phagocytes act as APC so specific T helper cells are activated quickly and produce cytokines due to vitamin C faster. Cytokines activate the specific Clone of B cells faster. B cells divide faster and differentiate to specific plasma cells that would produce specific antibodies. Also the T killer cells are activated faster so they divide and differentiate faster and cause lysis to the host infected cells. Vitamin C increases the production of interferon that is passed more to healthy cells and bind to them preventing virus from entering them.

Common misconceptions relating to this part of the specification include the idea that viruses get killed either by macrophages of T-killer cells and that B-cells produce antibody.

Question 4

Questions relating to the part of the specification concerning decomposition are generally answered well, but this slightly different approach confused some students. The most common problem was that the questions were not read carefully enough.

In Q04(a) students frequently talked about the effect of the ratio on the temperature and not on rate of decomposition.

In part (b) there were a number of responses that discussed the effect of increased temperature on decomposition, instead of explaining why the temperature increased.

A number of responses to part (c)(i) discussed the importance of nitrogen to plants and not the microorganisms and the answer to part (a) was given in part (c)(ii).

Question 5

Students approached all parts of this question positively and generally scored well.

Students are good at answering questions involving speciation but only the more able appreciated that subspecies are not reproductively isolated, limiting many students to three marks in Q05(b). Some common errors were seen as in previous series such as genes not alleles being passed on, mutations occuring without mention of where they occur and no reference to phenotype adaptations.

In Q05(c)(i) we saw some very extensive accounts of both PCR and gel electrophoresis despite not all being needed. Although this does not count against the student, it could result in them running short of time at the end of the paper.

In Q05(c)(ii) we saw the usual confusion between fragments and bands. Bands of DNA are seen as a result of gel electrophoresis, each band being composed of fragments of DNA of similar length. A surprising number of students related the different banding patterns to the genetic diversity of the pandas and not the number of individual organisms. Although this was not what the question asked it was encouraging to see such good understanding of uses of DNA profiling.

Question 6

Q06(a)(i) was disappointing. We saw lots of students attempt to answer the question but very few appreciated that the number of wolves went up as their reproduction rate was faster than their death rate and that the number of elk went down as the wolves were eating them faster than they could produce more young.

Q06(a)(ii) and (b)(ii) saw some good suggestions, despite a few students thinking that the elk were carnivores.
Disappointingly, few students identified that (b)(i) was testing succession.

Question 7

This pair of multiple choice questions generally answered quite well and there was no one distractor that was consistently chosen incorrectly.

Students know huge amounts of detail about forensic entomology and other aspects of the specification point relating to dead mammals and are only two keen to write everything that they know. Quite often the detail goes beyond the requirement of the specification point but illustrates their interest in this topic. Unfortunately, a number of students identified the context of the question without reading it carefully enough resulting in a response that did not tell us that the information had to be collected and how it could actually be used. There were also some very detailed accounts of insect succession which were essentially just repeating the information given in the stem of the question.

Question 8

This multiple choice did see more incorrect answers, with the majority of students believing that using several eggs would make the investigation more accurate.

Q08(a)(iii) saw a range of responses. Students need to remember to explain how the results should be used, in this case how the growth rate can be calculated from the measurements made.

Unfortunately the responses to part (iv) were rarely above GCSE level. At this level we expect students to tell us that respiration produces ATP and to list specific uses of ATP and protein instead of making vague reference to 'growth'.

The calculation caused very few students a problem, with lots scoring all three marks.

Summary

The performance of students sitting a WBIO4 paper would be improved if they remembered the following points:

(i) In questions involving data presented in tables or graphs read the question carefully to check what you are being asked to do; it may be that you have to interpret the data and not just make comments about the actual variables given. An example of this in this paper was Q04(a) where you were asked about decomposition which you had to interpret from a graph showing temperature.

(ii) Read through your answers carefully to make sure that you have not made careless slips due to the pressures of exam conditions. For example in this paper there were references to viruses being killed in Q03(b) when this is not possible as they are not living organisms. In the same question there were responses about bacteria which are not appropriate in the context of this question.

(iii) Read the question very carefully and do not launch into writing a response just because you recognise the specification point. This was a mistake made in this paper in Q03(b) and Q07(c). In Q03(b) students described the defence mechanisms without relating them to the improvements resulting

from Vitamin C. In Q07(c) changes occurring to a dead body were described without explaining how they could actually be used.

(iv) Ensure that your answer does not simply repeat the stem of the question - we will not credit you for information that we have given you. This happened in Q7(b) where detailed descriptions of insect succession were given, although we had shown this in the table on page 20 of the exam paper.

(v) Ensure that your answers are at an appropriate level for an A2 paper. Examples of where this was a problem in this paper were Q06(a)(i) and Q08(a)(iv).
In Q06(a)(i) an explanation of why there are changes in the numbers of organisms should relate birth rate to death rate. In Q08(a)(iv) more specific uses of various nutrients were needed.

Grade Boundaries

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