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**General Certificate of Education (A-level)**
**January 2011**

# Human Biology HBIO2

# (Specification 2405)

# Unit 2: Humans - their origins and adaptations

# *Report on the Examination*

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### *General Comments*

There was no evidence that candidates were short of time. There were very few blank spaces left this year, with most candidates attempting every question. There were, however, several questions where many candidates failed to gain marks through an inability to express their answers in clear English.

### *Question 1*

(a) was well known by most candidates and about 80% of candidates gained both marks in this section.

In (b) only 30% of candidates gained all three marks. Often candidates failed to gain marks by being vague, rather than simply not knowing. The examiners hoped that candidates would realise that aerobic respiration produces more ATP than anaerobic respiration, and that anaerobic respiration results in a build-up of lactate that can lead to muscle fatigue. Many candidates simply wrote vaguely about the need to avoid becoming tired, pacing oneself and having more energy.

### *Question 2*

In (a), structure X was well known, although a few candidates confused the centromere with a chromatid or centriole.

In (b), just under half of candidates scored both marks. A common error was to confuse genes and alleles. Some said that the chromosomes had *similar* genes or that they were different shapes.

(c) was well known by a high proportion of candidates. Where they failed to gain marks, it was often because candidates did not refer to spindle fibres pulling the chromatids apart or by describing the daughter chromosomes moving into a new cell.

### *Question 3*

(a) was a straightforward question and was well answered by most candidates. The commonest error was to have nerve impulses going to the wrong part of the brain.

Only about 30% of candidates scored both marks in (b). Some had the muscles contracting faster but also contracting less, or had them contracting more deeply but less often. A few also misread the question and referred to changes in the heart rate.

### *Question 4*

Most candidates scored at least one mark in (a), usually for recognising that a parasite causes harm to its host. Some picked features that are not restricted to parasites, such as the ability to reproduce asexually.

Most candidates scored at least 2 marks in (b). The commonest error was to pick a correct adaptation, such as the ability of cysts to resist many chemicals used in the treatment of drinking water, but then fail to explain the adaptation adequately. Vague answers such as 'so it can survive' were common.

### *Question 5*

In (a), candidates could correctly identify circle G, but few gained further marks. This was often because of poor expression. Many thought the reason was that there were only two kinds of Australopithecine, or wrote vaguely about families and classes, in the non-biological sense.

Answers in (b) were also spoiled by vague expression. Many candidates simply said that you need to see how similar the DNA is. References to comparing base sequences, or DNA hybridisation, were very rare.

### *Question 6*

Although in (a), candidates were asked for two ways in which a malignant tumour differs from a benign tumour, many only gave two sides of the same argument, e.g., 'Malignant tumour is fast growing. Benign tumour is slow growing'. Other were simply too vague, e.g., 'malignant tumour is cancer'. Nevertheless, just under 60% of candidates gained both marks.

In (b)(i), very few candidates scored two marks, although most gained one mark. The commonest correct response was the idea that older people have had more exposure to UV radiation, but this was rarely linked to tumour suppressor or proto-oncogenes. In (b)(ii), most candidates scored at least one mark but very few scored three. The main reason for this was that candidates focused on just one set of data in the graph. It was common to read that the conclusion is valid because incidence rises continually, or that it is not valid after about age 60 because the number of new cases per year stops rising. Only the best candidates saw both arguments and attempted to explain the apparent contradiction.

### *Question 7*

The calculation in (a) proved easy for most candidates with almost 70% of candidates scoring two marks. Very few left the space blank.

Part (b)(i) proved straightforward and over 70% of candidates scored both marks. Part (b)(ii) was less well answered, often because candidates failed to give an environmental reason.

### *Question 8*

Most candidates scored at least one mark in (a)(i), usually for recognising that body mass varies between hominids, or for the idea that this allows comparison. However, only the best candidates gave both points. In (a)(ii), very few candidates scored all three marks but most scored one or two. Many could see that brain size had increased relative to body size between 3 to 1.5 million years ago, but fewer commented on the lack of increase over the past 0.5 million years, or that the increase only occurred as new species develop.

Almost 60% of candidates scored two marks in (b)(i). The commonest error was to give only part of a dating method, e.g., potassium dating, or to misspell the term so badly that credit could not be given, e.g., strategic dating. Many marks were lost in part (b)(ii) because of poor expression. Although candidates often had the right idea, answers gave vague or incorrect comments such as 'there is no carbon left' or 'it does not work'.

### *Question 9*

It surprised the examiners to see that only a little over half of all candidates scored all three marks in (a). This was sometimes because candidates gave vague answers such as 'sugar' or 'pentose' for Z rather than deoxyribose. However, others confused Z with a base, described X as a DNA monomer, or Y as a 'base-pair'. The worst candidates offered components that are not found in DNA, such as amino acids.

In (b), many candidates knew that a large DNA molecule allows it to store more information, although others thought it made the molecule more stable. Fewer recognised that the smaller size of an RNA molecule allows it to leave the nucleus. Many thought it allowed RNA to *enter* the nucleus, or to leave the cell and travel round the body.

Part (c) was clearly the most difficult question on the paper. In (c)(i), many candidates gave the reason that DNA causes disease, without any reference to transformation of the bacteria or recognition that other substances in the type S bacteria had no effect. In (c)(ii), better candidates did understand the need to test each component separately so that only one variable was tested at a time. However, many candidates left the answer blank or thought that this was to check that R bacteria do not cause disease. In (c)(iii), few candidates scored 2 marks. The usual answer was along the lines of 'it is not fair to harm animals' or 'we do not have the right to kill rats who cannot give permission'. Few candidates said anything further, such as recognising that scientific advances could not have been made without this.

### *Question 10*

Only the best candidates scored four marks in part (a). Few candidates considered how early humans may have attracted young wolves to their settlements. The idea of breeding animals with desired characteristics was well known by most, but many thought it would have been the fiercest and most vicious animals that were selected. It was also unusual to find a reference to the need for this selection to take place over many generations.

In (b)(i), there were many references to 'better communication' but often there was no more detail given. Better candidates only referred to the benefits of sharing information about hunting, or passing on skills and knowledge. Similarly, in (b)(ii), many understood the benefits of an extended childhood for learning, but few considered the types of complex skills that could be developed.

Part (c)(i) was surprisingly badly answered with almost half of all candidates scoring nothing. Many simply confined their answer to a vague statement such as 'a change in DNA'. In (c)(ii), it was clear that many candidates do not know what a seed is. Many confused a seed with pollen, and wrote about how this mutated seed could fertilise another plant and pass on the mutation. Others ignored the context of the question and wrote a rehearsed answer about rachis strength and survival of the fittest.

Part (d) produced answers scoring the full range of marks. Weak candidates thought that the mutations in wheat meant that hunter-gatherers would find a field of wheat (presumably already planted and growing) that was so productive they did not need to move on. The increase in temperature was frequently related to humans, who survived better as they did not get so cold, while the increased carbon dioxide was sometimes described as increasing their heart rate. Another common error was to suggest that increased temperature increased the *respiration* of wheat and therefore its yield. On the other hand, the best candidates gave the full story about successful farming providing a reliable food supply, allowing population growth, and even went on to describe the production of a surplus which could be traded.

## Mark Ranges and Award of Grades

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