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Biology (Salters-Nuffield) (6131 and 6134)

This Examiners' Report relates to Mark Scheme Publication code: UA 017362

January 2006

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Examiners' Report

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Biology (Salters-Nuffield)
(6131 and 6134)

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January 2006

Publications Code UA017362

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6131 Unit SN1 Examiner Report

Maximum mark 60

Mean mark 32.3

Standard deviation 11.1

General Comments
The paper produced a wider spread of marks than previous papers. A significant number of candidates scored less than 10 marks where others were scoring comfortably in the 50's. The paper marked well and most candidates were able to tackle all the questions. Less able candidates however struggled with concepts such as protein structure, protein synthesis and gene therapy. It was apparent that certain key parts of the specification such as primary structure and bonding in proteins and types of gene therapy had not been covered in sufficient detail by some centres. Examiners are aware that this was the first examination for new centres starting the course in September 2005.

Question 1
The table in proved to be difficult for many candidates and therefore this question was very discriminating providing the full range of marks. Full marks were rarely seen even in 50+ candidates. The elements proved to be the hardest part, particularly in relation to nucleic acids where most candidates missed out P. Other common mistakes included missing the glycerol from lipids and considering sugars as polysaccharides. Some candidates need to be encouraged to be more precise in their answers – e.g. sugar as a subunit of polysaccharides lacks the precision required at AS level. In part (b), most candidates recognised that unsaturated fatty acids have a double bond. Although many did not refer to the fact that it was a C=C double bond, the mark scheme did credit simply the presence of a double bond. Less able candidates referred to saturated fats having double bonds or only one of the lipids being soluble in water. Most candidates scored 2 or 3 marks for their labelled diagram of a membrane in part (c). Common errors were drawing phospholipids with a single 'tail' or failing to add protein to the diagram; some less able candidates attempted to draw glucose structure or did not attempt this part at all.

Question 2
In part (a), despite a generous mark scheme some candidates failed to gain a mark for defining what a mutation is. Weak answers focussed on defective cells rather than changes in DNA, alleles or genes. For part (b), although the genetics involved in this unit does not involve much more detail than many candidates have covered at GCSE, a significant number of candidates cannot distinguish between genotype and phenotype; a common error is describing the phenotype as a carrier. (This was allowed as an error carried forward into the table as it was such a common mistake and it prevented candidates being penalised twice). Most candidates completed the table correctly although some misread the question and thought it was the probability of being affected and therefore 25%; some were muddled up between probabilities and ratios. A range of correct answers was given to the genetic testing aspect, though candidates need to take care with their spelling as chorionic villus sampling was invariably written as chronic villus sampling.

Question 3

Many candidates scored well on the first calculation but the second section proved harder with many simply comparing the number of deaths so reaching an answer of 3.76 as they ignored the difference in population sizes between men and women. When describing the graph in part (b)(i) candidates can easily spot the main trend to gain one mark but of those who try to use the data most just tended to read off figures from the graph rather than manipulate the figures or use the figures to illustrate a difference in the trend between two points. For part (b), many candidates do know the formula for BMI, although some mistakenly use weight instead of mass and some fail to square the height. In section (iii), there was generally a very good understanding of the causes of CHD in terms of higher blood cholesterol levels and high blood pressure and many correctly refer to atheroma or plaque formation. More able candidates added reference to the risk of a blood clot blocking coronary arteries or an increased risk of Type II diabetes. Less able candidates tend to refer to strain on the heart or fat around the heart or clogging up arteries. Some candidates refer to obese people eating too much LDL and fail to make the distinction clear between dietary fat and LDL's/cholesterol levels in the blood.

Question 4

Practically all candidates referred to Daphnia being transparent and gained a mark in part (a)(i) although a few referred to an advantage being that they were very like humans. However, when attempting to identify control of suitable variables in section (ii) many candidates referred to caffeine concentration which was clearly the independent variable in this investigation. Other candidates need to avoid the use of vague terms such as amount instead of volume and room temperature was another vague control variable given by some candidates. In terms of section (iii) some candidates got the significance of surface area to volume ratio the wrong way round, although a lot of candidates recognised that diffusion was insufficient by itself. A few candidates thought that Daphnia was warm-blooded or even a mammal. In part (b), many less able candidates could score 2 marks, usually for referring to caffeine raising blood pressure and therefore causing damage to arteries or increasing the risk of a heart attack or stroke. Few candidates referred to vasoconstriction.

Question 5

Most candidates achieved both marks in part (a), although some only referred to the movement of one of the gases or described both gases moving in the same direction. In part (b) more able candidates could easily score full marks for the details of the alveoli or capillary network, though marks were frequently lost through lack of precision; typical errors from less able candidates involved reference to cell walls, good blood supply or concentration gradients with no reference to how they are achieved. In part (c) many candidates can refer to the CFTR protein but then have no clear idea of its function, failing to link this to a lack of chloride ions in the mucus or water therefore not able to move into the mucus by osmosis. Simple answers referred to water not being regulated. In section (ii) few candidates scored 2 marks; many recognise that the sticky mucus blocks the airways but fail to provide any further detail as to how this will affect gas exchange. Vague answers here referred to mucus clogging up the surface making diffusion or gas exchange difficult.

Question 6

Part (a) proved to be a high range discriminator. A small number of candidates clearly explained primary structure of a protein. Less able candidates simply refer to it as the first structure in a protein! In section (ii) more able candidates can refer to R groups and the significance of specific named bonds in forming the tertiary structure of a protein but others have some awareness that the polypeptide chain folds in some way but go no further in their explanation. This lack of detail has been apparent on previous papers. In terms of enzymes in part (b) many candidates correctly quote active sites and the lock and key hypothesis. Good answers referred to the specific or complementary shape of the substrate and the formation of enzyme-substrate complexes. A few candidates thought that it was the substrate that possessed the active site. In part (c) there were many good answers describing translation, though some candidates lost time describing transcription first. The role of the ribosome, codon-anticodon binding and peptide bonds were recognised by many candidates, though few refer to the fact that the tRNA picks up **specific** amino acids.

Question 7

Most candidates could score full marks for the table, though many failed to score marks on the remaining sections with a large number leaving it blank. This part of the specification appeared to have been overlooked by many candidates and correct responses were more often seen in certain centres. Common misconceptions were relating germ line gene therapy to the uses of 'germs' or viruses and somatic gene therapy to liposomes, rather than the type of cell to be treated. Some candidates did recognise that germ line therapy could affect future generations. In part (c)(ii) there were many superficial answers referring to the fact that germ line gene therapy was dangerous, resulted in death to the embryo or simply that it was playing God. The question was a good discriminator as only most able candidates were scoring full marks for this section.

6134 Unit SN4 Examiner Report

Maximum mark 60

Mean mark 37.5

Standard deviation 8.3

General comments
This paper turned out to be particularly accessible to candidates, and the mean mark was markedly higher than previous sessions. There was a wide range of marks, although very few candidates scored zero in any question, and full marks was quite common in a number of sections. It was unusual to find evidence that a candidate had insufficient time, and there were many very full answers.

It was pleasing, once again, to see candidates approaching unfamiliar material with confidence, and providing well thought out suggestions and explanations. Clearly, the experience of the course has provided the appropriate skills. There were also questions on this paper that allowed credit for demonstrating learning of biological facts and processes in a more straightforward fashion, and in general candidates' answers were as detailed and accurate as was hoped. The quality of expression showed some improvement, and in general less time seemed to be spent in unravelling the logic of explanations.

Question 1
Part (a) proved to be less straightforward introduction to the paper than was intended. Although it was worth enough marks to warrant the number of stages in the calculation, few candidates were able to proceed past the simple working out of the temperature rise. Of those who spotted that the temperature would rise each hour due to a lack of evaporation of sweat, a few lost the final mark as a result of inappropriate rounding of the answer given by their calculator. It should be noted that one of the criteria for success at this level includes and ability to perform calculations, so they are always likely in the examination paper at some point. Candidates should be reminded that they should have a calculator with them.

Part (b) redressed the balance somewhat, since candidates appeared to enjoy giving a detailed account of thermoregulation. High scores were common, and it was pleasing to see that candidates had understood the principles of negative feedback and homeostasis. Less impressive was the number of answers the described sweating as a means of cooling, when the context of the question made it clear that this was not possible. Candidates should take notice of the context of the question when giving their answers.

Question 2
The first part of this question proved to be as well done as the previous section, being a straightforward description of the light dependent reactions. Light and chlorophyll were surprisingly common omissions, however, with the chloroplast acting as the source of electrons in a remarkable number of answers. One mark was easily gained for part (b), but candidates should be advised that some quantitative comparison is needed for more credit. Simple quoting of values is unlikely to be sufficient, but expressions such as 'more than double' or 'about two and a half times' are fine. Part (c) discriminated well, with good candidates accepting that more of the carbon was being diverted into sucrose production. Some worried that this could not occur as RuBP was not being regenerated. The question, however, invites suggestions which concentrate on explaining the information given, and this is likely to be a simplification. Most

candidates were able to relate the increased sucrose to some commercial benefit, but credit was not given for descriptions of selective advantage in this context.

Question 3

The historical development of evolutionary theory was well known, and many candidates scored well in part (a). Part (b) was only answered well by more able candidates, and there was much confusion between 'gene' and 'allele', with frequent misuse of 'gene'. Despite the emboldening of the negative, many found part (c) confusing and described reasons why dogs are all the same species. More able candidates understood ways in which Wilberforce's argument might have been flawed.

Question 4

Candidates were able to gain marks on most parts of this question, although only more able candidates scored highly. Responses to part (a) usually involved some description of immunosuppression, and many discussed routes of infection. Part (b) was centre dependent, but T cells in some guise were usually recognised as being particularly important in the response to virally infected cells. Part (c) was an example of candidates correctly interpreting novel information and was generally well done. In part (d), many gave answers involving natural selection to describe how resistant forms have arisen. This did not make best use of the information given, however, and because of context of the stem this was not credited. Part (e) did give credit for descriptions of selection, and where candidates find themselves repeating an answer they should look for alternatives.

Question 5

This question proved to be difficult in that interpretation of data was not very thorough at times. In part (a)(i), most recognised the lack of a correlation, but many did not expand on their answer for the second mark. Many did, however, phrase the same answer in two different ways. As suggested earlier, candidates should look to make comparisons of particular examples. In part (a)(ii), few candidates scored above a single mark. The clear pattern in the cell wall data was largely ignored, and where it was quoted it was often suggested that cell walls prevent water loss. Again, irrelevant data is unlikely to be included in a question. Almost every candidate scored full marks in part (b), and those who knew, or noticed, the word 'biotic' found part (c) very easy.

Question 6

As in previous papers, candidates seemed well versed in investigations on dead bodies. Most appreciated the effect of temperature on insect development in part (a), and also the value of comparative data for assessing reliability in part (b). Part (c) was straightforward, with many candidates suggesting suitable reasons to doubt the conclusions.

Question 7

More able candidates found this question very easy, and almost all were familiar with the problems and benefits of zoos. It was intended as a gentle exit from the paper, and it certainly seemed to be just that. Part (a) stimulated a whole range of correct responses, and answers to part (b) were similarly varied and accurate.

UNIT GRADE BOUNDARIES AND UNIFORM MARKS

The raw mark obtained in each unit is converted into a standardised mark on a uniform mark scale, and the uniform marks are then aggregated into a total for the subject. Details of the method of aggregation are given in Appendix A.

For the AS examinations Units 1 and 3 have a weighting of 30% and Unit 2 has a weighting of 40%, and the maximum raw marks and maximum UMS marks are shown in the table below.

Unit code	Maximum raw marks	Maximum UMS marks
6131	60	90
6132	80	120
6133	40	90

For the A level, Units 1, 3, 4 and 6 have a weighting of 15% and Units 2 and 5 have a weighting of 20%, and the maximum raw marks and maximum UMS marks for the A2 units are shown below.

Unit code	Maximum raw marks	Maximum UMS marks
6134	60	90
6135	80	120
6136	60	90

The table below shows the boundaries at which raw marks were converted into uniform marks in this examination. The A and E grade boundaries are determined by inspection of the quality of the candidates' work. The other grade boundaries are determined by dividing the range of marks between A and E. Marks within each grade are scaled appropriately within the equivalent range of uniform marks.

In Unit 3 the A and E boundaries are determined separately on the two components of the unit, paper 01 (visit or issue report) and paper 02 (practical work review). These marks are then added together to find the A and E boundaries for the unit as a whole, and the other grade boundaries for the Unit are then found as described above. Boundaries for the B, C and D grades for each component can be calculated in the same way, but please note that these are **not** simply added together to obtain the B, C and D boundaries for the unit as a whole.

Unit grade boundaries
Please refer to the notes above.

Unit	Maximum mark	Grade				
		A	B	C	D	E
	Uniform marks					
	90	72	63	54	45	36
	Raw marks					
6131 Unit SN1	60	44	39	34	30	26
6134 Unit SN4	60	46	42	38	34	31

PROVISIONAL STATISTICS

The provisional percentages of candidates obtaining at least the indicated grade are given below.

Unit	Number sat	Cumulative percentage of candidates				
		A	B	C	D	E
6131 Unit SN1	3 101	18.0	31.4	47.1	59.9	72.4
6134 Unit SN4	926	17.3	34.1	51.9	69.3	79.4

AS cash in	Entry	A	B	C	D	E
8048	23	8.7	26.1	56.5	60.9	87.0
9048	6	33.3	100.0	100.0	100.0	100.0

APPENDIX A
The Uniform Mark System for AS and A level Unit Schemes

The result for each unit will be issued as a standardised mark on a uniform mark scale. AS subjects have a total of 300 uniform marks and A level subjects have a total of 600 uniform marks.

Tables 1 and 2 show the numbers of uniform marks required to gain each subject grade in AS and A level examinations. They also indicate the number of uniform marks in units with various weightings that will aggregate into the appropriate subject grade. These provide a guide to the level of performance in each unit.

The uniform marks shown for each unit do not necessarily represent the actual mark range used for marking the module. Grade boundaries for units are set at Awarding meetings on the basis of candidate performance on the actual mark range used. These boundaries are then converted to the uniform marks shown in the tables, with intermediate values calculated accordingly.

Table 1 – Advanced Subsidiary Subjects

Subject		Unit Weighting					
Grade	**UM**	**20%**	**30%**	**$33\frac{1}{3}$%**	**40%**	**50%**	**60%**
Max mark	**300**	60	**90**	100	**120**	150	180
A	**240**	48	**72**	80	**96**	120	144
B	**210**	42	**63**	70	**84**	105	126
C	**180**	36	**54**	60	**72**	90	108
D	**150**	30	**45**	50	**60**	75	90
E	**120**	24	**36**	40	**48**	60	72

For example, a candidate for AS Salters-Nuffield Biology must take three units, Unit 1 and Unit 3 are weighted at 30% and Unit 2 is weighted at 40%

	Uniform mark obtained	**Approximate level of performance**
Unit 1	65	B
Unit 2	73	C
Unit 3	80	A
Subject Total	**218**	**Subject Grade = B**

Table 2 – Advanced Level Subjects

Subject		Unit Weighting				
Grade	**UM**	**15%**	**16^{2}_{3}%**	**20%**	**25%**	**30%**
Max mark	**600**	**90**	100	**120**	150	180
A	**480**	**72**	80	**96**	120	144
B	**420**	**63**	70	**84**	105	126
C	**360**	**54**	60	**72**	90	108
D	**300**	**45**	50	**60**	75	90
E	**240**	**36**	40	**48**	60	72

For example, a candidate for A level Salters-Nuffield Biology must take six units, Units 1, 3, 4 and 6 are weighted at 15% and Units 2 and 5 are weighted at 20%. The candidate in this example has four units in the bank.

	Uniform Mark Obtained	**Approximate level of performance**
Unit1	59	C
Unit 2	73	C
Unit 3	69	B
Unit 4	82	A
Unit 5	*	
Unit 6	*	
	Partial Total in Bank = 283	

The candidate already has 283 uniform marks in the bank. If a Grade B is required in the subject, the candidate must obtain at least 137 marks from the remaining two (e.g. 70+67) in order to gain the minimum uniform mark of 420 for a Grade B (283 + 137 = 420).

There is no rule requiring candidates to take units amounting to 30% of the examination at the time of cashing in, nor do candidates have to take all papers with synoptic assessment at the same time at their first cash in.

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