Biology 3201
Grading Standards
June 2004

1. Pre-Marking Appraisal

Comments:
Overall, the June 2004 exam was considered fair. The exam was well designed and of reasonable length and difficulty. Item # 33 was dropped because there was no correct answer. Item #76(b) was also dropped. This item was created from the outcomes for Core Lab # 2 - *Identifying Diabetes Mellitus.* The suggested temperature of 36 ^{o}C in the lab procedure did not work for most teachers and as a result the lab did not work. The temperature of the water must be much higher than 36 ^{o}C for it to work during one lab period. The marking board decided that this question was unfair due to this problem with the procedure.

2. Post Marking Report:

(a) Marking Standard and Consistency

Marker reliability was checked by obtaining a random sample of 50 papers that went through the marker panel and marks were assigned to each question on a separate sheet of paper. The 50 exams were put back into the original stack of exams and corrected again when they appeared. The two values were compared and if there were discrepancies, the chief marker would review the scoring with the individual marker.

Throughout the marking process there was statistical analysis run on item data to enhance reliability and consistency of marking

Summary:

Two obvious issues are clear from the student responses on this exam. Biology students must be tested at higher orders of cognitive learning throughout their school year. It is obvious that many students are not able to answer higher order questions.

In addition, the Evolution unit must be given either more or better treatment by teachers during the school year. Many items from this unit were deemed "very easy" by the marking board, but were unanswered by students.

Finally, the marking board determined that students that scored well in part II most often wrote their responses in a clear and concise manner. As a result, it was suggested that the examinations in the future direct students to make sure that their responses to constructed response items are clearly presented in a well-organized manner. When this is done student results are usually affected in a positive manner.

PART II
Total Value: 25%

Constructive Response/Common Errors

Value

3% 76(a) Shortly after being struck in the back of the head, a person staggers. What part of the brain was damaged? Give two reasons to support your answer.

Cerebellum - motor coordination and balance

1½ marks - cerebellum
1½ marks - reason

Commentary on Response:

Generally, the question was very well done with many students getting full marks. It was generally a question where students would typically get full marks or no marks.

Common Errors:

- students often gave cerebrum for a response instead of cerebellum.

2% 76(b) What four symptoms would confirm the diagnosis obtained from a positive result on a Benedict's Solution test?

- thirst	- frequent urination	- sweating
- poor circulation	- fatigue	- high & low blood sugars
- vision problems	- high blood pressure	- disorientation
- headaches		

- also ½ marks if "diabetes" is mentioned.

Note: Question Dropped from this Exam (see earlier explanation (pre-marking analysis)

Value

2% 77(a) Explain either two reasons for supporting or two reasons for opposing the use of therapeutic cloning to replace damaged cells in the spinal cord.

For normal life; nerve cells grow slow so may need cloning to improve rate; may lead to future discoveries in spinal research; doesn't have to use embryos.

Oppose "playing God"
- Religion
- killing embryos (possibly?)
- rejected by new person

1 mark for each answer.

Commentary on Response:

Generally, the question was fairly well done with many students getting at least half marks on the question. Students with little background knowledge could reasonably arrive at a decent response.

Common Errors:

- students mistakenly regarding therapeutic cloning as cloning of an entire individual.

2% 77(b) Two females athletes were administered testosterone to improve athletic performance. One athlete had gone through puberty while the other had not. How would the reproductive systems of the two athletes be affected differently by the administration of testosterone?

Already had puberty - menstrual cycle slowed / stopped / altered

Not at puberty - delayed / prevented / stays the same.

1 mark for each answer.

Commentary on Response:

Students who read the entire question seemed to have a better chance at getting the answer correct than the students who tended to skim through the question and miss the intent of the question.

Common Errors:

- students would discuss the development of male sex characteristics in females.
- students would discuss the females' change in athletic ability.
- students would discuss that testosterone effected one female (and answer correctly) but it did not effect the other female.
- students would discuss a delay in female secondary sex characteristic development.

3% 77(c) The rhythm method is a method of birth control in which a couple does not have sexual intercourse while they believe ovulation is occurring. Give three biological reasons why this is an ineffective method of birth control.

- sperm can live for days
- menstrual cycle varies (from month-month)
- difficult to monitor temp and vaginal discharge for release of eggs
- stress, exercise, drugs, etc. may affect
- diet

1 mark for each answer.

Commentary on Response:

Students generally understood this material. Many responses that received full marks actually gave answers that included more than the three required items. Those students who did not fair well, appeared to misunderstand that the question was looking for the "Biological Reasons" to the ineffectiveness of this method.

Common Errors:

- not a method for preventing S.T.I.S.
- not knowing how to test for the ovulation period.
- gave other types of birth control.

2% 78(a) Identical twins were separated at birth and adopted by two different families. As adults, one of the twins became a professional athlete while the other was fragile and had many health problems. Give two reasons how this could happen.

- nutrition
- social factors - money, medicine
- environmental
- exercise
- mutation
- childbirth and fetal development differences

1 mark for each answer - also 1 mark if just "environmental" was mentioned

Commentary on Response:

Overall answered reasonably well. Accepted answers included reference to the environment as it pertained to diet, exercise, and social pressures. Pre-natal factors including mutations and problems with umbilical cord were also accepted. Somatic mutations provided an additional source of variation.

Common Errors:
- students often referenced "siamese" twins".
- discussed environmental factors in general terms.
- did not connect the genetic similarity between identical twins.
- confused the term fraternal twins.
- discussed sex-linked traits as a source of variety.
- did not state that genetic disease would affect both.

3% 78(b) In guinea pigs, black coat colour (B) is dominant to white (b), and short hair length (S) is dominant to long (s). A male guinea pig, black with short hair, mates with two females. The matings are described below.

female	phenotype of female	phenotypes of offspring produced
A	white, short-haired	black, short haired
B	black, short-haired	all white, long-haired

What are the genotypes of the male parent and each female parent? Show all workings.

Male
Black Short
B ___ S___

Female #1
White Short
bb S___

Female #2
Black Short
B___ S___

Male × Female 1
Bb Ss Bb Ss
\ /
Black Short - B_ S_
White Long -bb ♂ ♂

Male × Female 2
Bb Ss Bb Ss
\ /
White Long -bb ♂ ♂

1 mark for each correct answer
2 marks if answer was correct **BUT** no workings were shown
Partial marks if answer was incorrect **BUT** some workings were correct.

Commentary on Response:

Student answered question marginally well. Students that knew answer, knew it well. Those that didn't, did very poorly.

Common Errors:

- did not realize that heterozygous parents can produce homozygous recessive genotypes/phenotypes.
- made question a sex-linked problem.
- did not show workings
- did not "map" $F_1 \rightarrow F_2$ generations.

2% 78(c) The island of Newfoundland is an attractive location for genetic research studies. How would a substantial influx of new families into the island affect further research by these companies?

- new allele freq. brought in will change the allele freq. in the Founder Population.

- now Newfoundland will be less attractive for research companies.

1 mark for each answer.

Commentary on Response:

The question was poorly answered because they did not focus on the real question. Many students spent too much time discussing why Newfoundland is a good site for genetic research. They spent little time on stating the real reasons, probably because they did not understand the STSE well enough to answer this question. However, there were a number of very good responses which indicates it was a fair question.

Common Errors:

- research would cost more and take longer
- cause an upset in the research
- more genes to research
- it would make research harder
- the more people you get, the better the results
- more diseases and mutations be introduced
- research wouldn't be as accurate
- change the environment, more pollution and clearing the land for more houses

2% 78(d) A research lab has developed a strain of potato with an abundance of protein and the capability of reducing cholesterol levels. What is one advantage and one disadvantage associated with providing these potatoes to farmers?

For - better nutrition
- possibly reducing heart problems/high blood pressure
- financial benefit for farmers

Against - possible unknown health risks
- environmental troubles
- cross breeding with existing potatoes

1 mark for each correct answer.

Commentary on Response:

This question was done moderately well. Most students received part marks.

Common Errors:

- students answered by stating the following statement directly from the question, "*the abundance of protein and the capability of reducing cholesterol levels*", as the advantage.
- the intent of the question was to discuss the biological advantages and disadvantages to the farmers, however, many students answered from an economic standpoint.

2% 79(a) If 16% of a Hardy-Weinberg population expresses a particular recessive trait, calculate the percentage of the population that would have the heterozygous genotype for this trait. Show all workings.

$p^2 + 2pq + q^2 = 1$ $\quad q = .4$

$\downarrow$ $\quad q = .6$

2(.4)(.6)

$\boxed{48\%}$

$\frac{1}{2}$ mark - q

$\frac{1}{2}$ mark - q

$\frac{1}{2}$ mark - if **both** equations are given

$p^2 + 2pq + q^2 = 1$

$p + 1 = 1$

2 marks for correct answers with workings.

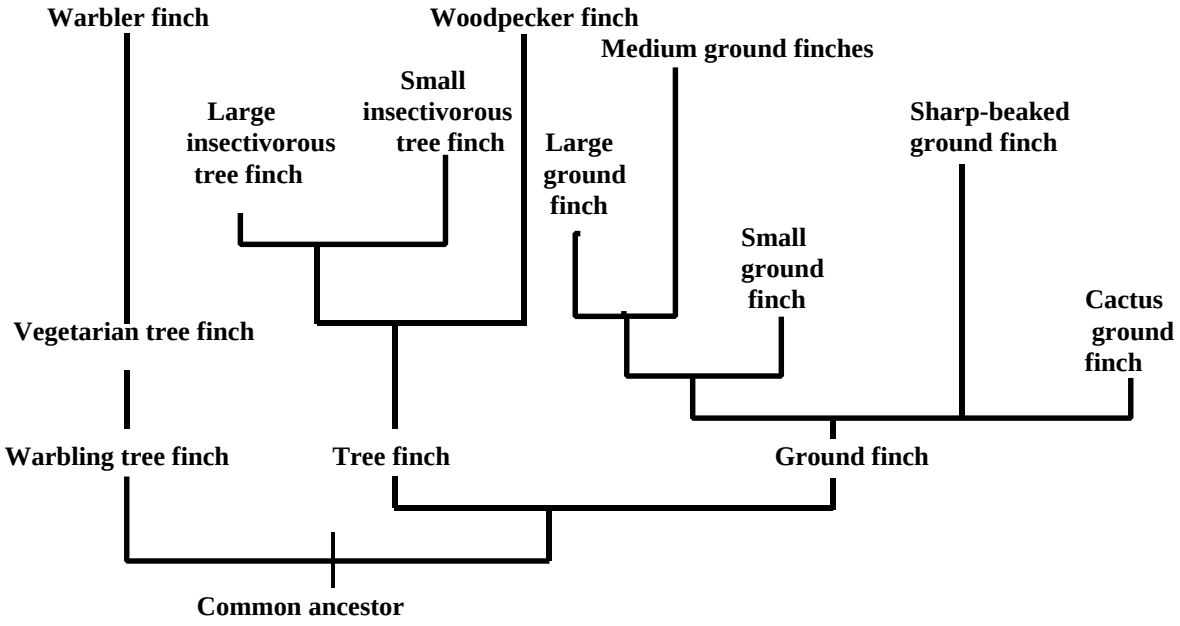
Commentary on Response:

A large number of students did not attempt this question. It appears that students either could or could not do the problem, as there were very few "partial" marks awarded.

Common Errors:

- q = .16, therefore p = .84, and 2pq was calculated 2 × .16 × .84.
- $p^2 + 2p(.16) + (.16)^2 = 1$ and tried to solve for p.

2% 79(b) The diagram below shows how the Galapagos Island finches evolved from one common ancestor.



(i) What mechanism of evolution is illustrated in this diagram?

Adaptive Radiation or Divergent Evolution or Punctuated Equilibrium or Gradualism

(ii) Give two possible reasons for the occurrence of this pattern of evolution.

Any two of Geographic isolation/Reproductive isolation/Habitat Isolation
- unfilled niches
- less competiton

$\frac{1}{2}$ mark for each answer.

Commentary on Response:

The students appear to be confused on the use of the term “mechanism”. They did not appear to understand exactly what was being asked.

Common Errors:

- described Darwinism as opposed to giving the possible reasons for divergences.

BIOLOGY 3201 ITEM ANALYSIS
SELECTED - RESPONSE (PART I)

Item	Answer	Cognitive Level	Responses				
			Multiple Answers or No Response	A	B	C	D
			%	%	%	%	%
1	C	1	0.1	2.7	0.9	95.7	0.6
2	C	1	0.4	12.6	18.2	50.8	18
3	D	1	0.1	17.4	5.7	10.4	66.3
4	D	2	0.1	16.3	7.5	3.9	72.2
5	C	1	0.2	8.4	32.7	52	6.7
6	A	1	0.3	50	26.4	9.5	13.8
7	D	1	0	5.4	4.5	7.4	82.7
8	D	2	0.2	16.4	20	12.9	50.3
9	B	1	0.1	14.7	58	3.3	24
10	B	1	0.1	2.9	62.6	31.5	2.9
11	D	2	0	16.2	3.3	1.3	79.1
12	C	2	0.6	9.2	12.8	53.4	24
13	C	1	0	0.3	3	93.7	3
14	B	2	0.4	13.9	52.2	18.4	15.1
15	A	3	0.2	45	25.4	21.5	7.8
16	C	1	0.1	14.8	30.1	46.3	8.7
17	A	2	0.3	41	18.5	20.7	19.5
18	A	2	0.2	60.9	4.1	15.5	19.3
19	C	3	0.1	59.2	3.1	34.2	3.5
20	A	1	0.1	65.4	10.3	12.2	12
21	A	1	0.1	64	10.4	4.4	21.1
22	A	1	0	82.5	10.8	4.9	1.7
23	C	2	0	36.6	13.6	32.8	17

Item	Answer	Cognitive Level	Responses				
			Multiple Answers or No Response	A	B	C	D
			%	%	%	%	%
24	C	1	0	3.7	13.2	63.5	19.6
25	D	2	0.1	10.4	9.1	51.7	28.7
26	A	1	0.1	66.1	3.9	18.2	11.6
27	B	1	0	9.3	67.5	6.3	16.8
28	B	1	0.1	3.7	70.6	7	18.6
29	D	2	0	20.6	3	0.9	75.4
30	C	1	0	11.2	23.7	54.4	10.5
31	A	1	0	68.1	13.4	16.1	2.3
32	D	1	0.1	18.2	11	3.8	67
33	**Item Omitted**						
34	B	2	0	20.2	62.9	13.7	3.1
35	A	2	0	95.3	1.5	2.1	1.1
36	B	2	0.1	8.7	78.3	10.9	2
37	C	1	0	7.5	1.6	89.6	1.3
38	C	2	0.1	5.4	15.7	71.6	7.1
39	C	2	0	0.3	10.2	88.9	0.7
40	D	3	0.4	11.7	59.4	12.7	15.8
41	D	3	0.3	31.2	9.6	25.7	33.2
42	B	2	0	27	68.5	3.7	0.7
43	A	3	0.4	59.6	9.6	19.7	10.7
44	D	1	0.2	21.9	11	14.2	52.8
45	A	1	0.2	53.7	9.9	30	6.2
46	C	2	0.1	24	15.8	26.8	33.4
47	D	3	0.1	10.3	26.5	39.5	23.6
48	C	1	0.3	6.2	8.2	76.6	8.7
49	C	2	0.1	3.6	5.2	87.4	3.6

Item	Answer	Cognitive Level	Responses				
			Multiple Answers or No Response	A	B	C	D
			%	%	%	%	%
50	D	2	0.1	27.4	7	10.8	54.7
51	A	1	0.1	70.6	15.2	10	4.1
52	A	2	0.2	52..2	20.8	7	19.8
53	D	1	0.1	10.2	11.7	35	43.1
54	D	2	0.1	31.2	2.5	2	64.2
55	A & D	2	0	52.5	3.2	4.3	40
56	C	1	0.1	4.3	8.3	73.7	13.6
57	B	1	0.1	34.9	56.2	7.2	1.6
58	A	1	0.1	57.2	19.6	14.5	8.6
59	A	2	0.3	70.6	9.5	10.5	9.1
60	D	1	0.2	13.7	13.3	19.1	53.6
61	D	1	0.1	17.7	11.2	9.4	61.6
62	A	1	0.1	35.9	47.1	7.1	9.8
63	D	2	0.4	14.1	18.6	21.2	45.7
64	A	1	0.1	96.4	1.6	1.3	0.6
65	D	1	0.2	9.3	34.4	18.1	38
66	A	1	0.1	63.4	7.3	14.3	14.9
67	B	1	0.2	8.6	60.2	18.6	12.3
68	D	2	0.3	15	7.2	20.8	56.6
69	C	1	0.1	11.7	8.2	44.5	35.5
70	D	2	0.2	12.8	26.7	26.2	34
71	C	2	0.1	14.2	8.3	65.2	12.2
72	D	3	0.3	16.9	28.5	29.6	24.7
73	B	2	0	6.2	81.1	6.2	6.5
74	C	2	0.3	9.5	20.9	45.3	24.1
75	C	1	0.4	30.3	10.6	38.7	20

BIOLOGY 3201 ITEM ANALYSIS
CONSTRUCTED - RESPONSE (PART II)

Item	Number of Students Completing Item	Value	Cognitive Level	Average	Average % Per Item
76 (a)	3324	3	3	1.8	60.8
76 (b)	**Item Omitted**				
77 (a)	3324	2	2	1	50.1
77 (b)	3324	2	3	0.5	26.3
77 (c)	3324	3	3	1.2	40.1
78 (a)	3324	2	3	1.3	63.8
78 (b)	3324	3	3	1.5	50.6
78 (c)	3324	2	2	0.9	22.7
78 (d)	3324	2	2	0.5	44.7
79 (a)	3324	2	2	0.5	27.3
79 (b)	3324	2	3	0.4	19

Biology 3201 Grade Level Results
Percent Achieved
0
10
20
30
40
50
60
70
80
90
100
73
65
63
53
Explain the role of enzymes in digestion
Describe the role of the circulatory system
Identify the components of blood
Describe the role of the respiratory system