IB DIPLOMA PROGRAMME
PROGRAMME DU DIPLÔME DU BI
PROGRAMA DEL DIPLOMA DEL BI

M02/410/S(2)

BIOLOGY
STANDARD LEVEL
PAPER 2

Thursday 9 May 2002 (afternoon)

1 hour

Name

Number

INSTRUCTIONS TO CANDIDATES

- Write your candidate name and number in the boxes above.
- Do not open this examination paper until instructed to do so.
- Section A: Answer all of Section A in the spaces provided.
- Section B: Answer one question from Section B. Write your answers in a continuation answer booklet, and indicate the number of booklets used in the box below. Write your name and candidate number on the front cover of the continuation answer booklets, and attach them to this question paper using the tag provided.
- At the end of the examination, indicate the number of the Section B question answered in the box below.

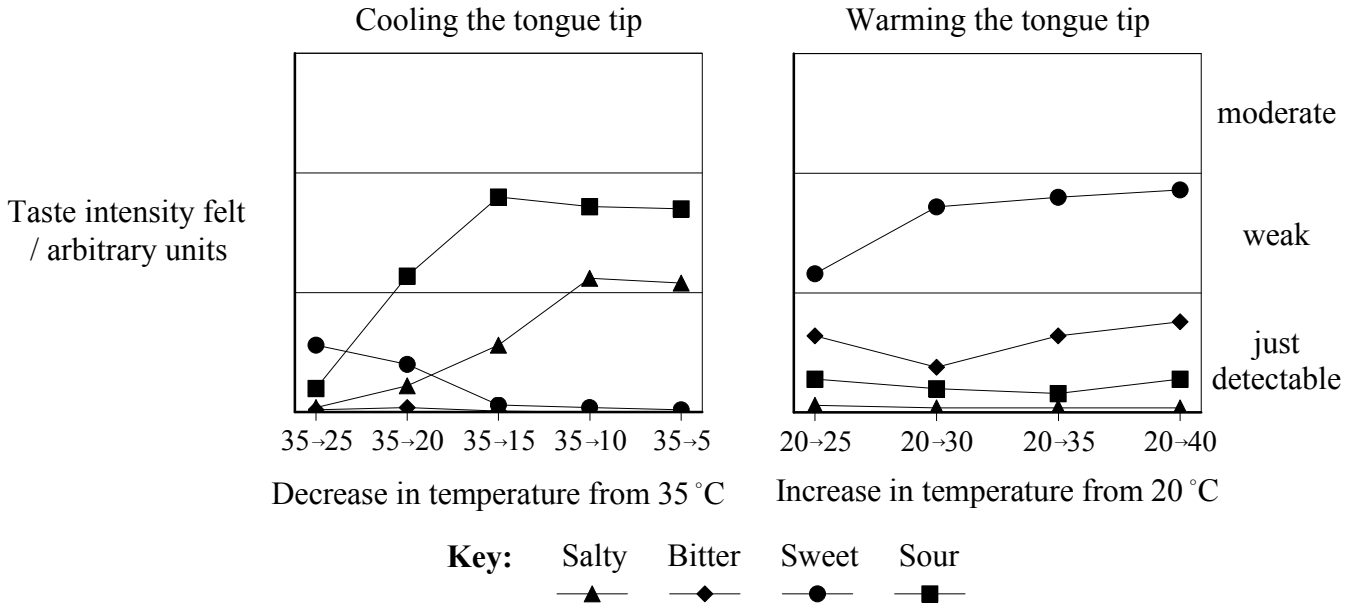
QUESTIONS ANSWERED		EXAMINER	TEAM LEADER	IBCA
SECTION A	ALL	/20	/20	/20
SECTION B QUESTION	. . . . .	/20	/20	/20
NUMBER OF CONTINUATION BOOKLETS USED	. . . . .	TOTAL /40	TOTAL /40	TOTAL /40

SECTION A

*Candidates must answer **all** questions in the spaces provided.*

1. The sense of taste is normally caused by the stimulation of chemoreceptors in the taste buds of the tongue. There are four main 'tastes': sweet, salty, bitter and sour. The tongue also has receptors for temperature. It is known that the taste of food can vary according to whether it is cold, warm or hot. Scientists discovered that just warming or cooling parts of the tongue, even when no food was present, also caused a sensation of taste.

Scientists experimented with a group of people. They gradually cooled the tips of their tongues and measured the intensity of the taste felt by each member of the group. The experiment was repeated, this time warming the tip of the tongue. The graphs show the average values for the group.



[Source: modified from Cruz and Green, *Nature* (2000) **403**, page 889]

(a) Identify which taste was felt most strongly when the tip of the tongue was *[1]*

(i) cooled. . . . . .

(ii) warmed. . . . . .

(b) Compare the effects on the taste of **sweetness**, of warming and cooling the tip of the tongue. *[2]*

. . . . . .

. . . . . .

. . . . . .

. . . . . .

(This question continues on the following page)

(Question 1 continued)

(c) It is important that such experiments use a population sample that is representative. Suggest **two** biological criteria the scientists would have used to select the people to be tested. *[1]*

. . . . . .

. . . . . .

(d) Explain whether cooling or warming the tip of the tongue has the greater effect on the sensation of taste. *[2]*

. . . . . .

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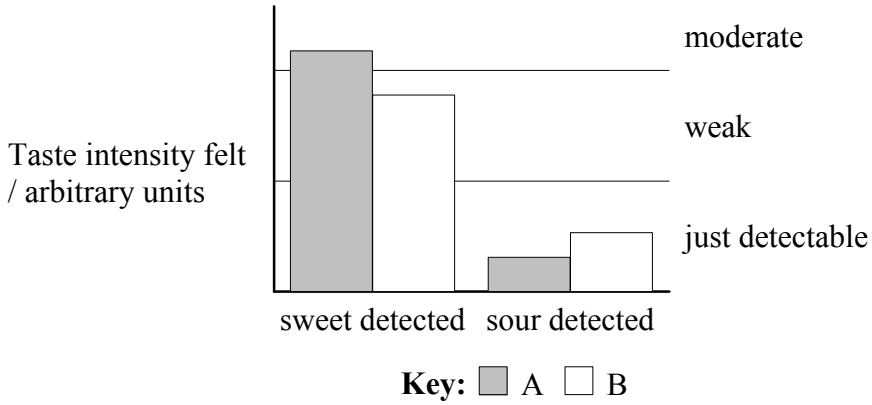
The scientists discovered that there were two types of chemoreceptor in the tongue tip. They called these A and B. They tested these chemoreceptors using solutions of sucrose to find out the type of taste and the intensity felt. The results are shown in the bar chart.



(e) Compare the effects of sucrose on the A and B chemoreceptors by giving **two** similarities and **two** differences. *[4]*

Similarities . . . . . .

. . . . . .

. . . . . .

. . . . . .

Differences . . . . . .

. . . . . .

. . . . . .

. . . . . .

2. Many elements are necessary to form biochemicals required by living organisms. For each element below, state the name of **one** molecule containing the element and state the function of the molecule.

(a) Iron: Molecule . . . . . *[2]*

Function . . . . .

. . . . .

(b) Phosphorus: Molecule . . . . . *[2]*

Function . . . . .

. . . . .

3. (a) Define *sex linkage*. *[1]*

. . . . .

. . . . .

(b) State **one** example of sex linkage. *[1]*

. . . . .

. . . . .

(c) Draw a simple pedigree chart that clearly shows sex linkage in humans. Use conventional symbols. Start with an **affected woman** and an **unaffected man**. *[4]*

SECTION B

*Answer **one** question. Up to two additional marks are available for the construction of your answer. Write your answers in a continuation answer booklet. Write your name and candidate number on the front cover of the continuation answer booklets, and attach them to this question paper using the tag provided.*

4. (a) State **one** contribution to cell theory made by each of the following: Hooke, van Leeuwenhoek, Schleiden, Schwann and Virchow. *[5]*

(b) Outline the process of endocytosis. *[5]*

(c) Compare, with the aid of a diagram, the structure of generalised prokaryotic and eukaryotic animal cells. *[8]*

5. (a) Draw a diagram of a villus in vertical section. *[5]*

(b) Outline **one** named health problem concerned with disorders of the blood transport system. *[5]*

(c) Explain the relationship between the structure and function of arteries, veins and capillaries. *[8]*

6. (a) Describe how standard deviation is useful in comparing ecological data between **two** sites. *[4]*

(b) Outline the quadrat method of random sampling used to determine the population of a plant species. *[6]*

(c) Discuss the effects of **one** named human activity that harms ecosystems and how it might be contained or reduced. Refer to an example **other than** those increasing the greenhouse effect. *[8]*