

# BIOLOGY HSC REVIEW LECTURE



**NS5**  
NORTH SHORE  
SECONDARY SCHOOLS PARTNERSHIP

# COURSE OUTCOMES



THIS COURSE AIMS TO

- PROVIDE STUDENTS WITH TECHNIQUES AND SKILLS REQUIRED TO APPROACH HSC BIOLOGY WITH CONFIDENCE
- FOCUS ON SKILLS, MANDATORY INVESTIGATIONS AND PRACTICAL WORK
- INCREASE EXPOSURE TO EXTENDED RESPONSE QUESTIONS.
- GAIN AN UNDERSTANDING OF WHAT HSC MARKERS ARE LOOKING FOR IN STUDENT RESPONSES
- ADDRESS AREAS OF WEAKNESS IN PREVIOUS EXAMS

# TIMING IN THE EXAM

- Total exam time is 3 hours
- 100 marks in 180 minutes
- Equates to 1.8 minutes per mark
- Keep an eye on timing

**Total marks – 100**

**Section I** Pages 2–24

**75 marks**

This section has two parts, Part A and Part B

Part A – 20 marks

- Attempt Questions 1–20
- Allow about 35 minutes for this part

Part B – 55 marks

- Attempt Questions 21–31
- Allow about 1 hour and 40 minutes for this part

**Section II** Pages 25–35

**25 marks**

- Attempt ONE question from Questions 32–36
- Allow about 45 minutes for this section

# WHAT TO BRING INTO THE EXAM

- Multiple pens
- Pencil for drawing
- Calculator
- Ruler and eraser
- Liquid paper tape



## General Instructions

- Reading time – 5 minutes
- Working time – 3 hours
- Write using black pen
- Draw diagrams using pencil
- Board-approved calculators may be used

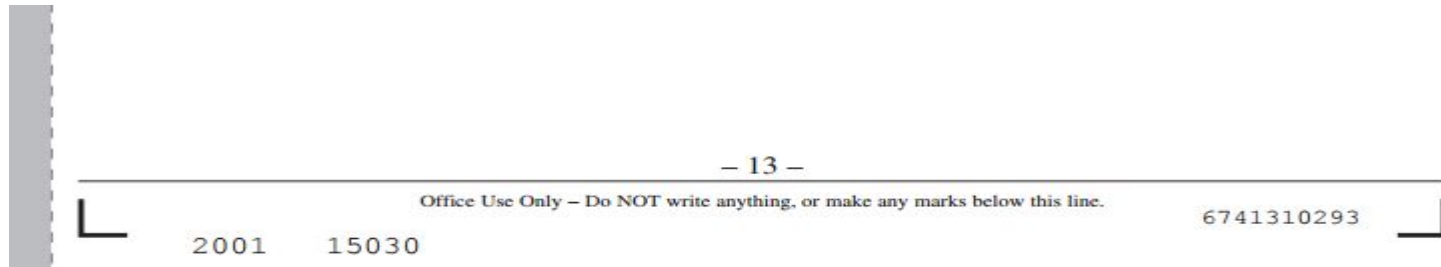
# READING TIME

- Read the exam instructions
- Is it your exam paper?
- Look for clues
- Prioritise your answers
- Question location in booklet
- Focus and prepare



# WHERE TO WRITE YOUR ANSWERS

- Exam papers are scanned and emailed to HSC markers
- Scanner will not detect writing outside the corners
- Do not write outside the margins



# IF YOU RUN OUT OF SPACE

- Clearly write and highlight that your answer is continued
- Identify the page and booklet number
- Clearly write and highlight exactly where your extended answer begins
- If you use an extra booklet then you must let the marker know by writing them a message



# NOTES AND PLANNING

Markers will only mark work that is NOT crossed out.

Do not cross your plan out!

Write 'plan' and leave it there!

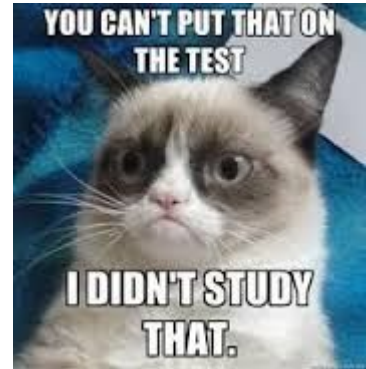


# IS YEAR 11 WORK EXAMINED?

It can be!

Should you study it?

What is the best way?



# THE MARKING PROCESS

- Papers are scanned
- Markers are organised into teams
- Most questions are marked separately
- Pilot marking first
- Marking



# MULTIPLE CHOICE QUESTIONS

- FOUR POSSIBLE ANSWERS FROM WHICH TO CHOOSE THE CORRECT (OR BEST) ONE.
- THE PURPOSE OF THE OTHER ANSWERS (DISTRACTORS) IS TO PRESENT A RANGE OF OPTIONS THAT APPEAR TO BE FEASIBLE.
- DISTRACTORS MAY BE PARTIALLY RIGHT BUT WITH SOME ELEMENT OF INCORRECT INFORMATION.
- IN DEVELOPING MULTIPLE-CHOICE QUESTIONS, THE BOARD DOES NOT SET OUT TO TRICK STUDENTS, AND IN THE CASE WHERE STUDENTS FEEL THERE MAY BE TWO POSSIBLE CORRECT ANSWERS, STUDENTS SHOULD STILL CHOOSE WHAT THEY CONSIDER TO BE THE MOST CORRECT ANSWER.
- MAY BE KNOWLEDGE BASED OR STIMULUS BASED

☐

An obviously incorrect answer.

☐

Almost correct...but has a trick in it.

☐

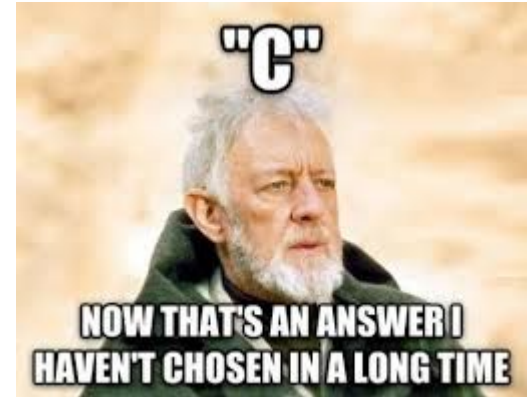
The other obviously incorrect answer.

☐

The correct answer for this test.

# MULTIPLE CHOICE TECHNIQUE

- TRY TO ANTICIPATE THE CORRECT RESPONSE BEFORE YOU LOOK AT THE ANSWER OPTIONS
- CHECK AND SEE IF YOUR ANSWER IS THERE
- IF YOUR ANSWER IS THERE THEN MAKE SURE THAT NONE OF THE OTHER RESPONSES ARE BETTER
- IF YOUR ANSWER ISN'T THERE THEN TRY AND ELIMINATE SOME OPTIONS
- TRANSFER YOUR ANSWERS IMMEDIATELY ONTO YOUR ANSWER SHEET



# ONLINE RESOURCES

mcq.bostes.nsw.edu.au



New South Wales Government

Online Multiple Choice  
Board of Studies NSW

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## Online Multiple Choice



**This is a trial application.** It is for your personal interest and should not be used for any actual testing purposes. Care has been taken to ensure that the questions and answers are correct and fully edited, but small errors of layout, display and typography may still appear in different browsers and on different systems as development continues.

You should also note that syllabuses may change over time. Consequently, some questions from previous tests or examinations may not be relevant for the current year. Also, there may be content examined in the current year that has not been examined in previous years.

If you notice an error, please [contact us](#). Let us know as much detail as possible including the question number you are referring to.

✓ You have the latest version of Adobe Flash Player installed.

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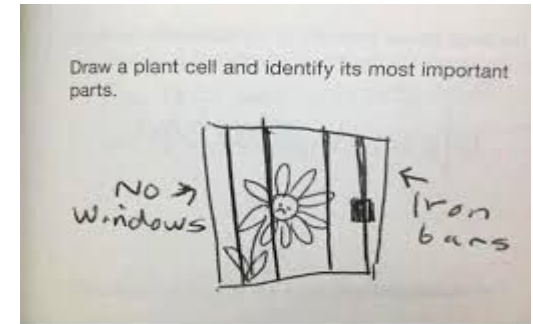
# BIOLOGY OPTION

- ONLY ATTEMPT ONE OPTION QUESTION
- DO NOT ATTEMPT PARTS FROM DIFFERENT OPTIONS
- ONLY ATTEMPT THE OPTION YOU LEARN IN CLASS
- MAKE SURE THAT YOU ADDRESS EVERY PART OF THE OPTION SECTION

- a) the core, which constitutes 90 indicative hours and includes:
  - Maintaining a Balance (30 indicative hours)
  - Blueprint of Life (30 indicative hours)
  - The Search for Better Health (30 indicative hours)
- b) ONE option, which constitutes 30 indicative hours and may comprise any one of the following:
  - Communication
  - Biotechnology
  - Genetics: The Code Broken?
  - The Human Story
  - Biochemistry

# GRAPHING AND DRAWING IN BIOLOGY EXAMS

- DRAW DIAGRAMS USING PENCIL AND RULER
- LABEL DIAGRAMS CLEARLY
- LABEL GRAPHS WITH AXES AND UNITS
- CONSIDER DRAWING DIAGRAMS TO SUPPORT YOUR EXTENDED RESPONSE ANSWERS
- DRAW ON YOUR PEDIGREE AND USE THE IDENTIFIED SECTION TO EXPLAIN YOUR ANSWER



# FIRST-HAND INVESTIGATIONS

- More than 10 first investigations in the core topics
- Heavily weighted towards Maintaining a Balance
- You need to write an hypothesis, aim, identify equipment
- Know the procedure
- Appropriate risk assessment
- Specific to the prac
- Differentiate between reliability and validity



# SAFETY IN FIRST-HAND INVESTIGATIONS

Remember...what is the risk **TO YOU???**

<p>Safe work practices to be followed</p>	<p>Risk 1: Burning yourself with the Bunsen burner when sterilising the inoculating loop.</p> <p>Safety precaution: Take care when using the Bunsen burner, ensuring that the inoculating loop doesn't make contact with your skin.</p> <p>Risk 2: Growing microbes that are harmful to humans and other animals.</p> <p>Safety precaution: Do not open plates once they have been sealed. Dispose of plates in the correct manner.</p>
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# RELIABILITY, ACCURACY AND VALIDITY

	first-hand information and data	secondary information and data
<b>Accuracy</b>	Instruments should be precise and calibrated.	Sources should be reputable?
<b>Reliability</b>	All tests should be repeated a significant number of times.	Information obtained should be consistent with information from other reputable sources.
<b>Validity</b>	Experiments should test the hypothesis that is proposed. The experimental method must be correct? All variables should be identified and controlled.	Information should be gathered in an unbiased and professional manner. Findings must relate to the hypothesis or problem.

# KEY BOSTES VERBS

- You should know these
- You should use them when you plan your responses
- Markers use them when planning the marking guidelines
- Marks allocated and verbs used are linked
- [http://www.boardofstudies.nsw.edu.au/syllabus\\_hsc/glossary\\_keywords.html](http://www.boardofstudies.nsw.edu.au/syllabus_hsc/glossary_keywords.html)

# WHAT IF THE VERB IS NOT ON THE LIST?

2016 exam

**Question 21** (2 marks)

Give TWO potential benefits of artificial blood.

2

.....

.....

Use your common sense and be guided by the number of marks allocated and the space allocated

It does not need to be refrigerated.  
It does not require cross-matching.

# WHEN CAN I ANSWER USING A TABLE?

- GOOD FOR VERBS SUCH AS OUTLINE AND DESCRIBE
- AVOID FOR VERBS SUCH AS JUSTIFY AND ANALYSE
- USE THE KEY PARTS OF THE QUESTION AS YOUR HEADINGS
- USE A RULER

- (a) Describe TWO ways in which Mendel's use of flower parts contributed to the success of his experiments.

3

.....

.....

# USING TABLES IN ANSWERS

Technique used by Mendel	Why was the technique successful?
He removed stamens from flowers	This avoided self-pollination and therefore controlled the parents that were crossed
He used a brush to transfer pollen from the anther/stamen of one plant to the stigma of another	This process ensured he controlled which parental plants were crossed

# AREAS FOR IMPROVEMENT

- BoS identifies areas for improvement
- Approximately 50% of the Areas for improvement from 2015 examination were directly examined in the 2016 exam paper
- From the 2016 exam CANDIDATES NEED TO IMPROVE IN THESE AREAS:
- DESCRIBING THE RESPONSE OF A NAMED AUSTRALIAN ECTOTHERM TO A CHANGE IN THE AMBIENT TEMPERATURE (Q22)
- LINKING THE REASON GIVEN FOR MAINTAINING WATER CONCENTRATION IN CELLS TO OPTIMUM CELL FUNCTION (Q23)
- LINKING THE HOST RESPONSE TO A DEFENCE ADAPTATION (Q24)
- APPLYING KNOWLEDGE TO A NEW DISCOVERY (Q28)
- EXPLAINING HOW MENDEL'S EXPERIMENTS HELPED ADVANCE OUR KNOWLEDGE OF INHERITANCE (Q29)
- EXPLAINING THE ADAPTIVE ADVANTAGE OF HAEMOGLOBIN (Q31)
- LINKING THE NEED FOR ENDOTHERMS TO PRODUCE HEAT AND THEREFORE THE NEED FOR MORE OXYGEN (Q31).

# WHAT IS LINKING?

- IMPORTANT WHEN CONNECTING YOUR IDEAS
- EASIER TO READ FOR THE MARKERS
- ALLOWS YOU TO ADD ADDITIONAL INFORMATION AND GIVE EXAMPLES WITHIN THE CONTEXT OF YOUR WRITING
- ALLOWS YOU TO EMPHASISE A POINT
- ALLOWS YOU TO INDICATE THE RESULT OR CONSEQUENCE
- HIGHER ORDER SKILL



# LINKING TERMS TO DESCRIBE SIMILARITIES

Likewise

In the same way

Similarly

Correspondingly

# 2015 EXAM QUESTION 26

## Question 26 (5 marks)

Sugar is transported in vascular tissues in plants and animals.

5

Contrast the structure and workings of ONE named plant tissue and ONE named animal tissue used to transport sugar.

	<i>Plants</i>	<i>Animals</i>
Tissue name	Phloem	Artery
Structure	A tube made from single cells joined end on end with ends of cells perforated to allow sap to flow from one cell to another	A tube made from many living muscle cells arranged in concentric layers around a hollow lumen.
Workings	Pressure flow due to active transport of sugar into tube followed by passive osmosis	Pressure flow due to pump action of the heart muscle and recoil of stretched artery

# LINKING WORDS WHEN COMPARING AND CONTRASTING

However

Instead

Yet

alternatively

# LINKING WORDS TO SHOW CAUSE AND EFFECT

- Therefore
- For this reason
- Because
- As a result

Antibiotics are reduced in their effectiveness as bacterial pathogens have developed resistance to them due to natural selection. Bacteriophages are capable of mutation and may therefore evolve phenotypes that remain pathogenic to the mutated bacteria. Antibiotics usually act on more than one type of bacteria, and may therefore kill useful bacteria as well as pathogens, whereas bacteriophages only target the pathogen.

# LINKING TO SHOW CAUSE AND EFFECT (QUESTION 28 2016)

**Explain TWO advantages of using bacteriophage treatment compared to antibiotic treatment for bacterial infections.**

Antibiotics are reduced in their effectiveness as bacterial pathogens have developed resistance to them due to natural selection. Bacteriophages are capable of mutation and may therefore evolve phenotypes that remain pathogenic to the mutated bacteria. Antibiotics usually act on more than one type of bacteria, and may therefore kill useful bacteria as well as pathogens, whereas bacteriophages only target the pathogen.

# 8 MARK QUESTIONS

- Expect one in the core
- Maybe also one in the elective
- Typically higher order verbs
- Coherence of ideas is important
- Remember your English skills
- Often bring key ideas together
- 2016 paper had stimulus material for 8 mark question

# 2015

## Question 31 (8 marks)

‘Renal dialysis and kidney transplants are very different treatments for the same medical condition. Each treatment was developed from a new application of biological knowledge.’ Justify these statements.

- 8 marks is 16 minutes in the exam
- Expect to write up to 1.5 pages
- Highlight the verb ‘support an argument or conclusion’
- Write your plan
- Do not cross your plan out!

# PLAN

- Identify each medical condition
- Outline how each treatment works
- New application of biological knowledge – dialysis  
include diffusion, membrane, technology/machine
- New application of biological knowledge – transplant  
include reducing rejection, knowledge of immune response



# ANSWER

Both kidney transplants and renal dialysis are used to treat kidney failure. Renal dialysis filters the blood to remove nitrogenous wastes by passing the blood through a machine. Kidney transplant involves replacing damaged kidney with a functioning kidney from a donor.

The biological knowledge required to develop renal dialysis involves an understanding of diffusion occurring across a semi-permeable membrane in this case. Diffusion is the movement of substance from regions of high concentrations to regions of low concentration.

## ANSWER CONTINUED

The application of this knowledge is demonstrated by the development of the machine that conducts the dialysis. The machine works by taking blood from the patient, mixing it with blood thinners to prevent clotting and passing the blood through the machine. Inside the machine the blood flows in the opposite direction to dialysis fluid (the blood and dialysis fluid are separated by a semipermeable membrane which is permeable to urea) and as such a steep concentration gradient is established so the urea in blood can pass out by diffusion.

## ANSWER CONTINUED

Kidney transplants would not be possible without an understanding of the immune response in humans. This application of biological knowledge has allowed scientists to better understand rejection of donated organs. Donated organs have cell markers that are read by the immune system, specifically B and T cells, as 'not self' and thus the body attacks the organ. Anti-rejection drugs have been developed to suppress the immune response and are an application of the knowledge of the immune response.

# MAINTAINING A BALANCE

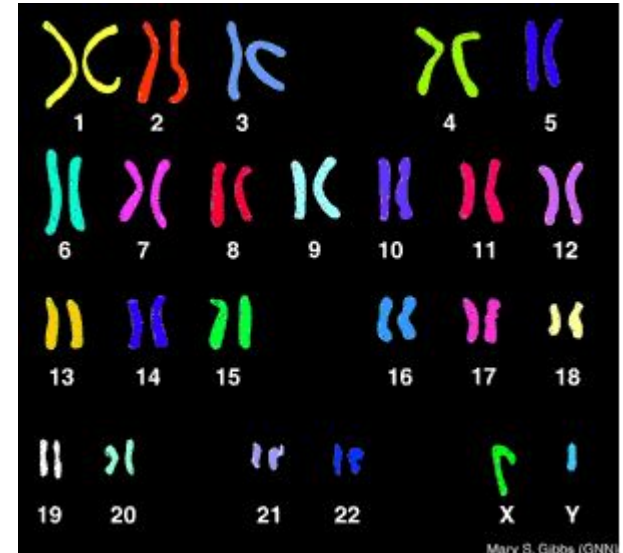
This module increases students' understanding of

- the applications and uses of biology,
- implications for society and the environment and
- current issues, research and developments in biology.



# BLUEPRINT OF LIFE

THIS MODULE INCREASES STUDENTS' UNDERSTANDING OF THE HISTORY, NATURE AND PRACTICE OF BIOLOGY,  
THE APPLICATIONS AND USES OF BIOLOGY, THE IMPLICATIONS OF BIOLOGY FOR SOCIETY AND THE ENVIRONMENT AND CURRENT ISSUES,  
RESEARCH AND DEVELOPMENTS IN BIOLOGY.



# SEARCH FOR BETTER HEALTH

This module increases students'

- understanding of the history, nature and practice of biology,
- the applications and uses of biology,
- and the implications of biology for society and the environment.



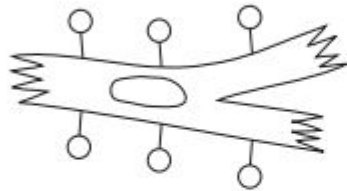
# SCAFFOLD FOR ASSESS

- PROS AND CONS
- MAKE A JUDGEMENT

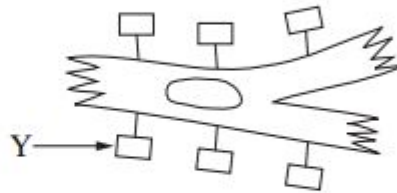
## Question 28 (8 marks)

Organ transplants may trigger an immune response which can lead to organ rejection.

The diagram below represents a model of two heart cells, one from a transplant recipient and one from a donor.



Recipient heart cell



Donor heart cell

(a) What does Y represent?

# MARKING GUIDELINES

## Question 28(b)

Criteria	Marks
<ul style="list-style-type: none"><li>• Provides a judgement about the model's effectiveness</li><li>• Supports their judgement with a piece of evidence, which correctly reflects the rejection process</li></ul>	3
<ul style="list-style-type: none"><li>• Provides a judgement about the model's effectiveness</li><li>• Supports their judgement with a piece of evidence</li></ul> OR <ul style="list-style-type: none"><li>• Provides a piece of evidence which correctly links the model and the rejection process</li></ul>	2
<ul style="list-style-type: none"><li>• Provides a correct statement relating to organ rejection</li></ul> OR <ul style="list-style-type: none"><li>• Provides a general statement that relates to the use of this model</li></ul>	1

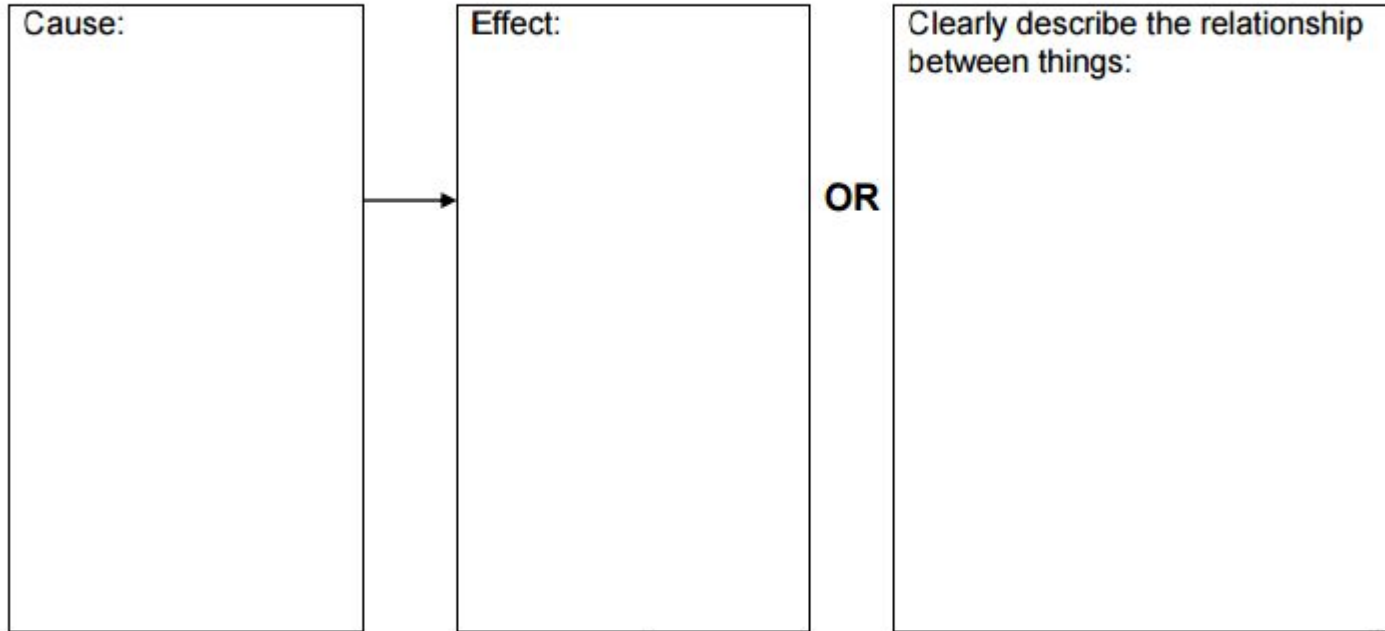


## Question 28(b) Sample answer:

The model is highly effective as it shows the difference between the two types of cells. The two cells have different surface molecules (antigens) which means that the recipient will be able to recognise and attack the new organ with their immune system

# SCAFFOLD FOR EXPLAIN

**Explain:** *relate cause and effect; make the relationship between things evident; provide why and/or how*



# 2016 EXAM PAPER

Explain ONE reason why the concentration of water in cells should be maintained within a narrow range for optimal cell function.

## Sample answer

Concentration of water in cells is maintained to regulate concentrations of solutes in cells. This provides appropriate substrate concentrations for metabolic function.

