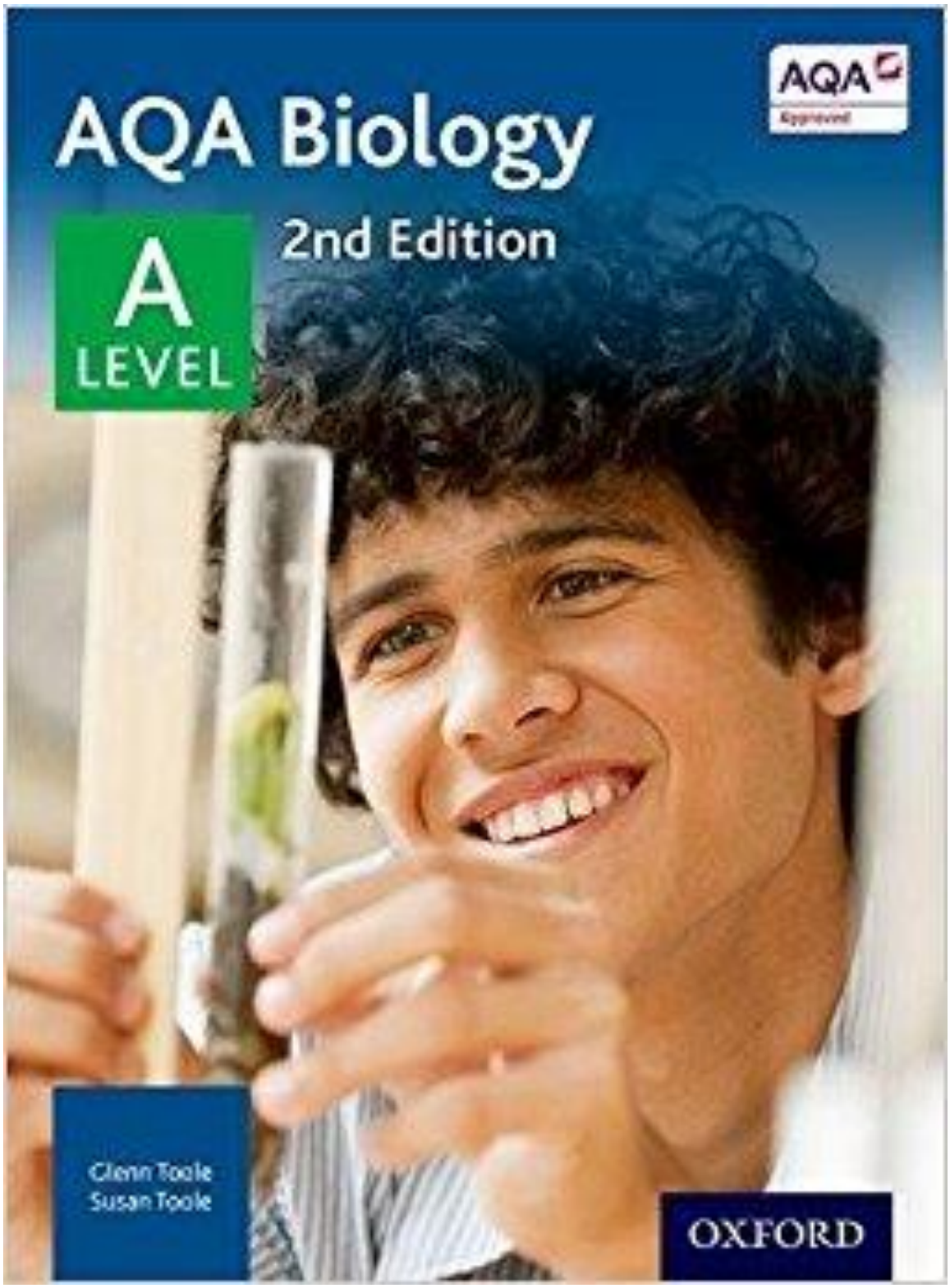
A LEVEL BIOLOGY



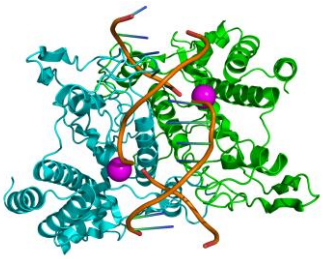
Specification Content – AQA A-Level Biology (7402)

http://filestore.aqa.org.uk/resources/biology/specifications/AQA-7401-7402-SP-2015.PDF

Year 1 – Lower VI

Section 1: Biological molecules

This topic covers carbohydrates, lipids and proteins, including enzymes. It also covers the structure of DNA and RNA and the structure and functions of ATP and water.

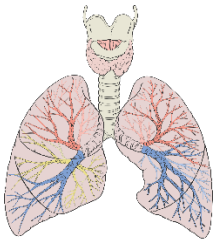


Section 2: Cells

This topic covers microscopy, cell infrastructure, prokaryotic and eukaryotic cells, viruses, cell specialisation and mitosis/cell cycle. Also covered are cell membranes and transport, cell recognition, the immune system and HIV.

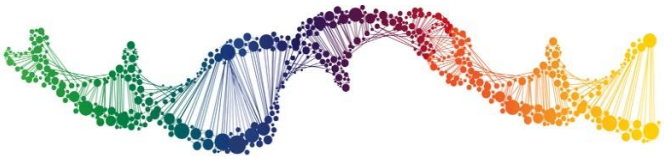
Section 3: Organisms and exchange

This topic covers gas exchange in single celled organisms, fish, insects, plants and humans. The mechanisms of breathing and the structure of the human gas exchange system are studied, alongside gas exchange in the lungs. Also covered are digestion and enzymes, mass transport and the role of haemoglobin, the heart and cardiac cycle and transport in plants.



Section 4: Genes, variation and relationships between organisms

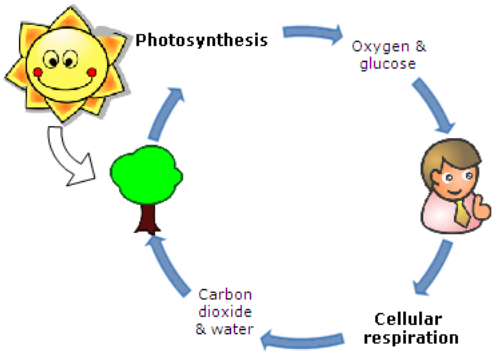
In this topic we study DNA, genes and protein synthesis. We also cover genetic diversity, and biodiversity including mutations, types of selection, meiosis and taxonomy.



Year 2 – Upper VI

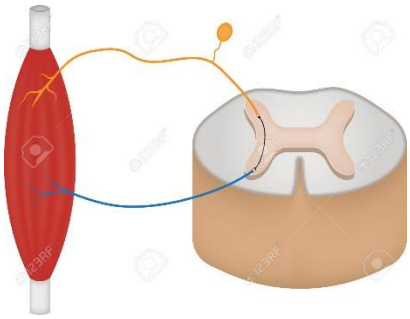
Section 5: Energy transfer between organisms

Here we study photosynthesis, respiration, energy and ecosystems.



Section 6: Response to change in the environment

This topic covers the nervous system and reflex arcs, the control of heartbeat and plant growth factors. We also look at the nervous impulse, synapses and the structure and function of skeletal muscle.

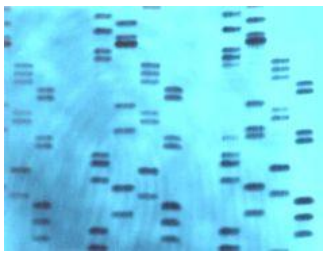


Section 7: Genetics, populations, evolution and ecosystems

This topic studies patterns of inheritance, epistasis, population genetics, natural selection, speciation and evolution. Also studied are population, competition and predation, succession and conservation.

Section 8: Control of gene expression

This topic looks at gene mutations, stem cells, gene expression and cancer, genome projects and DNA technology.



Skills in A-Level Biology

Mathematical requirements:

A-Level Biology requires skills in two areas, in addition to the taught specification. These areas are Mathematics and Practical Skills.

At least 10% of the overall marks in Biology will require the use of mathematical skills, applied in the context of Biology. These skills will be at least the standard of higher tier GCSE Mathematics.

Practical Assessment:

Throughout the course you will be required to perform 12 required practical activities, covering a wide variety of techniques. The Practical Skills Endorsement will be assessed by your teachers based on direct observation.

In your written papers at least 15% of the marks will be based on questions on practical skills.

"Never bring a pet to school . . . especially if it's a frog!"

How is the course assessed?

Biology A-Level is assessed over 3 papers (plus demonstrated competency in all skills in the required practicals):

Paper 1 – Any content from topics 1-4, including relevant practical skills (91 marks, 35% of A-Level, 2 hours)

Paper 2 – Any content form topics 5-8, including relevant practical skills (91marks, 35% of A-Level, 2 hours)

Paper 3 – Any content form topics 1-8, including relevant practical skills. Also includes synoptic essay worth 25 marks. (78 marks, 30% of A-Level, 2 hours).

Recommended Reading (Compulsory):

The following books are recommended for enrichment as biology is a synoptic subject which draws extensively on material from outside the syllabus.

- *Bad Science* by Ben Goldacre
- *A Short History of Nearly Everything* by Bill Bryson
- *The Selfish Gene* by Richard Dawkins

Select at least one of these books, read it and write an A4 synopsis of the main idea in the book

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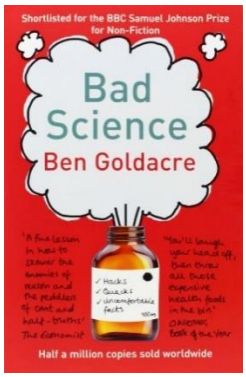
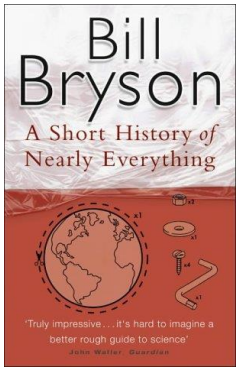
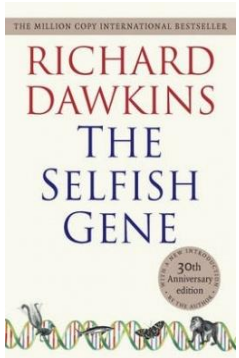




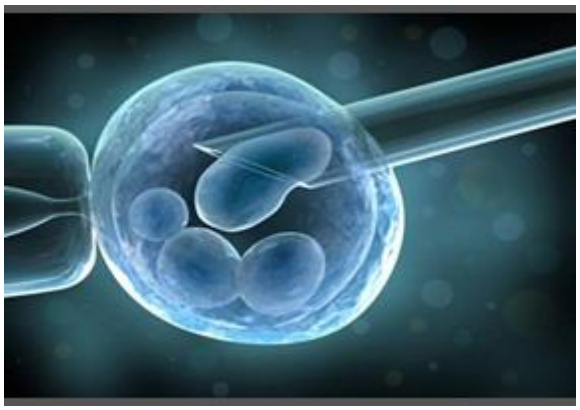


Task 1 – In the news (Compulsory)

Throughout the summer holidays keep an eye out on newspapers and TV/radio/online to see how many science related stories you can find. Take clippings or make a note of any stories from TV/radio/online. Many of these stories will link directly to your studies and may even appear in an exam question.

Task 2 – Read the attached article on embryonic stem cells (Compulsory)

What do you think about the use of embryonic stem cells for research? Is it acceptable? Write an essay discussing the pros and cons. This should cover one side of A4 word processed.



Why Embryonic Stem Cell Use is Unethical

By Vicki Mozo

Embryonic Stem Cell research offers a remarkable way to treat various disorders where conventional therapeutic interventions have failed to treat effectively. With embryonic stem cells, a valuable alternative approach can be proffered to treat injuries and certain disorders with rather minimal risks.

What is interesting about embryonic stem cells? These cells have the ability to self-renew through mitosis. They are also pluripotent, which means they have the potential to differentiate into a more specialized, mature cell type performing distinct functions. It means that these cells can give rise to different cell types similar to a typical cell of a growing embryo inside the mother's uterus that can differentiate into any basic cell type -- be it a blood cell, muscle cell, nerve cell, *etc*. The difference though is that the embryonic stem cells are created, maintained, and grown in laboratory cultures outside the human body.

What do their features mean in medicine? The capacity of embryonic stem cells to self-renew and exhibit pluripotency means that they can be used in regenerative medicine such as tissue graft while the risk of donor-host rejection and teratoma are reduced, even prevented. And since these cells can become any of the fundamental adult cells, they can be used to replenish the body with functional cells. Thus, patients suffering from tissue injuries or genetic disorders can be administered with these cells to restore damaged or faulty cells.

Because they are capable of propagating indefinitely they can also serve as models for genetic disorders. Thus, they can become a potent research tool to probe certain human genetic disorders such as fragile-X syndrome and cystic fibrosis.

If embryonic stem cells are meant to help treat and prolong life, and by this means spur hope to the afflicted, then, *how can embryonic stem cell turn out to be unethical?* In this article, I only intend to provide a general idea about the ethical issues surrounding embryonic stem cell by identifying the reasons embossed by critics how embryonic stem cell research can be morally unsound.

First and foremost, embryonic stem cells are cells with a potential for life. The ''embryonic'' part ignites multifarious debates stemming from the lack of consensus regarding the meaning, bounds, and sense of life. Questions such as *"When does life starts and ends?"* and *"Does an embryonic stem cell implicate life or not?"* cannot be plainly answered. Those who oppose believe that these cells are also living cells. Conversely, others deem that embryonic stem cells do not depict life but only a potential for life.

Another reason relevant to the above is the lack of consensus regarding the categorization of a human being. The embryonic stem cells function the same way as typical embryonic cells that give rise to human foetus. Thus, opponents can regard embryonic stem cells as potential human beings despite of their *in vitro* origin. If this kind of research persists, the quintessence of human life may soon be tainted, especially from the standpoint of religious and social groups.

Finally, procedures such as storing and destroying embryonic stem cells for research are viewed as ethically wrong. The storing of embryonic stem cells seems as an act of denying the right for human life. The proponents though rationalize with a "nothing is lost" argument.[1] They argue that since there is an excess of embryos created in vitro these embryos have to be kept for future research use. What else can be done to these embryos is nothing but to put them to beneficial use, such as in research that could generate key findings that can save lives. In the United States, there is a surplus of 400,000 human embryos produced from in vitro fertilization and are therefore frozen and kept to this day. Nonetheless, the project still remains unacceptable to pro-life advocates since studies using these embryos eventually lead to the destruction of the embryo and thus tagged the procedure as ''murder''.

Embryonic stem cell research is a heated topic because of the ethical concerns involved. It only goes to show that what can be regarded as generally good does not always mean it is also ethically right.

Source(s):

[1]*Arthur Asuncion, "Embryonic Stem Cell Research Is Unethical", October, 2004. http://www.ics.uci.edu/~asuncion/stem_cells.htm*

To cite:

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