



## **Biology Department**

### **Y11 to Y12 Bridging Work**



**Helping you to leap the gap between GCSE  
and A level**

# Summer 2022

## Welcome

Welcome to A-Level Biology! At Weald of Kent Grammar School, we study the Edexcel Biology A (Salters-Nuffield) course. This course requires a good fundamental understanding of all the key areas of the GCSE Biology course and will require a good level of understanding as well as a passion for Biology. You will need to spend as much time studying out of the classroom as spent studying in it. We delve into the concepts you have met in GCSE and develop these further which in turn means the depth of your explanations needs to improve. The mathematical and graphical skills used at GCSE will be used throughout the course and you will also develop your use of statistical analysis. It will help if you are studying A-Level Chemistry, but it is not essential, as there is overlap between the Biochemistry components of the course. Any student who wants to understand why life can function on this planet and loves the intellectual challenge of a science-based course is well suited to pursue Biology at A-level.

You will be provided in this pack with a variety of questions to complete relating to Biology which will require you to complete a series of activities and including examination style. The work will access that you have the key basic biological knowledge to help you start your A-level course but will not cover everything. There will be a test in the first few weeks back at school in September. If you have done this work, it should not be a problem but if you have concerns about your suitability for the course you need to discuss these with a member of staff as soon as possible. Support will be available throughout the course. Two years does allow the time for students to develop their skills but only if they have the desire and work ethic to do so. There is also a self-directed visit project to complete, details are included in this pack. Please complete these tasks and bring with you to your first Biology lesson of the year.

In addition to the bridging work I have included a suggested reading list so that you can begin to read around the subject, documentaries to watch and links to Massive Open Online Courses (MOOC) if you wish to best prepare for the start of you're A-level. You do not need to purchase any course materials, as you will be provided with them at the beginning of the course.

Best of luck and if you have any questions do not hesitate in emailing me.



**Mr R Cooper**  
Head of Biology

# Biology Bridging Tasks

This should take approximately 3-4 hours. There are 3 tasks that will assess your knowledge and skills in Biology. The work will be collected in the first week of Year 12 lessons and assessed.

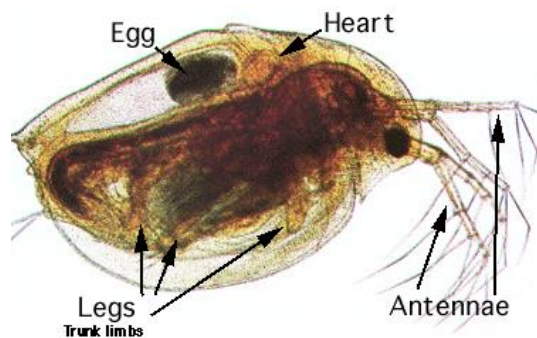
**Task 1** – Design an article for a medical magazine about Coronary Heart Disease. It must include:

- 1) A simple explanation of the meaning of the term coronary heart disease.
- 2) An explanation about what causes coronary heart disease including diagrams.
- 3) A description of at least 4 lifestyle factors that increase the risk of getting coronary heart disease.
- 4) Treatment options for the disease as well as recommended lifestyle changes.

*It is suggested to include diagrams where necessary. (Don't forget to reference where they come from; for details on how to reference please see here: [https://guides.lib.monash.edu/ld.php?content\\_id=48260115](https://guides.lib.monash.edu/ld.php?content_id=48260115))*

**Task 2** – Scientific methods and maths for Biology. Note: You will be expected to be able to apply basic mathematical skills throughout the course and in the examinations.

The photograph below shows Daphnia (a water flea). Daphnia can be used to investigate the effect of chemicals such as caffeine on heart rate by placing it in a drop of water under a microscope and counting the heart beat



Magnification x30

Qu 1 – State two variables that you would need to control for a valid investigation into the effect of caffeine on the heart rate of Daphnia. Describe how to control each of these variables [4]

Qu 2 – Calculate the means for each column [2]

Daphnia	Number of beats (no caffeine)	Number of beats (1% caffeine added)
A	82	100
B	78	96
C	80	120
D	75	89
E	98	0
F	83	125
Mean		

Qu 3 – What type of graph should be used to present this data and why? [2]

Qu 4 – Name one species of animal that does not have a heart [1].

A young athlete begins a training program and the table shows part of her training record.

Time measured in weeks from the start of training	0	8	16	24	32	40
Mean resting pulse rate measured in pulses per minute	75	69	66	63	61	60

Qu 5 - Calculate the percentage change in the resting pulse rate from week 0 to week 40. Show your working [2]

Qu 6 - Suggest two physical changes to her heart resulting from this training [2]

Qu 7 - Plot a graph to match the data from her training record. Draw a smooth curve through the points. [4]

Qu 8 - Use your graph:

a) To estimate her resting pulse rate, in pulses per minute, after 18 weeks of training [1]

b) To predict her resting pulse rate, in pulses per minute, if she continues her training for a further 10 weeks [1]

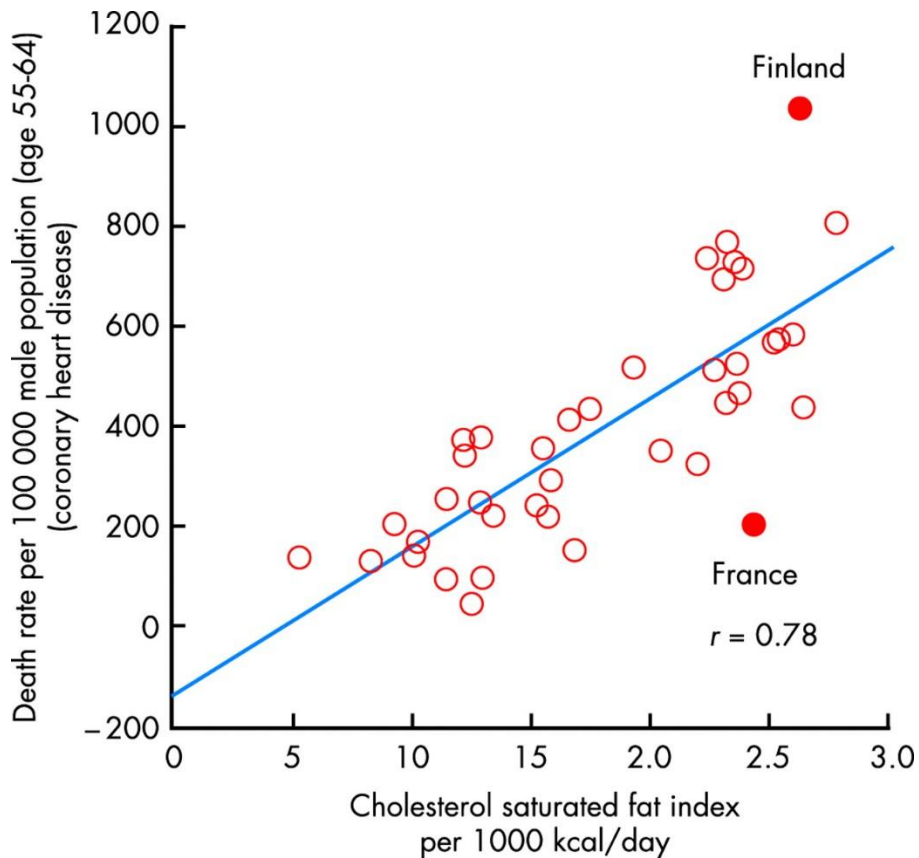
A doctor measured the volume of air in the lungs of 2 groups of people over a period of 7 seconds. All people were resting. There were 150 people in Group A. They had emphysema. There were 200 people in Group B. They were healthy. The results are shown in the table.

Time	Mean Volume of air in lungs /dm <sup>3</sup>	
	Group A	Group B
0 sec	6.5	7.0
1 sec	3.8	6.0
2 sec	3.0	5.6
3 sec	2.3	5.1
4 sec	2.0	4.8
5 sec	1.7	4.5
6 sec	1.6	4.2
7 sec	1.6	3.9

Qu 9 - Calculate the rate at which Group A breathed air out of their lungs between 0 and 3 seconds. Show your working. [2]

Qu 10 - 75% of people in Group A complained of breathlessness while walking up stairs. How many people complained? [2]

**Task 3** – Graph interpretation – the link between saturated fat and heart disease.



Qu 1 – This graph is based on data from the 1970's. Describe what this graph shows [3] marks]

Qu 3 – Suggest why France is an anomalous result. You can do research. [2 marks]

Qu 4 – Suggest why Finland is an anomalous result. You can do research. [2 marks]

Total = 30 marks

# A-level Biology Suggested Location Visits:

Kent has a number of interesting places to visit which will expose you to the wider world of biology. For your summer work why not **go to one of these places**, and **investigate an object, cell, tissue or organism**. This will then allow you to gain a greater understanding of Biology and maybe even spark an interest in a new field for you!

In your chosen place you must find on object, **organism, cell or tissue** you find interesting.

You should **take a selfie** with your chosen object and make a couple of key notes on what you saw and what interested you about this. We would love to hear about what you explored when you join us in September.

For example if you chose the “Wild Boar” in Wildwood you may wish to find out about reintroduction programmes, or if you chose the “pre-historic animal skeleton” at the Powell-Cotton Museum, you may wish to research how osteocytes form bones in animals.

Here are some suggested places in Kent.

- 1) Home of Charles Darwin - Down House. Luted Road, Downe, Kent, BR6 7JT
- 2) Wildwood Trust, Herne Common, Herne Bay, Kent, CT6 7LQ
- 3) Sevenoaks Wildlife Reserve and Jeffery Harrison Visitor Centre Bradbourne Vale Road, Sevenoaks, Kent, TN13 3DH
- 4) Powell-Cotton Museum at Quex Park, Park Lane, Birchington, Kent, CT7 0BH

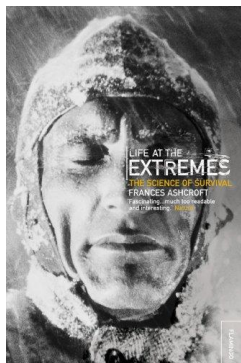
However, do feel free to choose a place further afield for your study. Some options include

- 5) The Gordon Museum of Pathology, Hodgkin Building, Guy's Campus, King's College London, London, SE1 1UL
- 6) Alexander Fleming Laboratory Museum. St Mary's Hospital, Praed Street, London W2 1NY
- 7) Wellcome Collection, 183 Euston Road, London NW1 2BE
- 8) The Museum of Military Medicine, Keogh Barracks, Ash Vale, Aldershot, GU12 5RQ
- 9) Museum of the History of Science, Broad Street, Oxford OX1 3AZ

The options are vast for Biology as it is all around us. Find out something new and share your passion for the subject with your peers!



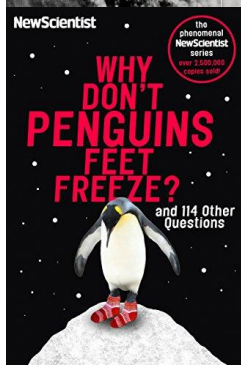
# A-Level Biology reading list



## Life at the Extremes

by Frances Ashcroft

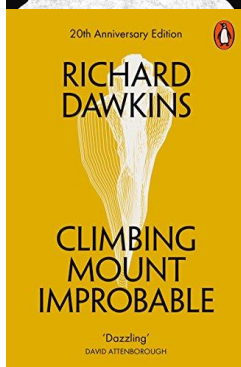
*'How do people survive extremes of heat, cold, depth, speed and altitude? This book explores the limits of human survival and the physiological adaptations which enable us to exist under extreme conditions'*



## Why don't penguins feet freeze?

by New Scientist

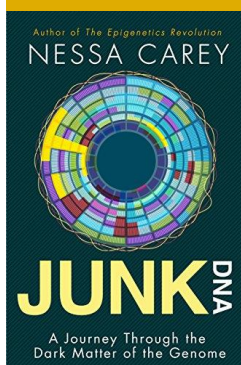
*'A compilation of readers' answers to the questions in the 'Last Word' column of New Scientist, the world's best-selling science weekly. This is not just linking to Biology but Chemistry and Physics as well!'*



## Climbing Mount Improbable

by Richard Dawkins

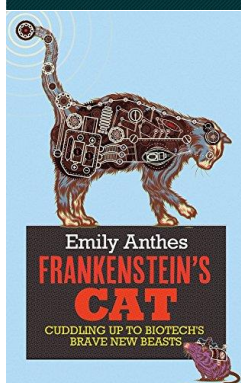
*'How could such an intricate object as the human eye - so complex and so precise - have come about by chance? In this masterful piece of popular science, Richard Dawkins builds a powerful and carefully reasoned argument for evolutionary adaptation as the force behind all life on earth.'*



## Junk DNA: A Journey Through the Dark Matter of the Genome

by Nessa Carey

*'For decades after the structure of DNA was identified, scientists focused purely on genes, the regions of the genome that contain codes for the production of proteins. Other regions - 98% of the human genome - were dismissed as 'junk'. But in recent years researchers have discovered that variations in this 'junk' DNA underlie many previously intractable diseases, and they can now generate new approaches to tackling them.'*

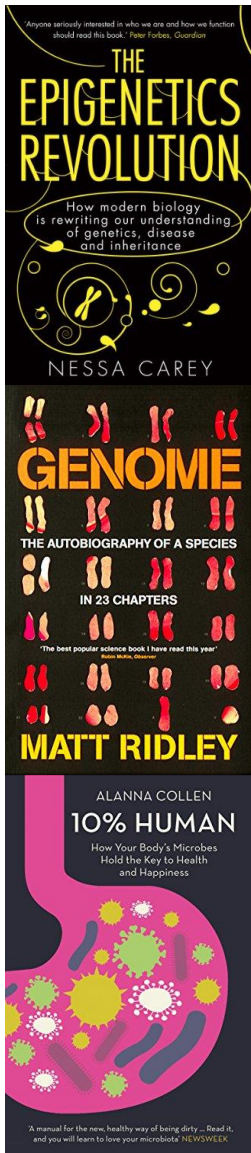


## Frankenstein's Cat

by Emily Anthes

*'From the petri dish to the pet shop, meet the high-tech menagerie of the near future, as humans reinvent the animal kingdom. Fluorescent fish that glow near pollution. Dolphins with prosthetic fins. Robot-armoured beetles that military handlers can send on spy missions. Beloved pet pigs resurrected from DNA.'*





## The Epigenetic Revolution

by Nessa Carey

*'Understanding of the way the genetic code is used to create the foetus and maintain the body has extended considerably over the past decades. The genes are now regarded more as a toolkit for producing proteins than a blueprint. This book examines the process by which the original strand of DNA in the single cell becomes modified to produce the specialised cells in different parts of the body.'*

## Genome: The Autobiography of a Species in 23 Chapters

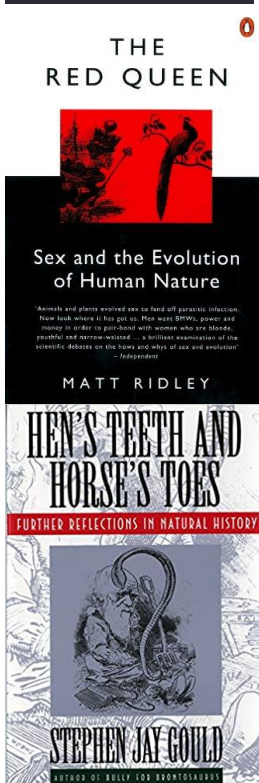
by Matt Ridley

*'The genome is our 100,000 or so genes. The genome is the collective recipe for the building and running of the human body. These 100,000 genes are sited across 23 pairs of chromosomes. Genome, a book of about 100,000 words, is divided into 23 chapters, a chapter for each chromosome. The first chromosome, for example, contains our oldest genes, genes which we have in common with plants.'*

## 10% Human: How Your Body's Microbes Hold the Key to Health and Happiness

by Alanna Collen

*'Obesity, autism, mental health problems, IBS, allergies, auto-immunity, cancer. Does the answer to the modern epidemic of 'Western' diseases lie in our gut? You are 10% human. For every one of your cells, there are nine impostors hitching a ride. You are not just flesh and bone, but also bacteria and fungi. And you are more 'them' than you are 'you'.'*



## The Red Queen: Sex and the Evolution of Human Nature

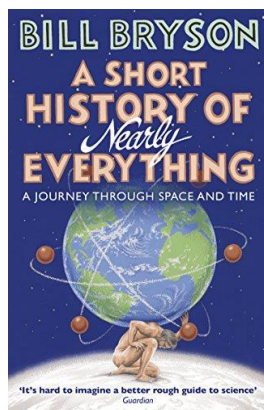
by Hugh Aldersey-Williams

*'Sex is as fascinating to scientists as it is to the rest of us. A vast pool of knowledge, therefore, has been gleaned from research into the nature of sex, from the contentious problem of why the wasteful reproductive process exists at all, to how individuals choose their mates and what traits they find attractive. This fascinating book explores those findings, and their implications for the sexual behaviour of our own species.'*

## Hen's Teeth and Horse's Toes

by Stephen Jay Gould

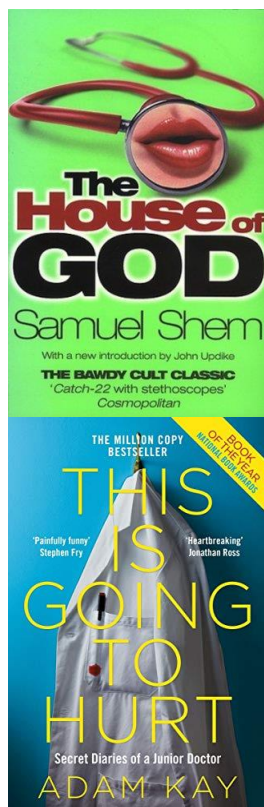
*'Over a century after Darwin published the Origin of Species, Darwinian theory is in a "vibrantly healthy state," writes Stephen Jay Gould, its most engaging and illuminating exponent. Exploring the "peculiar and mysterious particulars of nature," Gould introduces the reader to some of the many and wonderful manifestations of evolutionary biology.'*



## **A Short History of Nearly Everything**

by Bill Bryson

*'A Short History of Nearly Everything is his quest to understand everything that has happened from the Big Bang to the rise of civilization - how we got from there, being nothing at all, to here, being us.'*



## **FOR PROSPECTIVE MEDICS**

### **The House of God**

by Samuel Shem

*'The hilarious novel of the healing arts that reveals everything your doctor never wanted you to know. Six eager interns -- they saw themselves as modern saviors-to-be. They came from the top of their medical school class to the bottom of the hospital staff to serve a year in the time-honored tradition, racing to answer the flash of on-duty call lights and nubile nurses. But only the Fat Man --the Clam, all-knowing resident -- could sustain them in their struggle to survive, to stay sane, to love-and even to be doctors when their harrowing year was done.'*

### **This is Going to Hurt: Secret Diaries of a Junior Doctor**

by Adam Kay

*'Scribbled in secret after endless days, sleepless nights and missed weekends, Adam Kay's diaries provide a no-holds-barred account of his time on the NHS front line. Hilarious, horrifying and heartbreaking, this is everything you wanted to know - and more than a few things you didn't - about life on and off the hospital ward.'*



## **ONLINE READING**

### **Biofact Sheets**

by Curriculum Press

*A great website of resources for A-level science paid for by the school. Click on the link:*

<https://curriculum-press.co.uk/>





*Login using these details:*

*User: [cp@wealdgs.org](mailto:cp@wealdgs.org)*

*PW: TN92JP*



*Click on resources, secondary, Biology, then explore!*

# Documentaries to watch

 <p><b>Marine plastics: is it too late to save our oceans?</b> Every minute, the equivalent of a truck load of plastic is dumped into our ocean. Can we reverse the damage already done by dumping plastics? Are we able to alter our plastic consumption enough to preserve biodiversity?</p> <p>Real Society of Biology   Biology Week   The Royal Institution   BIOCHEMICAL SOCIETY</p>	<p><b>The Royal Society of Biology YouTube Channel</b> <i>The key society on Biology in this country. Keep up to date on current Biological ideas. Follow this particular link to a lecture on 'Marine plastics: is it too late to save our oceans?'</i></p>
 <p><b>CLIMATE CHANGE – THE FACTS</b> presented by DAVID ATTENBOROUGH</p>	<p><b>Climate Change – The Facts</b> By BBC <i>Sir David Attenborough looks at the science of climate change and potential solutions to this global threat. Interviews with some of the world's leading climate scientists explore recent extreme weather conditions such as unprecedented storms and catastrophic wildfires.</i></p>
 <p><b>SEVEN WORLDS ONE PLANET</b></p>	<p><b>Seven Worlds, One Planet</b> By BBC <i>Revealing the extraordinary wildlife stories and unseen wilderness of our seven unique continents with Sir David Attenborough</i></p>
	<p><b>Sci Show YouTube Channel</b> <i>A channel of short interesting facts relating to all aspects of science in a digestible format. Can also highlight some key current news.</i></p>
 <p><b>100 GREATEST Discoveries</b> <b>GENETICS</b> Hosted by Bill Nye</p>	<p><b>DNA and Genetics: The Scientific Discoveries of The 21<sup>st</sup> Century</b> Hosted by Bill Nye <i>This DNA and genetics scientific discoveries documentary highlights the influence DNA and genetics have on cells. discoveries of the 21st century are also spoken of as well as answering the question what is DNA and genes?</i></p>

# Massive open online course (MOOC)

A **Massive Open Online Course (MOOC)** is an interactive step-by-step course aimed at reaching an unlimited number of participants worldwide to create a community of lifelong learners. As a MOOC Learner, you will build upon your knowledge of Biology beyond the specification of the A-Level. You will be able to draw upon this learning when writing the personal statement of your UCAS application. The best bit is they are all free. Below are a few suggestions, but explore the web and find something that interests you!

	<b>Biology Courses</b> Biology is the science of life and fundamentally important to understand how it interacts with the physical world. Explore the links in this series of online courses.
	<b>Open Learn</b> The open University has a multitude of free online courses to supplement your learning including health, disease, animal welfare and drug discovery. Explore the science and technology section to find one that peaks your interest.