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partners in excellence

Adapted by D Finn May 2020

Countesthorpe Leysland Community College

Transition Pack for A Level Biology

Get ready for A-level!

**A guide to help you get ready for A-level Biology,
including everything from topic guides to interesting
reads and online learning courses.**

Commissioned by The PiXL Club Ltd. February 2016

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Please note: these resources are non-board specific. Please direct your students to the specifics of where this knowledge and skills most apply.

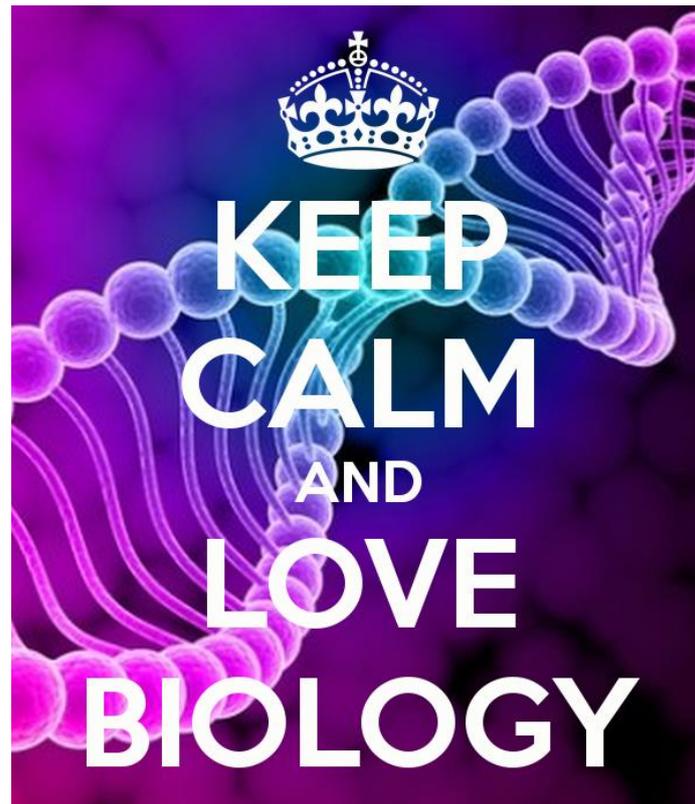
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So you have chosen to study A Level Biology?



This pack contains a programme of activities and resources to prepare you to start an A level in Biology in September. It is designed for you to complete throughout the remainder of the summer term to help you prepare for your course in September.

Deadline 22nd June 2020.

So what's it like to study A level Biology at CLCC?

Your teachers:

- Mr Finn (Head of Biology) DFinn@clcc.college
- Ms Preneta EPreneta@clcc.college
- Mrs Hayes ahayes@clcc.college
- Ms Moorhead LMoorhead@clcc.college

Your course:

- Following OCR A (from 2015) exam board
- All students are expected to complete the full A level course, we do not sit AS level exams.

To find out more about the course or view the specification use this link:

<https://www.ocr.org.uk/qualifications/as-and-a-level/biology-a-h020-h420-from-2015/>

The course content is split into six teaching modules:

Content is in six modules, each divided into key topics:

Module 1: Development of practical skills in biology

The development of practical skills is a fundamental and integral aspect of the study of any scientific subject. These skills not only enhance learners' understanding of the subject but also serve as a suitable preparation for the demands of studying biology at a higher level.

Module 2: Foundations in biology

All living organisms have similarities in cellular structure, biochemistry and function. An understanding of these similarities is fundamental to the study of the subject. This module gives learners the opportunity to use microscopy to study the cell structure of a variety of organisms. Biologically important molecules such as carbohydrates, proteins, water and nucleic acids are studied with respect to their structure and function. The structure and mode of action of enzymes in catalysing biochemical reactions is studied. Membranes form barriers within, and at the surface of, cells. This module also considers the way in which the structure of membranes relates to the different methods by which molecules enter and leave cells and organelles. The division and subsequent specialisation of cells is studied, together with the potential for the therapeutic use of stem cells.

Module 3: Exchange and transport

In this module, learners study the structure and function of gas exchange and transport systems in a range of animals and in terrestrial plants. The significance of surface area to volume ratio in determining the need for ventilation, gas exchange and transport systems in multicellular organisms is emphasised. The examples of terrestrial green plants and a range of animal phyla are used to illustrate the principle.

Module 4: Biodiversity, evolution and disease

In this module the learners study the biodiversity of organisms; how they are classified and the ways in which biodiversity can be measured. It serves as an introduction to ecology, emphasising practical techniques and an appreciation of the need to maintain biodiversity. The learners also gain an understanding of the variety of organisms that are pathogenic and the way in which plants and animals have evolved defences to deal with disease. The impact of the evolution of pathogens on the treatment of disease is also considered. The relationships between organisms are studied, considering variation, evolution and phylogeny

Module 5: Communication, homeostasis and energy

It is important that organisms, both plants and animals are able to respond to stimuli. This is achieved by communication within the body, which may be chemical and/or electrical. Both systems are covered in detail in this module. Communication is also fundamental to homeostasis with control of temperature, blood sugar and blood water potential being studied as examples. In this module, the biochemical pathways of photosynthesis and respiration are considered, with an emphasis on the formation and use of ATP as the source of energy for biochemical processes and synthesis of biological molecules.

Module 6: Genetics, evolution and ecosystems

This module covers the role of genes in regulating and controlling cell function and development. Heredity and the mechanisms of evolution and speciation are also covered. Some of the practical techniques used to manipulate DNA such as sequencing and amplification are considered and their therapeutic medical use. The use of microorganisms in biotechnology is also covered. Both of these have associated ethical considerations and it is important that learners develop a balanced understanding of such issues. Learners gain an appreciation of the role of microorganisms in recycling materials within the environment and maintaining balance within ecosystems. The need to conserve environmental resources in a sustainable fashion is considered, whilst appreciating the potential conflict arising from the needs of an increasing human population. Learners also consider the impacts of human activities on the natural environment and biodiversity.

Section title:

Key ideas identified:

Where can this topic be found in your textbook?

Useful diagrams/tables etc..

Key word definitions:

What previous topics does this link to?

Questions I need to ask in the lesson

Pre-Knowledge Topics- All must be completed

You have come across most of these concepts to some degree at GCSE but it is really important you understand them as they are fundamental ideas in Biology. Make sure you can complete these tasks fully- use the links for help and guidance. You could always email myself or any of the Biology team, if you get really stuck! Use the flipped learning sheet on the previous page to help you lay out your notes, we use it for pre-reading tasks at A level so you can get some practise at using it as you work through the tasks. If you can't print it out at home, you can just copy out the format onto your paper.

DNA and the Genetic Code

In living organisms nucleic acids (DNA and RNA have important roles and functions related to their properties. The sequence of bases in the DNA molecule determines the structure of proteins, including enzymes.

The double helix and its four bases store the information that is passed from generation to generation. The sequence of the base pairs adenine, thymine, cytosine and guanine tell ribosomes in the cytoplasm how to construct amino acids into polypeptides and produce every characteristic we see. DNA can mutate leading to diseases including cancer and sometimes anomalies in the genetic code are passed from parents to babies in disease such as cystic fibrosis, or can be developed in unborn foetuses such as Downs Syndrome.

Read the information on these websites (you could make more Cornell notes if you wish):

<http://www.bbc.co.uk/education/guides/z36mmp3/revision>

<http://www.s-cool.co.uk/a-level/biology/dna-and-genetic-code>

And take a look at these videos:

<http://ed.ted.com/lessons/the-twisting-tale-of-dna-judith-hauck>

<http://ed.ted.com/lessons/where-do-genes-come-from-carl-zimmer>

Task:

Produce a wall display to put up in your classroom in September. You might make a poster or do this using PowerPoint or similar Your display should use images, keywords and simple explanations to:

Define gene, chromosome, DNA and base pair

Describe the structure and function of DNA and RNA

Explain how DNA is copied in the body

Outline some of the problems that occur with DNA replication and what the consequences of this might be.

Exchange and Transport

Organisms need to exchange substances selectively with their environment and this takes place at exchange surfaces. Factors such as size or metabolic rate affect the requirements of organisms and this gives rise to adaptations such as specialised exchange surfaces and mass transport systems. Substances are exchanged by passive or active transport across exchange surfaces. The structure of the plasma membrane enables control of the passage of substances into and out of cells

Read the information on these websites (you could make more Cornell notes if you wish):

<http://www.s-cool.co.uk/a-level/biology/gas-exchange>

<http://www.s-cool.co.uk/a-level/biology/nutrition-and-digestion/revise-it/human-digestive-system>

And take a look at these videos:

<http://ed.ted.com/lessons/insights-into-cell-membranes-via-dish-detergent-ethan-perlstein>

<http://ed.ted.com/lessons/what-do-the-lungs-do-emma-bryce>

Task:

Create a poster or display to go in your classroom in September. Your poster should either: compare exchange surfaces in mammals and fish or compare exchange surfaces in the lungs and the intestines. You could use a Venn diagram to do this. Your poster should:

Describe diffusion, osmosis and active transport

Explain why oxygen and glucose need to be absorbed and waste products removed

Compare and contrast your chosen focus.

Cells

The cell is a unifying concept in biology, you will come across it many times during your two years of A level study. Prokaryotic and eukaryotic cells can be distinguished on the basis of their structure and ultrastructure. In complex multicellular organisms cells are organised into tissues, tissues into organs and organs into systems. During the cell cycle genetic information is copied and passed to daughter cells. Daughter cells formed during mitosis have identical copies of genes while cells formed during meiosis are not genetically identical

Read the information on these websites (you could make more Cornell notes if you wish):

<http://www.s-cool.co.uk/a-level/biology/cells-and-organelles>

<http://www.bbc.co.uk/education/guides/zvjycdm/revision>

And take a look at these videos:

<https://www.youtube.com/watch?v=gcTuQpuJyD8>

<https://www.youtube.com/watch?v=L0k-enzoeOM>

<https://www.youtube.com/watch?v=qCLmR9-YY7o>

Task:

Produce a one page revision guide to share with your class in September summarising one of the following topics: Cells and Cell Ultrastructure, Prokaryotes and Eukaryotes, or Mitosis and Meiosis.

Whichever topic you choose, your revision guide should include:

Key words and definitions

Clearly labelled diagrams

Short explanations of key ideas or processes.

Biological Molecules

Biological molecules are often polymers and are based on a small number of chemical elements. In living organisms carbohydrates, proteins, lipids, inorganic ions and water all have important roles and functions related to their properties. DNA determines the structure of proteins, including enzymes. Enzymes catalyse the reactions that determine structures and functions from cellular to whole-organism level. Enzymes are proteins with a mechanism of action and other properties determined by their tertiary structure. ATP provides the immediate source of energy for biological processes.

Read the information on these websites (you could make more Cornell notes if you wish):

<http://www.s-cool.co.uk/a-level/biology/biological-molecules-and-enzymes>

<http://www.bbc.co.uk/education/guides/zb739j6/revision>

And take a look at these videos:

<https://www.youtube.com/watch?v=H8WJ2KENIKO>

<http://ed.ted.com/lessons/activation-energy-kickstarting-chemical-reactions-vance-kite>

Task:

Krabbe disease occurs when a person doesn't have a certain enzyme in their body. The disease effects the nervous system. Write a letter to a GP or a sufferer to explain what an enzyme is.

Your poster should:

Describe the structure of an enzyme

Explain what enzymes do inside the body

Ecosystems

Ecosystems range in size from the very large to the very small. Biomass transfers through ecosystems and the efficiency of transfer through different trophic levels can be measured. Microorganisms play a key role in recycling chemical elements. Ecosystems are dynamic systems, usually moving from colonisation to climax communities in a process known as succession. The dynamic equilibrium of populations is affected by a range of factors. Humans are part of the ecological balance and their activities affect it both directly and indirectly. Effective management of the conflict between human needs and conservation help to maintain sustainability of resources.

Read the information on these websites (you could make more Cornell notes if you wish):

<http://www.bbc.co.uk/education/guides/z7vqtfr/revision>

<http://www.s-cool.co.uk/a-level/biology/ecological-concepts>

And take a look at these videos:

<https://www.youtube.com/watch?v=iZKIHe2LDP8>

<https://www.youtube.com/watch?v=E8dkWQVFAoA>

Task:

Produce a newspaper or magazine article about one ecosystem (e.g. the arctic, the Sahara, the rainforest, or something closer to home like your local woodland, nature reserve or shore line).

Your article should include:

Key words and definitions

Pictures or diagrams of your chosen ecosystem.

A description of the changes that have occurred in this ecosystem

An explanation of the threats and future changes that may further alter this ecosystem.

Control Systems

Homeostasis is the maintenance of a constant internal environment. Negative feedback helps maintain an optimal internal state in the context of a dynamic equilibrium. Positive feedback also occurs. Stimuli, both internal and external, are detected leading to responses. The genome is regulated by a number of factors. Coordination may be chemical or electrical in nature

Read the information on these websites:

<http://www.s-cool.co.uk/a-level/biology/homeostasis>

<http://www.bbc.co.uk/education/topics/z8kxpv4>

And take a look at these videos:

<https://www.youtube.com/watch?v=x4PPZCLnVKA>

<https://www.youtube.com/watch?v=x4PPZCLnVKA>

Task:

Produce a poster to display in your classroom in September summarising one of the following topics: Temperature Control, Water and the Kidneys, Glucose, or The Liver.

Whichever topic you choose, your poster or display should include:

Key words and definitions

Clearly labelled diagrams

Short explanations of key ideas or processes.

Energy for Biological Processes

In cellular respiration, glycolysis takes place in the cytoplasm and the remaining steps in the mitochondria. ATP synthesis is associated with the electron transfer chain in the membranes of mitochondria and chloroplasts in photosynthesis energy is transferred to ATP in the light- dependent stage and the ATP is utilised during synthesis in the light-independent stage.

Read the information on these websites (you could make more Cornell notes if you wish):

<http://www.bbc.co.uk/education/guides/zcxrd2p/revision>

<http://www.s-cool.co.uk/a-level/biology/respiration>

And take a look at these videos:

https://www.youtube.com/watch?v=00jbG_cfGuQ

<https://www.youtube.com/watch?v=2f7YwCtHcgk>

Task:

Produce an A3 annotated information poster that illustrates the process of cellular respiration and summarises the key points.

Your poster should include:

Both text and images

Be visually stimulating

Key words and definitions

Clearly labelled diagrams

Short explanations of key ideas or processes.

Scientific and Investigative Skills

As part of your A level you will complete a practical assessment. This will require you to carry out a series of practical activities as well as planning how to do them, analysing the results and evaluating the methods. This will require you to: use appropriate apparatus to record a range of quantitative measurements (to include mass, time, volume, temperature, length and pH), use appropriate instrumentation to record quantitative measurements, such as a colorimeter or photometer, use laboratory glassware apparatus for a variety of experimental techniques to include serial dilutions, use of light microscope at high power and low power, including use of a graticule, produce scientific drawing from observation with annotations, use qualitative reagents to identify biological molecules, separate biological compounds using thin layer/paper chromatography or electrophoresis, safely and ethically use organisms, use microbiological aseptic techniques, including the use of agar plates and broth, safely use instruments for dissection of an animal organ, or plant organ, use sampling techniques in fieldwork.

Task:

Produce a glossary for the following key words:

accuracy, anomaly, calibration, causal link, chance, confounding variable, control experiment, control group, control variable, correlation, dependent variable, errors, evidence, fair test, hypothesis, independent, null hypothesis, precision, probability, protocol, random distribution, random error, raw data, reliability, systematic error, true value, validity, zero error,

Careers- Complete all tasks

You may already have an idea about what you want to do beyond GCSE and A levels or you may have chosen your A level courses based on the topics you enjoy either way investigating the types of careers that a Biology course can lead you into might surprise you and inspire you.

Visit the following websites: -

<https://www.rsb.org.uk/careers-and-cpd>

<https://www.prospects.ac.uk/careers-advice/what-can-i-do-with-my-degree/biology>



- 1) Create a wordle of the jobs titles that you come across, try to get a good range of different job types.
- 2) Pick two of the jobs that you find most interesting and write a job description for each in the style of a job advert you might see online or in a newspaper. Include salary, qualifications and skills needed and what the job entails in terms of day to day tasks and activities (see example below). Note: -If you are doing more than one Science topic and these jobs overlap e.g. Pharmacist (involves Biology and Chemistry) you need not do this task twice! Submit the same advert to both your teachers.
- 3) Write down your current thoughts on what **you** might like to do beyond A levels (it doesn't have to be one of the jobs you have researched), has it changed in light of your research?

Videos to watch online (Pick one topic that interests you)

A New Superweapon in the Fight Against Cancer

Available at :

http://www.ted.com/talks/paula_hammond_a_new_superweapon_in_the_fight_against_cancer?language=en

Cancer is a very clever, adaptable disease. To defeat it, says medical researcher and educator Paula Hammond, we need a new and powerful mode of attack.



Why Bees are Disappearing

Available at :

http://www.ted.com/talks/marla_spivak_why_bees_are_disappearing?language=en

Honeybees have thrived for 50 million years, each colony 40 to 50,000 individuals coordinated in amazing harmony. So why, seven years ago, did colonies start dying en-masse?

Why Doctors Don't Know About the Drugs They Prescribe

Available at :

http://www.ted.com/talks/ben_goldacre_what_doctors_dont_know_about_the_drugs_they_prescribe?language=en

When a new drug gets tested, the results of the trials should be published for the rest of the medical world — except much of the time, negative or inconclusive findings go unreported, leaving doctors and researchers in the dark.



Growing New Organs

Available at :

http://www.ted.com/talks/anthony_atalla_growing_organs_engineering_tissue?language=en

Anthony Atalla's state-of-the-art lab grows human organs — from muscles to blood vessels to bladders, and more.

Research activities (pick two)

Use your online searching abilities to see if you can find out as much about the topic as you can. Remember it you are a prospective A level biologist; you should aim to push **your** knowledge.

You can make a 1-page summary for each one you research using Cornell notes or use the flipped learning sheet again:

<http://coe.jmu.edu/learningtoolbox/cornellnotes.html>

Topic 1: The Cell

Available at: <http://bigpictureeducation.com/cell>

The cell is the building block of life. Each of us starts from a single cell, a zygote, and grows into a complex organism made of trillions of cells. In this issue, we explore what we know – and what we don't yet know – about the cells that are the basis of us all and how they reproduce, grow, move, communicate and die.



Topic 2: The Immune System

Available at: <http://bigpictureeducation.com/immune>

The immune system is what keeps us healthy in spite of the many organisms and substances that can do us harm. In this issue, explore how our bodies are designed to prevent potentially harmful objects from getting inside, and what happens when bacteria, viruses, fungi or other foreign organisms or substances breach these barriers.



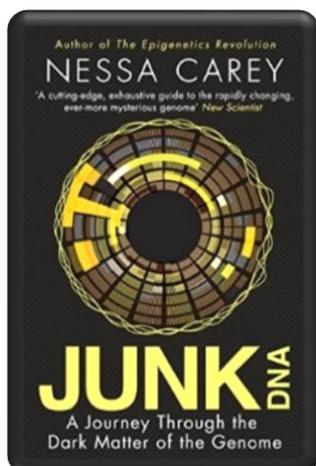
Topic 3: Exercise, Energy and Movement

Available at: <http://bigpictureeducation.com/exercise-energy-and-movement>

All living things move. Whether it's a plant growing towards the sun, bacteria swimming away from a toxin or you walking home, anything alive must move to survive. For humans though, movement is more than just survival – we move for fun, to compete and to be healthy. In this issue we look at the biological systems that keep us moving and consider some of the psychological, social and ethical aspects of exercise and sport.



Book Recommendations

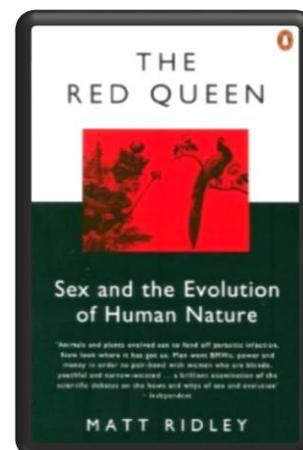


Junk DNA

Our DNA is so much more complex than you probably realize, this book will really deepen your understanding of all the work you will do on Genetics. Available at amazon.co.uk

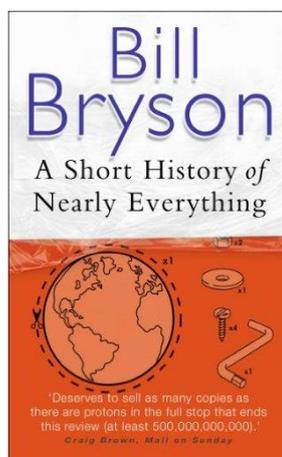
The Red Queen

Its all about sex. Or sexual selection at least. This book will really help your understanding of evolution and particularly the fascinating role of sex in evolution. Available at amazon.co.uk



A Short History of Nearly Everything

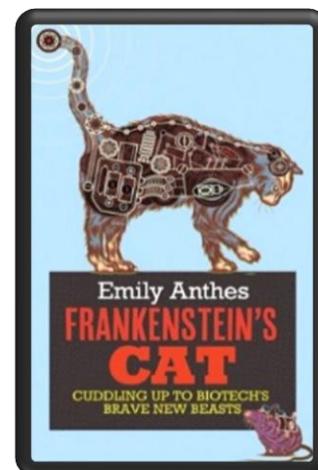
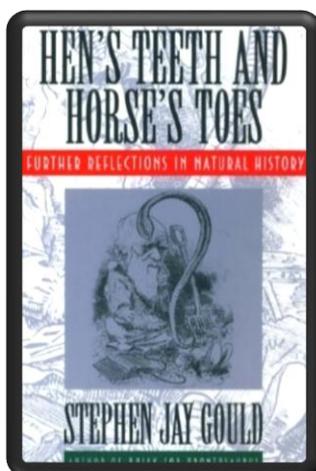
A whistle-stop tour through many aspects of history from the Big Bang to now. This is a really accessible read that will re-familiarise you with common concepts and introduce you to some of the more colourful characters from the history of science! Available at amazon.co.uk



Studying Geography as well?

Hen's teeth and horses toes

Stephen Jay Gould is a great Evolution writer and this book discusses lots of fascinating stories about Geology and evolution. Available at amazon.co.uk



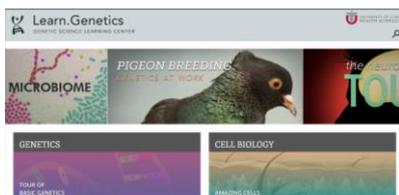
An easy read..

Frankenstein's cat

Discover how glow in the dark fish are made and more great Biotechnology breakthroughs. Available at amazon.co.uk

Science websites

These websites all offer an amazing collection of resources that you should use again and again throughout your course.



Probably the best website on Biology....

Learn Genetics from Utah University has so much that is pitched at an appropriate level for you and has lots of interactive resources to explore, everything from why some people can taste bitter berries to how we clone mice or make glow in the dark jelly fish.

<http://learn.genetics.utah.edu>



DNA from the beginning is full of interactive animations that tell the story of DNA from its discovery through to advanced year 13 concepts. One to book mark!

<http://www.dnaftb.org/>



In the summer you will most likely start to learn about Biodiversity and Evolution. Many Zoos have great websites, especially London Zoo. Read about some of the case studies on conservation, such as the Giant Pangolin, the only mammal with scales. <https://www.zsl.org/conservation>



At GCSE you learnt how genetic diseases are inherited. In this virtual fly lab you get to breed fruit flies to investigate how different features are passed on. <http://sciencecourseware.org/vcise/drosophila/>



Ok, so not a website, but a video you definitely want to watch. One of the first topics you will learn about is the amazing structure of the cell. This BBC film shows the fascinating workings of a cell... a touch more detailed than the "fried egg" model you might have seen.

http://www.dailymotion.com/video/xzh0kb_the-hidden-life-of-the-cell_shortfilms

If this link expires – google "BBC hidden life of the cell"