# DP unit planner 1

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| **Teacher(s)** | Adam Lerch, Niko Kaikkonen | **Subject group and course** | Group IV, Biology | | |
| **Course part and topic** | From the big to the small: Evolution, Cell Biology and Biochemistry | **SL or HL/Year 1** | SL & HL | **Dates** | Term 1 |
| **Unit description and texts** | | **DP assessment(s) for unit** | | | |
| The unit begins with the underlying and all-encompassing theory of evolution through natural selection (Units 5.1 & 5.2). The following topics of Cell Biology (Topic 1) and parts of Biochemistry (Topic 2.1-2.7) are covered in light of evolutionary theory, including the interesting question of how life began and how life has evolved from non-living molecules. Oxford IB Diploma Programme Biology. | | The use of previous test questions from all papers (including practical based questions from Paper 3).  Computer models and simulation of selection.  Required practical 1: Use of the microscope  Required practical 2: Estimation of osmolarity in onion cells and potato cells.  Required practical 3: Investigation of a factor affecting enzyme activity.  Paper 1: Multiple choice questions  Paper 2: Data based questions, short and extended response  Paper 3: Questions from Section A | | | |

***INQUIRY: establishing the purpose of the unit***

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| **Transfer goals**  *List here one to three big, overarching, long-term goals for this unit. Transfer goals are the major goals that ask students to “transfer” or apply, their knowledge, skills, and concepts at the end of the unit under new/different circumstances, and on their own without scaffolding from the teacher.* |
| *The*  overarching theme of the unit is to establish evolutionary theory as the core of the core material and the study of Biology as a whole. It is the lens through which the study of biology can be viewed in proper focus. When the focus switches to cells and cell biology, the evolution of cells and cell organelles remains in focus.  The unit also considers the goal of understanding that living organisms are comprised of non-living molecules, which are therein comprised of non-living atoms. The study of Biology remains in pursuit of the answers to questions regarding origin of life from non-living particles.  The third big goal is to gain an understanding of macromolecules by comparing and contrasting their structures, functions, formation, breakdown, and other chemical and physical characteristics. |

***ACTION: teaching and learning through inquiry***

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| **Content/skills/concepts—essential understandings** | | **Learning process**  *Check the boxes for any pedagogical approaches used during the unit. Aim for a variety of approaches to help facilitate learning.* | |
| Students will know the following content:  1. Evolution takes place when heritable characteristics change over short or long periods of time, as evidenced by fossils, artificial selection, divergence, and species response to environmental change.  2. The reasons for continuous and discontinuous variation.  3. Homologous structures arise out of common ancestry, while analogous structures do not.  4. The cell theory along with some possible exceptions.  5. Students will understand cell differentiation, first as a concept and later as a result of the products of transcription and translation.  6. Students will be able to define cell differentiation and explain it in regards to stem cells.  7. Students will understand the structure of cells and organelles as visible under light and electron microscopes.  8. Students will know the stages of cell division.  9. Students will understand the structure of membranes and how the functions of the membrane (e.g. movement across membranes) relate to the structure.  10. Students will understand theories on the origin of cells and organelles.  11. Students will understand how the key elements involved in life form the key molecules of life.  12. Students will understand how condensation and hydrolysis reactions are involved in the formation and breakdown of macromolecules.  13. Students will know of the reasons for water’s importance to life.  14. Students will understand the importance of enzymes as well as how enzymes function.  15. Students will know the importance of DNA as the coding molecule, how DNA relates to RNA and to proteins.  16. Students will know the specific importance of specific macromolecules in life.  Students will develop the following skills:   1. Students will become more familiar with the use of the light microscope. 2. Students will be able to draw and label cells of various types. 3. Students will be able to draw and label images of the cell membrane. 4. Students will be able to interpret electron micrographs. 5. Students will be able to calculate magnification of images, calculate total magnification of microscopes.   Students will grasp the following concepts:  Time: Evolution occurs in some species over vast expanses of time and in others in short amounts of time.  Transformation: Evolution has resulted in dramatic transformations in species, leading up to speciation.  Cycles: Cell division involves a series of cycles.  Models: Different models can be used to exemplify and illustrate matters that are too small to be seen: Molymod molecule models, computer models of molecules, plastic/ clay models of macromolecules allow us to visualize that which is hard to see. | | **Learning experiences and strategies/planning for self-supporting learning:**  Lecture  Socratic seminar  Small group/pair work  PowerPoint lecture/notes  Individual presentations  Group presentations  Student lecture/leading  Interdisciplinary learning  Details:  Other/s: Hands on learning through laboratory investigations  Debates on stems cell research. | |
| **Formative assessment:**  Practicing work on explaining natural selection in essay form.  All drawings as mentioned in the syllabus.  Data based questions on each sub-topic, if relevant. | |
| **Summative assessment:**  Assessment of biological drawings and calculations of magnifications.  Exam containing previous test questions as well as IB style test questions, including possible questions from Papers 1-3. | |
| Differentiation:  Affirm identity—build self-esteem  Value prior knowledge  Scaffold learning  Extend learning  Details: | |
| **Approaches to learning (ATL)**  *Check the boxes for any explicit approaches to learning connections made during the unit. For more information on ATL, please see* [*the guide*](http://ibpublishing.ibo.org/dpatl/guide.html)*.* | | | |
| Thinking  Social  Communication  Self-management  Research  Details: | | | |
| **Language and learning**  *Check the boxes for any explicit language and learning connections made during the unit. For more information on the IB’s approach to language and learning, please see* [*the guide*](http://ibpublishing.ibo.org/dpatl/guide.html)*.* | **TOK connections**  *Check the boxes for any explicit TOK connections made during the unit* | | **CAS connections**  *Check the boxes for any explicit CAS connections. If you check any of the boxes, provide a brief note in the “details” section explaining how students engaged in CAS for this unit.* |
| Activating background knowledge  Scaffolding for new learning  Acquisition of new learning through practice  Demonstrating proficiency  Details: Demonstrating proficiency through diagram annotation, competency in using e.g. microscopes, scalpels, and other laboratory equipment. | Personal and shared knowledge  Ways of knowing  Areas of knowledge  The knowledge framework  Details: Understanding what a theory means in the natural sciences. Understanding how the evidence for evolution through natural selection has become stronger in light of technological developments. | | Creativity  Activity  Service  Details: |
| **Resources**  *List and attach (if applicable) any resources used in this unit* | | | |
| **Oxford IB Diiploma Programme Biology textbook**  **Oxford IB Study Guides: Biology for the IB Diploma**  **InThinking Biology online learning environment / resources from InThinking**  **<https://peda.net/p/adam.lerch%40jns.fi/ib-biology> (the list of links available is too extensive to add here). The peda.net space also provides plenty of other documents on these topics, including the IB Biology Subject Guide.** | | | |

***Stage 3: Reflection—considering the planning, process and impact of the inquiry***

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| **What worked well**  *List the portions of the unit (content, assessment, planning) that were successful* | **What didn’t work well**  *List the portions of the unit (content, assessment, planning) that were not as successful as hoped* | **Notes/changes/suggestions:**  *List any notes, suggestions, or considerations for the future teaching of this unit* |
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