

Acknowledgements – Unit 1

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WHMIS pictogram, Canadian Centre for Occupational Health and Safety, URL: <http://www.ccohs.ca/WHMISpictograms.html>, Accessed 10/10/2017.

Lab assistant with petri dish, miszaqq/iStock/Getty Images

Simple diagram of animal cell, domdomegg, URL: [https://commons.wikimedia.org/wiki/File:Simple_diagram_of_animal_cell_\(en\).svg](https://commons.wikimedia.org/wiki/File:Simple_diagram_of_animal_cell_(en).svg), Accessed 07/11/2018, Granted under Creative Commons Attribution 4.0 International (CC-BY-4.0) license: <https://creativecommons.org/licenses/by/4.0/deed.en>.

The cells of eukaryotes (left) and prokaryotes (right), National Center for Biotechnology Information, URL: <https://commons.wikimedia.org/wiki/File:Celltypes.svg>, Accessed

07/11/2018.

The Flower, Unknown creator, URL: <https://www.qldscienceteachers.com/junior-science/biology/functions-of-plant-parts>, Accessed 11/12/2018.

Ranunculus glaberrimus, Matt Levin and Peter coxhead, URL: https://commons.wikimedia.org/wiki/File:Ranunculus_glaberrimus_labelled.jpg, Accessed 07/11/2018.

Venn diagram, Copyright © 2018 The Ontario Educational Communications Authority. All rights reserved.

Simple diagram of animal cell, domdomegg, URL: [https://commons.wikimedia.org/wiki/File:Simple_diagram_of_animal_cell_\(en\).svg](https://commons.wikimedia.org/wiki/File:Simple_diagram_of_animal_cell_(en).svg), Accessed 07/11/2018, Granted under Creative Commons Attribution 4.0 International (CC-BY-4.0) license: <https://creativecommons.org/licenses/by/4.0/deed.en>.

Microscope, Mahray, URL: <https://www.turbosquid.com/3d-models/microscope-3ds-free/255314>, Accessed 07/11/2018.

Microscope, urginguss/istockphoto.com/Getty Images

Group of people with research concept © iStock.com/Rawpixel.

MSC high magnification, Robert M. Hunt, URL: https://commons.wikimedia.org/wiki/File:MSC_high_magnification.jpg, Accessed 07/11/2018, Granted under Creative Commons Attribution 3.0 Unported (CC-BY-3.0) license: <https://creativecommons.org/licenses/by/3.0/deed.en>.

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Mindmaps screenshot, David Richard, URL: <https://www.mindmaps.app/>, Accessed 14/11/2018.

Mindmaps, David Richard, URL: <https://www.mindmaps.app/>, Accessed 07/11/2018.

Learning girl, bowie15/iStock/Getty Images

E-book reader concept, onurdongel/iStock/Getty Images

Enchanting Forest in India © iStock.com/Yoav Peled.

Classification of Life, Paul Andersen, URL: https://www.youtube.com/watch?v=tYL_8gv7RiE, Accessed 09/11/2018.

The Butterfly Book. Plate XXXV, W.J. Holland, URL: <https://www.flickr.com/photos/internetarchivebookimages/20518240351/>, Accessed 09/11/2018.

Animal Kingdom Arachiades Pl 11 Ter, Georges Cuvier, P.A. Latreille and Henry McMurtie, URL: <https://www.flickr.com/photos/internetarchivebookimages/17576919553/>, Accessed 09/11/2018.

Ladybug in the green grass, Visual_Intermezzo/iStock/Getty Images

Red-headed woodpecker, JackVandenHeuvei/iStock/Getty Images

Biological classification, Peter Halasz, URL: https://commons.wikimedia.org/wiki/File:Biological_classification_L_Pengo.svg, Accessed 09/11/2018.

Tree of Living Organisms, Maulucioni y Doridí, URL: https://commons.wikimedia.org/wiki/File:Tree_of_Living_Organisms_2.png, Accessed 09/11/2018.

Halobacteria, NASA, URL: <https://commons.wikimedia.org/wiki/Category:Halobacteria#/media/File:Halobacteria.jpg>, Accessed 09/11/2018.

Vibrio cholerae bacteria, Ronald Taylor, Tom Kirn, Louisa Howard, URL: <http://remf.dartmouth.edu/images/bacteriaSEM/source/1.html>, Accessed 12/11/2018.

Paramecium aurelia, Barfooz, URL: <https://commons.wikimedia.org/wiki/File:Paramecium.jpg>, Accessed 12/11/2018.

Fly Agaric, Amanita muscaria, P.D. Pratt and Tom Preney, URL: http://www.ojibway.ca/A_muscaria.jpg, Accessed 12/11/2018.

Lake Killarney Provincial Park, serg269/iStock/Getty Images

Asia animals, JackF/iStock/Getty Images

Dichotomous key, Unidentified creator, URL: <http://biology-igcse.weebly.com/dichotomous-keys.html>, Accessed 12/11/2018.

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Cladogram of Six Kingdoms and Three Domains, Unidentified creator, URL: <http://slideplayer.com/slide/4422495>, Accessed 13/11/2018.

Intestinal microbiome escherichia coli, Dr_Microbe/iStock/Getty Images

Bacteria © iStock.com/spawans.

Prokaryote cell, Ali Zifan, URL: <https://en.wikipedia.org/wiki/Prokaryote#/media/>

File:Prokaryote_cell.svg, Accessed 13/11/2018.

Bacterial cell diagram, jack0m, Getty Images, URL: <https://www.gettyimages.ca/detail/illustration/bacterial-cell-diagram-royalty-free-illustration/685763686>,

Bacteria close-up, bodym, Getty Images, URL: <https://www.gettyimages.ca/detail/photo/bacteria-close-up-royalty-free-image/901949424>,

Bacteria © iStock.com/spawans.

Staphylococci on the surface of skin, Dr_Microbe/iStock/Getty Images

Spirillum bacteria, petersimoncik/iStock/Getty Images

Average prokaryote cell, Mariana Ruiz Villarreal, URL: https://commons.wikimedia.org/wiki/File:Average_prokaryote_cell-_en.svg, Accessed 13/11/2018.

Antibiotic resistance, Wykis, URL: https://commons.wikimedia.org/wiki/File:Antibiotic_resistance.svg, Accessed 13/11/2018.

Hands in soil, M Tullottes, URL: <https://commons.wikimedia.org/wiki/File:HandsInSoil.jpg>, Accessed 13/11/2018.

Septic tank, Olek Remesz, URL: https://commons.wikimedia.org/wiki/File:Septic_tank_EN.svg, Accessed 13/11/2018.

Blausen.com staff (2014). "Medical gallery of Blausen Medical 2014". WikiJournal of Medicine 1 (2). DOI:10.15347/wjm/2014.010. ISSN 2002-4436 Granted under Creative Commons Attribution 3.0 Unported (CC-BY-3.0) license: <https://creativecommons.org/licenses/by/3.0/deed.en>.

French chemist Louis Pasteur, Photos.com/PHOTOs.com/Getty Images

Hepatitis C virus model, Dr_Microbe/iStock/Getty Images

Structure of bacteriophage, kawin302/iStock/Getty Images

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Lysogenic and lytic cycle. Accessed 13/11/2018. © 2 Nov 2016 OpenStax College Microbiology. Textbook content produced by OpenStax College Microbiology is licensed under a Creative Commons Attribution License 4.0 license.

Dangerous biological research, mediphotos/iStock/Getty Images

Chakraborty O, Mukherjee A and Roy P. Gene Therapy for Treatment of Melanoma Cancer. *Ann Appl Microbiol Biotechnol J.* 2017; 1(1): 1002. Granted under Creative Commons Attribution 4.0 International (CC BY 4.0) license: <https://creativecommons.org/licenses/by/4.0/>.

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Five kingdom classification system, srle7777/iStock/Getty Images

Mouse-eared bat, Myotis, DPFishCo/iStock/Getty Images

Clearcut logging © iStock.com/eppicphotography.

Protist collage, , URL: https://commons.wikimedia.org/wiki/File:Protist_collage.jpg, Accessed 16/11/2018.

Moving yellow plasmodium of a slime mold, Iuliia Morozova/iStock/Getty Images

Giardia lamblia, Jerad M Gardner MD, URL: https://commons.wikimedia.org/wiki/File:Giardia_lamblia_cytology_closeup.jpg, Accessed 16/11/2018.

Art drawing of an amoeba, Pearson Scott Foresman, URL: [https://commons.wikimedia.org/wiki/File:Amoeba_\(PSF\).png](https://commons.wikimedia.org/wiki/File:Amoeba_(PSF).png), Accessed 16/11/2018.

Balantidium coli in wet mount, Euthman, URL: https://commons.wikimedia.org/wiki/File:Balantidium_coli_wet_mount.jpg, Accessed 16/11/2018.

Malaria parasites, Scharvik/iStock/Getty Images

Euglena diagram, Claudio Miklos, URL: <https://en.wikipedia.org/wiki/Euglena>, Accessed 16/11/2018.

Noctiluca scintillans, Hans Hillewaert, URL: https://commons.wikimedia.org/wiki/File:Noctiluca_scintillans.jpg, Accessed 16/11/2018.

Circle of diatoms on a slide, Wipeter, URL: <https://commons.wikimedia.org/wiki/File:Diatom2.jpg>, Accessed 16/11/2018.

Glaucocystis, NEON, URL: https://commons.wikimedia.org/wiki/File:Glaucocystis_sp.jpg, Accessed 16/11/2018.

Fungi of Saskatchewan, Sasata, URL: https://commons.wikimedia.org/wiki/File:Fungi_of_Saskatchewan.JPG, Accessed 16/11/2018.

Fungi - Basidiomycota, Livingstone, BIODIDAC, URL: <http://biodidac.bio.uottawa.ca/thumbnails/catquery.htm?Kingdom=Fungi>, Accessed 16/11/2018.

Green sprouts, ligora/iStock/Getty Images

Winter landscape Telemark, Randi Hausken, URL: <https://www.flickr.com/photos/randihausken/2106272012/>, Accessed 16/11/2018.

Inside the botanical gardens, Qaalvin, URL: https://commons.wikimedia.org/wiki/File:Inside_the_botanical_gardens_-_panoramio.jpg, Accessed 16/11/2018, Granted under Creative Commons Attribution 3.0 Unported (CC-BY-3.0) license: <https://creativecommons.org/licenses/by/3.0/deed.en>.

Moss, Greg Mote, URL: <https://www.flickr.com/photos/96264862@N00/5885420132>, Accessed 16/11/2018, Granted under Creative Commons Attribution 2.0 Generic (CC-BY-3.0) license: <https://creativecommons.org/licenses/by/2.0/>.

Forest in the Canary Islands, Luisrojasstock/iStock/Getty Images

Fern: *Pteridium aquilinum*, David Monniaux, URL: https://commons.wikimedia.org/wiki/File:Fern_dsc06699.jpg, Accessed 16/11/2018.

Mossy lava field in Iceland, borchee/E+/Getty Images

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Algae pollution environment © iStock.com/Jose Tejo.

Amoeba proteum, micro_photo/iStock/Getty Images

Bacteriophage Virus Electron microscopy, extender01/iStock/Getty Images

Spider *Dolomedes fimbriatus* © iStock.com/Alasdair Thomson.

Earth worms, stockcam/iStock/Getty Images

Insect eating plant, Martin Wahlborg/iStock/Getty Images

Elephant charging © iStock.com/SoopySue.

Body symmetry, University of California Museum of Paleontology, URL: https://evolution.berkeley.edu/evolibrary/article/arthropods_04, Accessed 16/11/2018.

White Lobster, Nilfanion, URL: https://commons.wikimedia.org/wiki/File:Lobster,_National_Lobster_Hatchery_2.jpg, Accessed 16/11/2018.

Red starfish on the aquarium glass, Анатолий Тушенцов/iStock/Getty Images

Illustration of digestive system, Eraxion/iStock/Getty Images

Worm's body cavity, Mr. Bodell, URL: <http://bodell.mtchs.org/OnlineBio/BIOCD/text/chapter23/concept23.6.html>, Accessed 16/11/2018.

X-Ray image of the human hand, GeorgHanf/E+/Getty Images

Snail on green leaf, valentinrussanov/E+/Getty Images

Earthworm on damp soil, jlmcloughlin/iStock/Getty Images

Phylogenetic tre, Copyright © 2018 The Ontario Educational Communications Authority. All rights reserved.

Tube sponges and diver, Albert kok, URL: https://commons.wikimedia.org/wiki/File:Sponge_diver.jpg, Accessed 19/11/2018.

The structure of a sponge, McGraw-Hill Companies, Inc., Accessed 19/11/2018.

Cnidaria flow chart, Marine Education Society of Australasia, URL: <http://www.mesa.edu.au/Cnidaria/images/intro.jpg>, Accessed 19/11/2018.

SEM of a nematocyst after release, Pierre Tardent, Academic Press Inc., URL: <https://en.wikipedia.org/wiki/Cnidocyte#/media/File:Nematocyst-discharged.png>, Accessed 19/11/2018.

Fish aquarium coral © iStock.com/andipantz_ts.

Land planarian, Pavel Kirillov, URL: <https://www.flickr.com/photos/74834643@N07/21248664896>, Accessed 19/11/2018.

Nematode Heligmosomoides polygyrus, Naldo-Crocoduck, URL: <https://commons.wikimedia.org/wiki/File:Heligmosomoides.jpg>, Accessed 19/11/2018.

Common Earthworm on the ground © iStock.com/igreen images.

Schematic mollusc, KDS4444, URL: https://commons.wikimedia.org/wiki/File:Schematic_mollusc_in_vector_format.svg, Accessed 19/11/2018, Based on Augusta Foote Arnold illustration. .

Octopus vulgaris, Albert Kok, URL: <https://commons.wikimedia.org/wiki/File:Octo2.jpg>, Accessed 19/11/2018.

Fromia monilis (star fish), Nhobgood Nick Hobgood, URL: <https://en.wikipedia.org/wiki/Starfish>, Accessed 19/11/2018.

Echinus melo, Marco Busdraghi, URL: https://commons.wikimedia.org/wiki/File:Riccio_Melone_a_Capo_Caccia_adventurediving.it.jpg, Accessed 19/11/2018, Granted under Creative Commons Attribution 3.0 Unported (CC-BY-3.0) license: <https://creativecommons.org/licenses/by/3.0/deed.en>.

Harvestman (Opilio canestrinii), Charles J. Sharp, URL: https://commons.wikimedia.org/wiki/File:Harvestman_opilio_canestrinii_male.jpg, Accessed 19/11/2018.

Fiddler crab, The Photographer, URL: https://commons.wikimedia.org/wiki/File:Fiddler_crab_2.jpg, Accessed 19/11/2018, Granted under Creative Commons CC0 1.0 Universal Public Domain Dedication (CC-BY-1.0) license: <https://creativecommons.org/publicdomain/zero/1.0/deed.en>).

Ruby Meadowhawk, Mike Ostrowski, URL: <https://www.flickr.com/photos/38976602@N05/4719445252>, Accessed 19/11/2018.

Eurygyrus ochraceus, Kiril Makarov, URL: https://commons.wikimedia.org/wiki/File:Eurygyrus_ochraceus.png, Accessed 19/11/2018, Granted under Creative Commons Attribution 4.0 International (CC-BY-4.0) license: <https://creativecommons.org/licenses/by/4.0/deed.en>.

Giant centipede, Katarina Cochran, URL: https://en.wikipedia.org/wiki/Scolopendra_gigantea#/media/File:Scolopendra_gigantea.jpg, Accessed 19/11/2018.

Arachnid and Insect, Epilex, URL: http://www.elipex.com/nz/disease_information/horses/ec_parasite.asp, Accessed 19/11/2018.

Animal skeletons, 3drenderings/iStock/Getty Images

Mouth of a sea lamprey, PEDRE/E+/Getty Images

Great white shark, lindsay_imagery/iStock/Getty Images

Smallmouth bass underwater, RLSPHOTO/iStock/Getty Images

Frog in a marsh, Robitaille/iStock/Getty Images

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Scarlet macaws, OGphoto/iStock/Getty Images

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Australian Platypus, John Carnemolla/iStock/Getty Images

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Earth worms, stockcam/iStock/Getty Images

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Mindmaps, David Richard, URL: <https://www.mindmaps.app/>, Accessed 19/11/2018.

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Acknowledgements – Unit 2

Forest sunlight shining through foliage, grafxart8888/iStock/Getty Images

Plant, Kelvinsong, URL: <https://commons.wikimedia.org/wiki/File:Plant.svg>, Accessed 20/11/2018.

Monocotyledonous flowers vs dicotyledonous flowers, Flowerpower207, URL: https://commons.wikimedia.org/wiki/File:Monocot_vs_Dicot.svg, Accessed 20/11/2018.

Single pine cone, Studio Doros/iStock/Getty Images

Coniferous tree branches, LiliGraphie/iStock/Getty Images

Eastern White Pine *Pinus strobus*, Nicholas A. Tonelli, URL: <https://www.flickr.com/photos/14922165@N00/8381295605>, Accessed 20/11/2018.

Growing plants, showcake/iStock/Getty Images

Dandelion, ttbphoto/iStock/Getty Images

Weed with roots, DonNichols/E+/Getty Images

A root, SparkNotes LLC, URL: <https://www.sparknotes.com/biology/plants/plantstructures/section2/>, Accessed 20/11/2018.

Air plant, ChristinaPrinn/iStock/Getty Images

Prop roots of maize, Jamain, URL: https://commons.wikimedia.org/wiki/File:Prop_roots_of_maize_J1.jpg, Accessed 20/11/2018.

Mangrove forest, woraput/iStock/Getty Images

Thorns, University of Miami, URL: http://www.bio.miami.edu/dana/pix/thorn_rose.jpg, Accessed 20/11/2018.

Bunch of freshly cut sugar cane, bdsnp/iStock/Getty Images

Young plant, amenic181/iStock/Getty Images

Fresh ginger, Atiwat Studio/iStock/Getty Images

A Herbaceous Stem, World Book-Childcraft International, Inc., URL: <http://www.robinsonlibrary.com/science/botany/anatomy/stems.htm>, Accessed 20/11/2018, From World Book Encyclopedia Chicago: World Book-Childcraft International, Inc., 1979.

A Woody Stem, World Book-Childcraft International, Inc., URL: <http://www.robinsonlibrary.com/science/botany/anatomy/stems.htm>, Accessed 20/11/2018, From World Book Encyclopedia Chicago: World Book-Childcraft International, Inc., 1979.

Annual ring, LUHUANFENG/iStock/Getty Images

Stem growth, Rice University, URL: https://cnx.org/contents/GFy_h8cu@10.8:E17qqXmk@5/Stems, Accessed 20/11/2018, Granted under Creative Commons

Attribution 4.0 (CC-BY-4.0) license: <https://creativecommons.org/licenses/by/4.0/>.

Euphorbia rhizophora, Frank Vincentz, URL: https://commons.wikimedia.org/wiki/File:Euphorbia_rhizophora2_ies.jpg, Accessed 20/11/2018.

Tunic of Crocosmia, JonRichfield, URL: <https://en.wikipedia.org/wiki/Corm#/media/File:CrocosmiaCormTunic5601s.jpg>, Accessed 20/11/2018.

Potatoes, Nednapa/iStock/Getty Images

Tulip bulbs with sprouts, fermate/iStock/Getty Images

Fresh organic strawberry in the garden, swisoot/iStock/Getty Images

Leaf Tissue Structure, Zephyris, URL: https://en.wikipedia.org/wiki/File:Leaf_Tissue_Structure.svg, Accessed 20/11/2018.

Autumn leaf colours in Gatineau Park, Orchidpoet/iStock/Getty Images

Christmas Fir Tree, o_sa/iStock/Getty Images

Phytoremediation, Unknown creator, URL: <https://wildlifeandecogardens.files.wordpress.com/2017/05/phytoremediation-01.jpg>, Accessed 20/11/2018.

Broad bean leaf surface 40x, Copyright © 2018 The Ontario Educational Communications Authority. All rights reserved.

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Cross section of a pine needle, Livingstone, BIODIDAC, URL: http://biodidac.bio.uottawa.ca/thumbnails/filedet.htm/File_name/coni001b/File_type/gif, Accessed 20/11/2018.

Scattercreek burned, Adam Peterson, URL: https://commons.wikimedia.org/wiki/File:Scattercreek_burned.JPG, Accessed 20/11/2018.

Cracked soil with little plant, amphotora/iStock/Getty Images

Clearcutting in Southern Finland, Tero Laakso, URL: <https://www.flickr.com/photos/23807585@N07/2924234581/>, Accessed 20/11/2018, Granted under Creative Commons Attribution 2.0 Generic (CC-BY-2.0) license: <https://creativecommons.org/licenses/by/2.0/>.

Fire forest , Cameron Strandberg, URL: <https://www.flickr.com/photos/38449766@N03/3603009008/>, Accessed 20/11/2018, Granted under Creative Commons Attribution 2.0 Generic (CC-BY-2.0) license: <https://creativecommons.org/licenses/by/2.0/>.

Lodgepole pine tree infested by the mountain pine beetle, Padraic Ryan, URL: https://commons.wikimedia.org/wiki/File:Infested_tree.jpg, Accessed 20/11/2018.

Turf and Earth cross section, Pixelsatwork/iStock/Getty Images

Below the grass, georgeclerk/E+/Getty Images

Hand holding compost soil, burwellphotography/E+/Getty Images

Scale of pH value, RobinAtzeni/iStock/Getty Images

Soil compaction, Unknown creator, Organic Soil Solutions, URL: <http://www.organicsoilsolutions.com/wp-content/uploads/soil-compaction.jpg>, Accessed 20/11/2018.

Carrying out a soil analysis, DGLimages/iStock/Getty Images

Nitrogen fixing nodules in roots, Terraprima, URL: https://commons.wikimedia.org/wiki/File:Nitrogen-fixing_nodules_in_the_roots_of_legumes.JPG, Accessed 20/11/2018.

Crow standing on ground of death valley, Tao_Shen/iStock/Getty Images

National Evolutionary Synthesis Center (NESCent). "Woody Plants Adapted To Past Climate Change More Slowly Than Herbs." ScienceDaily. www.sciencedaily.com/releases/2009/09/090923121441.htm (accessed January 23, 2019).

Phototropism diagram, MacKhayman, URL: https://commons.wikimedia.org/wiki/File:Phototropism_Diagram.svg, Accessed 20/11/2018.

Apical cycle, Doctor Smart, URL: <https://commons.wikimedia.org/w/index.php?curid=53983579>, Accessed 20/11/2018.

Apical dominance, Michael G. Mason et al, URL: <http://www.pnas.org/content/111/16/6092>, Accessed 20/11/2018.

Cross section through a typical dicot leaf, Livingstone, URL: http://biodidac.bio.uottawa.ca/thumbnails/filedet.htm/File_name/dico001b/File_type/gif, Accessed 20/11/2018.

Vincetoxicum rossicum, Epibase, URL: https://commons.wikimedia.org/wiki/File:Vincetoxicum_rossicum1UME.JPG, Accessed 20/11/2018, Granted under Creative Commons 3.0 Unported (CC-BY-3.0) license: <https://creativecommons.org/licenses/by/3.0/deed.en>.

Garlic Mustard (*Alliaria petiolata*), sannse, URL: https://commons.wikimedia.org/wiki/File:Garlic_Mustard_close_800.jpg, Accessed 20/11/2018.

Purple loosestrife, Liz West, URL: <https://www.flickr.com/photos/53133240@N00/27566214>, Accessed 21/11/2018, Granted under Creative Commons 2.0 Generic (CC-BY-2.0) license: <https://creativecommons.org/licenses/by/2.0/>.

Japanese knotweed, MdE, URL: https://commons.wikimedia.org/wiki/File:Fallopia_japonica_MdE_2.jpg, Accessed 21/11/2018.

European buckthorn - *Rhamnus cathartica* L., Leslie J. Mehrhoff, URL: https://commons.wikimedia.org/wiki/File:Rhamnus_cathartica_5456085.jpg, Accessed 21/11/2018, Granted under Creative Commons 3.0 Unported (CC-BY-3.0) license: <https://creativecommons.org/licenses/by/3.0/deed.en>.

Little spiderhunter bird feeding, momnoi/iStock/Getty Images

Honey bees dying and dead, FrederickDunn/iStock/Getty Images

Hand planting potato tuber into the ground, PavelRodimov/iStock/Getty Images

Fragaria, Frank Vincentz, URL: https://commons.wikimedia.org/wiki/File:Pink_Panda_08_ies.jpg, Accessed 21/11/2018.

Rana clamitans among duck weed, SondraP/iStock/Getty Images

Birch trees, vav63/iStock/Getty Images

Plant cutting, Hydrob, URL: <https://commons.wikimedia.org/wiki/File:Taking-a-cutting.jpg>, Accessed 21/11/2018.

Gardeneer planting on broad bean plants, cjp/E+/Getty Images

Grafting fruit tree, Lex20/iStock/Getty Images

Grafted apple tree, Unidentified photographer, URL: <http://fruittreeses.blogspot.com/2016/05/different-types-of-apple-trees.html>, Accessed 21/11/2018.

Ripe and red blackberries, photohampster/iStock/Getty Images

Mature flower diagram, Mariana Ruiz LadyofHats, URL: https://commons.wikimedia.org/wiki/File:Mature_flower_diagram.svg, Accessed 21/11/2018.

Sequence of pumpkin plant growing, brozova/iStock/Getty Images

Monocotyledon, Graphic_BKK1979/iStock/Getty Images

Germination of seed, Graphic_BKK1979/iStock/Getty Images

Pollen colorized, Dartmouth Electron Microscope Facility, Dartmouth College, URL: https://commons.wikimedia.org/wiki/File:Misc_pollen_colorized.jpg, Accessed 21/11/2018.

Seed dispersal, Encyclopaedia Britannica Inc., URL: <https://www.britannica.com/plant/angiosperm/Seeds>, Accessed 21/11/2018.

Conifer leaves, lucentius/iStock/Getty Images

Fresh pine cone, vavlt/iStock/Getty Images

Pine pollen, Micronaut, Caters News, URL: <https://www.telegraph.co.uk/news/science/picture-galleries/7606811/Hayfever-sufferers-know-your-enemy-Scanning-Electron-Microscope-pictures-of-grains-of-pollen.html?image=12>, Accessed 21/11/2018.

Closeup of branch of pine tree, Rachel_Web_Design/iStock/Getty Images

Life cycle of conifer, OpenStax College, OpenStax CNX, URL: https://cnx.org/contents/GFy_h8cu@10.53:tLxQLksB@5/Gymnosperms, Accessed 21/11/2018, Granted under Creative Commons Attribution 4.0 International (CC-BY-4.0) license: <https://creativecommons.org/licenses/by/4.0/>.

Apple tree, GroM1124/iStock/Getty Images

Photosynthesis, mapichai/iStock/Getty Images

Photosynthesis, Paul Andersen, Bozeman Science, URL: <https://www.youtube.com/watch?v=g78utclQrJ4>, Accessed 21/11/2018.

Primary succession, Unknown creator, URL: <https://sites.google.com/site/lmwhitebiology/ecology/ecological-succession>, Accessed 21/11/2018.

Aftermath of wildfire in Colorado, Gary Gray/iStock/Getty Images

Gold mine entrance, shaun/iStock/Getty Images

Secondary succession is shown in an oak and hickory forest after a forest fire, OpenStax College, OpenStax CNX, URL: https://cnx.org/contents/GFy_h8cu@10.53:d0xglyLD@4/Community-Ecology, Accessed 21/11/2018, Granted under Creative Commons Attribution 4.0 International (CC-BY-4.0) license: <https://creativecommons.org/licenses/by/4.0/>.

Potential Climate Change Impacts, United States Environmental Protection Agency, URL: <http://www.atmo.arizona.edu/students/courselinks/fall12/atmo336/lectures/sec6/implications.html>, Accessed 21/11/2018.

Smart goal setting concept © iStock.com/Marek Uliasz.

Acknowledgements – Unit 3

“Lactose Intolerance (Enzymes)” Case Studies for Understanding the Human Body. Stanton Braude et al. Jones & Bartlett Learning. Published 2012. p.15-18.

“Lactose Intolerance (Enzymes)” Case Studies for Understanding the Human Body. Stanton Braude et al. Jones & Bartlett Learning. Published 2012. p.33-36.

Apple nutrition facts, Robert Byron/iStock/Getty Images

Blue beaded necklace, GLady, URL: <https://pixabay.com/en/pearls-necklaces-blue-beads-coral-70856/>, Accessed 23/11/2018.

Polymers, Saylor Academy, URL: https://saylordotorg.github.io/text_the-basics-of-general-organic-and-biological-chemistry/s16-05-polymers.html, Accessed 23/11/2018.

Carbohydrates, eSchooltoday, URL: <http://eschooltoday.com/science/nutrients-in-food/what-are-carbohydrates.html>, Accessed 23/11/2018.

Monosaccharides, Copyright © 2018 The Ontario Educational Communications Authority. All rights reserved.

Disaccharides, Copyright © 2018 The Ontario Educational Communications Authority. All rights reserved.

Polysaccharides, Copyright © 2018 The Ontario Educational Communications Authority. All rights reserved.

Complex and simple lipids, Pearson Education, URL: http://wps.prenhall.com/wps/media/objects/340/348272/Instructor_Resources/Chapter_25/Text_Images/FG25_01.JPG, Accessed 23/11/2018.

Lipids, Copyright © 2018 The Ontario Educational Communications Authority. All rights reserved.

Amino acids, chromatos/iStock/Getty Images

Healthy woman eating, Andres Rodriguez/iStock/Getty Images

Hydrolysis of lactose to galactose, Yikrazuul, URL: https://commons.wikimedia.org/wiki/File:Hydrolysis_of_lactose.svg, Accessed 23/11/2018.

Induced fit model of enzyme activity, TimVickers, URL: https://simple.wikipedia.org/wiki/Enzyme#/media/File:Induced_fit_diagram.svg, Accessed 23/11/2018.

Digestive System, snapgalleria/iStock/Getty Images

Digestive System, snapgalleria/iStock/Getty Images

Palatine uvula, Lamiot, URL: <https://commons.wikimedia.org/wiki/File:LurettePalatineUvula.jpg>, Accessed 23/11/2018, Granted under Creative Commons Attribution 3.0 Unported (CC-BY-3.0) license: <https://creativecommons.org/licenses/by/3.0/deed.en>.

Stomach, DataBase Center for Life Science, URL: https://commons.wikimedia.org/wiki/File:201405_stomach.png, Accessed 23/11/2018, Granted under Creative Commons Attribution 4.0 International (CC-BY-4.0) license: <https://creativecommons.org/licenses/by/4.0/deed.en>.

Human stomach anatomy, kowalska-art/iStock/Getty Images

Pancreas Vector, newannyart/iStock/Getty Images

Small intestine, marina_ua/iStock/Getty Images

Microvilli, ttsz/iStock/Getty Images

Structure and function of large intestine, Zentagle/iStock/Getty Images

Structure and function of the large intestine, Zentagle/iStock/Getty Images

Medical structure of the liver, ElenBushe/iStock/Getty Images

Liver functions, ttsz/iStock/Getty Images

The Digestive System, Paul Andersen, Bozeman Science, URL: <https://www.youtube.com/watch?v=nM5kMSjBrmw>, Accessed 05/02/2019.

Gallstones, ttsz/iStock/Getty Images

“Lactose Intolerance (Enzymes)” Case Studies for Understanding the Human Body. Stanton Braude et al. Jones & Bartlett Learning. Published 2012. p.15-18.

“Lactose Intolerance (Enzymes)” Case Studies for Understanding the Human Body. Stanton Braude et al. Jones & Bartlett Learning. Published 2012. p.33-36.

“Lactose Intolerance (Enzymes)” Case Studies for Understanding the Human Body. Stanton Braude et al. Jones & Bartlett Learning. Published 2012. p.71-75.

Global pollution, cteconsulting/iStock/Getty Images

Internal external respiration, Copyright © 2018 The Ontario Educational Communications Authority. All rights reserved.

Cardiovascular circulation, OpenStax College, OpenStax CNX, URL: <https://cnx.org/contents/FPtK1zmmh@6.27:WNsszrPZ@4/Structure-and-Function-of-Blood-Vessels>, Accessed 26/11/2018, Granted under Creative Commons Attribution 3.0 Unported (CC-BY-3.0) license: <https://creativecommons.org/licenses/by/3.0/>.

Respiration, Austin Community College, URL: <http://www.austincc.edu/apreview/PhysText/Respiratory.html>, Accessed 26/11/2018.

Air pollution cityscape, Nina_Piankova/iStock/Getty Images

Human respiratory system, kowalska-art/iStock/Getty Images

Labeled illustration of human lungs, snapgalleria/iStock/Getty Images

Respiratory system, marina_ua/iStock/Getty Images

The Respiratory System, Paul Andersen, Bozeman Science, URL: <https://www.youtube.com/watch?v=MrDbiKQOtIU>, Accessed 26/11/2018.

Alveolus gas exchange, ttsz/iStock/Getty Images

Breathing, lukaves/iStock/Getty Images

Human brain detailed anatomy, switchpipipi/iStock/Getty Images

Obstruction sleep apnea, robroxtton/iStock/Getty Images

Cough mechanics, Donna Frownfelter and Mary Massery, URL: <https://clinicalgate.com/facilitating-airway-clearance-with-coughing-techniques/>, Published 13/02/2015, Accessed 29/11/2018.

Man in first aid class performing mouth to mouth, Highwaystarz-Photography/iStock/Getty Images

Lung volumes, Vihadas/wikimedia.org/Getty Images

Spirometry, National Heart Lung and Blood Institute, URL: https://commons.wikimedia.org/wiki/File:Spirometry_NIH.jpg, Accessed 29/11/2018.

Phagocytosis, knorre/iStock/Getty Images

Extreme winter climbing, sezer66/iStock/Getty Images

“Lactose Intolerance (Enzymes)” Case Studies for Understanding the Human Body. Stanton Braude et al. Jones & Bartlett Learning. Published 2012. p.71-75.

Human circulatory system, paveugra/iStock/Getty Images

The outlining note taking method, Oxford Learning, URL: <https://www.oxfordlearning.com/5-effective-note-taking-methods/>, Accessed 26/11/2018.

“Lactose Intolerance (Enzymes)” Case Studies for Understanding the Human Body. Stanton Braude et al. Jones & Bartlett Learning. Published 2012. p.51-53.

Human bloodstream, ttsz/iStock/Getty Images

Blood vein, newannyart/iStock/Getty Images

Different salad and snack, KarpenkoDenis/iStock/Getty Images

The risk of smoking illustration, jehomwang/iStock/Getty Images

The human circulatory system, ttsz/iStock/Getty Images

Artery, Paladjai/iStock/Getty Images

Blood centrifuge machine, ktsimage/iStock/Getty Images

Test tube with blood cells, TefiM/iStock/Getty Images

Blood cells formation, stockdevil/iStock/Getty Images

3D Blood cells, seyfettinozel/iStock/Getty Images

Structure of human hemoglobin, ttsz/iStock/Getty Images

Hemoglobin and respiratory, ttsz/iStock/Getty Images

Signs of carbon monoxide poisoning, Unidentified creator, URL: <https://www.sylviagroup.com/blog/how-many-carbon-monoxide-alarms-do-i-need-to-prevent-co-poisoning>, Accessed 27/11/2018.

Anemia diagram, roxanabalint/iStock/Getty Images

Symptoms of anemia, ttsz/iStock/Getty Images

Red and white blood flowing through cells, Rost-9D/iStock/Getty Images

Macrophage engulfing tuberculosis bacteria, Dr_Microbe/iStock/Getty Images

Limbo platelets in the bone marrow, Timoninalryna/iStock/Getty Images

Basic steps in hemostasis, ttsz/iStock/Getty Images

Thrombus, ttsz/iStock/Getty Images

Compatibility testing concerning RBCs, Luigi Albert Maria, URL: https://commons.wikimedia.org/wiki/File:Compatibility_testing_concerning_RBCs_2014-02-01_00-42.jpg, Accessed 27/11/2018.

Rh D Isoimmunization, Ternopil State Medical University, URL: <https://coreem.net/core/anti-d-immunoglobulin/>, Accessed 27/11/2018.

Artery, Pakadjai/iStock/Getty Images

Capillaries, 7activestudio/iStock/Getty Images

Artery and vein, ttsz/iStock/Getty Images

Varicose veins on a female senior leg, Marina113/iStock/Getty Images

The Circulatory System, Paul Andersen, Bozeman Science, URL: <https://www.youtube.com/watch?v=NJzJKvkWWDc>, Accessed 28/11/2018.

Heart anatomy, ttsz/iStock/Getty Images

Unlabelled diagram of human heart, Copyright © 2018 The Ontario Educational Communications Authority. All rights reserved.

Difference between pulmonary and systemic circulation, Unknown creator, URL: <http://anatomymedicallook.com/systemic-system-diagram/systemic-system-diagram-printable-diagram-pulmonary-systemic-circulation-anatomy-body-list/>, Accessed 28/11/2018.

Coronary arteries, Patrick J. Lynch, Fred the Oyster, Mickael Häggström, URL: https://commons.wikimedia.org/wiki/File:Coronary_arteries.png, Accessed 28/11/2018.

Cast of coronary arteries, Schandra, URL: <https://commons.wikimedia.org/wiki/>

File:Coronary_Arteries.tif, Accessed 28/11/2018, Granted under Creative Commons CC0 1.0 Universal Public Domain license:<https://creativecommons.org/publicdomain/zero/1.0/deed.en>.

The Circulatory System2, Paul Andersen, Bozeman Science, URL: <https://www.youtube.com/watch?v=NJzJKvKWWDc>,

Heartbeat gif, Unknown creator, GIPHY, URL: <https://media.giphy.com/media/rMfiAUhjQW4aQ/giphy.mp4>, Accessed 28/11/2018.

Human heartbeat sound, Daniel Simon, URL: <http://soundbible.com/2162-Human-Heartbeat.html>, Accessed 28/11/2018, Granted under Creative Commons Attribution 3.0 (CC-BY-3.0) license: <https://creativecommons.org/licenses/by/3.0/deed.en>.

Nurse examining female patient, bowdenimages/iStock/Getty Images

Human healthy pumping heart, Mariana Ruiz Villarreal, URL: https://commons.wikimedia.org/wiki/File:Human_healthy_pumping_heart_en.svg, Accessed 28/11/2018.

A homemade stethoscope, Copyright © 2018 The Ontario Educational Communications Authority. All rights reserved.

“Lactose Intolerance (Enzymes)” Case Studies for Understanding the Human Body. Stanton Braude et al. Jones & Bartlett Learning. Published 2012. p.51-53.

3D illustration of human body organs, PALMIHELP/iStock/Getty Images

Front view of an arab doctor woman showing stethoscope, FS-Stock/iStock/Getty Images

Micrograph of myeloma neoplasm, OGphoto/iStock/Getty Images

Cells dividing, Just-Super/iStock/Getty Images

Colon cancer, Raycat/iStock/Getty Images

Benign and malignant tumour, Simon Caulton, URL: https://commons.wikimedia.org/wiki/File:BENIGN_AND_MALIGNANT_TUMOUR.png, Accessed 03/12/2018.

Cancer cells, cancer foci and Metastases, ttsz/iStock/Getty Images

Acid reflux or heartburn, Tharakorn/iStock/Getty Images

Colon cancer concept, wildpixel/iStock/Getty Images

Colonoscopy, Eraxion/iStock/Getty Images

Polyp removal, Eraxion/iStock/Getty Images

Crohn's disease, selvanegra/iStock/Getty Images

Stomach erosion and peptic ulcer, elanabs/iStock/Getty Images

Helicobacter pylori, ttsz/iStock/Getty Images

Cigarettes with health issues, mrhighsky/iStock/Getty Images

Woman suffering from acid reflux, Tharakorn/iStock/Getty Images

Gastroesophageal reflux disease, Graphic_BKK1979/iStock/Getty Images

Sick woman with sore throat, Sasha_Suzi/iStock/Getty Images

Bronchitis, ttsz/iStock/Getty Images

Inflammation of the bronchus causing asthma, ttsz/iStock/Getty Images

Chronic obstructive pulmonary disease, ttsz/iStock/Getty Images

20-year lag time between smoking and lung cancer, National Cancer Institute, URL: https://commons.wikimedia.org/wiki/File:Cancer_smoking_lung_cancer_correlation_from_NIH.svg, Accessed 03/12/2018.

Lung cancer thorax CT image, windcatcher/iStock/Getty Images

Heart attack, wildpixel/iStock/Getty Images

Symptoms of hypertension, ttsz/iStock/Getty Images

Heart attack symptoms, ttsz/iStock/Getty Images

Ischemic stroke in the cerebral artery and thrombus, ttsz/iStock/Getty Images

Cerebral artery with atherosclerosis, ttsz/iStock/Getty Images

Esophagogastroduodenoscopy, ttsz/iStock/Getty Images

Astrocytes, Jeffrey Friedman, Hillman Lab, URL: <http://orion.bme.columbia.edu/~hillman/Neuroimaging.html>,

Scans showing different brain diseases, stockdevil/iStock/Getty Images

Illustration of stents, kocakayaali/iStock/Getty Images

Lateral view of the fetal pig showing the main external features, Jon Houseman, BIODIDAC, URL: http://biodidac.bio.uottawa.ca/thumbnails/filedet.htm/File_name/fpig002p/File_type/gif, Accessed 10/12/2018.

Ventral view of the main external features of the fetal pig, Jon Houseman, BIODIDAC, URL: http://biodidac.bio.uottawa.ca/thumbnails/filedet.htm/File_name/fpig055p/File_type/gif, Accessed 10/12/2018.

General ventral view of the organs in the neck, thoracic, and abdominal cavity of the fetal pig, Jon Houseman, BIODIDAC, URL: http://biodidac.bio.uottawa.ca/thumbnails/filedet.htm/File_name/fpig035p/File_type/gif, Accessed 10/12/2018.

Buccal cavity of the fetal pig, Jon Houseman, BIODIDAC, URL: http://biodidac.bio.uottawa.ca/thumbnails/filedet.htm/File_name/fpig085p/File_type/gif, Accessed 10/12/2018.

Musculature, venous circulatory system, and glands of the ventral surface of the neck of a fetal pig, Jon Houseman, BIODIDAC, URL: http://biodidac.bio.uottawa.ca/thumbnails/filedet.htm/File_name/fpig026p/File_type/gif, Accessed 10/12/2018.

Anterior circulatory system of the fetal pig: Heart and anterior blood vessels are visible in the

photo, Jon Houseman, BIODIDAC, URL: http://biodidac.bio.uottawa.ca/thumbnails/filedet.htm/File_name/fpig031p/File_type/gif, Accessed 10/12/2018.

Posterior circulatory system of the fetal pig: blood supply to the kidneys and the umbilical cord are visible in this photo, Jon Houseman, BIODIDAC, URL: http://biodidac.bio.uottawa.ca/thumbnails/filedet.htm/File_name/fpig032p/File_type/gif, Accessed 10/12/2018.

Posterior circulatory system in the fetal pig showing the blood supply to the hind limbs, Jon Houseman, BIODIDAC, URL: http://biodidac.bio.uottawa.ca/thumbnails/filedet.htm/File_name/fpig045p/File_type/gif, Accessed 10/12/2018.

Ventral view of the fetal pig heart, Jon Houseman, BIODIDAC, URL: http://biodidac.bio.uottawa.ca/thumbnails/filedet.htm/File_name/fpig050p/File_type/gif, Accessed 10/12/2018.

Sagittal section through the heart of the fetal pig, Jon Houseman, BIODIDAC, URL: http://biodidac.bio.uottawa.ca/thumbnails/filedet.htm/File_name/fpig064p/File_type/gif, Accessed 10/12/2018.

Left, lateral view of the fetal pig heart, Jon Houseman, BIODIDAC, URL: http://biodidac.bio.uottawa.ca/thumbnails/filedet.htm/File_name/fpig047p/File_type/gif, Accessed 10/12/2018.

Dorsal view of the fetal pig heart, Jon Houseman, BIODIDAC, URL: http://biodidac.bio.uottawa.ca/thumbnails/filedet.htm/File_name/fpig053p/File_type/gif, Accessed 10/12/2018.

Sagittal section through the heart of the fetal pig, Jon Houseman, BIODIDAC, URL: http://biodidac.bio.uottawa.ca/thumbnails/filedet.htm/File_name/fpig063p/File_type/gif, Accessed 10/12/2018.

Detail of the kidneys, adrenal glands, and their blood supply in the fetal pig, Jon Houseman, BIODIDAC, URL: http://biodidac.bio.uottawa.ca/thumbnails/filedet.htm/File_name/fpig039p/File_type/gif, Accessed 10/12/2018.

Section through the kidney of the fetal pig, Jon Houseman, BIODIDAC, URL: http://biodidac.bio.uottawa.ca/thumbnails/filedet.htm/File_name/fpig060p/File_type/gif, Accessed 10/12/2018.

Section through the kidney of the fetal pig, Jon Houseman, BIODIDAC, URL: http://biodidac.bio.uottawa.ca/thumbnails/filedet.htm/File_name/fpig061p/File_type/gif, Accessed 10/12/2018.

Male urogenital system, and its blood supply, in the fetal pig, Jon Houseman, BIODIDAC, URL: http://biodidac.bio.uottawa.ca/thumbnails/filedet.htm/File_name/fpig043p/File_type/gif, Accessed 10/12/2018.

Deep and surface musculature of the ventral surface of the neck of the fetal pig, Jon Houseman, BIODIDAC, URL: http://biodidac.bio.uottawa.ca/thumbnails/filedet.htm/File_name/fpig077p/File_type/gif, Accessed 10/12/2018.

Detail of the anterior part of the respiratory system of the fetal pig showing larynx and related structures, Jon Houseman, BIODIDAC, URL: <http://biodidac.bio.uottawa.ca/>

thumbnails/filedet.htm/File_name/fpig058p/File_type/gif, Accessed 10/12/2018.

Respiratory system in the thoracic cavity of the fetal pig, Jon Houseman, BIODIDAC, URL: http://biodidac.bio.uottawa.ca/thumbnails/filedet.htm/File_name/fpig054p/File_type/gif, Accessed 10/12/2018.

Thoracic cavity of the fetal pig showing the heart, lungs, thymus and related structures, Jon Houseman, BIODIDAC, URL: http://biodidac.bio.uottawa.ca/thumbnails/filedet.htm/File_name/fpig021p/File_type/gif, Accessed 10/12/2018.

Ventral view of the respiratory system of the fetal pig. Trachea, lungs and related structures have been removed from the thoracic cavity, Jon Houseman, BIODIDAC, URL: http://biodidac.bio.uottawa.ca/thumbnails/filedet.htm/File_name/fpig057p/File_type/gif, Accessed 10/12/2018.

Dorsal view of the respiratory system of the fetal pig. Trachea, lungs and related structures have been removed from the thoracic cavity, Jon Houseman, BIODIDAC, URL: http://biodidac.bio.uottawa.ca/thumbnails/filedet.htm/File_name/fpig056p/File_type/gif, Accessed 10/12/2018.

Section through the lung of a fetal pig showing blood supply and bronchial tube, Jon Houseman, BIODIDAC, URL: http://biodidac.bio.uottawa.ca/thumbnails/filedet.htm/File_name/fpig059p/File_type/gif, Accessed 10/12/2018.

Buccal cavity of the fetal pig, Jon Houseman, BIODIDAC, URL: http://biodidac.bio.uottawa.ca/thumbnails/filedet.htm/File_name/fpig085p/File_type/gif, Accessed 10/12/2018.

Abdominal cavity of the fetal pig as it appears when the cavity is first opened and none of the organs have been displaced, Jon Houseman, BIODIDAC, URL: http://biodidac.bio.uottawa.ca/thumbnails/filedet.htm/File_name/fpig022p/File_type/gif, Accessed 10/12/2018.

Abdominal cavity of the fetal pig showing the main organs, including the umbilical chord and its blood supply, Jon Houseman, BIODIDAC, URL: http://biodidac.bio.uottawa.ca/thumbnails/filedet.htm/File_name/fpig019p/File_type/gif, Accessed 10/12/2018.

Abdominal cavity of the fetal pig. Liver has been cut to display the main structures of the digestive and hepatic systems, Jon Houseman, BIODIDAC, URL: http://biodidac.bio.uottawa.ca/thumbnails/filedet.htm/File_name/fpig015p/File_type/gif, Accessed 10/12/2018.

General ventral view of the organs in the abdominal cavity of the fetal pig, Jon Houseman, BIODIDAC, URL: http://biodidac.bio.uottawa.ca/thumbnails/filedet.htm/File_name/fpig038p/File_type/gif, Accessed 10/12/2018.

Internal anatomy of a fetal pig, Unknown creator, biologycorner.com, URL: https://www.biologycorner.com/worksheets/fetal_pig_dissection_teacher.html, Accessed 03/12/2018.

The Case of the Coughing Housewife, McGraw-Hill Companies, URL: <http://www.mhhe.com/biosci/ap/saladin/student/olc/chap19clinical.html>, Accessed 10/12/2018.

The Case of the Overworked Executive, McGraw-Hill Companies, URL: <http://www.mhhe.com/biosci/ap/saladin/student/olc/chap15clinical.html>, Accessed 10/12/2018.

Hospital infections: Case studies, BBC, URL: <http://news.bbc.co.uk/2/hi/health/3291997.stm>, Published 04/12/2003, Accessed 03/12/2018.

The Human Digestive Tract, Mariana Ruiz Villarreal, URL: <http://bugs-in-your-guts.com/?p=91>, Accessed 03/12/2018.

Lung cancer rates in men and women, ILC, OECA, Accessed 03/12/2018.

University of Queen Mary London. "Vitamin D protects against colds and flu, finds major global study." ScienceDaily. ScienceDaily, 16 February 2017. <www.sciencedaily.com/releases/2017/02/170216110002.htm>.

"Lactose Intolerance (Enzymes)" Case Studies for Understanding the Human Body. Stanton Braude et al. Jones & Bartlett Learning. Published 2012. p.15-18.

"Lactose Intolerance (Enzymes)" Case Studies for Understanding the Human Body. Stanton Braude et al. Jones & Bartlett Learning. Published 2012. p.33-36.

"Lactose Intolerance (Enzymes)" Case Studies for Understanding the Human Body. Stanton Braude et al. Jones & Bartlett Learning. Published 2012. p.71-75.

"Lactose Intolerance (Enzymes)" Case Studies for Understanding the Human Body. Stanton Braude et al. Jones & Bartlett Learning. Published 2012. p.51-53.

Acknowledgements – Unit 4

Venn diagram 1831 to today, ILC, OECA,

Skeletons of the Gibbon, Orang. Chimpanzee Gorilla Man, Waterhouse Hawkins, URL: https://commons.wikimedia.org/wiki/File:Ape_skeletons.png, Published 1863, Accessed 04/12/2018, From Thomas Henry Huxley, Man's Place in Nature, frontispiece.

Carl von Linné, Alexander Roslin, URL: [https://commons.wikimedia.org/wiki/File:Carl_von_Linn%C3%A9,_1707-1778,_botanist,_professor_\(Alexander_Roslin\)_-_Nationalmuseum_-_15723.tif](https://commons.wikimedia.org/wiki/File:Carl_von_Linn%C3%A9,_1707-1778,_botanist,_professor_(Alexander_Roslin)_-_Nationalmuseum_-_15723.tif), Accessed 04/12/2018.

Georges-Louis Leclerc, François-Hubert Drouais, URL: https://commons.wikimedia.org/wiki/File:Buffon_1707-1788.jpg, Accessed 04/12/2018.

Erasmus Darwin, Joseph Wright of Derby, URL: [https://commons.wikimedia.org/wiki/File:Portrait_of_Erasmus_Darwin_by_Joseph_Wright_of_Derby_\(1792\).jpg](https://commons.wikimedia.org/wiki/File:Portrait_of_Erasmus_Darwin_by_Joseph_Wright_of_Derby_(1792).jpg), Accessed 04/12/2018.

Jean-Baptiste de Monet Chevalier de Lamarck, Charles Thévenin, URL: https://commons.wikimedia.org/wiki/File:Jean-Baptiste_de_Lamarck.jpg, Accessed 04/12/2018.

Baron Georges Cuvier, François-André Vincent, URL: https://commons.wikimedia.org/wiki/File:Georges_Cuvier_3.jpg, Accessed 04/12/2018.

Charles Darwin, Muall and Polybank, URL: https://commons.wikimedia.org/wiki/File:Charles_Darwin_by_Muall_and_Polyblank,_1855-1.jpg, Accessed 04/12/2018.

Voyage of the Beagle, Sémhur, URL: https://commons.wikimedia.org/wiki/File:Voyage_of_the_Beagle-en.svg, Accessed 04/12/2018.

Doedicurus, Huhu Uet, URL: <https://commons.wikimedia.org/wiki/File:Doedicurus.jpg>, Accessed 04/12/2018.

Nine-banded Armadillo Stepping Out, Joesboy/iStock/Getty Images

Map of Galapagos Islands, Daniel Feher, freeworldmaps.net, URL: <https://commons.wikimedia.org/wiki/File:Galapagos%2Bmap.jpg>, Accessed 04/12/2018.

Timeline: The Life and Work of Charles Darwin, Copyright © 2018 The Ontario Educational Communications Authority. All rights reserved.

The Making of a Theory: Darwin, Wallace, and Natural Selection — HHMI BioInteractive Video, Howard Hughes Medical Institute, URL: <https://www.youtube.com/watch?v=XOiUZ3ycZwU&feature=youtu.be>, Accessed 20/12/2018, Used with permission from the Howard Hughes Medical Institute, Copyright 2018. All rights reserved. www.BioInteractive.org.

Superbug strain of bacteria, bakhtiar_zein/iStock/Getty Images

Jelly beans, Gladys_Glez/iStock/Getty Images

Abstract colorful geometrical background, natrot/iStock/Getty Images

Pod containing fruits and vegetables, giuliano2022/iStock/Getty Images

The Sentence Note Taking Method, Oxford Learning, URL: <https://www.oxfordlearning.com/5-effective-note-taking-methods/>, Accessed 05/12/2018.

Human tree, anamad/iStock/Getty Images

Medical research, ClaudioVentrella/iStock/Getty Images

Ladybugs on a chard leaf, BruceBlock/iStock/Getty Images

Optimizing fitness, University of California Museum of Paleontology's Understanding Evolution/<http://evolution.berkeley.edu/>Getty Images

Peppered moth, Henrik_L/iStock/Getty Images

Descent with modification, Unknown creator, URL: http://njscuba.net/biology/misc_classification.php,

Evolution, National Human Genome Research Institute, URL: https://commons.wikimedia.org/wiki/File:Evolution_sm.png, Accessed 05/12/2018.

Two woodpeckers looking for food inside the wood, momnoi/iStock/Getty Images

Evidence of natural selection, Copyright © 2018 The Ontario Educational Communications Authority. All rights reserved.

Geological Time Chart, National Park Service, URL: <https://www.nps.gov/museum/exhibits/dino/geotime/geotime2.html>, Accessed 05/12/2018.

Darwin explores Galapagos Islands, NGS Art Department, National Geographic Society, URL: <https://www.nationalgeographic.org/thisday/sep15/darwin-explores-galapagos-islands/>, Accessed 05/12/2018.

The Origin of Species: The Beak of the Finch, Howard Hughes Medical Institute, URL: <https://www.hhmi.org/biointeractive/origin-species-beak-finch>, Accessed 20/12/2019, Used with permission from the Howard Hughes Medical Institute, Copyright 2018. All rights reserved. www.BioInteractive.org.

Homology vertebrates, Волков Владислав Петрович, URL: https://commons.wikimedia.org/wiki/File:Homology_vertebrates-en.svg, Accessed 06/12/2018.

Homologous Structures versus Analogous Structures, B. Cornell, URL: <http://ib.bioninja.com.au/standard-level/topic-5-evolution-and-biodi/54-cladistics/structural-evidence.html>, Accessed 06/12/2018.

Whale skeleton, Unknown creator, Meyers Konversations-Lexikon, URL: https://commons.wikimedia.org/wiki/File:Whale_skeleton.png, Accessed 06/12/2018.

Embryo development of different animals, George John Romanes, URL: https://commons.wikimedia.org/wiki/File:Embryo_development_of_different_animals.png

wikimedia.org/wiki/File:Haeckel_drawings.jpg, Accessed 06/12/2018.

Cladogram of the primates, Petter Bockman, URL: https://commons.wikimedia.org/wiki/File:Primate_cladogram.jpg, Accessed 06/12/2018.

Different puppy dogs, MirasWonderland/iStock/Getty Images

Peppered moth, Ian_Redding/iStock/Getty Images

Highland cow with champion rosette, Gannet77/iStock/Getty Images

Natural selection simulator, Copyright © 2018 The Ontario Educational Communications Authority. All rights reserved. Using “Natural Selection”, URL: <https://phet.colorado.edu/en/simulation/legacy/natural-selection>, PhET, University of Colorado Boulder. Granted under Creative Commons Attribution 4.0 International (CC BY 4.0) license: <https://phet.colorado.edu/en/simulation/legacy/natural-selection>.

Time is evolution, Pogonici/iStock/Getty Images

Set of different coloured eyes, firstpentuer/iStock/Getty Images

Point mutation, yourgenome, Genome Research Limited, URL: <https://www.yourgenome.org/facts/what-types-of-mutation-are-there>, Granted under Creative Commons Attribution 4.0 International (CC BY 4.0) license: <https://creativecommons.org/licenses/by/4.0/>.

Gametic vs. Somatic Mutations, Learning Pathwayz Limited, URL: <https://www.pathwayz.org/Tree/Plain/GAMETIC+VS.+SOMATIC+MUTATIONS>, Accessed 06/12/2018.

Illustration of gene flow, Tsaneda, URL: https://commons.wikimedia.org/wiki/File:Gene_flow.jpg, Granted under Creative Commons Attribution 3.0 Unported (CC BY 3.0) license: <https://creativecommons.org/licenses/by/3.0/deed.en>.

Illustration of gene flow, Tsaneda, URL: https://commons.wikimedia.org/wiki/File:Gene_flow.jpg, Granted under Creative Commons Attribution 3.0 Unported (CC BY 3.0) license: <https://creativecommons.org/licenses/by/3.0/deed.en>.

Population bottleneck, Professor Marginalia, URL: https://commons.wikimedia.org/wiki/File:Population_bottleneck.jpg, Accessed 06/12/2018.

Different kinds of endangered species, Iuplupme/iStock/Getty Images

Peacock, VitaBella/iStock/Getty Images

Lioness and Lion, hoschi/iStock/Getty Images

Corn field, venturecx/iStock/Getty Images

Making of the Fittest: Evolution of the Stickleback Fish — HHMI BioInteractive Video, Howard Hughes Medical Institute, URL: <https://www.youtube.com/watch?v=Pv4Ca-f4W9Q>, Accessed 20/12/2021, Used with permission from the Howard Hughes Medical Institute, Copyright 2018. All rights reserved. www.BioInteractive.org.

Human tree, anamad/iStock/Getty Images

Panda in a small cage, MediaProduction/iStock/Getty Images

Cows crossing desert, Richmatts/iStock/Getty Images

Oil spill clean-up operation in Monument Valley, David Hiser, Environmental Protection Agency, URL: <https://catalog.archives.gov/id/545637>, Accessed 06/12/2018.

Polyploids in plants, Unknown creator, URL: <https://slideplayer.com/slide/6835694/>, Accessed 06/12/2018.

Close up of ripe wheat ears, xalanx/iStock/Getty Images

School of Malwai cichlids, mtreasure/iStock/Getty Images

Distribution of height, Copyright © 2018 The Ontario Educational Communications Authority. All rights reserved.

The Last Polar Bear, Coldimages/iStock/Getty Images

Grizzly bear catching salmon, Leamus/iStock/Getty Images

Polar and Grizzly Hybrid, Nickolay Lamm, Business Insider, URL: http://sciencenordic.com/sites/default/files/6_Polar-and-Grizzly-Hybrid.jpg, Accessed 06/12/2018.

Flipbook, New York Film Academy, URL: <https://www.nyfa.edu/student-resources/flipbook-animation-techniques-and-examples/>, Accessed 07/12/2018.

Fertilization, ttsz/iStock/Getty Images

Spermatogenesis and Oogenesis, ttsz/iStock/Getty Images

Structure of DNA, Zephyris, URL: https://en.wikipedia.org/wiki/DNA#/media/File:DNA_Structure%2BKey%2BLabelled.pn_NoBB.png, Accessed 07/12/2018.

Chemical structure of DNA, Madeleine Price Ball, URL: https://en.wikipedia.org/wiki/DNA#/media/File:DNA_chemical_structure.svg, Accessed 07/12/2018, Granted under Creative Commons CC0 1.0 Universal (CC0 1.0) Public Domain Dedication: <https://creativecommons.org/publicdomain/zero/1.0/deed.en>.

DNA Helix Spinning, Maciej Frolow, URL: <https://www.youtube.com/watch?v=Kv46-LpXKYk>, Accessed 18/12/2018.

How DNA is Packaged (Advanced), Howard Hughes Medical Institute, URL: <https://youtu.be/gbSIBhFwQ4s>, Accessed 20/12/2023, Used with permission from the Howard Hughes Medical Institute, Copyright 2018. All rights reserved. www.BioInteractive.org.

Normal human karyotype, somersault18:24/iStock/Getty Images

Haploid vs diploid, Ehamberg, URL: https://commons.wikimedia.org/wiki/File:Haploid_vs_diploid.svg, Accessed 07/12/2018.

Mitosis cell division, ttsz/iStock/Getty Images

Cell division Mitosis, Aldona/iStock/Getty Images

Phases of Meiosis, Paul Andersen, Bozeman Science, URL: <https://www.youtube.com/watch?v=16enC385R0w>, Accessed 07/12/2018.

A diagram of meiosis stages, Ali Zifan, URL: https://en.wikipedia.org/wiki/Meiosis#/media/File:Meiosis_Stages.svg, Accessed 07/12/2018.

A diagram of meiosis stages, Ali Zifan, URL: https://en.wikipedia.org/wiki/Meiosis#/media/File:Meiosis_Stages.svg,

Venn diagram, Copyright © 2018 The Ontario Educational Communications Authority. All rights reserved.

Venn diagram filled out, Copyright © 2018 The Ontario Educational Communications Authority. All rights reserved

Gender dependency from chromosomes, Neokryuger/iStock/Getty Images

Nondisjunction diagrams, Tweety207, URL: https://commons.wikimedia.org/wiki/File:Nondisjunction_Diagrams.svg, Accessed 07/12/2018.

Portrait of girl, DenKuvaiev/iStock/Getty Images

Fruit fly, Copyright © 2018 The Ontario Educational Communications Authority. All rights reserved.

Senior man's ear, JodiJacobson/iStock/Getty Images

Boy's ear, bobbeio/E+/Getty Images

Young businessman in blue shirt, innovatedcaptures/iStock/Getty Images

Female mouth, dtiberio/iStock/Getty Images

Hazel eyes, GlobalStock/iStock/Getty Images

Blue eyes, ValuaVitaly/iStock/Getty Images

Close up of a young teenage boy's face rolling his tongue, Ben Gingell/iStock/Getty Images

Young man sticking out tongue, drbimages/E+/Getty Images

Creative workspace, RBOZUK/iStock/Getty Images

Top view woman left hand is writing on a blank notepad , apichon_tee/iStock/Getty Images

Female college student dimples, theboone/iStock/Getty Images

Woman smile closeup, utkamandarinka/iStock/Getty Images

Cheerful young boy freckles, Rawpixel/iStock/Getty Images

Portrait of a First Nations Canadian Woman, stockstudioX/E+/Getty Images

Thumb up, LightFieldStudios/iStock/Getty Images

Thumb up with bend, master1305/iStock/Getty Images

Gregor Mendel, Unknown photographer, URL: https://history.nih.gov/exhibits/nirenberg/popup_htm/01_mendel.htm, Accessed 07/12/2018.

Double helix DNA chromosome and human figure, ChrisGorgio, Getty Images, URL: <http://www.gettyimages.ca/license/547499578>,

Mendel's peas, Mariana Ruiz Lady of Hats, URL: https://commons.wikimedia.org/wiki/File:Mendels_peas.png#/media/File:Mendels_peas.png, Accessed 07/12/2018, Granted under Creative Commons CC0 1.0 Universal (CC0 1.0) Public Domain Dedication: <https://creativecommons.org/publicdomain/zero/1.0/deed.en>.

Dominant recessive heterozygous, Copyright © 2018 The Ontario Educational Communications Authority. All rights reserved.

A Beginner's Guide to Punnett Squares, Paul Andersen, Bozeman Science, URL: <https://youtu.be/Y1PCwxUDTI8>, Accessed 10/12/2018.

Intro to Punnett Square, Copyright © 2018 The Ontario Educational Communications Authority. All rights reserved.

YY x yy, Copyright © 2018 The Ontario Educational Communications Authority. All rights reserved.

Tt x Tt punnett square, Copyright © 2018 The Ontario Educational Communications Authority. All rights reserved.

Ww x ww punnett square, Copyright © 2018 The Ontario Educational Communications Authority. All rights reserved.

The Independent Assortment of Genes, WhiteBoardScience, URL: <https://www.youtube.com/watch?v=X-Zj8irYZ3o>, Accessed 10/12/2018.

2 A Beginner's Guide to Punnett Squares, Paul Andersen, URL: <https://www.youtube.com/watch?v=Y1PCwxUDTI8>, Accessed 10/12/2018.

TtPp x TtPp, Copyright © 2018 The Ontario Educational Communications Authority. All rights reserved.

Guinea pig dihybrid, Copyright © 2018 The Ontario Educational Communications Authority. All rights reserved.

Incomplete dominance, Copyright © 2018 The Ontario Educational Communications Authority. All rights reserved.

Codominance, Copyright © 2018 The Ontario Educational Communications Authority. All rights reserved.

Blood type example, Copyright © 2018 The Ontario Educational Communications Authority. All rights reserved.

Blood type solution, Copyright © 2018 The Ontario Educational Communications Authority. All rights reserved.

Should down syndrome be cured?, Lisa Belkin, URL: <https://parenting.blogs.nytimes.com/2010/01/11/should-down-syndrome-be-cured/>, Published 11/01/2010, Accessed 10/12/2018.

Karyotype of a human male, National Human Genome Research Institute, URL: https://en.wikipedia.org/wiki/Karyotype#/media/File:NHGRI_human_male_karyotype.png, Accessed 10/12/2018.

Telomere Loss Health Concept, wildpixel/iStock/Getty Images

Chromosome unraveling, University of Leicester, National Human Genome Research Institute, URL: <https://www2.le.ac.uk/projects/vgec/highereducation/topics/dna-genes-chromosomes>, Accessed 10/12/2018.

XX x XY punnett square, Copyright © 2018 The Ontario Educational Communications Authority. All rights reserved.

X-linked recessive inheritance, drsrissentil, National Institutes of Health, URL: https://commons.wikimedia.org/wiki/File:X-linked_recessive.svg, Accessed 10/12/2018.

X-linked recessive inheritance - where the mother is a carrier for the condition, Genetics Education Programme, URL: <https://youtu.be/20AzpPybnB4>, Accessed 21/01/2019, Granted under Creative Commons Attribution 3.0 Unported (CC-BY-3.0) license: <https://creativecommons.org/licenses/by/3.0/legalcode>.

3 A Beginner's Guide to Punnett Squares, Paul Andersen, BozemanScience, URL: <https://www.youtube.com/watch?v=Y1PCwxUDTI8&feature=youtu.be>, Accessed 14/12/2018.

Haemophilia in the descendants of Queen Victoria, Shakko, URL: https://commons.wikimedia.org/wiki/File:Haemophilia_of_Queen_Victoria_-_family_tree_by_shakko.jpg, Accessed 10/12/2018.

Colour blind punnett square, Copyright © 2018 The Ontario Educational Communications Authority. All rights reserved.

Nucleotides, Paul Gillam, URL: <https://pmgbiology.com/tag/nucleotide/>, Accessed 10/12/2018.

DNA Nucleotides, OpenStax Anatomy and Physiology, URL: https://commons.wikimedia.org/wiki/File:0322_DNA_Nucleotides.jpg, Accessed 10/12/2018, Granted under Creative Commons Attribution 4.0 International (CC BY 4.0) license: <https://creativecommons.org/licenses/by/4.0/deed.en>.

Nucleic acid, Copyright © 2018 The Ontario Educational Communications Authority. All rights reserved.

Broken DNA string, Tomacco/iStock/Getty Images

Human skin absorbing and reflecting UV rays, ttsz/iStock/Getty Images

Male and female karyotype, Dr_Microbe/iStock/Getty Images

Diagram showing main types of isolated brachydactyly, Samia A. Temtamy and Mona S. Aglan, URL: <https://ojrd.biomedcentral.com/articles/10.1186/1750-1172-3-15>, Accessed 10/12/2018, Modified version of diagram found in: Temtamy SA, McKusick VA: The Genetics of Hand Malformations. 1978, New York: Alan R Liss, INC. Granted under Creative Commons Attribution 2.0 Generic (CC BY 2.0) license: <https://creativecommons.org/licenses/by/2.0/>.

White Albino Squirrel, CBCK-Christine/iStock/Getty Images

Anemia, ttsz/iStock/Getty Images

Foot with twelve toes, Toms93/iStock/Getty Images

Karyotype of a human male, National Human Genome Research Institute, URL: https://en.wikipedia.org/wiki/Karyotype#/media/File:NHGRI_human_male_karyotype.png, Accessed 10/12/2018.

Real female scientists researching, PointImages/iStock/Getty Images

Scientific research concept, ClaudioVentrella/iStock/Getty Images

Genetically Modified Food with DNA Helix, cosinart/iStock/Getty Images

Loading DNA Samples onto an Agarose Gel for Electrophoresis, luchschen/iStock/Getty Images

Repairing DNA, National Institute of General Medical Science, National Institute of General Medical Science, URL: <https://images.nigms.nih.gov/Pages/DetailPage.aspx?imageID2=2330>, Accessed 10/12/2018, Courtesy of Tom Ellenberger, Washington University School of Medicine in St. Louis, and Dave Gohara, Saint Louis University School of Medicine.

Plasmid, Spaully, URL: [https://commons.wikimedia.org/wiki/File:Plasmid_\(english\).svg](https://commons.wikimedia.org/wiki/File:Plasmid_(english).svg), Accessed 10/12/2018.

Plasmid Insertion, New England Biosciences , URL: <http://www.sciencegateway.org/resources/biologytext/rdna/rdna.html>, Accessed 10/12/2018.

Dolly clone, Squidonius, URL: https://commons.wikimedia.org/wiki/File:Dolly_clone.svg, Accessed 10/12/2018.

Diverse couple during medical appointment, KatarzynaBialasiewicz/iStock/Getty Images

What is cystic fibrosis, exactly?, Cystic Fibrosis Trust, URL: <https://www.youtube.com/watch?v=4IGz5p4n8Fg>, Accessed 19/12/2018.

Ethical, Legal and Social Implications of Genetic Knowledge, National Human Genome Research Institute, URL: <https://www.youtube.com/watch?v=Apjebtal8bQ>, Accessed

10/12/2018, Granted under Creative Commons Attribution 3.0 Unported (CC BY 3.0)
license: <https://creativecommons.org/licenses/by/3.0/legalcode>.

