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|  **Overall Expectations** | **Specific Expectations** |
| A1. Demonstrate scientific investigation skills (related to both inquiry and research) in the four areas of skills (initiating and planning, performing and recording, analyzing and interpreting, and communicating) B3. Demonstrate an understanding of the diversity of living organisms in terms of the principles of taxonomy and phylogeny B2. Investigate, through laboratory and/or field activities or through simulations, the principles of scientific classification, using appropriate sampling and classification techniques | A1.3 Identify and collect a variety of print and electronic resources that enable them to address research topics fully and appropriately A1.1 Formulate relevant scientific questions about observed relationships, ideas, problems, make informed predictions, and/or formulate educated hypotheses to focus inquiries or research A1.2 Select appropriate instruments (e.g., sampling instruments, a microscope, a stethoscope, dissection instruments) and materials (e.g., dichotomous keys, computer simulations, plant cuttings), and identify appropriate methods, techniques, and procedures, for each inquiry A1.12 Use appropriate numeric, symbolic, and graphic modes of representation (e.g., biological diagrams, Punnett squares), and appropriate units of measurements (e.g., SI and imperial units) A1.11 Communicate ideas, plans, procedures, results, and conclusions orally, in writing, and/or in electronic presentations, using appropriate language and a variety of formats (e.g., data tables, laboratory reports, presentations, debates, simulations, models) B3.5 Explain why biodiversity is important to maintaining viable ecosystems (e.g., biodiversity helps increase resilience to stress and resistance to diseases or invading species) B2.3 Use proper sampling techniques to collect various organisms from a marsh, pond, field, or other ecosystem, and classify the organisms according to the principles of taxonomyB2.1 Use appropriate terminology related to biodiversity  |
| **Concepts** |
| **Terminology** | **Theory** |
| * Microorganism
* Taxon
* Phylogeny
 | * Binomial nomenclature
* Dichotomous key
 | * Classification principles
* Organization of taxons (KPCOFGS)
* Dichotomous key
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| **Material to prepare** |
| * Image of cheese with a bloomy rind and one blue cheese
* Image sheets for 8 different microorganisms. ***Document: Images of cheese biodiversity version A, B and C***
* Computer for research
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| **Context*** Present the principle of dichotomous and phylogenetic classification
* Present cheese as an ecosystem
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| **Activity*** Create a dichotomous key based on the visible characteristics (document: Classification activity) of cheese microflora from the images. (Document: Images of cheese biodiversity)
* Discuss the results: identify the clues and categories that come up most often - identify the limitations of this type of classification
* Fill out an identity card for a selected microorganism according to the phylogeny principles (Template for classification\_taxon)
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| **Pushing further**– Present different, unknown organisms. Ask students to classify them according to the knowledge acquired from the phylogenetic classification (article: *Les inclassables* [<https://leblob.fr/enquetes/biodiversite-ces-especes-inclassables>])* Discussion on the future of classification. What contributions can systematics and researchers working in this field make to society? Has the model of classification changed much since the 18th century? Can a controversy-free model exist?
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| **Evaluation*** Formative — feedback— discussion
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| **Resources*** Document: Images of cheese biodiversity version A, B and C
* Document : Images of cheese biodiversity organism names
* A few microorganisms involved in cheese ripening
* Internet
* [*Des bactéries et des moisissures dans le fromage*](http://androuet.com/print-article.php?id=28)
	+ [[*http://androuet.com/print-article.php?id=28*](http://androuet.com/print-article.php?id=28)]
* Canadian Food Inspection Agency
	+ [<https://www.canada.ca/en/public-health/topics/food-safety-monitoring-surveillance.html>]
* [*Les microorganismes intervenant dans l’affinage des fromages à pâte lactique*](http://bergers-fromagers.org/public/Technique/Production-Transformation/MICROFLORE_-_Les_micro_organismes_dans_affinage_des_fromages_a_pate_lactique.pdf)
	+ [[*http://bergers-fromagers.org/public/Technique/Production-Transformation/MICROFLORE\_-\_Les\_micro\_organismes\_dans\_affinage\_des\_fromages\_a\_pate\_lactique.pdf*](http://bergers-fromagers.org/public/Technique/Production-Transformation/MICROFLORE_-_Les_micro_organismes_dans_affinage_des_fromages_a_pate_lactique.pdf)]
* [*Fromage : les autres microorganismes*](https://www.futura-sciences.com/sante/dossiers/gastronomie-lait-cru-pasteurise-tradition-hygiene-1712/page/6/)
	+ [[*https://www.futura-sciences.com/sante/dossiers/gastronomie-lait-cru-pasteurise-tradition-hygiene-1712/page/6/*](https://www.futura-sciences.com/sante/dossiers/gastronomie-lait-cru-pasteurise-tradition-hygiene-1712/page/6/)]
* [*Mieux comprendre l’activité des levures et des moisissures*](http://lait.org/fichiers/Revue/PLQ-2011-06/recherche.pdf)
	+ [[*http://lait.org/fichiers/Revue/PLQ-2011-06/recherche.pdf*](http://lait.org/fichiers/Revue/PLQ-2011-06/recherche.pdf)]
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