LA'AU LAPA'AU

THE MEDICINAL PROPERTIES OF PLANTS

BY MICHELLE PHILLIPS

How are plants and animals similar and/or different in terms of structure (ie. cells, tissues, organs, and organ systems) and function?
In what ways do humans and plants impact each other?
How have humans used plants for their benefit?

EARLY COLLEGE BIOLOGY COURSE FOR NON-BIOLOGY MAJORS

TIMEFRAME THREE CLASS PERIODS (75 MIN. EACH)

With additional outside research, project development, and presentation. One class period will be spent on a field trip learning about plant diversity within a cultural context – ie. endemic, native, canoe, invasive, and medicinal plants present in Hawai'i.

STANDARD BENCHMARKS AND VALUES

STUDENT LEARNING OUTCOMES (SLOS)

- Demonstrate basic knowledge of plant and animal kingdoms.
- Describe how living systems function, and relate structure to function, at all levels within the hierarchy of life, from molecules to the biosphere.
- Present informed, rational and objective opinions on biologically-related issues important to human society.

GENERAL EDUCATION LEARNING OUTCOMES (GELOS)

- Thinking/Inquiry - Make effective decisions with intellectual integrity to solve problems and/or achieve goals utilizing the skills of critical thinking, creative thinking, information literacy, and quantitative/symbolic reasoning.
- Integrative Learning - Explore and synthesize knowledge, attitudes and skills from a variety of cultural and academic perspectives to enhance our local and global communities.

PROGRAM LEARNING OUTCOMES (PLOS)

- Employ the scientific process and apply a scientific framework to decision-making regarding issues past, present and future.
- Communicate why Hawai'i is a unique place on Earth and propose scientifically-based mediations to biological problems.

NĀ HOPENA AʻO LEARNING OUTCOMES

- Strengthened Sense of Belonging – Students will communicate their research and ideas with clarity and confidence, and recognize that plants have been utilized as medicine, food, and shelter for centuries and are still used as such today.
- Strengthened Sense of Responsibility – Students will reflect on their place in the world and their role as stewards of the land and the other creatures in it, namely plants in this exercise.
- Strengthened Sense of Excellence – Students will prioritize and manage their time to finish the assignment on time. Students will also utilize their creativity to come up with their own unique project and/or product resulting from their own research.
- Strengthened Sense of Aloha – Students will communicate effectively and malama ʻāina with their understanding of the connection between plants and humans, and the broader community.
- Strengthened Sense of Total Well-Being – Students will utilize the resources and information gained through the research for the project to make choices to improve their well-being, and share that information to promote wellness in others.
- Strengthened Sense of Hawaiʻi – Students will learn and apply Hawaiian traditional world view and knowledge in the classroom setting. Students will share the histories, stories, culture and ancient ways of doing things with their classmates, and compare and contrast traditional and western ways of utilizing medicinal and food plants. Students will treat their environment with respect.

ENDURING UNDERSTANDINGS

- Students will understand that plants and humans are connected, not only in structure but also in function, and that humans utilize plants for food, shelter, and medicine.
  - ⊳ Connections to earlier concepts/terms in the class: Co-evolution, cycle of matter, energy, glucose, carbon, carbon dioxide, respiration, photosynthesis, global climate change.

CRITICAL SKILLS AND CONCEPTS

- Students will demonstrate their grasp of basic scientific concepts, such as the identification of plant body structures, biological hierarchy, adaptation to the environment, ecological diversity and niche, evolution, and co-evolution.
- Students will be able to describe plant structure using their knowledge and connections with human structure (ie. all living organisms have the same biological hierarchy - cells, tissues, organs, and organ systems).
- Students will develop and build connection with a plant relevant to them and/or their culture.
- Students will be able to explain the interdependence of humans on plants (for food, shelter, medicine) and plants on humans (carbon dioxide, co-evolution of food and/or medicinal species with humans).
- Students will be able to identify culturally important plants and their effects on human biology as medicine or as food.
- Expansion Opportunities: Discussions on the evolution of plants, co-evolution of plants with humans and other organisms, global climate change and relations to photosynthesis, the impact of development in Hawaii on agriculture, and/or Hawaiʻi's continued dependence on outside resources for food. Examine plant adaptations in Hawaiʻi as an exemplary example of diversity and evolution.

AUTHENTIC PERFORMANCE TASK:

1. Students will develop a project that represents a culturally-relevant plant and their research about it. The project should identify the plant, its structure, uses for the various parts of the plant, where it is found, and its connection to humans and human biology. Examples of project could include:
   - Design a poster that would "advertise" and/or describe the plant and its uses.
   - Record a video "tour" of the plant and its properties.
   - Make a recipe booklet.
   - Write a story, myth or legend about the plant.
   - Design a "value-added" product with an informational label.
   - Design a lesson plan to teach others about that plant.
2. Students will write a 1-page reflection about the project and how it has impacted their lives.

AUTHENTIC AUDIENCE:

- Community College students in BIOL101: General Biology (Biology in Society).
- Projects will be displayed at the STEM Center at Hawai'i Community College for the remainder of the semester so that students outside the class can enjoy and learn from them as well.

OTHER EVIDENCE:

- Students complete an in-class think-pair-share activity where they will identify the differences in plants and humans (animals) using the biological hierarchy of life. Students will write a short, 1-page essay on the interdependence of plants and humans on Earth, noting at least three impacts they have on each other – including at least one positive and one negative impact.

LEARNING PLAN

1. (Class periods 1-2) Students will be introduced to plant structure, function, and diversity through the chapter in their textbook and a powerpoint presentation geared toward reinforcing important concepts.
   - Show "Nature Rx" video to Hook students in to the topic: https://www.youtube.com/watch?v=Bf5TgVRGND4
   - During the first class period, students will complete an in-class think-pair-share activity where they will identify the similarities and differences in plants and humans (animals) using the biological hierarchy of life as a basis.
   - During the second class period, students will have a homework assignment to write a short, 1-page essay on the interdependence of plants and humans on Earth, noting at least three impacts they have on each other – including at least one positive and one negative impact.
2. (Class period 3) Students will explore the diversity of plants through a talk story at ʻImiloa Astronomy Center with a guest speaker. The difference in endemic, indigenous, canoe, and invasive species will be described, as will the use of plants for Hawaiian herbal medicine (laʻau lapaʻau) will be introduced.
3. (Outside Class Project) Students will identify a single plant they are interested in from a list of plants important in laʻau lapaʻau (ie. mamaki, ʻolena, kukui, awa), and research the plant. They could also choose other plants related to their own culture with approval from the instructor. Students will develop a unique physical project that represents their research and understanding about the plant. The project must include:
   - Identify the plant, using its common, scientific, and Hawaiian name (if it has one).
   - Identify where the plant originates from – is it native, a canoe plant, endemic, or introduced to Hawaiʻi? Where is it found in the world?
   - Identify its connection to humans and human biology – both its current and past uses for medicine, food, etc. in Hawaiʻi and/or other societies and cultures in other parts of the world.
   - Describe the major parts of the plant and its structure, utilizing proper scientific terms.
   - Connect the parts of the plant to its use – what part of the plant is used for its medicinal properties? (ie. the roots are used for medicine, but not the leaves)
   - Expand upon the basics - Is there a scientific basis for the plant's current uses? Have medicinal compounds been identified in the plant?
   - Make it relevant - Are there spiritual connections to the plant and/or pule /legends /mythology /songs/etc that you can include?
   - Make it personal - Reflect on the project; including what was learned or gained from this exercise, and how it has impacted or changed your ideas about your particular plant, or plants in general. This portion of the project must be a minimum of 1-page, double-spaced, and typed.

REFERENCES/RESOURCES

Textbook: Biology- The Core (Eric Simon)

Additional Reading:

Hawaiian herbal medicine, Ch. 8 or Ch. 11 (June Gutmanis)

Botany of Desire (Michael Pollen)

Websites:

http://www.systemiccoaching.com/huna_articles/laʻau_lapaʻau.htm

ʻImiloa Native Garden: http://www.imiloahawaii.org/42/native-garden

Videos:

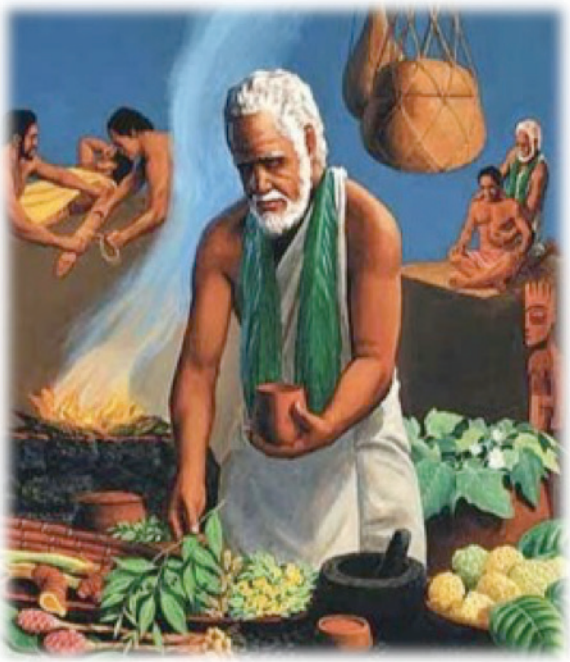
Nature Rx: https://www.youtube.com/watch?v=Bf5TgVRGND4

Conversations with Laʻau Lapaʻau, traditional Hawaiian healer Mahilani Poepoe (https://vimeo.com/61475410)

Polynesian Herbal Medicine video: https://www.youtube.com/watch?v=q0NvX6IQ4pQ

LAʻAU LAPAʻAU: THE MEDICINAL PROPERTIES OF PLANTS

BIOL101 GENERAL BIOLOGY SPRING 2016



Laʻau lapaʻau, the traditional Hawaiian practice of herbal medicine, originated when Polynesian immigrants to Hawaiʻi arrived roughly 1500 years ago in double-hulled canoes. The Polynesians brought a number of plant species with them on their journey, most of which were primarily intended for use as medicines. More importantly, they brought a wealth of knowledge about healthy lifestyles and the medicinal uses of plants found widely across the mostly (indigenous) central Pacific region. Over time, as the Polynesians populated each island, they adapted to their surroundings and also learned to use the native (endemic) species found only in the Hawaiian Islands. A set of guiding philosophical principles, beliefs, and understandings of the ways that the world works was used to direct both the development and application of a complex health care system that is still in use today.

FOR THE PLANT UNIT IN OUR CLASS, WE HAVE BEEN FOCUSED ON THREE ESSENTIAL QUESTIONS:

1. How are plants and animals similar and/or different structure (ie. in terms of cells, tissues, organs, organ systems?)
2. In what ways do humans and plants impact each other?
3. How have humans used plants for their benefit?

We covered the first two questions through the activities and short paper that you've already turned in, and you were introduced to some of our local plants during our field trip to ʻImiloa Astronomy Center's native plant garden. Now it's your turn to use what you've learned to expand upon this and explore our third question, "How have humans used plants for their benefit?" and identifying your own personal connection to a particular plant. You'll do this by completing a project and a short, 1-page reflection paper on the project.

The project: Identify a single plant from the list of plants we saw at ʻImiloa Astronomy Center, or the list of plants found at the end of this handout that are used in laʻau lapaʻau (ie. mamaki, ʻolena, kukui, awa). Choose one that is relevant to you, your culture, or your curiosity, so you have some investment in your project! You are also welcome to choose other plants related to your own culture with approval from your instructor. Next, you must research the plant and answer a series of questions about it, building on your previous knowledge about all plants and making it specific to your plant of interest. From your research, you will develop a unique project that represents your findings and understanding about the plant.

REQUIREMENTS FOR THE PROJECT:

First, research your plant. Your completed project must contain the answers to the following questions about your chosen plant, as well as the additional requirements listed.

1. Identify the plant, using its common, scientific, and Hawaiian name (if it has one).
2. Identify where the plant originates from – is it native, a canoe plant, endemic, or introduced to Hawai'i? Where is it found in the world?
3. Identify its connection to humans and human biology – both its current and past uses for medicine, food, etc. in Hawai'i and/or other societies and cultures in other parts of the world.
4. Describe the major parts of the plant and its structure, utilizing proper scientific terms.
5. Connect the parts of the plant to its use – what part of the plant is used for its medicinal properties? (ie. perhaps the roots are used for medicine, but not the leaves)
6. Expand upon the basics - Is there a scientific basis for the plant's current uses? Have medicinal compounds been identified in the plant?
7. Make it relevant - Are there spiritual connections to the plant and/or pule, legends, mythology, songs, etc. that you can include?
8. Make it personal - Reflect on the project; including what was learned or gained from this exercise, and how it has impacted or changed your ideas about your particular plant, or plants in general. This portion of the project must be a minimum of 1-page, double-spaced, and typed.

Next, you will develop a physical project that represents your culturally relevant plant and the research you have done about it. You have total freedom to decide what your project will entail, so long as your project includes all eight requirements listed above. The project should, at a minimum, identify the plant, its structure, uses for the various parts of the plant, where it is found, and its connection to humans and human biology (requirements 1-5 above). You may include any of the other information as a written portion of the project, but if you do so, this would be in addition to the 1-page of reflection. Examples of the project could include:

- Design a poster that would "advertise" and/or describe the plant and its uses.
- Record a video "tour" of the plant and its properties.
- Make a recipe booklet (feel free to bring in products of your recipe).
- Write an original story, myth, legend, or poetry about the plant.
- Design a "value-added" product with an informational label.
- Design a lesson plan to teach others about that plant.

REQUIREMENTS FOR THE PROJECT:

Do **not** use Wikipedia! It's a great place to start, but cannot be used as a primary source (*Why not?* Because *anyone* or their dog can write a Wikipedia entry!). Choose proper, reliable sources such as journal articles, books, and/or websites from sources such as .gov or .edu, as discussed previously in class. If you have questions as to what a "reliable" source is, please see me or check your source with me. You will lose points for using sources that are not reliable! You must have a total of **four different referenced materials, one of which cannot be from a strictly internet site (ie. journal article, book, etc.)**

The library website is a great resource! http://guides.library.uhh.hawaii.edu/home. Librarians are available at UHH to help you navigate through how to find and research what you need – and they have a great Hawaiian collection you may find useful!

Be sure to properly cite your references, both in-text if needed, and in a references section following your reflection paper or as part of the the project itself. A guide to the proper way to cite your references APA format is posted on Laulima. Please ask if you have any concerns or questions about how to do this!

DISPLAY AND DUE DATE:

Your project and reflection paper are due the last day of class on May 3. **No late projects or papers will be accepted**, so make sure you complete it by then. You'll put your project on display in our classroom for other students to look at and examine on our last day of class during our discussion and review session.

OPTIONAL PLANT LIST TO GET YOU STARTED:

- *Aalii* (Hopseed bush)
- *Aloala* (Hibiscus)
- *Awa* (Kava)
- *Awapuhi* (Shampoo ginger)
- *Kalo* (Taro)
- *Kukui* (Candlenut Tree)
- *Ko* (Sugar cane)
- *Koali* (Morning Glory)
- *Mamaki*
- *Noni* (Indian Mulberry)
- *Ohia lehua*
- *'Olena* (Turmeric)
- *Pia* (Arrowroot)
- *Popolo* (Glassy Nightshade)

GRADING RUBRIC

LAʻAU LAPAʻAU: THE MEDICINAL PROPERTIES OF PLANTS
BIOL101 GENERAL BIOLOGY SPRING 2016
POINT VALUE: 50 POINTS

NAME: _____

_____ PHYSICAL PROJECT (20)

_____ Creativity (5)
_____ Structure/Organization (5)
_____ Questions (10) *2/question*

1. **Identify the plant**, using its common, scientific, and Hawaiian name (if it has one).
2. **Identify where the plant originates from** – is it native, a canoe plant, endemic, or introduced?
3. **Identify its connection to humans and human biology** – ie. its current and past uses for medicine, food, etc. in Hawaiʻi and/or other societies and cultures in other parts of the world.
4. **Describe the parts of the plant and its structure**, utilizing proper scientific terms.
5. **Connect the parts of the plant to its use** – what part of the plant is used? (ie. some plants the roots are used for medicine, but not the leaves)

_____ ADDITIONAL QUESTIONS (4)

6. **Expand upon the basics:** Is there a scientific basis for the plant's current uses? Have medicinal compounds been identified in the plant?
7. **Make it relevant:** Are there spiritual connections to the plant and/or pule, legends, mythology, songs, etc. that you can include?

_____ REFLECTION (18)

_____ Length, minimum 1-page (2)
_____ Structure/Organization, double-spaced, typed, neatly done (1)
_____ Content (15)

8. Make it personal: Reflect on the project; including what was learned or gained from this exercise, and how it has impacted or changed your ideas about your particular plant, or plants in general.

_____ SOURCES (8)

_____ Minimum 4 Sources (4)
_____ APA format (1)
_____ Proper, reliable sources used, one not from the internet (2)
_____ Cited in text or as part of project (1)

_____ TOTAL (50)