Helping students develop a clear understanding of taxonomic classification can be a daunting task. This is a field that is in a constant state of flux, particularly now that DNA testing is rewriting the map detailing how organisms are related to one another. TAXONOMY TRAIL is designed to convey, first, that all that exists is intrinsically related, and, second, that there are ways that scientists have agreed to "sort" or classify organisms in our world. The material is streamlined and simplified so that even young students can readily grasp the underlying structure of their larger environment.

TAXONOMY TRAIL combines auditory, visual, and kinesthetic learning styles. Students work in cooperative groups to master both the basic concepts and the terminology of taxonomic classification. TAXONOMY TRAIL combines a series of high interest activities including a hands-on science lab, student-generated quizzes, and a "high-stakes" board game to guide students in acquiring the following:

Knowledge

- The basic units used to distinguish life forms and their relationships, specifically:
  - — Kingdom
  - — Phylum
  - — Class
  - — Order
  - — Family
  - — Genus
  - — Species
- Strategies for determining how to classify a particular organism
- Learning why even familiar organisms have scientific names
- Scientific method—Question, Hypothesis, Observation/Experimentation, Recording Information, Conclusion
- Awareness of the complexity and diversity of life
- The principle that the greater the number and diversity of the species that survive, the healthier the environment

Skills

- Identifying the Kingdom to which an organism belongs (classification)
- Working cooperatively in groups
- Treating lab animals with care and compassion
- Recording observations
- Conforming to rules in a learning game

Attitudes

- Developing a positive and inclusive attitude about all life forms
- Satisfaction in grappling with a vast and complex field of knowledge
- Understanding the power of teamwork

PURPOSE

OVERVIEW

In TAXONOMY TRAIL, a variety of activities, observations, and games are used to reinforce and demonstrate mastery of the basic concepts and categories of taxonomic classification. Preserve Teams work together to sort everything from beans to living organisms according to their physical characteristics. Two lessons involving observations of live snails add the dimension of sorting species by behaviors, as well as both external and internal physical characteristics. The culminating activity is a board game where teams answer questions in order to progress towards the goal of preserving as much diversity in the ecosystem as possible.

TAXONOMY TRAIL begins with a sorting activity designed to help students think inclusively and globally, and ends with a game that allows them to demonstrate both their concrete and conceptual knowledge about the diversity of life. Preserve members are given roles and group social skills are reinforced throughout the unit. Prior to observing and experimenting with snails, students learn the proper treatment of these live specimens. Students are exposed to taxonomic vocabulary and learn about taxonomic classification by completing a variety of increasingly detailed activities. Preserve Teams research a snail and write a Snail Bio as they discover the diversity of snails. Finally, Preserve members work together as they play an interactive game in an attempt to *Save the Ecosystem*.

Differentiation

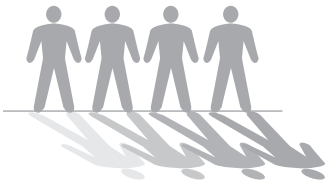
Like all Interact units, TAXONOMY TRAIL provides differentiated instruction through its various learning opportunities. Students learn and experience the knowledge, skills, and attitudes through all domains of language (reading, writing, speaking, and listening). Adjust the level of difficulty as best fits your students. Assist special needs students in selecting activities that utilize their strengths and allow them to succeed. Work together with the Resource Specialist teacher, Gifted and Talented teacher, or other specialist to coordinate instruction.

1. **Before you Begin**
   Carefully read through the entire Teacher Guide so that you understand the objectives and sequence of TAXONOMY TRAIL. Decide how you will use the unit in your classroom. Throughout the Teacher Guide, Interact employs certain editorial conventions to identify materials.
   a. In preparing materials, *class set* means one per student.
   b. One Day on the **Unit Time Chart** is the length of a normal *class period*—45 minutes to an hour.
   c. All transparency masters and student handouts are listed by name using ALL CAPITAL LETTERS.
   d. Teacher reference pages are named in **Bold**.
   e. Special events are named using *Italics* (e.g., *Save the Ecosystem*).

2. **Timing Options**
   This unit as presented will take 10 days for grades 3–5, and possibly 1–2 days longer for grade 2 to accommodate developing skills in following directions and in writing responses. If you select extension activities, there could be an additional 3–4 days of instruction (see **Daily Directions—Day 1, Setup #1** on page 24 for some suggested preserve names).

3. **Grouping Students**
   Divide your class into heterogeneous groups of four–five students, called Preserve Teams. Each team will be called by a different preserve name. These names add to the authenticity of the unit, as these are real preserve names. (See **Daily Directions—Day 1, Setup #1** on page 24 for some suggested preserve names.)
   a. Be sure to develop teams that are balanced academically, maximizing opportunities for peer teaching and learning.
   b. Encourage students to ensure that all their team members participate in recording observations, formulating conclusions, and creating acronyms, and that all members gain mastery of the characteristics of members of all five Kingdoms.
   c. Teach, monitor, and reinforce social skills throughout TAXONOMY TRAIL using the provided Preserve Team Rubric (found on PRESERVE TEAM ROLES AND RUBRIC, page 83).
   d. Once the unit is completed, students may be encouraged to play *Save the Ecosystem* in groupings of their own choice during free time.

10+ days



Preserve Teams of 4–5 members

Groups of two–three students are recommended for Days 2 and 4. This is to insure a calmer atmosphere and the safety of live specimens during observations.

UNIT TIME CHART

DAY 1: Everything in the World

- Introduce unit
- Group students into Preserve Teams
- Teams practice sorting and formulate governing questions
- PRE/POSTTEST
- SAMPLE SORTING GRID
- GLOSSARY
- SORTING GRID
- **Vocabulary**: preserve, docent, vertebrate, invertebrate, taxonomy
- **Extension**
  Research Preserve names

DAY 2: Wake the Snail

- Use governing questions in the game of twenty questions
- Learn the names of the external anatomy of a snail
- Discuss the proper treatment and handling of the snails
- Teams record the external characteristics of the snails
- Complete written assignment labeling the parts of the snail
- SNAIL SHELL and SNAIL BODY

—OR—

- SNAIL ICON—EXTERNAL
- SAFE SNAIL HANDLING
- PRESERVE TEAM ROLES AND RUBRIC
- **Vocabulary**: shell, apex, foot, head, mouth, tentacle, eye, radula, mollusk, anatomy, respiratory pore
- **Extensions**
  Watercolor Snail Icon
  Observe snail mouth and radula
  Generate questions for further experimental study

DAY 3: Snail Anatomy Maze

- Learn that scientists classify or sort organisms using more criteria than just their external characteristics
- Learn the distinctions between cells, tissues, and organs
- Color and label internal organs
- Trace through the digestive system of the snail
- SNAIL ICON—INTERNAL
- SNAIL INTERNAL ORGANS
- **Vocabulary**: vertebrate, invertebrate, cell, tissue, organ

DAY 4: Off to the Races!

- Learn the five steps of the scientific method
- Follow the scientific method in observing and recording snail behavior
- Learn that classification is determined by behavior as well as by physical characteristics
- SNAIL TRAIL
- **Vocabulary**: mobile, ingest, photosynthesis, chlorophyll
- **Extensions**
  Students develop Snail Haikus (individually or as a team)

UNIT TIME CHART

DAY 5: Uncle Mollusca?

- Discuss the concept of a family tree
- Brainstorm some close "relatives" of snails
- "Mirror" bulletin board displaying the snail's "family tree"
- SNAIL FAMILY TREE: UNCLE MOLLUSCA?
- FAMILY TREE
- **Vocabulary**: Kingdom, Phylum, Class, Mollusca, Gastropoda, Bivalve, Cephalopoda

DAY 6: Stump Your Parents!

- Explore the exceptional diversity and beauty of snails
- Introduce scientific names
- Learn some facts about snails that are "stranger than fiction"
- Research and create snail bios
- Devise parent quizzes to reinforce knowledge
- Add species diversity to student understanding and to bulletin board
- SNAIL PICTURES
- FANTASTIC SNAIL FACTS!
- SNAIL BIO
  —OR—
- SNAIL BIO CHECKLIST AND RUBRIC
- **Vocabulary**: scientific names
- **Extension**
  Students conduct a Snail Beauty Pageant.

DAY 7: Take Me to Your Kingdom!

- Review and distinguish cells, tissues, and organs
- Learn about photosynthesis
- Discuss different ways organisms obtain food
- Learn the names and main characteristics of the five Kingdoms
- Become familiar with how scientists came up with the five Kingdoms
- Perform an activity which reinforces and organizes this knowledge
- Create an answer scroll for *Save the Ecosystem* game
- KINGDOM KIT

DAY 8: King Phillip Commands Order for Goofy Shoes

- The seven levels of taxonomy classification are introduced: Kingdom/Phylum/Class/Order/Family/Genus/Species
- Learn taxonomic classifications for cat and dog
- Teams develop acronyms to help them remember the seven levels
- **Extension**
  Vocabulary Bingo

UNIT TIME CHART

DAY 9: *Save the Ecosystem*

- Assemble and learn to play *Save the Ecosystem*
- Reinforce Kingdom characteristics
- Increase awareness of the principle that the more diversity of organisms, the healthier the ecosystem
- ORGANISM CARDS
- GAME BOARD CARDS
- QUESTION CARDS
- SAVE THE ECOSYSTEM RULES
- SCORE CARD

DAY 10: Award-Winning Preserve

- Reinforce and test knowledge of Kingdom characteristics
- Celebrate and gain recognition for the investigation of a complex field of knowledge
- Release the snails (if they were collected by students)
- TOURNAMENT GRID
- SAVE THE ECOSYSTEM SCORE
- SCORE CARD
- CERTIFICATE
- PRE/POSTTEST

Day 1
Everything in the World

Objectives

- Introduce unit
- Group students into Preserve Teams
- Teams practice sorting activities
- Students formulate governing questions
- **Vocabulary**: preserve, docent, vertebrate, invertebrate, taxonomy

Materials

- PRE/POSTTEST 1 or 2 — *class set*
- **Pre/Posttest Key** — *teacher reference*
- SAMPLE SORTING GRID — *teacher reference OR transparency or class set (Optional)*
- GLOSSARY — *class set*
- SORTING GRID — *one per Preserve Team*
- WRITING RUBRIC — *class set, one per Preserve Team, or transparency + one to post (Optional)*
- Beans (different types, colors, sizes; for sorting) — *one ounce per student*
- Construction paper (12" x 18"; for Taxonomy Folders) — *class set*
- Construction paper (9" x 12"; for Sorting activity) — *one per Preserve Team*
- Glue — *one per Preserve Team*
- Hat or lined basket (for selecting Preserve names) — *one*
- Highlighter pen — *class set (Optional)*
- List of 16 familiar objects — *one (Create a list of familiar items students can observe within the classroom and outside looking through the windows.*

  Sample list:

apple	*begonia plant*
chair	*desk*
fern	*fly*
guinea pig	*lizard*
pen	*pencil*
pencil sharpener	*pinecone*
plastic ruler	*poster*
stapler	*tarantula*

- Overhead projector — *one (Optional)*
- Paper slips (small, scratch paper, for Preserve names) — *one per Preserve Team*

Prior to beginning the unit, be sure to read Taxonomy Background (Teacher Reference).

PRE/POSTTEST 1 is geared toward Primary students and 2 is geared toward Intermediate students.

The SAMPLE SORTING GRID shows how 16 familiar objects are sorted. Use this as a reference or as part of the whole class sorting. If you choose to use it with the class consider making a transparency and having students follow along as you uncover the various sections or reproduce this page and have the class follow along as you work to sort these 16 objects.

*As you expose students to the new words, consider having them highlight each word on their Glossary. See **Unit Components #2, Taxonomy Vocabulary** for suggestions on ways for students to learn the vocabulary presented in this unit.*

One 20 oz. bag of dried bean soup mix is enough for 20 students. Use a coffee scoop for distributing the beans.

DAILY DIRECTIONS
DAY 1

To locate the preserves in your state visit the Nature Conservancy website: http://nature.org/ wherewework/ northamerica/ states/.

Setup

1. Select Preserve names for the unit. Locate preserves in your state or use the ones offered here (from the state of California):
   - The Cosumnes River Preserve
   - Santa Cruz Island Reserve
   - Sequoia Foothills Project
   - Herbert Wetland Prairie Preserve
   - Kaweah Oaks Preserve
   - Lewis Hill Preserve
   - Rancho Cuyamaca
   - McCloud River Preserve
   - Ring Mountain Preserve
   - Santa Rosa Plateau Preserve

2. Write out the Preserve names on small slips of paper for team drawing (see **Procedure** #5).

3. Draw a sorting grid on the chalkboard or on a large piece of butcher paper.

4. Create a list of 16 familiar objects. Write these 16 familiar objects within the first tier (top of the grid) of the Grid you drew on the board or butcher paper (see SAMPLE SORTING GRID for an example).

5. Divide beans into fairly equal, but unsorted piles for each team.

Procedure

1. Give a brief overview of TAXONOMY TRAIL. Explain to students that they will be talking about "everything in the world," and how everything in the world is connected in some way to everything else.

Correct the Pretest and keep for later evaluation of learning (compare with the Posttest—Day 10). See the ***Pre/Posttest Key****.*

2. Distribute PRE/POSTTEST and administer. Allow time for students to complete. If you want, include question #21 for extra credit (see below; see **Pre/Posttest Key** on page 70 for more information).

   Extra Credit

   21. What do you think the organism in Question #19 is? What makes you think this?