

Using Collaborative Jigsaw Strategy to deliver content with focus on concepts

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INTRODUCTION

With 32 orders and over 1,000,000 species, the class Hexapoda is a very big subject! Teaching entomology demands that instructors whittle it down to manageable size. One strategy is to divide and conquer! A **modified Jigsaw strategy** maximizes content delivery while emphasizing concepts. Topics with numerous variations on a theme lend themselves to this strategy. I have used modified jigsaw to teach arthropod-borne diseases and global insect biodiversity. In this collaborative, student-active, constructivist strategy, each small group researches one topic and creates a summary artifact. They become the "experts," and they teach that topic to the rest of the class. Many examples are covered and students get practice with concepts, leading to mastery of lesson outcomes. Assessment questions allow students to answer using the topics with which they are most familiar, by asking students to apply a concept to a new, provided example, or to an authentic task.

A **signature lesson** is required for general education courses to achieve the area outcomes. These activities were signature lessons for ENT 2000 Six-Legged Science, HON 2060 Insect Biodiversity, and HON 2060 Butterfly Biodiversity.

THEORY, PLANNING AND IMPLEMENTATION

THEORY: Jigsaw is a student-active, constructivist strategy based on Lev Vygotsky's **collaborative learning theory**. Students of a range of prior-knowledge work in groups with one student serving as the **more-competent peer (MCP)**, who helps the students make connections to attach new content to their mental scaffolds.

PREPARATION: The **classroom design** of 2 or 3 students at tables created groups of 4-6 students when two tables were joined. When many students lacked prior knowledge, I assigned groups to ensure an MCP in each group. I designed a **template** to guide students' research and provide **clear and equivalent expectations** for each group. I **modeled** the expectations by preparing a fact sheet for an important example.



IMPLEMENTATION: Two class periods were used for **small group** work and presentations. The students researched an assigned topic and organized the content on a **fact sheet template**. Students then used their fact sheet to create a PowerPoint to teach the rest of the class about their assigned topic. All students received practice applying concepts through a variety of examples.

ARTHROPOD-BORNE DISEASES

For ENT 2000, each group was assigned a different disease. The template included the concepts and terms of the parasitic life cycle. The model fact sheet was about malaria.

MEDICAL ENTOMOLOGY: ARTHROPOD-BORNE DISEASES ENT 2000

DISEASE NAME: Onchocerciasis Trent Williams, Ben Southwell, Brandon Snodgrass Spring 2016

HISTORY/TIMELINE: The microfilarial parasite that causes the disease found by John O'Neill 1874
Role of blackflies in the transmission proven by Breadalbane Blacklock in 1890

THE ARTHROPOD:
genus *Simulium*
Black fly

EPIDEMIOLOGY (GEOGRAPHIC RANGE): Africa, Yemen, Latin America

THE DISEASE ORGANISM:
Onchocerca volvulus
Microfilariae live for 1-2 years, moving around the body in the skin
Blackfly transmits microfilariae larvae to human via bite, and can pick up microfilariae 3rd stage larvae from infected humans.
Adult microfilariae enter skin or other tissues (for about 15 years);
Reservoir: primates like chimpanzees, gorillas; also cattle and horses

LIFE CYCLE:
Life cycle of Onchocerca volvulus

SYMPTOMS: Itching, Blindness, Nodules in the skin

PREVENTION: No vaccines; Ivermectin kills larvae but not adults
Best prevention includes personal protection against insect bite (wearing insect repellent, long sleeves/ pants)
Can kill the aquatic larvae of blackflies with insecticides

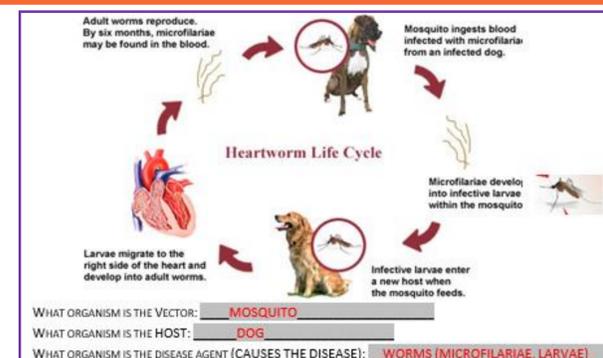
STORY OR INTERESTING FACTS:
Itching is so extreme that people scratch themselves with broken pottery. Does not cause death but the extreme disability of irreversible blindness; causes some to commit suicide.
Skin can be so hard that needles cannot penetrate it
* <http://www.cnn.com/2013/02/02/health/river-blindness/>
Jimmy Carter Foundation distributes ivermectin, provided by Merck, in areas where river blindness is endemic.

ASSESSMENTS AND FUTURE PLANNING

Assessment:

Questions focused on concepts by:

- 1) allowing the students to answer using the topics with which they were most familiar,
- 2) asking students to apply the concepts to a new example that I provided (ex. dog heartworm disease)
- 3) asking students to apply the concepts to authentic tasks (ex. personal travel or pet care)



Which gentleman is best-dressed for protection against mosquito bites?

ECOTOURISM

Planning personal travel is an engaging and authentic task for students.

For HON 2060, Insect Biodiversity, with 7

students, individual students created travel brochures to integrate the concepts of ecotourism, sustainability, and insect biodiversity with global outcomes.

Students presented their brochures to the class.

HON 2060, Butterfly Biodiversity has 17 students, so we will work in groups to ensure sufficient time for presentations during class.

Oro Province Tropical Rainforests

The coastal rainforests of northern Papua New Guinea are the only place in the world where the Queen Alexandra's Birdwing butterfly lives. The average temperature ranges between 70 and 90 degrees Fahrenheit.

Some of the plants that are notable in this rainforest are the orchids and the hibiscus flowers.

Queen Alexandra's Birdwing Butterfly
(*Ornithoptera alexandrae*)

This is the largest species of butterfly in the world! It is a holometabolous insect that lays its eggs on a pipevine plant. This is the host plant for the larva and pupal stages. Then this magnificent butterfly enters adulthood with its unique blue-green wings (for the males). The host plants for the adults are hibiscus flowers. Their strong wings allow them to fly high up in the forest. While in Papua New Guinea, it is a top priority to see these butterflies in their only natural habitat on Earth.

Papua New Guinea

Explore an island country just above Australia with a perfect climate for discovering new wildlife!

Due to Papua New Guinea's tropical environment, it is host to many incredible insects. Most notable of those is the Queen Alexandra's Birdwing butterfly. The focus of the trip will be on the forests of the Oro Province. It is also known as "The Land of Bark and Butterflies".

Madison Monroe
Hon 2060
Spring 2021

Culture in Papua New Guinea

There are over 7000 different cultural groups in the PNG population. Many traditional ceremonies and celebrations are still practiced there. The largest ethnic group in PNG is the Melanesians.

Mount Hagen Cultural Show

A common practice in PNG is to have sing-sing rituals. These rituals are the gathering of people from many different cultural and ethnic groups to share and celebrate their traditions. The Mount Hagen Cultural Show is one of the largest sing-sings. This is a display of many unique cultural body paints, costumes, headresses, and jewelry.

Prioritizing sustainable travel needs to be a top priority, especially when exploring wildlife.

How to make travel to PNG more sustainable:

Staying in the Tufi Resort eco-lodges is a great way to make the trip more sustainable. The Village Guesthouses allow travelers to experience the traditional culture of Papua New Guinea first-hand. Some of the activities include exploring with local fishermen and catching lobster. This experience allows outsiders to observe and learn about the traditions of the locals without harming their way of life.

Travel Details

Travelers will be staying in the Tufi Resort on the northern coast of the island.

The main foods that are served in PNG are seafood and fresh fruits and vegetables.

The high humidity and temperatures encourage lightweight, casual clothes.

Many of the activities will be outdoors, so prepare accordingly. Most travel will be don't through Public Motor Vehicles

Pre-Travel Requirements

Recommendations of vaccines to have up to date before travelling to PNG per the CDC:

- Routine Vaccines
- Hepatitis A
- Hepatitis B

Future planning:

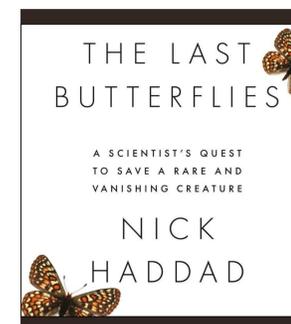
As a signature assignment for HON 2060, Butterfly Biodiversity, each group of students will read one chapter from *The Last Butterflies*, by Nick Haddad. Students will prepare a fact sheet on a template focusing on concepts of life history, such as host plants, with ecological concepts, including the habitats, to understand how to conserve the rarest butterflies.

By Kate Watts, Florida Keys National Wildlife Refuges Complex June 2, 2016

"Two adult Miami blue butterflies were detected fluttering on host plants, one of them ovipositing, or laying eggs, as they were spotted at Great White Heron National Wildlife Refuge."



<https://www.fws.gov/southeast/articles/miami-blue-butterfly-found-in-refuge/>



PART I. THE RAREST BUTTERFLIES

- 2 Bay Checkerspot
- 3 Fender's Blue
- 4 Crystal Skipper
- 5 Miami Blue
- 6 St. Francis' Satyr
- 7 Schaus' Swallowtail