Learning to identify species' can be challenging; especially species from a large taxonomic group that all share similar morphological features. One of the most easily accessible places to find marine species like this is the intertidal zone. Though there are quite a few identification guides written for beachcombers they may lack key diagnostic features and diagrams required for accurate identification across size classes and morphotypes. Conversely, dichotomous keys created by academic specialists can be cumbersome because they require highly specialized terminology and other knowledge not possessed by anyone outside the field (and personally I (Alex) find them tedious). In all cases, identification tools typically lack detailed information on the behavior, habitat, and trophic role of species—information that is essential for understanding where, when, and how many of a particular organism you are likely to find in the intertidal zone. To solve this problem, we're asking you to become experts in a small group of invertebrates that you can then teach to your classmates. Through this activity you will have the opportunity to contribute to an accurate, informative, and easy-to-use identification guide for local intertidal invertebrates and classes at BMSC.

Assignment Overview (40pts Total)

A group of four students will be assigned one or two invertebrate taxonomic groups (depending on the number of species and complexity in identification skills required). The assignment has four components:

A. Voucher Collection (10pts)

Each group is responsible for assembling and maintaining a voucher collection in the lab that contains ~10 individuals of each assigned species (except where species are rare, or where housing species in the lab is likely to cause stress to the individuals or spread disease between individuals in the lab). The goal of your collections is to capture the morphological diversity of each species necessary to identify it in the field.

Voucher collections will occur on Friday, October 15th at Scott's Bay during a class visit during the afternoon low tide (depart 1430, return 1800). It is your group's responsibility to care for their animals during collection, transport, and housing in the lab until your assignment is completed on Monday, October 18th. This includes keeping careful notes and labels on the sites of collection, daily checks of water flow, appropriate containment, suitable habitat to minimize stress, and regular feeding and removal of uneaten food.

The voucher collection will be graded on its accuracy, completeness, and overall effectiveness as a learning aid for species identification. In other words:

- Each species should be in a separate container (or containers if required to keep them from injuring each other)
- Each sea table should have a completed AUP card, and each container should be clearly labeled with species name and collection location.
- The individuals you have on display should each serve a purpose in terms of highlighting the morphological diversity found in your species.

B. Morphological Study

This will be broken into before and after collecting sections.

Before: tart by assembling and reading all available written identification guides to teach yourself what features are diagnostic in differentiating your species from others. Then, use these guides to help you hone

in on the most reliable characters. [https://www.centralcoastbiodiversity.org/marine-invertebrates.html]

After: With your species safely housed in the lab, your next task is to study the morphology of your assigned group using the individuals you collected. Run your ideas by your instructors before you start your final measurements.

Once you've figured out what to measure, use calipers, a microscope equipped with a camera, or any other appropriate tools to compare the morphology of your closely-related species. Evaluating all of the individuals in your sample will allow you to get a representative idea of diversity in form within species. You will use this information in constructing your ID guide and in teaching your classmates in the sections below.

Once you have completed your morphological study and are confident in your species IDs, your team must upload an image and species-level identification for at least four species to iNaturalist. Login to your account (at [https://www.inaturalist.org/]) and join the project "BMSC, Marine Population Ecology and Dynamics, Fall 2021".

C. ID Guide (20pts)

With your newfound knowledge, construct an ID guide to help your classmates identify your focal species in the field (note: some of this can be done prior to going to the field). We'll grade these for accuracy, have you make the necessary corrections and then make them available to your classmates as an identification guide. Please submit your ID guide as a single RMarkdown document composed of two parts:

Part 1:

For each species, create a two-sided 8 x 11-inch page composed completely of your original work that includes:

- A series of pictures and/or drawings that clearly shows the key features required to make a positive ID (including arrows pointing out where to look for key features, as seen in the best bird guides). This would be a good opportunity to show examples of some of the morphological variation (colour and shape) likely to be encountered in the field.
- A written description to aid in identification that includes a summary of the variation in colour and shape likely to be encountered in nature and descriptions of any look-alike species.
- Three questions per species (with diagrams or pictures to illustrate) whose answers together help unambiguously differentiate your species from other similar ones in the field. Examples of suitable questions could be: Does it have a groove at the anterior end (ventral side) of the shell? Do the plates on the top of the closed shell have a distinct zigzag along the midline where they meet? Do the last segments of its walking legs look like they have been dipped in blue paint?
- A one paragraph description of the species (i) current geographic distribution and habitat preferences, (ii) trophic role (including diet and foraging mode), and (iii) reproductive mode.

Part 2:

The final two pages of your ID Guide should include graphs of the morphological characteristics you measured for each species (Part C) and a summary table comparing the key information on size, morphology, trophic role and diet, and reproductive mode between the set of species.

D. Presentation (10pts)

Finally, you will give a 7-10 min presentation to aid your classmates in learning about the identification and ecology of your taxonomic group. An effective presentation will:

- Include a description of the results of your morphological study (including graphs, tables, diagrams, and pictures where appropriate)
- Give a summary of what you learned about how to tell your species apart in the field and their ecology.
- Have speaking contributions from all group members
- Effectively use images and diagrams and use text only to highly key points and label features.