Honors Biology Summer Assignment

Dear Incoming Student, Parent/Guardian,

Honors Biology will allow students to enhance their thinking and observational skills through independent and group experiments. Honors Biology requires a summer assignment for all entering students. This assignment will allow students to explore the biology where they live (or where they spend their summers!).

This project will provide students the freedom to explore the world around them over the summer and through the school year. Please discuss with your son or daughter the student’s responsibility regarding this assignment sheet and help him or her determine the best time when this work can be accomplished.

This assignment is worth TWO unit exams for the First Marking Period, and the final assignment will be collected the class immediately after Labor Day (so that students who register after the summer will have time to complete the project) and tested at the end of that week. We will be asking you to bring in ALL of your 30 plants during the second week of classes for a check in to make sure you have all your divisions and to help you use identification tools.

If you have any questions or concerns please email Cris Robson (cris.robson@asd20.org) or Cyndi Hatcher (Cyndi.hatcher@asd20.org) or Alison O’Neal (Alison.oneal@asd20.org).

Thank you,

Sincerely,

Cris Robson, Cyndi Hatcher, and Alison O’Neal

A copy of this assignment can be found on the AAHS Summer Assignment web site as well as the course summer group in Schoology.

As soon as you get a copy of this assignment please join our Schoology group. The join code is: QJR7-9CF6-KCTTK
Honors Biology Plant Collection Project

HOW TO MAKE A SCIENTIFIC PLANT COLLECTION

MATERIALS FOR A PLANT PRESS

The first thing you will need to do is make a plant press. The top and bottom boards for a plant press should be cut from one-quarter inch plywood slightly larger than a folded section of a newspaper; cut 2 boards about 30.5 cm X 40.5 cm (12 X 16 inches) for each press. Cardboard should also be cut to the same size. Note: before cutting anything, measure the folded newspaper that will be used in the press. Newspapers vary in size, so measure first.

The press is then assembled by layering the newspapers and cardboard. There is no rule for how many of each to use. Usually 5-10 pieces of cardboard are interspaced with three or four pieces of newspaper. Some plant collectors prefer to keep the newspapers separate until a piece is needed. When a specimen is collected it is placed in the folded newspaper and slipped between cardboard into the press. The press is held together by two straps with friction buckles.

MAKING A PLANT PRESS

When scientists preserve a specimen of a plant (or part of a plant) they usually flatten it, dry it and mount it on special paper. Preserved in this way the plant specimen can be stored for many years without falling apart.

To get a good preserved specimen, the plant material that is collected in the field must be of good quality. A half-dead, wilted or dry plant does not press well and will not make a good preserved specimen. Select plant material that is growing well, is healthy and is representative of that type of plant growing in the area. When collecting the specimen, cut it to a size that will fit conveniently in the plant press. If the specimen is small enough, it can be pulled from the ground so that the whole plant, roots and all can go into the press. Sometimes a specimen will need to be folded over or trimmed a little to make it fit in the press. **YOU MUST TAKE A PHOTO OF YOURSELF WITH THE PLANT BEFORE COLLECTING IT!!**

Plants that have been collected need to be pressed as soon as possible. Plants can be kept in a paper or plastic bag for an hour or so, but once they start to wilt they make poor specimens. **Press cut specimens as soon as possible.**

The preservation process begins by flattening the plant specimen in a plant press. NEVER put succulents such as cactus in your press. They do not press well and can rot leaving your plant press a mess! A plant press is made of newspapers, cardboard, blotter paper and wood and is held together with nylon straps. See the drawing below:

### Plant Press Construction

Work in groups of two and make one plant press for your group. The press should be put together as shown in the diagram to the right. The wooden pieces are the top and bottom. The cardboard and new paper are alternated and strapped into the press. Additional newspaper will be used for individual plant specimens and will be placed in the press when the specimens are collected. Place two straps around your press to hold it together.

**AGAIN: YOU MUST HAVE A PHOTO OF YOURSELF WITH THE PLANT BEFORE YOU COLLECT IT!**
USING YOUR PLANT PRESS

BACKGROUND: When scientists preserve a specimen of a plant (or part of a plant) they usually flatten it, dry it, and mount it on special paper. Preserved in this way the plant specimen can be stored for many years without falling apart. **MAKE SURE YOU PHOTOGRAPH YOUR PLANT (include yourself in the photo!!) BEFORE YOU COLLECT IT!!**

Select a specimen material that clearly represents the plant you are collecting. Picking a few leaves or flowers usually does not give a representative picture of a plant. Pieces of specimen plant material need to be large enough to show the characteristics of normal growth and development. Taking a branch, stem or even the entire plant may be required to get a good specimen. Plants that show unnatural growth, damage or deterioration will not be good specimens when dried and mounted. **It is important to collect good specimens.**

Once a good specimen is collected, the specimen is flattened in a plant press. A plant press is made of newspapers, cardboard, and wood and is held together with two straps.

You may experience some difficulty placing plants in the plant press, especially on a windy day. Some of these problems can be controlled by leaving the press in a sheltered place and bringing the plant specimens to the press. Or, the press can be left indoors and plants can be brought back from the field in plastic or paper bags. **Note: It is very important that collection data be kept with each separate plant specimen.** If the plant is not placed directly in the press at the collection site, care must be taken that the correct information is recorded and attached to the plant specimen.

MAKING SURE SPECIMENS DRY

When plant specimens are pressed it is important that the plants do not get mold or mildew growing on them. When plants are placed in the press they should be positioned so that leaves are not all bunched on top of each other. Spreading the leaves out on the newspaper so that they are not touching each other will help prevent mold and mildew. Several layers of newspaper need to be placed between each plant specimen. Plants that are especially juicy or wet should have the newspapers changed every few days. Under normal conditions, specimens dry completely in a week or so. However, if there has been a lot of rain and the humidity is high, the newspapers should be changed every two to three days until the specimens are dry. **Remember to keep all the collection data with the plant when you change the paper.**

If you do not have access to a plant field guide check out these websites to help you identify what you find:

http://jeffco.us/coopext/intro.jsp

http://www.range.colostate.edu/plantfind.shtml

http://www.easterncoloradowildflowers.com/

Additionally, there are a number of GREAT apps to help with identification some of these are listed below:


More resources are also located in our Honors Bio Schoology Group
COLLECTION REQUIREMENTS

You will hand in a total of 30 specimens representing 30 different species from at least 5 plant divisions.

Divisions to choose from:

1. **Magnoliophyta (AKA Angiosperms)** – These are flowering plants that include asters, cactus and grasses. For simplicity it is strongly suggested that you do NOT use cacti (as they are nearly impossible to press) and grasses (they are VERY hard to identify). Since flowering plants are so common you should find and use ONLY naturally growing plants native to Colorado. Commercial or ornamental plants such as roses will not be accepted.

2. **Bryophyta** – These include mosses. Mosses can be tricky to identify, so collect several in case you have trouble identifying a particular sample. A tip to help you is to photograph your specimen up close and then zoom in to see the details. Include the detailed photo with your collection photo prior to collecting. Additionally, I have found it easier to look up a specific moss and where it is found in a field guide and gather it from that information so it is “pre-identified”

3. **Coniferaphyta** – These include pine trees. We have many different species growing naturally in Colorado so these should be easy to find. Remember to include the cones as they aid greatly in identification.

4. **Ginkophyta** – The only species not extinct in this group is the Ginko tree. This tree is only native to Asia, but it is seen in Colorado Springs at several locations.

5. **Hepatophyta/Marchantiophyta** – These include liverworts.

6. **Anthocerotophyta** – These include hornworts.

7. **Lycophyta** – Club mosses and scale trees.

8. **Pterophyta** – These include ferns. These are very hard to find in Colorado so ornamental plants MAY be used. Be aware that some flowering plants are called “ferns” by their common name.

9. **Cycadophyta** – These include plants such as the sago palm. This group is not native to Colorado so ornamental plants MAY be used.

10. **Gnetophyta** – A common example of this plant is known as “Mormon Tea”. This plant CAN be found in Colorado Springs pretty easily. In fact we find them every year by Ice Lake on the Air Force Academy grounds!

The majority of your specimens should not be collected from plants growing in managed landscapes (such as landscaped yards)… we are mostly looking for wild Colorado plants.

(See below for additional instructions regarding collection sites.)

**Note:** If you travel during the summer we encourage you to gather samples from the places you visit (as long as it is allowed), so you can share how different (or similar) other places are to where we live!
In preparing your collection to turn in, follow these steps:

1) Attach your flattened & dried plant specimens to a blank, 8” x 11” paper using white glue, like Elmer’s. Use heavy paper.

2) Attach at least one color photograph of the plant you collected. Remember to include yourself in the photo!

3) Attach the label for the plant at the lower right-hand corner of page. Labels must be typed and follow the specified format.

4) Insert each page into a plastic page protector (a clear pocket for 3-ring binder). Some students have chosen to laminate their pages. This works well to ensure dryness of the sample and it keeps everything neat!

5) Put the pages in a 3-ring binder labeled on the spine with your name and block. The cover should be creative!

6) Remember to include a clear table of contents that not only lists the pages of each division, but each specimen as well under the division)

SPECIMEN COLLECTION AND PREPARATION
You will learn that plant identification relies in large part on examination of flowers and fruits (for angiosperms), and to a lesser extent on vegetative characters (the green parts). It is thus very important that, whenever possible, you collect specimens with reproductive parts—preferably both flowers and fruits (You can “collect” fruits by taking photos of them. Remember to include yourself!). Below ground structures are important characters for some plant families—particularly the grasses (which are NOT suggested for this project due to the difficulty in proper identification!)—and should be collected for herbaceous (non-woody) plants only by carefully digging around the base of the plant with a digging tool. Collections from woody plants should include parts of twigs (terminal branches) that contain leaves and reproductive parts, as well as spines or thorns that may be important in identification. When collecting conifers you should try to get a pinecone whenever possible.

Despite the importance of reproductive characters, always try to collect specimens with intact vegetative parts—leaves and stems.

Cautionary note: Unless your timing is perfect, you may not always find flowers and fruits together on one collecting trip; out of season, you may find neither. It sometimes may be possible to find old fruits on the ground around a plant, but you should be very careful in using any such material that is not still attached to its parent. Acorns may not fall far from the tree, but different species of oak may be growing right next to each other.

EXAMPLE LABEL:

<table>
<thead>
<tr>
<th>AAHS Plant Collection Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summer 2020</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Division:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scientific Name:</td>
</tr>
<tr>
<td>Common Name:</td>
</tr>
<tr>
<td>Collection Date:</td>
</tr>
<tr>
<td>Collection Location:</td>
</tr>
<tr>
<td>Description:</td>
</tr>
</tbody>
</table>
Honors Biology Plant Collection Project Rubric

Your Name: _________________________________

Total Number of Plants:_________ Total Number of Divisions:_________

Scoring:  

<table>
<thead>
<tr>
<th>Scoring</th>
<th>Student Score</th>
<th>Teacher Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 Species Represented in 5 different Divisions</td>
<td>___</td>
<td>___</td>
</tr>
<tr>
<td>Dryin and pressing:</td>
<td>___</td>
<td>___</td>
</tr>
<tr>
<td>Quality of specimens:</td>
<td>___</td>
<td>___</td>
</tr>
<tr>
<td>Quality of attachment and Neatness/Appearance</td>
<td>___</td>
<td>___</td>
</tr>
<tr>
<td>Accuracy in Identification:</td>
<td>___</td>
<td>___</td>
</tr>
<tr>
<td>Labels are Typed and Complete</td>
<td>___</td>
<td>___</td>
</tr>
<tr>
<td>Table of Contents (with page numbers see handout)</td>
<td>___</td>
<td>___</td>
</tr>
<tr>
<td>Aesthetics:</td>
<td>___</td>
<td>___</td>
</tr>
<tr>
<td>Total</td>
<td>___</td>
<td>___</td>
</tr>
</tbody>
</table>

This rubric must be filled out by the student and placed at the end of the project binder.