

**CYCAD/GINKGO FIELD AND INTERNET PROJECT**

Lab Section: ______________________  Name: ________________________________

This project leads you on two real and two virtual field trips to see and learn about cycads and *Ginkgo*. Staple these pages together, clearly write your lab section and name above, and complete the instructions below. The completed worksheet is due at the beginning of Lab 8. This assignment contributes to your overall lab grade. You can take the real field trips with a friend, but complete the internet assignments on your own.

**Part I**

Although we discuss only two cycad genera in lecture (*Cycas* and *Zamia*), nine additional genera are known, and they are: *Bowenia*, *Ceratozamia*, *Chigua*, *Dioon*, *Encephalartos*, *Lepidozamia*, *Macrozamia*, *Microcycas*, and *Stangeria*. Enter the greenhouses through Jordaan 139 (southeast corner of the first floor, beyond the stairs) and walk to the conservatory (Room P; the far southeast corner; the greenhouse with the highest roof), closing doors after yourself to maintain the different temperatures in each house. As you enter the conservatory, you will be facing east. In front of you and slightly to the right you will see a *Cycas revoluta* sporophyte planted in the ground. Look at this plant and indicate on Line 1 below whether a strobilis is present.

1) ____________________________________________

In the northeast corner of the conservatory (to the back left as you enter) is a cycad sporophyte this is taller than you and has strobili. Near the base of this plant is a white sign indicating its scientific name. Write the scientific name (genus and species) of this cycad on the Line 2 below.

2) ____________________________________________

Look around the conservatory for other labeled cycads. On Line 3 indicate what other cycad genera are in this living collection.

3) ____________________________________________

Take a few moments to appreciate the other plants in the conservatory, particularly the tree fern (*Sphaeropteris*) growing in the center area.

**Part II**

Go to the B300 website >Botany Links >The Cycad Pages. A wealth of information about cycads, including photos, is available at this site. Open The World List of Cycads toward the top of this web page (click on the blue words) and then open the page for the genus named on Line 2 above. Scroll down this page and see that there are many species in this genus (names in blue, with the genus name abbreviated). Read the explanation of the colored letters associated with these species names.
Click on the name of the species from **Line 2** above to open the web page for this species. Look at the green map of the region of the world in which this species naturally occurs. There is only one blue dot on this map, but the text in the line headed ‘**Distribution and habitat**’ provides more complete information about its geographic distribution. On **Line 4** indicate the native country of this species.

4) Country: ________________________________________________

On **Line 5** indicate the three states of that country in which this species is found (according to the information presented in ‘**Distribution and habitat**’).

5) States: ____________________ ____________________ ____________________

**Part III**

In Lab 7, you worked with demonstration materials from several cycad species, among them *Cycas revoluta* (which you just saw in the greenhouse) and *Cycas circinalis*. Of course there’s more to *C. circinalis* than the fragments we were able to present in lab. Return to The World List of Cycads webpage. In the list of genera click on the blue generic name *Cycas* to open its webpage. Scroll down this page to see, among other things, a list of the many species in this genus. Click on *C. circinalis* to open its webpage. Scroll down to the green map of the region of the world in which this species is native. The blue dots on this map indicate where natural populations of this species occur. Scroll down further to the paragraph headed ‘**Distribution and habitat**’. On **Line 6** indicate the native country of *C. circinalis*.

6) Country: ________________________________________________

On **Line 7** indicate the four states of that country in which *C. circinalis* is found (according to the information presented in ‘**Distribution and habitat**’).

7) States: ____________________ ____________________ ____________________ ____________________

On **Line 8** indicate the habitat of *C. circinalis*.

8) Habitat: ________________________________________________

**Part IV**

Return to the web page in which all of the species of the genus *Cycas* are listed. Species in this list for which a complete web page is available are indicated by a green dot. The page for one of the species with a green dot states that that species is ‘similar in pollen and seed cones to the true *C. circinalis*’ that we have been researching. That statement is made in a paragraph under the heading ‘**Distinguishing features**’ on the page for this similar-looking species. To find this ‘similar’ species you will have to open and examine the web pages of the species with green dots. The objective is for you to cruise these web pages to see the diversity of cycads, helping you to appreciate the variation present in this group, despite the limited number of examples.
presented in class. Read the web pages with green dots to find which of these species is said to be ‘similar ... to the true *C. circinalis*’ and write on Line 9 the scientific name (genus and species) of this species.

9) ______________________________________

The megasporophylls or microsporophylls (but not both) of this species (Line 9) are tightly grouped into a cone-like strobilus. Based on the photos and descriptions of the reproductive parts in the web page for this species (and what you should already know about *Cycas*), indicate on Line 10 whether the megasporophylls or the microsporophylls are tightly grouped into a cone-like strobilus.

10) ______________________________________

On Line 11 indicate what happens when you click on these images of the reproductive parts.

11) ______________________________________

Note the blue dot that indicates the geographic distribution of this species on its map. On Line 12 indicate the native country of this species.

12) Country: ______________________________________

On Line 13 indicate the province of that country in which this species is found.

13) Province: ______________________________________

(In the web page for this species, this geographic information is clearly stated in the line that gives the etymology [= the derivation or meaning] of the specific epithet).

On Line 14 indicate the habitat of this species.

14) Habitat: ______________________________________

_________________________________________

Part V

Before starting this part of the exercise, review your lecture notes regarding the shape of *Ginkgo* leaves and the difference between a bilobed leaf from a long shoot and the fan-shaped leaf from a short shoot. Then, walk to the northwest corner of Kirkwood Hall on campus. With your back to Kirkwood Hall, face the bell tower on top of the Student Building, standing so that the stone pavilion and the bell tower are in a straight line (if you are accurately positioned, the statue of Chancellor Wells seated on a bench will be off to your right). There is a very large tree in front of you (slightly to the left of the line to the bell tower). This is a ginkgo tree, a sporophyte of *Ginkgo biloba*. You examined some structures from *Ginkgo biloba* in Lab 7. Walk to this ginkgo tree. Because sporophytes of ginkgo are deciduous, the tree is leafless during winter, but
by looking up at the branches, you will easily distinguish the short shoots from the long shoots. Search the ground under the branches of this tree. Find and collect a fallen leaf that confirms that this is *Ginkgo*. On **Line 15** indicate whether this leaf came from a long shoot or from a short shoot and **staple your leaf securely ⇒ ⇒ ⇒ ⇒ ⇒ ⇒ ⇒ ⇒ ⇒ ⇒ ⇒ ⇒ HERE.**

**15) _____________________________________________**  

Because *Ginkgo* is dioecious, this sporophyte produces **either pollen or ovules** that become seeds. Look at the branches and search the ground under the branches of this tree to find **evidence** of whether this tree produces pollen or ovules. On **Line 16** indicate whether this tree produces pollen or ovules.

**16) _____________________________________________**  

On **Line 17** present the evidence for your answer for **Line 16.**

**17) _____________________________________________**

Between the statue of Chancellor Wells and Maxwell Hall’s southeast corner are two more *Ginkgo* trees of the same sex; you could also search beneath them for evidence.

**Part VI**

A very image- and information-rich website for *Ginkgo biloba* is linked to the B300 website >Botany Links. Although this *Ginkgo* site uses some terminology we do not use in B300, it contains great illustrations and a wealth of information. Cruise this website, delighting in the information provided. On **Line 18** indicate which year Engelbert Kaempfer first encountered *Ginkgo*.

**18) _____________________________________________**

Recall that *Ginkgo biloba* is dioecious. The site’s author discusses the chromosome conditions that determine whether a given tree will be pollen-producing (= ‘male’) or ovule-producing (= ‘female’). On **Line 19** indicate what well-known organism the author says shares this sex-determining chromosome constitution.

**19) _____________________________________________**

Find the site author’s instructions for stratifying and scarifying *Ginkgo* seeds and growing a *Ginkgo* tree from seed. According to the caption for the figures of *Ginkgo* seeds germinating via the sand and kitchen (paper) towel methods, what architect designed the house near where these seeds were collected? Indicate your answer on **Line 20.**

**20) _____________________________________________**