

Answer these questions on the Scantron answer sheet provided.  
USE #2 PENCIL ONLY.

NAME:

CHOOSE the BEST single answer for each.

1. Arrange the following taxonomic traditions in chronological sequence (order of their appearance):

- a. folk taxonomy ==> evolutionary taxonomy ==> Linnaeus's sexual system.
- b. Linnaeus's sexual system ==> folk taxonomy ==> evolutionary taxonomy.
- c. folk taxonomy ==> Linnaeus's sexual system ==> evolutionary taxonomy.

2. The earliest botanical encyclopedic works were produced by

- a. Numerical taxonomists.
- b. Evolutionary taxonomists.
- c. Herbalists.
- d. Carolus Linnaeus.

3. Dioscorides wrote *De Materia Medica*. This is generally attributed as...

- a. providing the first natural classification of plants.
- b. being the first herbal.
- c. being the longest used botanical encyclopedic work ever (being used and copied for over 1,000 years).
- d. both B and C.

4. The primary goal of the early herbals was

- a. to present all the then-known plant species in a logical sequence that followed natural relationships among the taxa.
- b. provide a means to identify herbaceous taxa to species.
- c. to facilitate the proper identification and use of medicinal or otherwise useful plants.

5. The concept that the key to humanity's use of various plants was indicated by the form of the plant.

- a. The Doctrine of Signatures.
- b. Tokogeny.
- c. Symplesiomorphy.

6. The Italian Caesalpino (1519-1603) is considered the first or one of the first taxonomists because

- a. His work (*De Plantis Libri*) provided a description and classification of ca. 1500 plant species based on morphological characters of functional or ecological significance.
- b. His work represented the first clear break from the medicinal perspective of herbals.
- c. both A and B.

7. Although most herbals of the 1500's are from Mediterranean Europe, an example of an American (Aztec) herbal from about this same time is
- De Materia Medica*.
  - Die Natürlichen Pflanzenfamilien*
  - The Badianus Manuscript.
8. Criticisms like “[such] loathsome harlotry as several males with one female would not be permitted in the vegetable kingdom by the Creator!” is likely to have been directed at
- Theophrastus and his classification based primarily on habit.
  - Carl von Linné (aka., Carolus Linnaeus).
  - Arthur Cronquist.
9. Phenetic Approaches to Classification burst onto the scene in the 1950-70's in part due to
- the influence of two biologists: Sokal & Sneath.
  - the theoretical and now computational foundation for crunching large amounts of data and having quantitative and/or statistical means of assessing species-species relationships.
  - all of the above.
10. The fused leaves of “boneset” (*Eupatorium perfoliatum*; that dead Asteraceae bush we saw at Longwood Gardens the other day) was once thought to heal broken bones. This is an example of..
- a joke Linnaeus used to tell his botany students at Uppsala University, Sweden.
  - the Doctrine of Signatures, subscribed by many herbalists during the Renaissance.
  - a synapomorphy.
11. Linnaeus's contribution to systematics..
- spans both botany and zoology.
  - is negligible.
  - in ongoing, as he is still actively producing floras.
12. Linnaeus lived during
- the 1500's
  - the 1700's
  - the 1900's
13. Linnaeus's system of classification was rejected outright by many prominent french botanists because
- however convenient, it was highly artificial.
  - they had personal disputes with Linnaeus.
  - the Frenchmen could not read latin.
14. French or French-Swiss such as de Jussieu and deCandolle were influential in
- develoing the first Herbals.
  - developing natural systems of classification.
15. Darwin's ideas expressed in his *On the Origin of Species by Means of Natural Selection* (1859) were influential in establishing the arena for
- “evolutionary” classifications by the likes of the Americans Bessey and Cronquist.
  - “evolutionary” classifications by the likes of Linnaeus.

16. In what way was Arthur Cronquist's 1981 *An integrated system of classification of flowering plants* "integrated"?

- a. Massive amounts of data from all sources including chemistry, cytology, & morphology.
- b. It was a hybrid system combining elements of the classifications produced by Linnaeus and Theophrastus the Greek.

17. Prior to the standardization of binomial nomenclature by Linnaeus in 1753, names of many species were

- a. polynomials.
- b. single word descriptors.
- c. in Chinese.

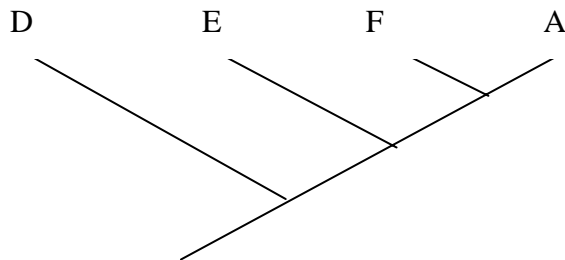
18. A binomial species name consists of

- a. A specific and subspecific epithet.
- b. A unique 5-letter word.
- c. a genus name followed by a specific epithet.

19. Phenetics defined:

- a. the use of shared derived characters to express relationships.
- b. the use of measures of similarity to express relationships.

20. What is the proper way to interpret the following dendrogram derived from a phenetic analysis?



- a. A and F are more closely related to each than either is to E.
- b. A and F share a more recent common ancestor than either do with E.
- c. A and F are more similar to one another than either is to E or D.

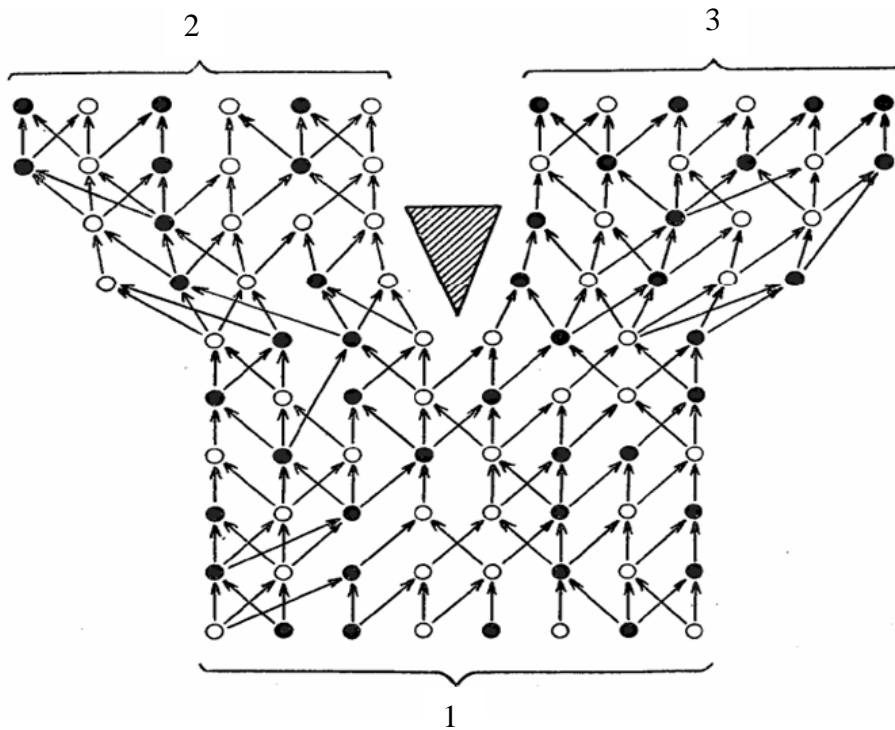
22. Who is often credited with developing the foundation for modern cladistic thinking and methods?

- a. Theophrastus.
- b. Sokal.
- c. Hennig.

23. Cladistics is the theory and practice of reconstructing (inferring)

- a. phylogeny
- b. tokogeny
- c. phenetic relationships.

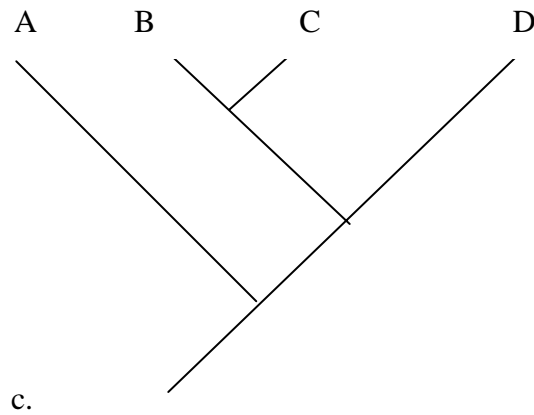
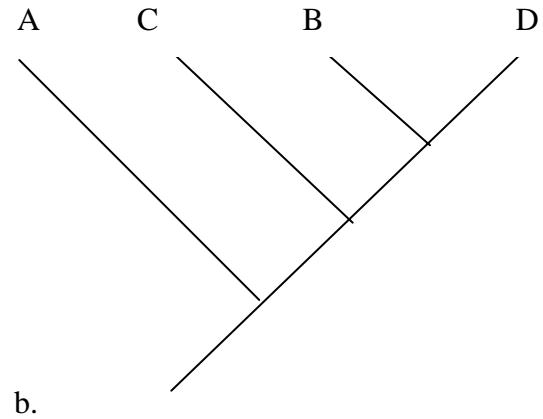
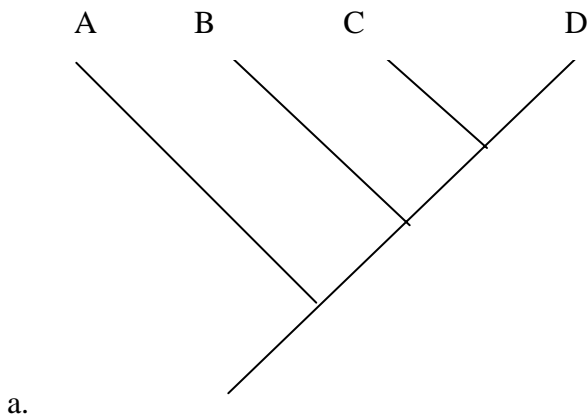
24. If the black and white circles below represent individuals, and the lines connecting them represent how they are related to one another, then relationships **WITHIN** lineages 2 and 3 are said to be
- phylogenetic
  - tokogenetic
  - reticulating
  - both B and C



25. Diagram above: Relationships **BETWEEN** 2 and 3 are said to be
- phylogenetic
  - tokogenetic
  - reticulating
  - both B and C
26. Diagram above: The triangle in the diagram above indicates the point of
- divergence between lineages 2 and 3.
  - speciation.
  - meteor impact.
  - both A and B.
27. Diagram above: Assume that “UP” on the vertical axis is towards the present, then lineage 1 is...
- derived from lineage 2.
  - derived from both lineage 2 and 3.
  - ancestral to lineages 2 and 3.
  - ancestral to lineage 2 only.

28. Which cladogram below is most parsimonious, based on the following character matrix?

	char. 1	char. 2	char. 3
Species A (outgroup)	0	0	1
Species B	1	1	0
Species C	1	0	1
Species D	1	1	1



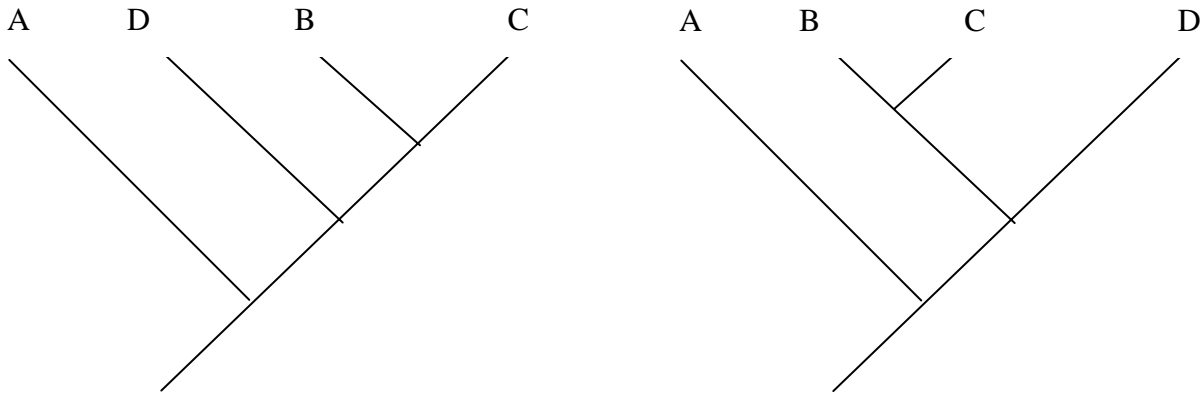
29. How many “steps” (inferred evolutionary changes in character state) does the most parsimonious cladogram have?

- a. 2 steps      b. 3 steps      c. 4 steps      d. 5 steps      e. 6 steps

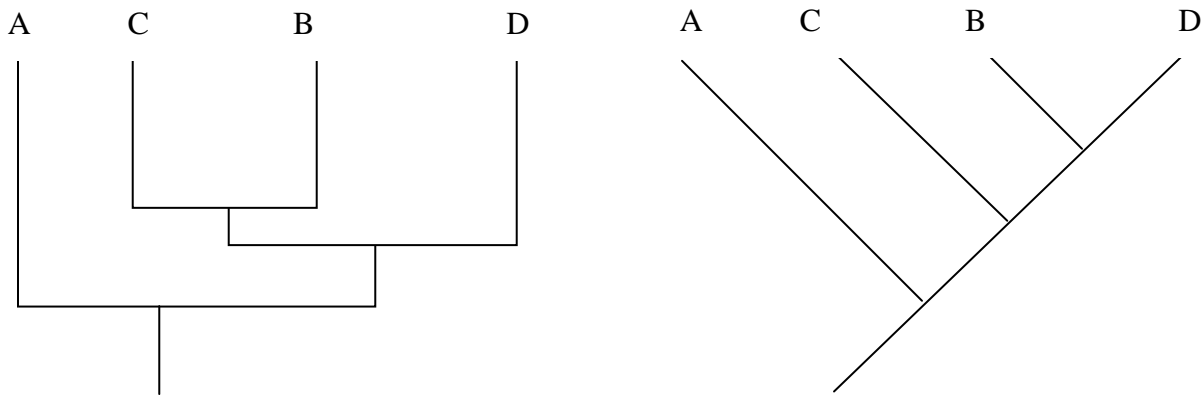
30. How many steps does the second most parsimonious (i.e., second best) cladogram above have?

- a. 2 steps                      b. 3 steps                      c. 4 steps                      d. 5 steps                      e. 6 steps

31. The two cladograms below express the same set of phylogenetic relationships.    a. True        b. False.

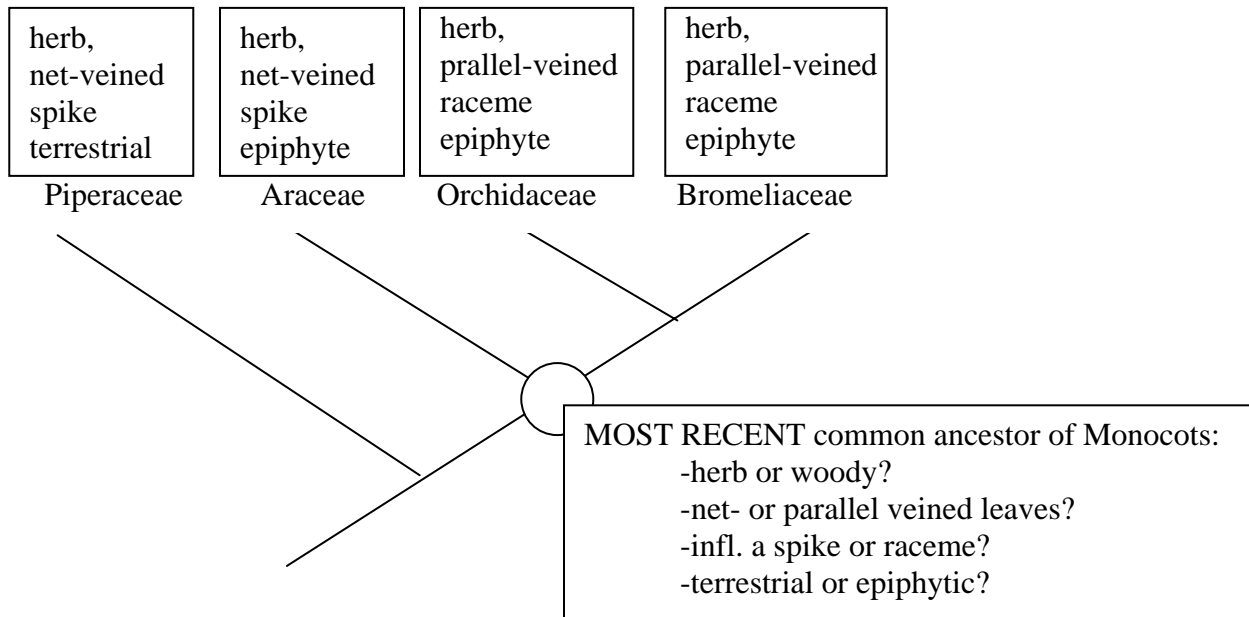


32. The two cladograms below express the same set of phylogenetic relationships.    a. True        b. False.



33. A clade is the same thing as a monophyletic group.    a. True        b. False

34. Based on the following cladogram and the principle of parsimony, infer the morphology of the MOST RECENT common ancestor of monocots.



- an epiphytic shrub with net-veined leaves and a raceme for an inflorescence.
- an epiphytic herb with net-veined leaves and spike inflorescences.
- a terrestrial herb with net-veined leaves and raceme inflorescences.

35. In addition to ancestor reconstruction, cladograms can be used for

- constructing classifications.
- Forensic investigations involving DNA/RNA evidence.
- all of the above.

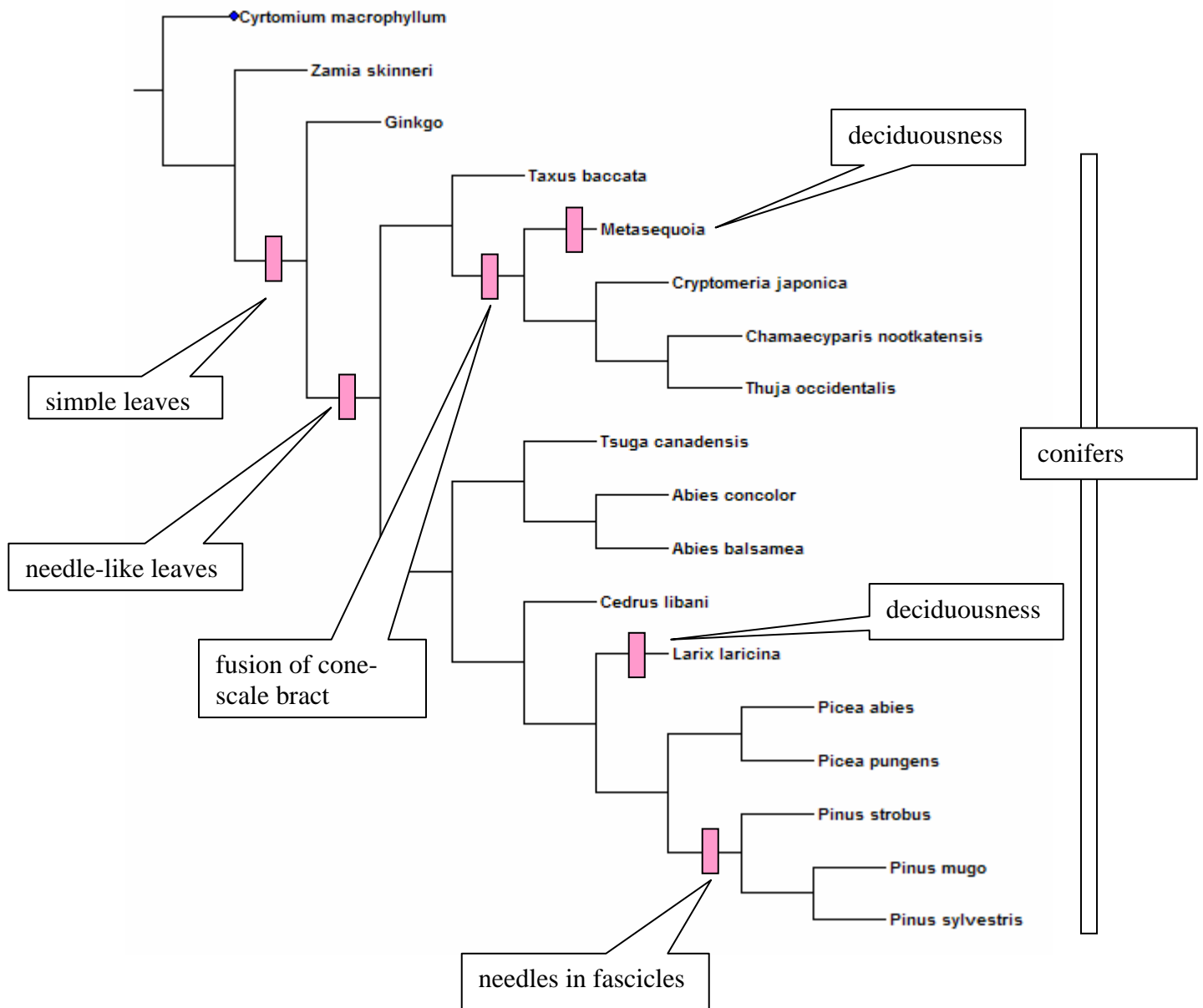
**Questions 36-40**

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- apomorphy
- plesiomorphy
- synapomorphy
- symplesiomorphy

- A derived character state.
- A shared derived character state.
- Hennig’s “special similarity”.
- Shared primitive character states.
- Supporting evidence for the monophyly of a clade.

Questions 41-45



41. The transition from compound leaves in the ferns (*Cyrtomium*) and cycads (*Zamia*) to simple leaves is
- a synapomorphy uniting *Ginkgo* with the Conifers.
  - a symplesiomorphy uniting *Ginkgo* with cycads.
42. The transition from expanded simple leaves (as seen in *Ginkgo*) to needle like leaves is
- an autapomorphy possessed only by *Taxus* (yew).
  - a symplesiomorphy uniting the conifers.
  - a synapomorphy uniting the conifers.

43. The fusion of the cone-scale to the subtending bract is a ...
- a synapomorphy uniting the members of Pinaceae (incl. *Tsuga* – *Pinus*).
  - a synapomorphy uniting the members of Cupressaceae (incl. *Metasequoia* - *Thuja*).
44. The occurrence of deciduousness in *Larix* (larch) and *Metasequoia* (dawn-redwood) is
- a synapomorphy uniting the two genera.
  - occurred independently (separately) in these two lineages (i.e., convergence)
45. The occurrence of needles borne singly (i.e., not in fascicles) is
- a synapomorphy uniting pines (species of *Pinus*)
  - a symplesiomorphy for the conifers.
46. The occurrence of needles borne in tight fascicles is
- an autapomorphy for *Pinus strobus* (white pine).
  - a synapomorphy uniting the three species of pine shown.
47. *Pinus mugo* and *Pinus sylvestris* are
- sister species (here)
  - not at all closely related
48. *Picea* (spruces) is most closely related to which genus?
- Abies* (firs)
  - Pinus* (pines)
  - Tsuga* (hemlock)
49. According to our sampling here
- Ginkgo is the close living relative to the conifers.
  - Ginkgo and Cycads (e.g., *Zamia*) are each other's closest living relatives.
50. The “dendrogram” above of the conifers is
- a cladogram.
  - a bicycle.
  - a fortune cookie.