INTRODUCTION
• point out L+R hemispheres - fissure
• relate size of brain + relative parts to lifestyle of animal.

BRAIN DISSECTION

PURPOSE

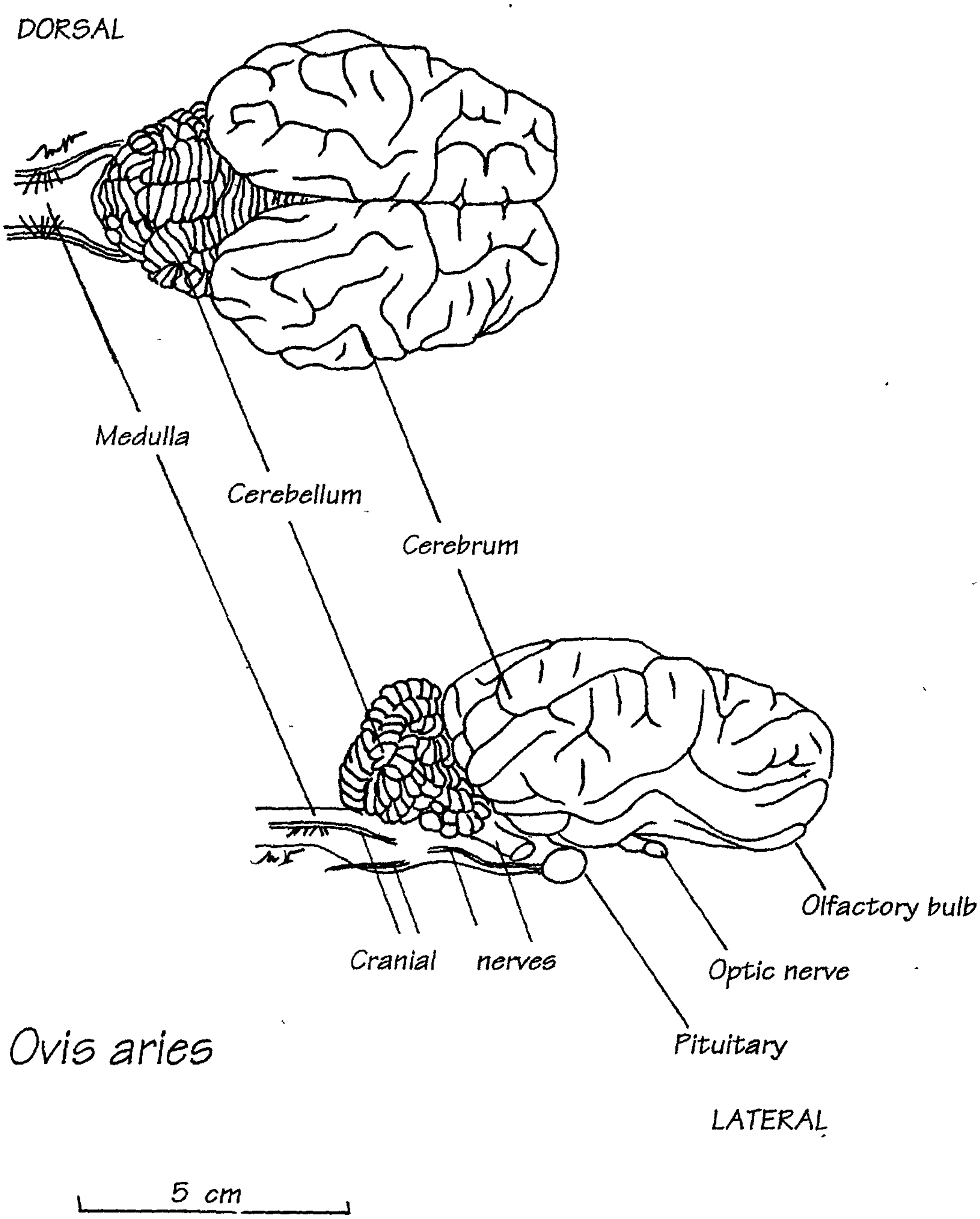
The brain, more than any other organ, is what determines the capabilities of an organism. It affects all aspects of the body from simple movements to complex imagining and emotions. By studying the form and structure of the brain, we hope to understand better the functions and the complexity of this organ. Through dissection, we will examine the 3-dimensional structure of the mammalian brain and consider the functions of some of its parts.

ADVANCE PREPARATION

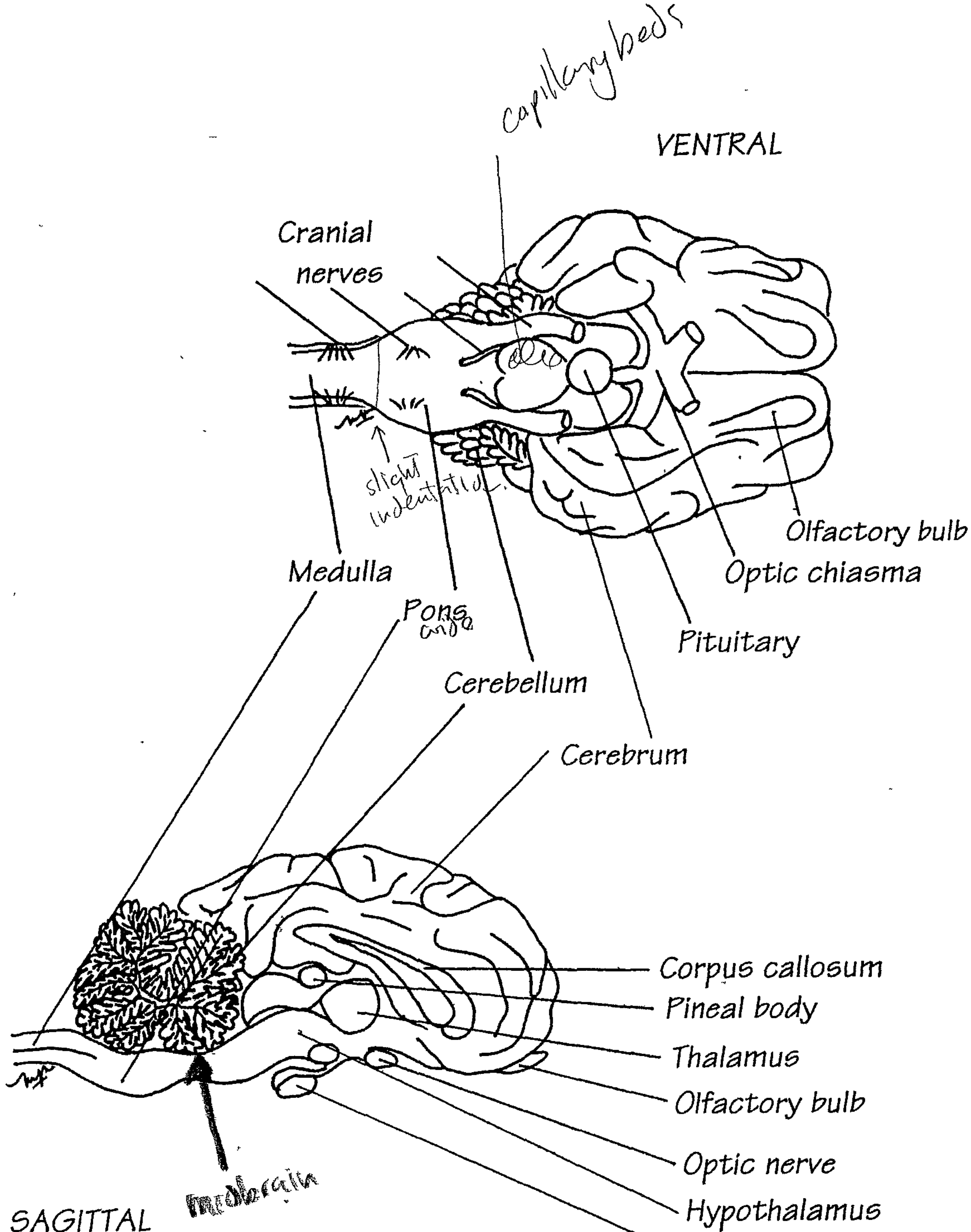
1. Review the functions of the parts of the brain.
2. Read Appendix C on Dissection.
3. Read Appendix B on Lab Safety.
4. Read Appendix E on How to Prepare for a Lab.

MATERIALS

- 1 sheep brain (preserved in formaldehyde and stored in a holding solution)
- 1 dissecting tray
- 1 scalpel
- 2 or more pairs of forceps
- 1 blunt probe per person
- a quantity of paper towelling
- model of the human brain
- 1 set of review cards


DORSAL
Medulla
Cerebellum
Cerebrum
Olfactory bulb
Cranial nerves
Optic nerve
Pituitary
LATERAL
5 cm

Ovis aries


VENTRAL
capillary beds
Cranial nerves
slight indentation
Medulla
Pons
Cerebellum
Cerebrum
Olfactory bulb
Optic chiasma
Pituitary
Corpus callosum
Pineal body
Thalamus
Olfactory bulb
Optic nerve
Hypothalamus
Pituitary
SAGITTAL
midbrain

METHOD

1. Work in groups as directed by your instructor. While you work on the sheep brain, refer to the models of the human brain for comparison purposes.

2. Examine the external features of the specimen. Use the diagrams to identify the various parts of the brain. Annotate (put notes on) the diagrams with the functions of the parts and with any other comments you feel would be useful to you.

3. Does your specimen have **MENINGES** still attached? If so, examine their texture and strength. How would they act as a protective covering for the brain? If your specimen has only the innermost **MENINX** present, check with a group whose specimen still has the other membranes present.

4. Does your specimen have bone attached to it? Notice how the skull serves to confine and protect the brain. If no bone is present, check with a group whose specimen does have bone present.

5. The dark lines on the specimen are blood vessels. Note the abundant **VASCULARIZATION** over the surface of the brain. Suggest reasons for this.

6. Some of the cranial nerves are obvious, such as the optic nerve and the olfactory nerve. Others appear as thin, thread-like strands. Look for these on the underside of the brain posterior to the optic chiasma and on the r and medulla. Don't try to identify them.

7. Place the brain dorsal (top) side up. With the scalpel, carefully cut the specimen into right and left halves along the longitudinal fissure (a little "canyon") of the cerebrum. At the posterior end, while cutting through the cerebellum, you will have to exercise greater care to maintain the mid-line because there is no fissure to guide you.

8. Examine the internal features of the specimen. Use the diagrams to identify the parts of the brain. As before, annotate the diagrams with the functions of the parts and with any other useful comments.

9. Examine the cut surfaces of your specimen. Some parts of the tissue will appear cream-coloured and other parts will be beige. Cream corresponds to

white matter and beige to grey matter. Remember that the white matter has this appearance because of myelin sheaths around the nerve cells. Determine the locations of the areas of white matter and the areas of grey matter, and make suitable notations on the diagrams. Why is the grey matter located where it is? What does this location indicate about the function of grey matter and white matter within the brain?

10. Take one of the brain halves and cut through it laterally from the dorsal side to the ventral side (from top to bottom). Examine the cut surfaces to determine the location of grey and white matter in the **CEREBRAL CORTEX**.

11. Obtain a set of review cards and use them to review what you have just learned.

The Eye

Notice the stubs of the six *external muscles* and the *optic nerve*. Clear away the muscles and adhering tissues (keeping the optic nerve intact) and identify:

(a) the *sclera*, the tough outer coat.
(b) the *cornea*, continuous with the sclera, transparent in life but cloudy after formalin preservation.
(c) the *iris*, the pigmented disc enclosing a central aperture, the *pupil*.
(d) the *lens*, visible through the pupil.

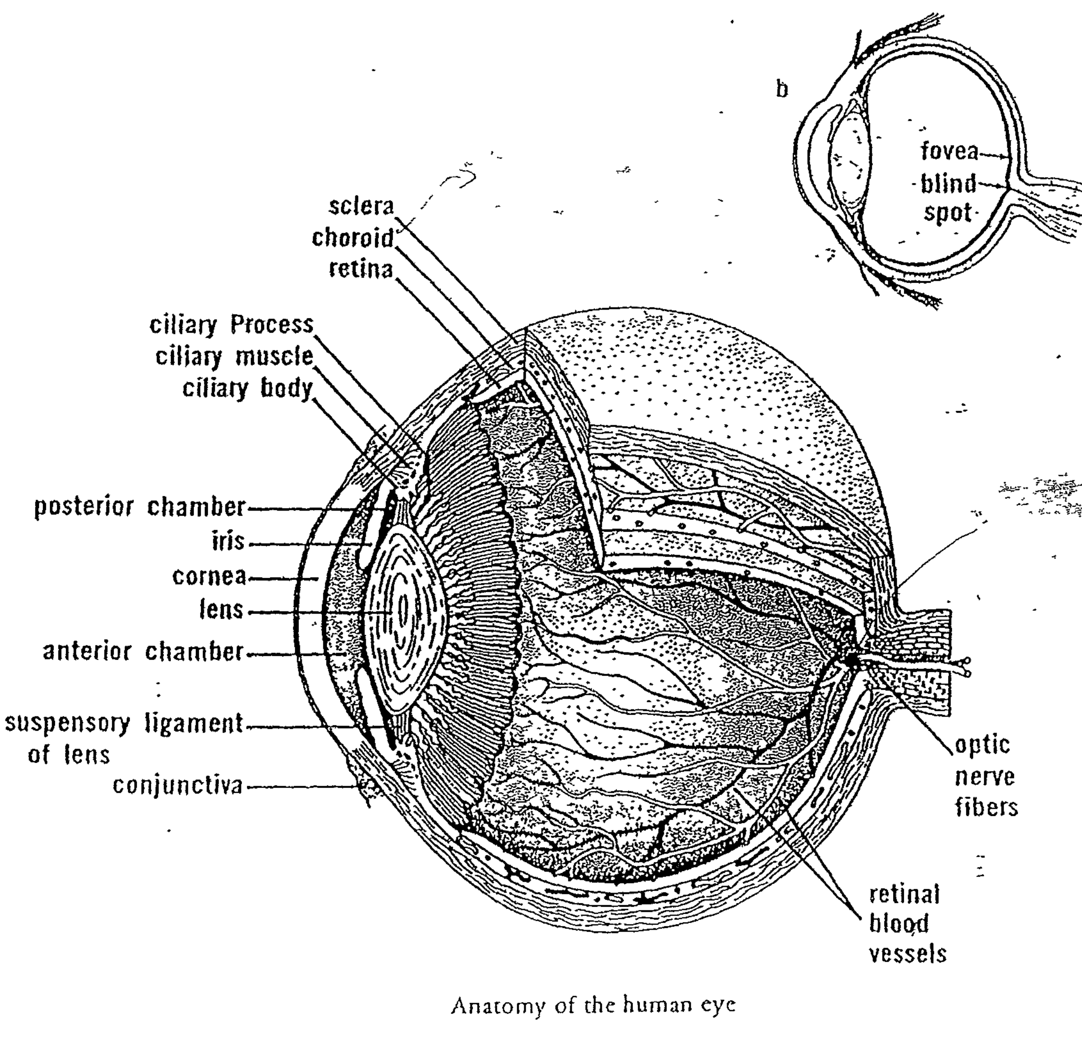
Float the eye in water in a finger bowl. Cut the eye into two equal halves in a plane parallel to the front surface. First examine the inside of the back half and note:

(a) the *vitreous humor*, the jellylike material filling the large *posterior chamber* of the eye.
(b) the *retina*, the greenish gray sensory tissue, which has collapsed within the cavity as a result of releasing the pressure normally maintained by the vitreous humor.
(c) the *blind spot*, the point where the retina is attached at the site of the exit of the optic nerve.

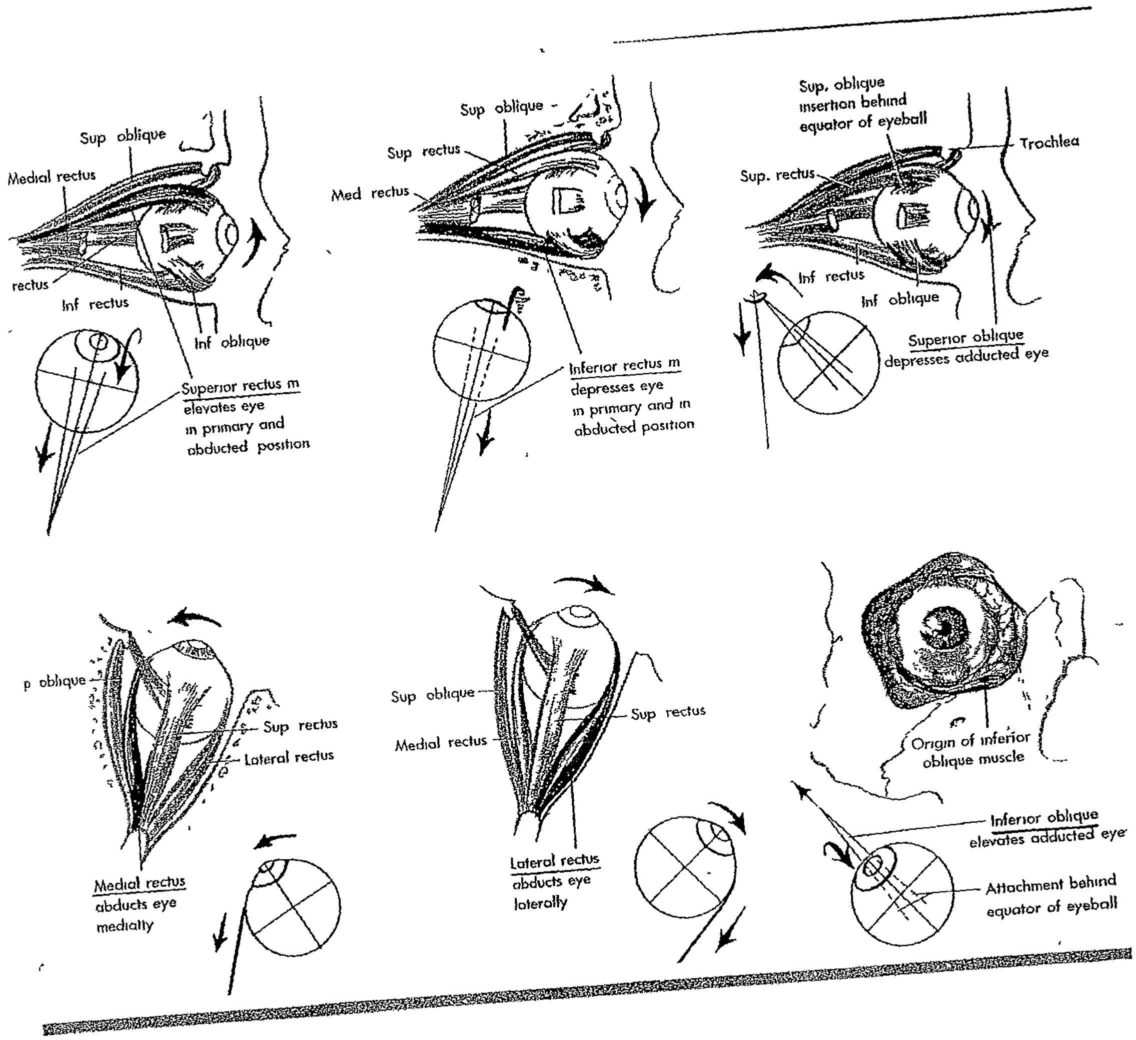
In the front half, identify:

(a) the *lens*, clear in life but clouded here by the preservative.
(b) the *ciliary body*, a thickened ring at the junction of the iris and choroid coat.
(c) the *anterior chamber* of the eye, containing in life a watery fluid, the *aqueous humor*.

Examine a model of the human eye and identify all the parts enumerated above. Make a drawing of a section through the eye as viewed when cut perpendicular to the front surface.



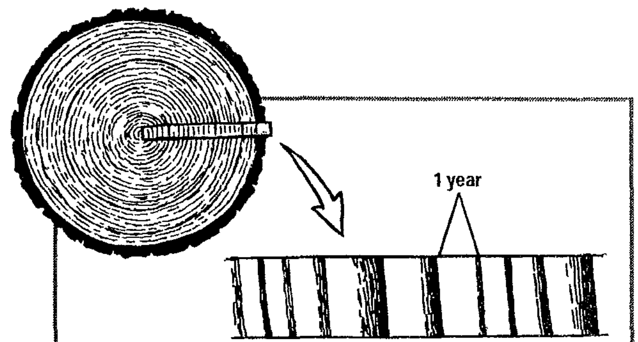
Anatomy of the human eye


Sup oblique
Medial rectus
rectus
Inf rectus
Inf oblique
Superior rectus m
elevates eye
in primary and
abducted position
Sup oblique
Sup rectus
Med rectus
Inferior rectus m
depresses eye
in primary and in
abducted position
Sup. oblique
insertion behind
equator of eyeball
Trochlea
Sup. rectus
Inf rectus
Inf oblique
Superior oblique
depresses adducted eye
p oblique
Sup rectus
Lateral rectus
Medial rectus
abducts eye
medially
Sup oblique
Medial rectus
Sup rectus
Lateral rectus
abducts eye
laterally
Origin of inferior
oblique muscle
Inferior oblique
elevates adducted eye
Attachment behind
equator of eyeball

Tree-Ring Science

NOVA Activity **Methuselah Tree**

Have you ever looked at a tree outside your house and wondered when it started growing? You can't tell how old it is just from looking at it, but you can tell from samples taken from within the tree In this activity, you will analyze tree ring samples—all from the same area—and determine the age of the oldest sample

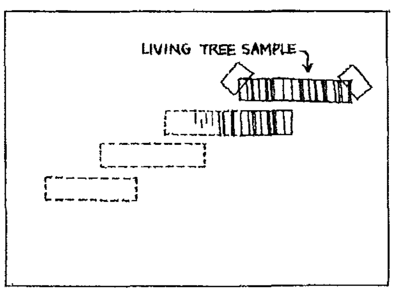


Tree Rings
Trees start out small, and each year, they grow by one ring By counting the rings from the middle of the trunk out to the end, a scientist can tell how old a tree is. One tree ring is added each year

Procedure

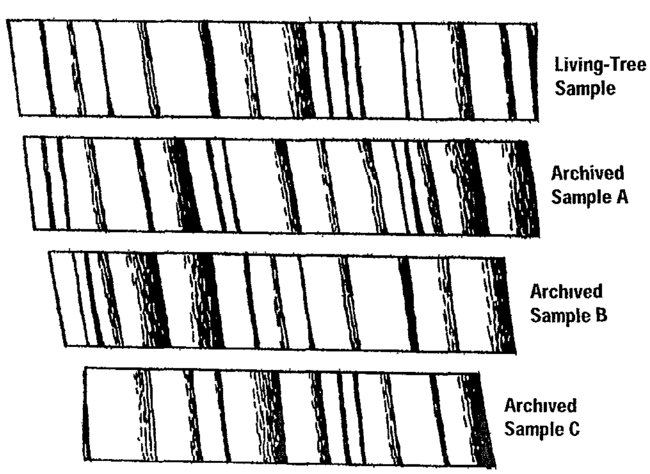
① On the copy of this activity sheet, cut out each of the four tree-ring samples

② Orient your blank sheet of paper horizontally Tape the live tree sample in the upper right-hand corner.



③ Now find the sample that matches part of the living tree sample Line that up correctly and tape that sample down Work from the top right-hand corner of the page to the bottom left-hand corner Continue this process until you have used all the samples.

④ Now count how many rings there are total, making sure to count the overlapped regions only once



Questions

Write your answers on a separate sheet of paper

① If the living tree is 15 years old, how old is the oldest tree in your sample set?

② Predict why some rings are bigger and others smaller

③ Your samples represent trees with normal growth years What are some factors that might contribute to abnormal growth?

④ You looked at four samples, but scientists who study tree rings use many samples from the same area Why might this be?