

Temperature, Rainfall, and Biome Distribution Activity

● In this lab you will investigate the relationship between the amount of rainfall and the variance of temperature and the effect on the distribution of biomes globally.

● You will find below six examples of climatograms, grids on which averages of precipitation and temperature at a particular location are plotted together. These climatograms show variations in only two important climatic factors during a year. Other factors may greatly affect climate, but a climatogram does give a rough idea of climate in the location from which the data were obtained.

Biomes are closely associated with climate. You can easily associate the climate of your own locality with the biome found there. Only by extensive travel, however, can the close relationship of particular climates with particular biomes be learned on a worldwide basis. This exercise is a poor substitute for such travel; but if it is carried out thoughtfully and with frequent reference to the description of biomes in the text, it can help you understand the biological relationships that make up the diversity of the biotic communities found on land.

Purpose:

This exercise provides practice in associating climate (as expressed in monthly averages of precipitation and temperature) with biomes. You will also make predictions about the distribution of a biome via altitude and latitude.

Procedure:

Follow the instructions below and answer any questions in your notebook. You will need the following: Blank climatogram sheets and precipitation and temperature data (see below).

UNKNOWN: _____

BIOME NAME _____

Graph the climate figures for precipitation and temperature for the four locales in Group 1 onto your blank climatogram sheets (ex. on left). Be sure that you label each with its biome name. Also be extremely careful as to how you record the information. All temperature readings are measured on the right side of the climatogram! All precipitation measurements are on the left side of the climatogram! Be sure to draw a line graph for temperature and a bar graph for precipitation.

Group 1

● Cuiaba, Brazil: Tropical Deciduous Forest

	J	F	M	A	M	J	J	A	S	O	N	D
P:	24.9	21.1	21.1	10.2	5.3	0.8	0.5	2.8	5.1	11.4	15	20.6
T:	27.2	27.2	27.2	26.6	25.6	23.9	24.4	25.6	27.8	27.8	27.8	27.2

● Santa Monica, California: Chaparral

	J	F	M	A	M	J	J	A	S	O	N	D
P:	8.9	7.6	7.4	1.3	1.3	0	0	0	0.3	1.5	3.5	5.8
T:	11.7	11.7	12.8	14.4	15.6	17.2	18.9	18.3	18.3	16.7	14.4	12.8

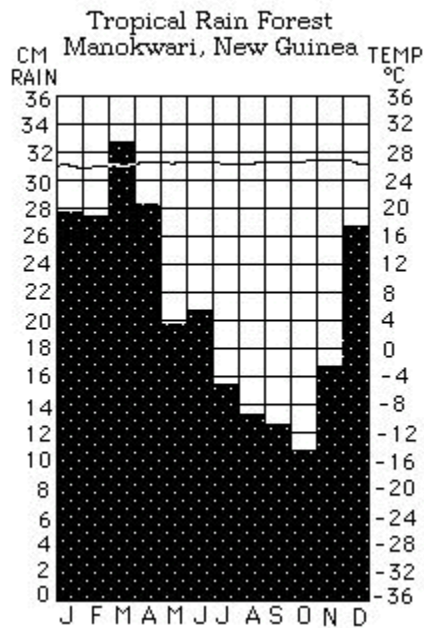
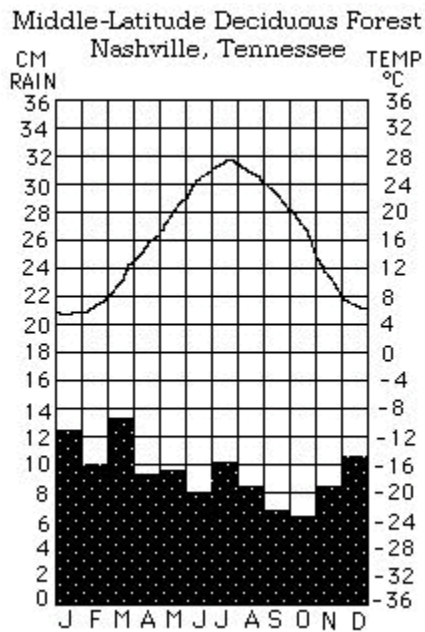
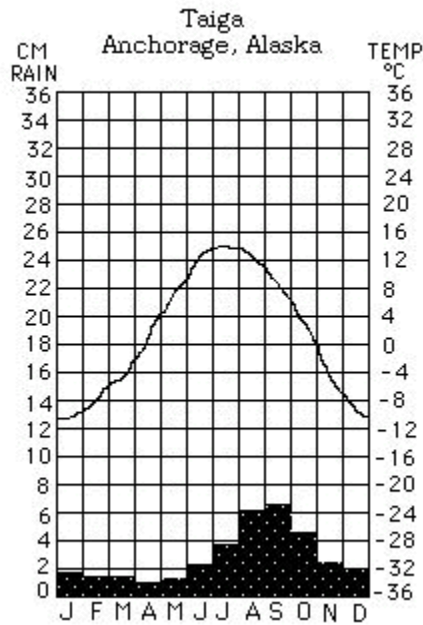
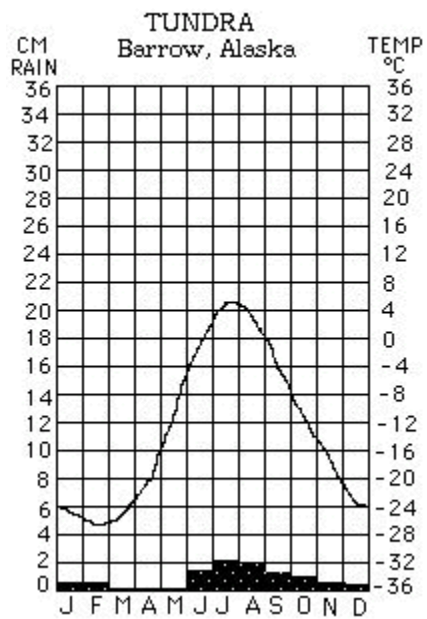
● Moshi, Tanganyika: Tropical Grassland

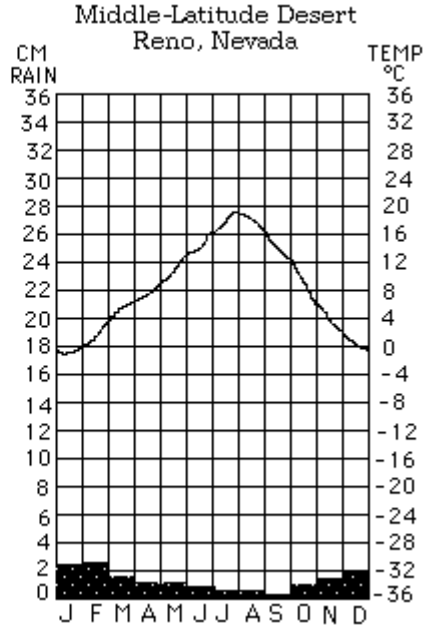
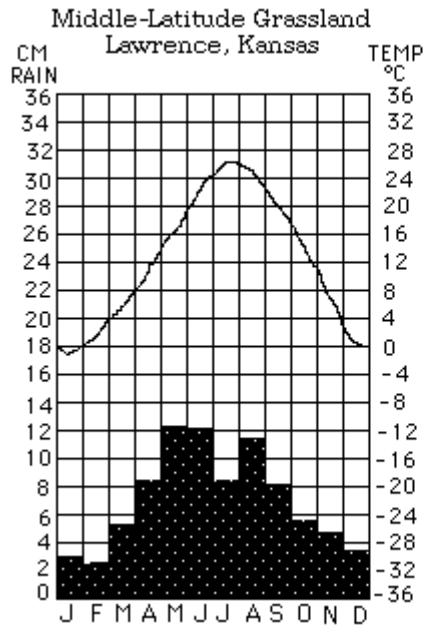
	J	F	M	A	M	J	J	A	S	O	N	D
P:	3.6	6.1	9.2	40.1	30.2	5.1	5.1	2.5	2	3	8.1	6.4
T:	23.3	23.2	22.2	21.1	19.8	18.4	17.9	18.4	19.8	21.4	22	22.4

● Aden, Aden: Tropical Desert

	J	F	M	A	M	J	J	A	S	O	N	D
P:	0.8	0.5	1.3	0.45	0.3	0.3	0	0.3	0.3	0.3	0.3	0.3
T:	24.6	25.1	26.4	28.5	30.6	31.9	31.1	30.3	31.1	28.8	26.5	25.1

● Combined with the six climatograms given as examples (see below), you now have ten climatograms representing ten different biomes found worldwide.





Now graph the information for San Francisco.

San Francisco

	J	F	M	A	M	J	J	A	S	O	N	D
P:	4.5	2.8	2.6	1.5	0.3	0.1	0	0.1	0.2	1.1	2.5	3.5
T:	13.0	15.0	16.0	17.0	17.0	19.0	18.0	18.0	21.0	20.0	17.0	14.0

Compare the climatogram for San Francisco with the ten knowns. What biome is San Francisco found in? If needed estimate for a best-fit guess.

Now graph the data for the Unknown biomes in Group 2 (letters a-l).

Group 2

UNKNOWN A

	J	F	M	A	M	J	J	A	S	O	N	D
P:	8.1	7.6	8.9	8.4	9.2	9.9	11.2	10.2	7.9	7.9	6.4	7.9
T:	1.1	1.7	6.1	12.2	17.8	22.2	25	23.3	20	13.9	7.8	2.2

UNKNOWN B

	J	F	M	A	M	J	J	A	S	O	N	D
P:	9.1	8.9	8.6	6.6	5.1	2	0.5	0.5	3.6	8.4	10.9	10.4
T:	10.6	11.1	12.2	14.4	15.6	19.4	21.1	21.7	20	16.7	13.9	11.1

UNKNOWN C

	J	F	M	A	M	J	J	A	S	O	N	D
P:	25.8	24.9	31	16.5	25.4	18.8	16.8	11.7	22.1	18.3	21.3	29.2
T:	25.6	25.6	24.4	25	24.4	23.3	23.3	24.4	24.4	25	25.6	25.6

UNKNOWN D

	J	F	M	A	M	J	J	A	S	O	N	D
P:	1	1.3	1	0.3	0	0	0.3	1.3	0.5	0.5	0.8	1
T:	12.8	15	18.3	21.1	25	29.4	32.8	32.2	28.9	22.2	16.1	13.3

UNKNOWN E

	J	F	M	A	M	J	J	A	S	O	N	D
P:	2.3	1.8	2.8	2.8	3.2	5.8	5.3	3	3.6	2.8	4.1	3.3
T:	-3.9	-2.2	1.7	8.9	15	20	22.8	21.7	16.7	11.1	5	-0.6

UNKNOWN F

	J	F	M	A	M	J	J	A	S	O	N	D
P:	0	0	1.5	0.5	8.9	14.7	12.2	8.1	2	1	0.3	0.8
T:	19.4	18.9	18.3	16.1	15	13.3	12.8	13.3	14.4	15	16.7	17.8

UNKNOWN G

	J	F	M	A	M	J	J	A	S	O	N	D
P:	1	1.3	1.8	1.5	1.5	1.3	2.3	2.8	2.8	2.8	2.8	1.3
T:	-22.2	-22.8	-21.1	-14.4	-0.39	1.7	5	5	1.1	-3.9	-10	-17.2

UNKNOWN H

	J	F	M	A	M	J	J	A	S	O	N	D
P:	3.6	4.1	4.6	6.9	8.1	6.9	6.4	6.6	8.9	5.1	5.6	4.6
T:	11.7	12.8	17.2	20.6	23.9	27.2	28.3	28.3	26.1	21.1	16.1	12.2

● UNKNOWN I

	J	F	M	A	M	J	J	A	S	O	N	D
P:	5.1	5.6	6.6	5.6	2.8	0.9	2.5	4.1	5.8	5.8	5.1	5.3
T:	23.3	22.2	19.4	15.6	11.7	8.3	8.3	9.4	12.2	15.1	18.9	21.7

● UNKNOWN J

	J	F	M	A	M	J	J	A	S	O	N	D
P:	0.3	0.5	1.5	3.6	8.6	9.2	9.4	11.4	10.9	5.3	0.8	0.3
T:	17.2	18.9	21.1	22.8	23.3	22.2	21.1	21.1	20.6	19.4	18.9	17.2

● UNKNOWN K

	J	F	M	A	M	J	J	A	S	O	N	D
P:	3.3	2.3	2.8	2.5	4.6	5.6	6.1	8.4	7.4	4.6	2.8	2.8
T:	-20	-18.9	-12.2	-2.2	5.6	12.2	16.1	15	10.6	3.9	-5.6	-15

● UNKNOWN L

	J	F	M	A	M	J	J	A	S	O	N	D
P:	1.5	1.3	1.3	1	1.5	0.8	0.3	0.5	0.8	1	0.8	1.5
T:	-0.6	2.2	5	10	13.3	18.3	23.3	22.2	16.1	10.6	4.4	0

Once graphed, try to distinguish what biome each is. Be sure to include in the heading of each climatogram the unknown letter and your choice of biome.

Answer the following questions: Examination of the San Francisco Biome:

1. Which of the known biome climatograms closely resembles San Francisco?

- a. In what ways were they similar?
- b. In what ways were they different?
- c. Would you consider them to truly be the same biome? Explain?

d. During the thirty year period used for the figures in the San Francisco climatogram there were four drought periods. How would this effect the appearance of the climatogram?

Examination of the known biomes:

2. How are the Tundra and Desert similar? different?

3. How are the Tropical Rain and Tropical Deciduous Forests similar? different?

4. Lawrence, Kansas and Nashville, Tennessee occupy similar latitudes. Why is one found in a grassland and the other in a forest biome?

5. Considering that the information in your climatograms is presented on a monthly basis, How would you determine which biomes are located in the southern hemisphere?

6. Which biome has the:

- a. most rainfall-**
- b. least rainfall-**
- c. the highest ave. temperature-**
- d. the lowest ave. temperature-**
- e. most consistant year round temperature-**
- f. most variable year round temperature-**

Notes for your Lab Report:

You will be writing a formal report reflecting our study of how climatic factors effect biome distribution by examining the biome represented by the six sets of data (A-F) below. By hand or by using a computer, create climatograms for locations A-F and then predict what the biome type is. All six represent the same biome: A-C occupy similar latitudes, but differing altitudes; D-F occupy differing latitudes. Attempt to predict where in altitude and/or latitude (relatively speaking) each lie. Use the concepts you've learned thus far about biomes to aid your predictions: where does more rainfall occur, northerly or southernly on the globe? Where are warmer temperatures found, northerly or southernly; high altitude or low?. Ideas for each aspect of a report are suggested below.

Purpose: To examine six unknown regions illustrating that distinct patterns of climate exist globally and that they can be used to predict the occurrence of biomes and slight variations in biomes.

- mention the prediction of biomes for this exercise
- make mention of why rainfall and temperature are used to study biome distribution.
- give examples of climate patterns: temperate/tropical, etc.

● **Hypothesis:** After examining the six climatograms, predict what they are and their general location.

- give specific explanations for your predictions

● **Procedure:**

- describe how climatograms are formed
- what is a climatogram and why they are useful?
- describe what characteristics of the graphs you will examine for altitudinal and latitudinal analysis and why

● **Analysis:**

- what patterns do you see: temperature-wise and precipitation-wise
- what patterns seem to exist to describe these biomes climatically
- support claims by comparing climatograms (knowns and unknowns) and their similarities
- what factors did you observe that leads you to predictions about altitude and latitude

● **Conclusion:**

- summarize the relationship that exists between climate and vegetation patterns
- re-emphasize the unknowns

Altitudinal Variation

A

	J	F	M	A	M	J	J	A	S	O	N	D
T:	-6.7	-5	1.7	9.4	15.6	21.1	23.9	22.2	17.8	11.1	2.8	-3.9
P:	3.8	3.6	5.6	6.6	9.9	11.4	9.4	8.6	10.2	6.4	4.8	3.8

B

	J	F	M	A	M	J	J	A	S	O	N	D
T:	-4.6	-1.9	2.6	9.9	15.8	21.8	25.7	24.4	18.9	12.2	3.3	-2.2
P:	1.3	1.6	2.8	6.1	9.9	10.3	6.5	5.2	6.1	3	2.1	1.5

C

	J	F	M	A	M	J	J	A	S	O	N	D
T:	-6.1	-5.6	-1.7	3.3	7.8	12.8	16.7	16.7	11.1	5	-1.1	-5.6
P:	1.3	0.8	2	2.5	3.8	3.1	4.3	3	2.5	2.3	1.3	1.3

Latitudinal Variation

D

	J	F	M	A	M	J	J	A	S	O	N	D
T:	12.2	13.3	17.2	21.1	24.4	27.8	28.9	28.3	26.7	22.8	17.2	13.9
P:	8.6	7.6	7.4	7.9	8.6	10.7	10.2	11.9	14.5	10.9	9.9	9.4

E

	J	F	M	A	M	J	J	A	S	O	N	D
T:	-5.6	-3.9	2.8	10.6	17.2	22.2	25	23.9	18.9	12.8	3.9	-2.8
P:	1.8	2.3	3.3	7.1	10.4	11.9	10.2	8.1	7.6	5.8	2.8	2.3

F

	J	F	M	A	M	J	J	A	S	O	N	D
T:	-20	-17.8	-9.4	3.3	11.1	16.7	18.9	17.8	12.2	5	-6.1	-14.4
P:	2.3	1.8	3.3	3.6	5.1	7.9	7.9	5.6	5.6	3.6	2.8	2.3
