SA #7	Characterizing Biotic Communities

LOOKING BACK: Our study of von Humboldt=s launching of geographic ecology and the subsequent concepts of Aisland biogeography@ (SA #6) gave us insights as to how organisms are distributed and what factors influence species richness across the landscape. Now, we will Ascale down@ from landscape to community ecology.

FORWARD: Recall your last experience in a relatively undisturbed setting, perhaps in a forest or alpine meadow or an underwater coral reef. Now consider what may have been an awesome number of species of plants and animals living there. Each of these represent a *biotic community*. In this assignment you will learn how to characterize biotic communities **B** that is, what Ameasuring sticks@ can be applied to compare them, describe their structure, judge their Ahealth@, and quantify their biodiversity.

READING: Textbook: Molles Chapter 16, p 397-405 (end at AThe Niches of Algae and Terrestrial Plants@)
Laboratory Ex. #2: APrairie Community Structure and Diversity@ **B** Read and bring to lecture

PROCEDURE: Is your Astudy plan@ beginning to mesh and bear fruit in good learning? Hopefully the suggestions within this guide are helpful. In Chapter 16, we will focus on the first three concept statements, page 399. Read them several times and then again with the ASummary Concepts@ on page 415. Finally, after skimming the assigned pages, read carefully and write answers to the STUDY QUESTIONS below. This assignment is intended as a resource for our field lab experiments this week. See how they relate?

STUDY QUESTIONS:

1. Define the following terms:

biotic community	relative abundance of species	species richness
community structure	percent cover (see also p. 250)	species evenness
guild	lognormal distribution	species diversity
life (growth)-form	rank-abundance curve	*H*=

2. What key question about biotic communities grew out of G. Evelyn Hutchinson=s paper?

3. What pattern among most communities is evident with respect to relative abundance of species? How can this pattern be illustrated graphically?

4. How is abundance of plant populations, sponges, corals, and algae often expressed instead of Anumber of individuals?@ Why is this done? Does the relationship in #3 still hold when this alternate expression of abundance is used?

5. How would you distinguish which of two biotic communities had the greatest *evenness* when relative abundance data for each community are presented on a spreadsheet? When it is presented as a rank-abundance curve? When the H' values are reported for the two communities?

6. How would you measure environmental heterogeneity of a prairie community or forest? What relationship did the MacArthur=s observe between heterogeneity and species diversity? What explanation for the relationship can you suggest from your reading? NOTE: Heterogeneity does not account for all diversity. See pages 405-415 (optional).

LECTURE and STUDY OUTLINE:

A. Community and population **B** definitions

B. Community Structure **B** two connotations:

1. Spatial characteristics must be considered

a. Area and Surrounding Landscape **B** community as an island or *patch* in a larger *matrix*
See following figures and related text: Ch 21**B**Fig. 21.4; Ch 22**B**Fig 22.4; Ch 1**B**Fig 1.10

b. *Distribution* of populations **B** three patterns (Figure 9.10, page 234)

c. *Zonation* **B** horizontal distribution **B** e.g. Chapter 3, page 64-66.

d. *Stratification* **B** vertical layering (strata) Ch 1 Fig 1-7; (or foliage ht. diversity, p. 404)

2. Numerical characteristics as highlighted by G. Evelyn Hutchinson=s question

a. *Species Richness* **B** usually considered according to guilds (animal) or life forms (plant)
? Community ecologists tend to focus on guilds/forms to keep experiments manageable and provide a more meaningful focus.

b. *Lognormal distributions* [number of species f(log of number of individuals or coverage) graphically show the principle that only a few species are rare or very abundant; whereas, most have moderate numbers or coverage (Fig 16.3 and 16.4)

c. *Species diversity* **B** composite of richness (density or % cover) and evenness (Fig. 16.5)

C. Plant or algal (*i.e.* AAutotrophic@) forms largely determine community structure and complexity

1. Provide the Aarchitecture@ or Ascaffolding@ of the community

2. Provide energy income for all populations through photosynthesis or chemosynthesis

3. Plants offer greater ease of study for our purposes (lab this week) **B** provided we can

a. Identify each species or population **B** hence the challenge to prepare for lab

b. Accurately sample the community to determine relative abundance (cover).
We will use random sampling with transects, quadrats, then analyze our data.