Stress and Resilience ~ People and Places Fall 2006

How to read *The Story of Life* by Richard Southwood

This book is an overview of the evolutionary history of life on Earth, and is full of many details and lots of obscure, hard-to-pronounce vocabulary. Learning this vocabulary is not your purpose in reading this book.

So, what is your goal in reading this? In general, the evolution of life on Earth, and its responses to stresses and catastrophes, is yet another context in which to consider our general questions that serve as focal concepts for our program (see below). These questions can be applied to the evolution of life in specific ways.

We are looking for general principles on how life responds to stress, and how resilience might be manifested at an evolutionary level. *The Story of Life* has twelve chapters. Read at least three or four chapters that cover different evolutionary phenomena, biological groups, or geological periods. As you read, keep your mind alert for *examples* that address some of the specific questions:

- Why do some evolutionary lines (e.g. species, genera, families...) persist for a long time in the evolutionary record without diversifying very much and without going extinct?
- Why do some evolutionary lines disappear quickly from the geological record?
- Why do some groups of organisms become highly diversified (for example, there are thousands of species of orchids, and perhaps millions of species of beetles)?
- Are the evolutionary responses to major extinction events different depending on what kind of catastrophe or environmental change causes the extinction event?
- How does the biology (body type, warm or cold-blooded, plant or animal, type of locomotion, reproduction - eggs, live birth, - etc.) or ecology (food type, habitat preferences or requirements, etc.) affect the persistence or diversification of an evolutionary line?
- Are there repeatable patterns or trends in evolution or in response to catastrophe?
- You probably will have some questions of your own.

Our general questions

- What attributes or abilities endow an entity or system with resilience?
- Does the ability to tolerate stress limit the ability to take advantage of favorable (non-stressful) circumstances?
- We can discuss concepts of stress and resilience at levels ranging from cells to societies, from seconds to centuries. Are there general principles that apply across these various scales of space, time, and levels of organization?
- We generally think of stress as a bad thing. Is it desirable to be free of stress? Always? Is it possible?
- If "resilience" implies return to some initial state, how do we define that state, in terms of both static (structure, composition) and dynamic (processes) attributes? Is return to initial conditions always the preferred response to stress?
- How does long-term, chronic stress differ from short-term stress? Is short-term stress the same thing as disturbance, perturbation, or disaster?
- How do entities or systems respond differently to short- vs long-term stress? If an entity or system has acclimated or adapted to long-term stress, can it still be considered to be under stress? Is stress tolerance the same thing as resilience?