LIFE HISTORIES

Plant Life Histories

J. P. **Grime** (1977, 1979) proposed that variation in environmental conditions has led to the development of distinctive strategies or life histories among plants. The two variables exerting selective pressure on plants; **the intensity of disturbance** and **the intensity of stress**.

Grime contrasted four extreme environmental types, which he characterized by combinations of disturbance intensity and stress intensity.

These four environmental extremes envisioned by Grime;

(1) low disturbance–low stress,

(2) low disturbance–high stress,

(3) high disturbance–low stress, and

(4) high disturbance–high stress.

Ruderals

Stress-tolerant

Competitive

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Towards a definition of ecological disturbance

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TABLE 1. Summary of concepts and working definitions of perturbation, stress, and disturbance

A. Perturbation	An effect; the response of an ecological component or system to disturbance or other ecological process as indicated by deviations in the values describing the properties of the component or system; relative to a specified reference condition; characterized by direction, magnitude, and persistence. (See also, Lewontin 1969; Odum *et al.* 1979.)
1. Transient	Temporary deviation which becomes zero over time with return to approximate original steady state.
2. Permanent	Deviation which becomes fixed in magnitude over time leading to steady state different from the original.
B. Stress	An effect; a physiological or functional effect; the physiological response of an individual, or the functional response of a system caused by disturbance or other ecological process; relative to a specified reference condition; characterized by direction, magnitude, and persistence; a type of perturbation. (See also, Barrett & Rosenberg 1981; Grime 1979.)
1. Survival trauma	Stress-induced loss of biomass which results in preservation of perennating tissue; e.g. drought-deciduous shrubs.
2. Lethal trauma	Stress-induced individual death; e.g. over-grazing.
C. Disturbance	A cause; a physical force, agent, or process, either abiotic or biotic, causing a perturbation (which includes stress) in an ecological component or system; relative to a specified reference state and system; defined by specific characteristics. (See also, Vitousek & White 1981; Bazzaz 1983.)
(a) destruction	Existing biomass is reduced in quantity. (See also, Grime 1979.)
(b) discomposition	Particular populations are selectively eliminated, reduced, added, or expanded.
(c) interference	Matter/energy/information exchange processes are inhibited.
(d) suppression	Prevention of natural disturbance.

SPECIES INTERACTIONS and COMPETITION

Ecology is the study of the relationships

between organisms and their environment.

When two organisms interact, there are three possible impacts on each:

positive,

negative,

or

neutral.

Some associations between species are extremely intimate.

Symbioses are interactions in which most or all of the life cycle of one organism occurs inside or on another; an example of this is an association in which a mycorrhizal fungus takes energy from a host plant while also increasing the host's water or nutrient uptake (+/+); mycorrhizal fungi are typically considered to be **mutualists**.

Commensalism

Amensalism

Competition

Asymmetric competition

Allelopathy

Competitive Interactions

Ecological competition is the interaction (struggle) between organisms for the same resources within an environment.

Intraspecific competition: within species

Interspecific competition: between species

https://www.nature.com/scitable/knowledge/library/species-interactions-and-competition-102131429/

Interference competition: direct interactions between individuals

Competition involving the use of such limited resources is called **resource** or **exploitative competition.**

*Over time the population is composed of fewer and fewer large individuals.

*Plant population density declines, biomass increases

Competitive Exclusion and Niches

The competitive exclusion principle proposes that two species with identical niches cannot coexist indefinitely, which leads to the prediction that coexisting species will have different niches.

As a consequence, the more effective competitor will have higher fitness (higher reproductive success) and will eventually exclude all individuals of the second species.

Competition and Niches

realized niches

fundamental niche.

Lotka-Volterra Model for interspecific competition

*interspecific competition is less intense than intraspecific competition

Character Displacement

You know the example of Darwin's finch species

Character displacement

Allopatric

Sympatric

EXPLOITATIVE INTERACTIONS

Herbivores

Predators

Parasites

Pathogens

These diverse interactions have one thing in common: exploitation, that is, one organism makes its living at the expense of another.

Exploitative interactions weave populations into a web of relationships that defy easy generalization.

A number of parasites alter the behavior of their hosts in ways that benefit transmission and reproduction of the parasite.

VİDEO

MUTUALISM

Mutualism

Interactions between individuals of different species that benefit both partners.

- **commensalism**.
- **facultative mutualism**.
- **an obligate mutualism**.

Mutualism may be common, but is it important?

Does it contribute substantially to the ecological integrity of the biosphere?

Mycorrhizae

(1) arbuscular mycorrhizae

(2) ectomycorrhizae

(3) Arbutoid mycorrhizae

(4) Ericoid mycorrhizae

(5) Monotropoid mycorrhizae

(6) Orchid mycorrhizae

(7) Ectendomycorrhiza

A Rare Example of Mutualism Between Humans and Free-living Wild Animal

Ravindra Krishnamurthy • January 4, 2017

A new study confirms the existence of mutual partnership between humans and a free living bird species. When the honey-hunters of the Yao tribe call for the greater honeyguides, the bird recognizes, understands and responds to the hunters call and leads them to honey in the forest.