

Angiosperm Specialization

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in plants, the energy source is sunlight



Angiosperm Specialization

autotroph = an organism that synthesizes its own organic compounds, using only CO₂, H₂O and minerals

in plants, the energy source is sunlight

heterotroph = an organism that obtains its carbon from organic molecules, not from CO₂



Angiosperm Specialization

symbiosis = an intimate association between two dissimilar organisms that either:

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or

B. benefits one, does not effect the other
= commensalism



Angiosperm Specialization

symbiosis = an intimate association between two dissimilar organisms that either:

1. benefits both of them = mutualism

or

2. benefits one, does not effect the other
= commensalism

or

3. harms one of them = parasitism



Angiosperm Specialization

I. Carnivory

A. Definitions

1. Autotrophic plants that obtain essential nutrients from animals (not soil)

primarily insects

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I. Carnivory

A. Definitions

1. Autotrophic plants that obtain essential nutrients from animals (not soil)

primarily insects

2. Carnivory requires absorptive cells with thin or no cuticle

Angiosperm Specialization

I. Carnivory

B. Taxonomic distribution

1. very limited

2. 8 families, 16 genera



Angiosperm Specialization

I. Carnivory

C. Hypothesized origins

- 1. Incidental capture in non-insectivorous plants w/ pre-existing structures

e.g. Bromeliaceae



Angiosperm Specialization

I. Carnivory

C. Hypothesized origins

- 2. Plants growing in:
 - a. low nutrient sites
 - bogs (acidic)
 - serpentine rock
 - epiphytes
 - b. high light, water



Darlingtonia californica
Sarraceniaceae

Angiosperm Specialization

I. Carnivory

C. Hypothesized origins

- 2. Plants growing in:
 - a. low nutrient sites
 - bogs (acidic)
 - epiphytes
 - b. high light, water

therefore nutrients
are limiting for growth



Darlingtonia californica
Sarraceniaceae

Angiosperm Specialization

I. Carnivory

C. Hypothesized origins



3. Specialized structures for insect capture are selected



Carnivory

II. Types of traps

A. Pitcher Traps

B. Flypaper Traps

C. Suction Traps

D. Snap Traps



Carnivory

II. Types of traps

A. Pitcher Traps

1. passive

2. with or w/o digestive glands that secrete digestive enzymes



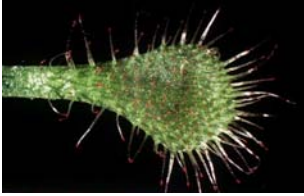
Nepenthes sp.
Nepenthaceae

Carnivory

II. Types of traps

B. Flypaper Traps [adhesive]

- 1. mucilage glands
- 2. sometimes movement



Drosera sp.
Droseraceae

Carnivory

II. Types of traps

C. Suction Traps

- 1. *Utricularia* species (180)

2. Features

- a. aquatic
- b. bladders



Carnivory

II. Types of traps

C. Suction Traps

3. Mechanism

- a. water pumped out
- b. closure
- c. trigger hairs
- d. suction



Utricularia sp.
Lentibulariaceae

Carnivory

II. Types of traps

D. Snap Traps

- 1. *Dionaea muscipula*
"Venus fly trap"
SE USA endemic
endangered species



Carnivory

II. Types of traps

D. Snap Traps

2. Mechanism

- a. motor cell turgor pressure holds trap open
- b. trigger hairs touched



Carnivory

II. Types of traps

D. Snap Traps

2. Mechanism

- a. motor cell turgor pressure holds trap open
- b. trigger hairs touched
- c. membrane permeability change
- d. rapid closure



Carnivory

II. Types of traps

D. Snap Traps

2. Mechanism

- a. motor cell turgor pressure holds trap open
- b. trigger hairs touched
- c. membrane permeability change
- d. rapid closure
- e. insect crushing
- f. digestive enzymes secreted



Carnivory

III. *Darlingtonia* adaptations



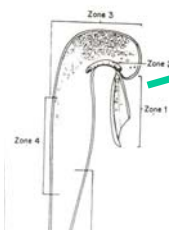
Darlingtonia californica
Sarraceniaceae

Carnivory

III. *Darlingtonia* adaptations

A. Nectaries

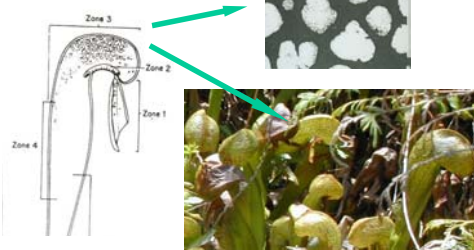
B. Upward pointing hairs



Carnivory

III. *Darlingtonia* adaptations

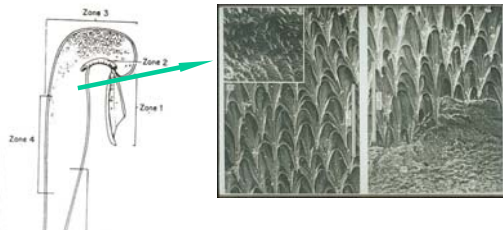
- A. Nectaries
- B. Upward pointing hairs
- C. Windows



Carnivory

III. *Darlingtonia* adaptations

- A. Nectaries
- B. Upward pointing hairs
- C. Windows
- D. Downward pointing hairs and wax patches



Carnivory

III. *Darlingtonia* adaptations

- E. Acidic liquid with a low surface tension
- F. Breakdown of prey by commensal organisms



Carnivory

III. *Darlingtonia* adaptations

- E. Acidic liquid with a low surface tension
- F. Breakdown of prey by commensal organisms
 - 1. mosquito larvae
 - 2. no digestive glands
- G. Absorption through cells in bottom of pitcher



Darlingtonia State Park
N of Florence
