

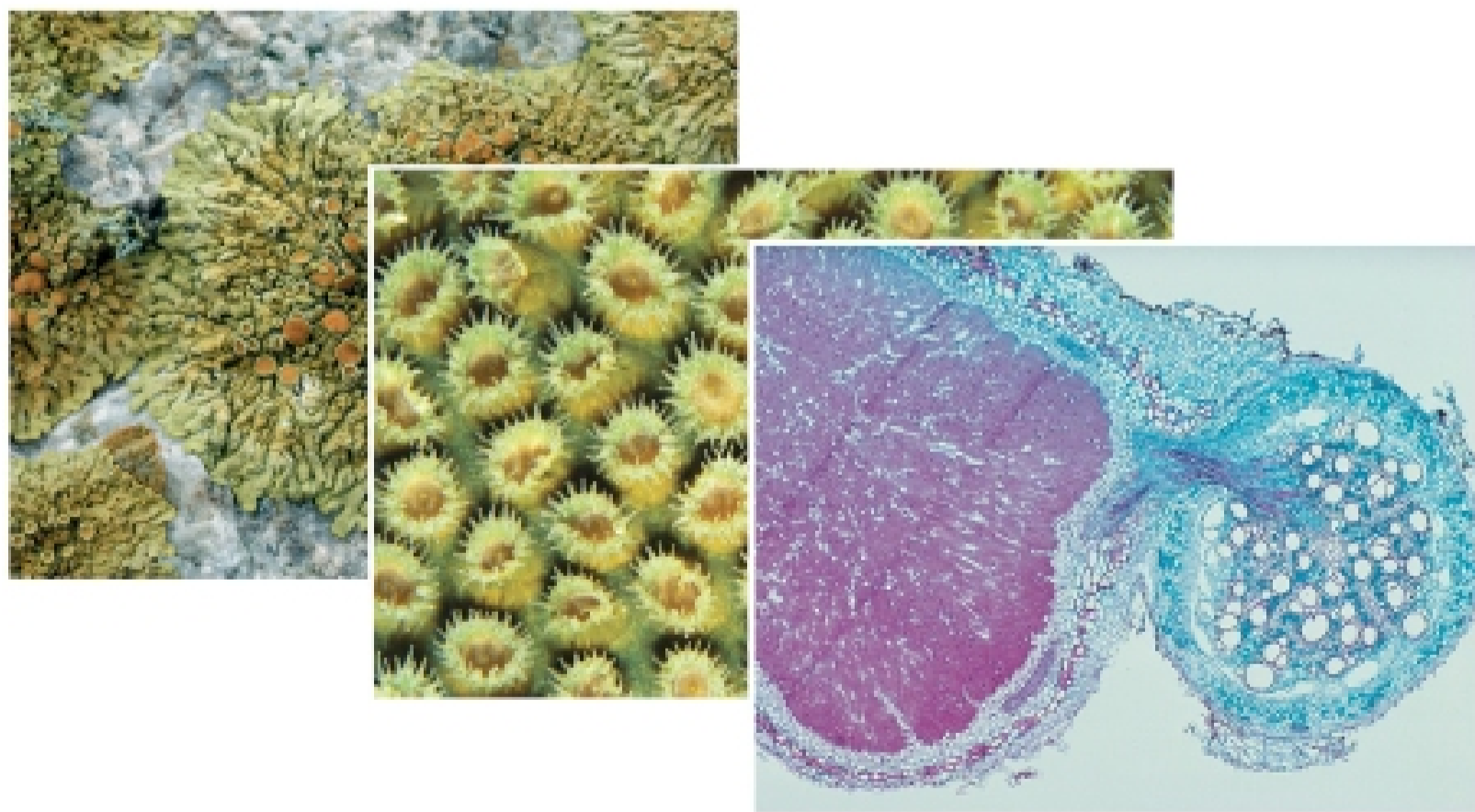
## Mutualism

Mutualism: Inter-specific relationship from which both species benefit



## Mutualism

Symbiosis: Intimate (generally obligate) inter-specific relationships from which both partners benefit



## Mutualism

Pollination by animals (ie birds, bees, moths, butterflies, beetles, ants, mammals)  
Pollinators receive food rewards (nectar and pollen), plants have pollen moved to other flowers

How did this mutualism evolve? What are the origins?

1. Antagonistic origin in a predator/prey relationship



How did this mutualism evolve? What are the origins?

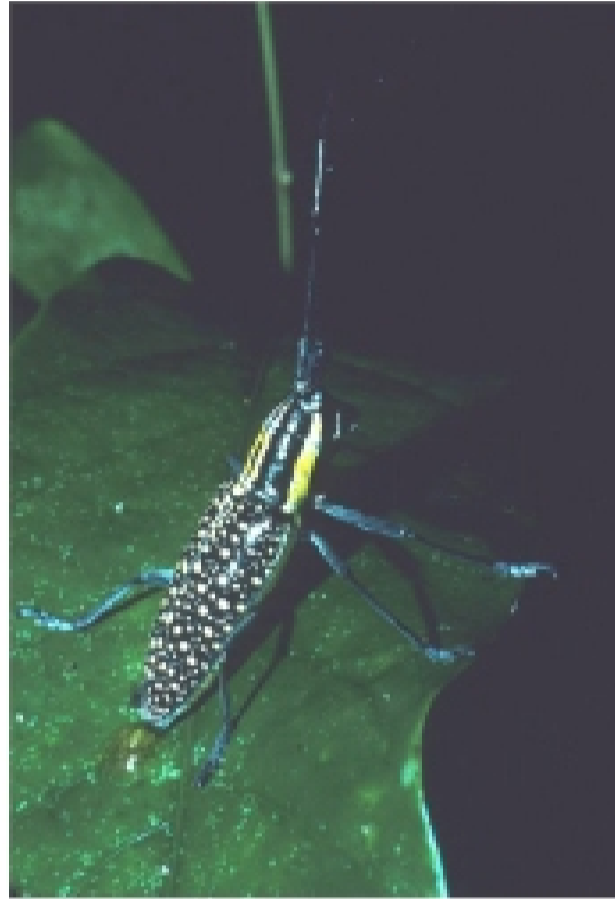
1. Antagonistic origin in a predator/prey relationship



Early plants were probably wind pollinated and insects were predators feeding on spores, pollen or ovules

How did this mutualism evolve? What are the origins?

1. Antagonistic origin in a predator/prey relationship



Early plants were probably wind pollinated and insects were predators feeding on spores, pollen or ovules



By chance, some floral visitors were less damaging and perhaps even beneficial in moving pollen between plants, thus selecting for traits in plants that would minimize damage and cost and maximize pollen transfer

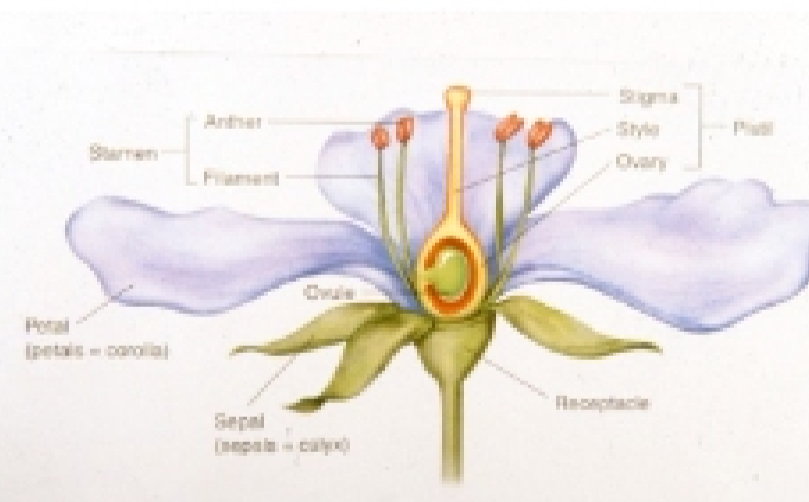
How did this mutualism evolve? What are the origins?

2. Evolution of plant traits that minimize negative impact of insects

a) protect ovules and pollen



Closed carpel to protect ovules



Defend pollen with chemical or physical defenses

