

# Coevolution

LS2201

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Now, here, you see, it takes all the running you can do, to keep in the same place. If you want to get somewhere else, you must run at least twice as fast as that! (Lewis Carroll, Through the Looking Glass)

**Coevolution:** Reciprocal genetic change in interacting species, owing to natural selection imposed by each other.

**Contexts:**

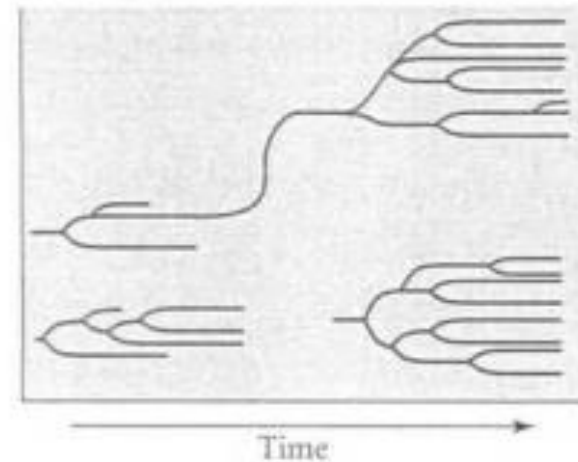
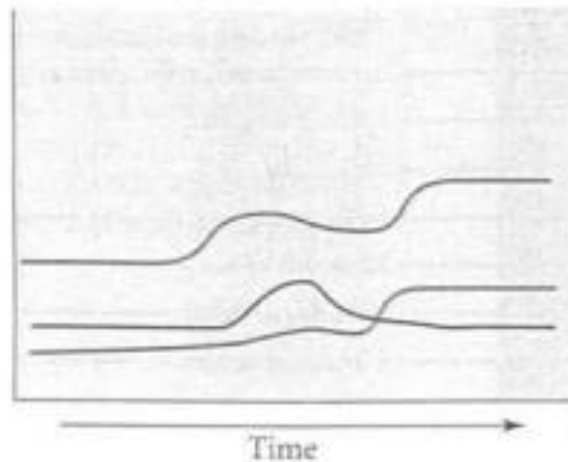
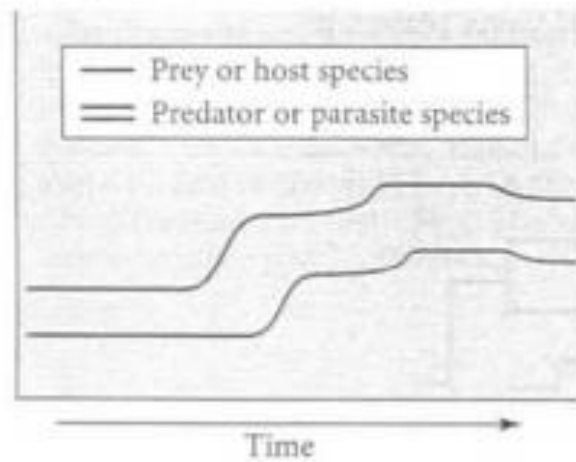
Interspecific competition for food or space

Parasite/host interactions

Predator/prey interactions

Symbiosis

Mutualisms

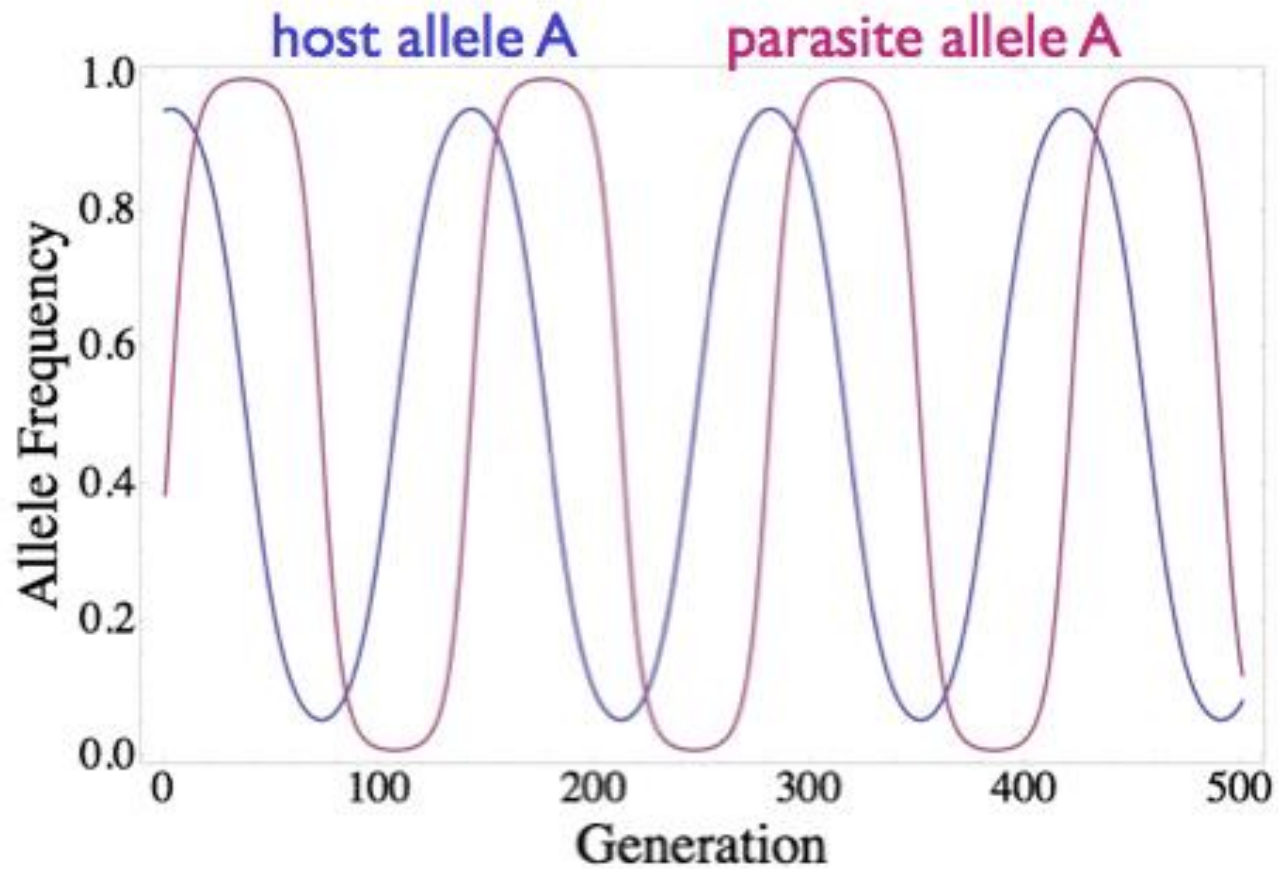


**Specific coevolution:** Two species evolve in response to each other (evolutionary arms race).

**Guild/ diffuse coevolution:** Whole groups of species interact with other groups of species, leading to changes that cannot really be identified as examples of specific, pairwise coevolution between two species.

**Escape-and-radiate coevolution:** an evolutionary innovation by either partner in a coevolutionary interaction enables an adaptive radiation, or speciation due to the availability of ecological opportunity.

# Which type?



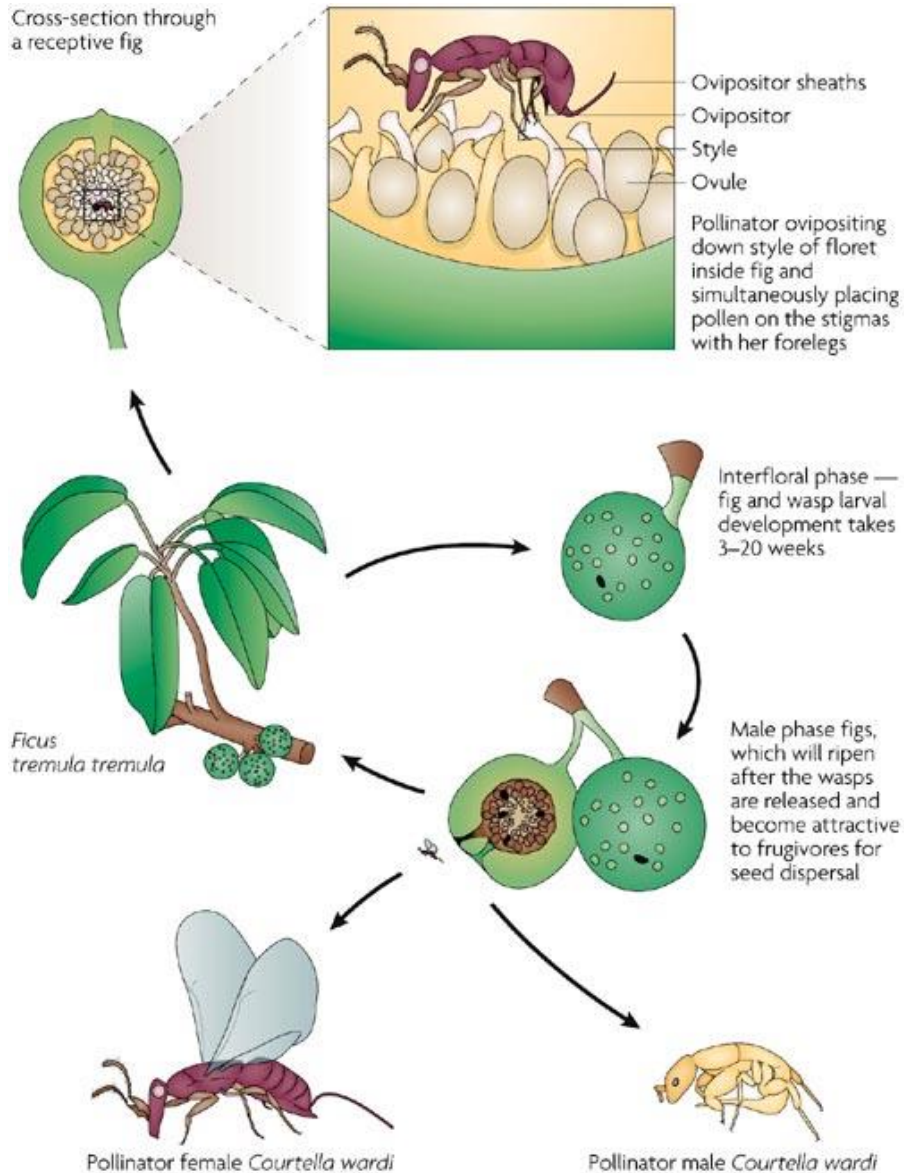


# The Fig and Fig wasp mutualism



Photos: Google images

# The Fig and Fig wasp mutualism



Pollinator females enter the fig, pollinate the flowers and rear their own progeny — one wasp in each seed, in a subset of the seeds. Pollinator males, after mating with females, chew an exit hole through the fig wall, allowing pollen-laden females to escape from the fig cavity. On leaving the natal figs, pollinator females home in on volatiles that are released by receptive figs on other trees. This is an obligate mutualism in which both species are completely interdependent on one another.



# The Bee orchids

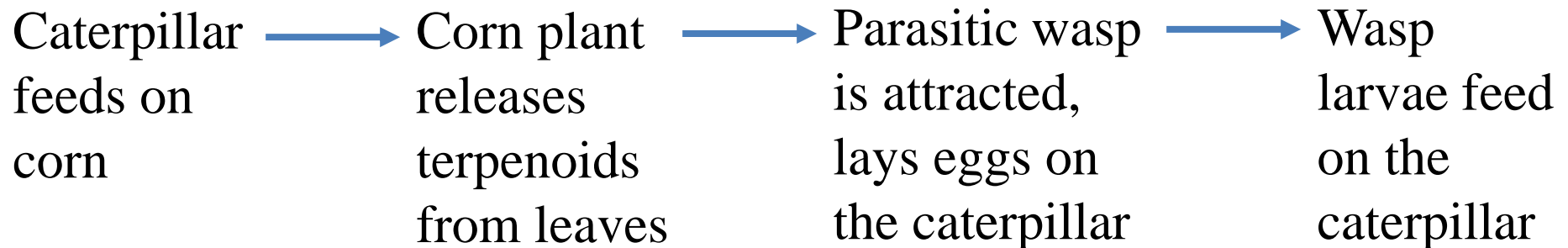




# Enemy of my enemy



Win-Win  
situation for the  
plant and the  
wasp!



# Parasite virulence



Pest in Australia



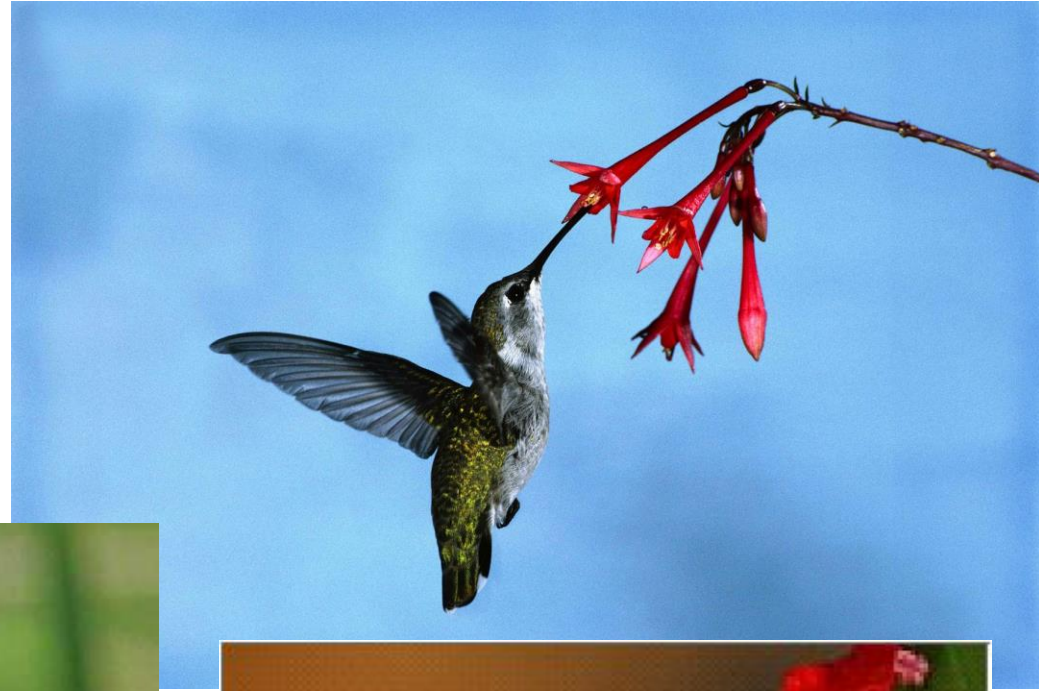
Myxoma virus from a South American rabbit introduced to Australia



Australian rabbits evolved resistance to Myxoma virus

**Some avirulent strains of the virus could be found, though the overall population was still virulent (Fenner and Ratcliffe, 1965; May and Anderson, 1983)**

# Helping each other

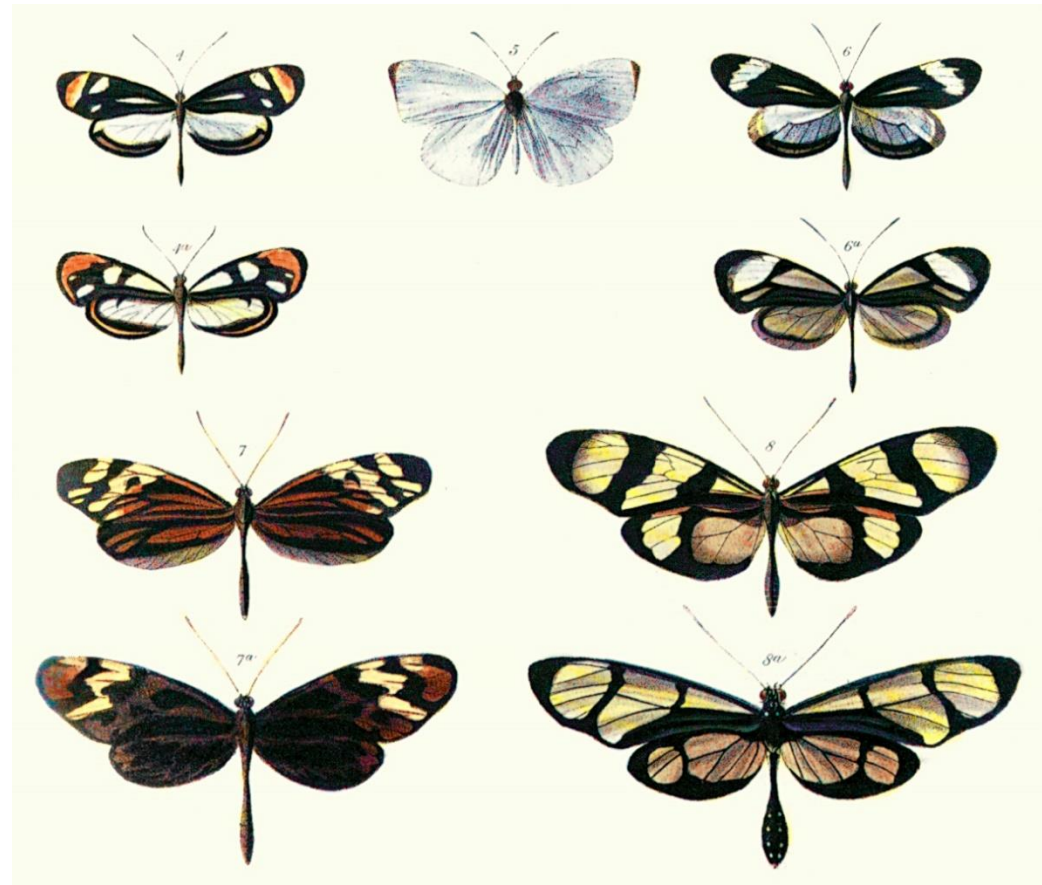




# Batesian mimicry

Batesian mimicry is a form of mimicry where a **harmless species** has evolved to imitate the **warning signals** of a harmful species directed at a predator of them both.

It is named after the English naturalist **Henry Walter Bates**, after his work on butterflies in the rainforests of Brazil.





# Batesian mimicry



Monarch



Viceroy

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# Batesian mimicry



Ladybug  
(noxious)



Phillippines cockroach  
(palatable)

# Müllerian mimicry

Two or more harmful species look very similar in order to ward off potential predators.

This is very advantageous to animals as a means of protection. If animals that resemble one another are all known to be poisonous or dangerous, they will have a significant advantage because predators will quickly learn to avoid them.



*Heliconius erato* (top row) and *H. melpomene* (bottom row)



# Müllerian mimicry



**Coral snakes are brightly coloured and highly conspicuous. All of them are poisonous.**



# Mimicking Their Prey



# Mimicking Their Prey



*Oecophylla smaragdina*



Spider mimic



# Brood parasitism



Cuckoos lay their eggs in the nests of other birds. They are called brood parasites.



# Brood parasitism

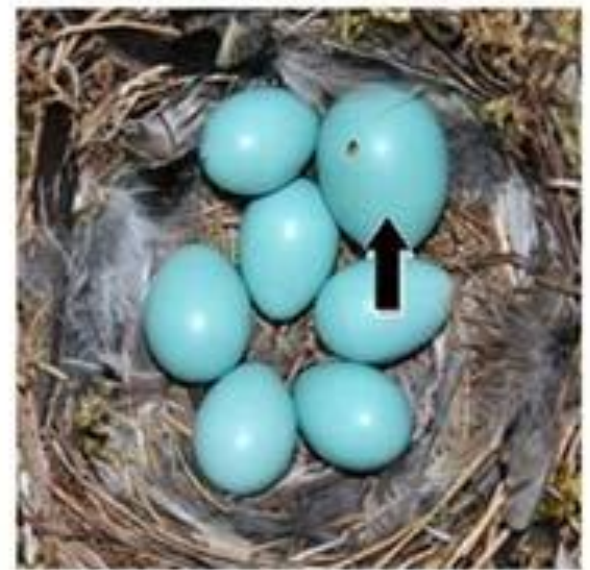
**Great reed warbler**  
*Acrocephalus arundinaceus*



**Reed warbler**  
*Acrocephalus scirpaceus*



**Redstart**  
*Phoenicurus phoenicurus*





# Brood parasitism



Reed  
warbler



Blue-headed  
wagtail



Red-backed  
shrike



Redstart

