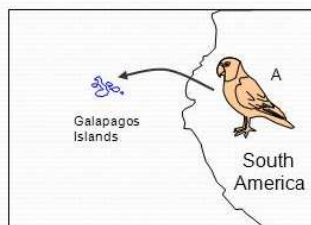


10.2: EVOLUTIONARY BIOLOGY AND ECOLOGY

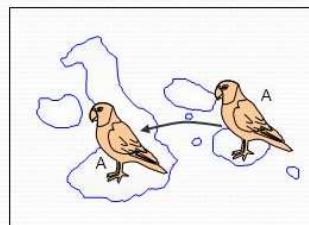
- ❑ An approach to the study of evolution that incorporates an understanding of the interactions between the species under consideration.
- ❑ The main areas of focus of evolutionary biology + ecology are:
 - life history evolution
 - sociobiology (the evolution of social behavior)
 - the evolution of biodiversity and of communities
 - the evolution of inter specific relations such as:
 - competition
 - cooperation
 - predator–prey interactions
 - parasitism
 - mutualism
 - the interactions with the physical environment

53

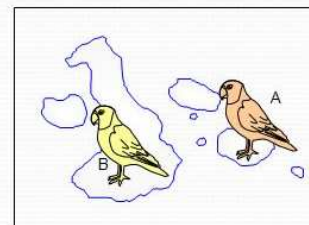
10.2: COMPETITION



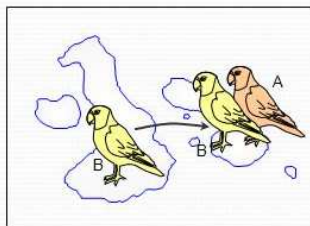
a) Founders Arrive



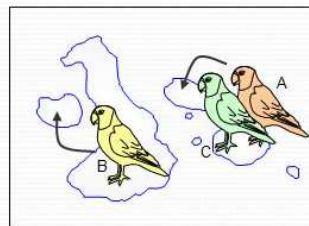
b) Separation of Populations



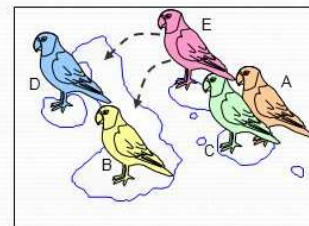
c) Changes in the Gene Pool



d) Reproductive Isolation



e) Ecological Competition



f) Continued Evolution

54

10.2: COOPERATION



55

10.2: COOPERATION



10.2: PREDATOR—PREY INTERACTIONS

- ☐ Drive evolution of adaptation in both predators and prey
- ☐ Drive causally related patterns of population dynamics
- ☐ Evolutionary arms race (see topic 9.2):
 - Defenses (hard, toxins, spikes)
 - Camouflage
 - Mimicry
 - Warning coloration
- ☐ Predators also evolve ways to overcome the above: sharper senses, chemical detoxification etc.

57

10.2: PREDATOR—PREY INTERACTIONS: CAMOUFLAGE



10.2: PREDATOR—PREY INTERACTIONS: DEFENSES



10.2: PREDATOR—PREY INTERACTIONS: WARNING COLORATION



10.2: PREDATOR–PREY INTERACTIONS: MIMICRY

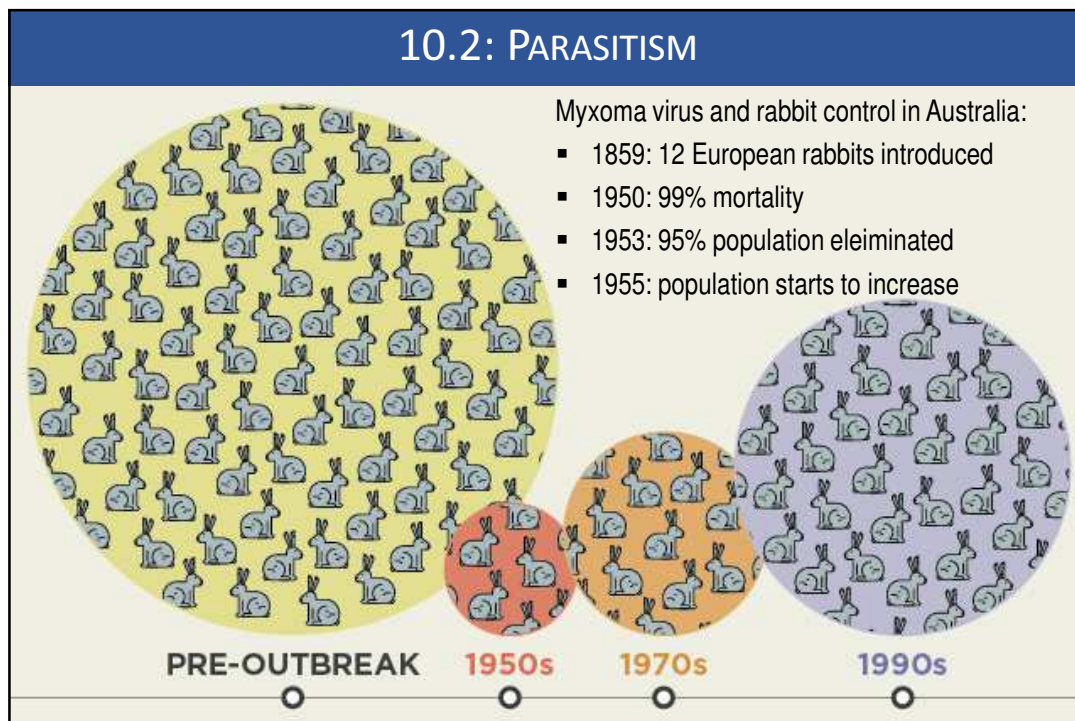


Eastern coral snake
(venomous)

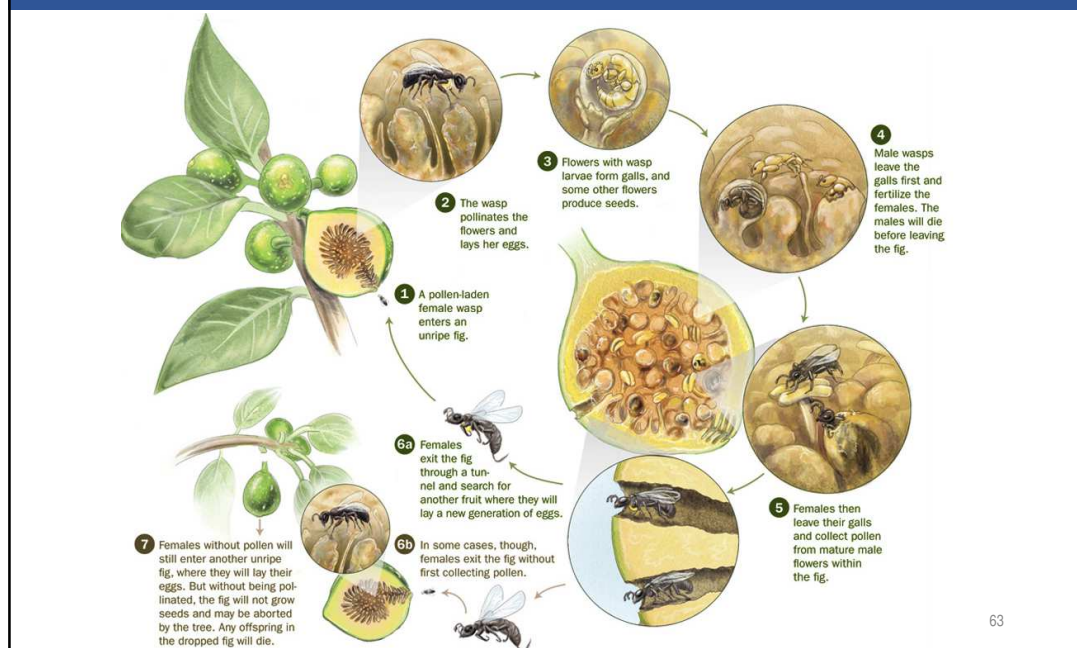


Scarlet king snake
(nonvenomous)

10.2: PARASITISM



10.2: MUTUALISM



10.2: EVOLUTIONARY BIOLOGY AND ECOLOGY

❑ Two important considerations:

- how interactions (both among species and between species and their physical environment) shape species through selection and adaptation
- the consequences of the resulting evolutionary change.

❑ Adaptation as a key feature of Evolutionary Biology and Ecology:

- It is an evolutionary solution
- A genetically determined characteristic or set of characteristics that improves an organism's ability to survive and reproduce in a particular environment .
- It includes behavioral, morphological or physiological changes.

❑ Ecology shapes evolution:

- The environment defines a template
- The process of evolution by natural selection shapes organisms to 'fit' that template

10.2: EVOLUTIONARY BIOLOGY AND ECOLOGY

□ Notes:

- Population – basic evolutionary unit.
- A population is a localized group of individuals that are capable of interbreeding and producing fertile offspring.
- In evolution the population matters, not the individuals.
- Gene pool – comprises all the genes of all the individuals in that population.



10.2: EVOLUTIONARY BIOLOGY AND ECOLOGY

- Some of the basic mechanisms of evolutionary change cannot operate without genetic variation.
- However, the variational theory of evolution has a peculiar *self-defeating property*:
 - If evolution occurs by the differential reproduction of different variants, we expect the variant with the highest rate of reproduction eventually to take over the population and all other genotypes to disappear.
 - But then (*if other genotypes to disappear*) there is no longer any variation for further evolution.
 - The possibility of continued evolution therefore is critically dependent on renewed variation.
- For a given population, there are three sources of variation: mutation, recombination, gene flow
- However, recombination by itself does not produce variation (unless alleles are segregating already at different loci); otherwise there is nothing to recombine.
- Similarly, immigration cannot provide variation if the entire species is homozygous for the same allele.
- Ultimately, the source of all variation must be mutation.