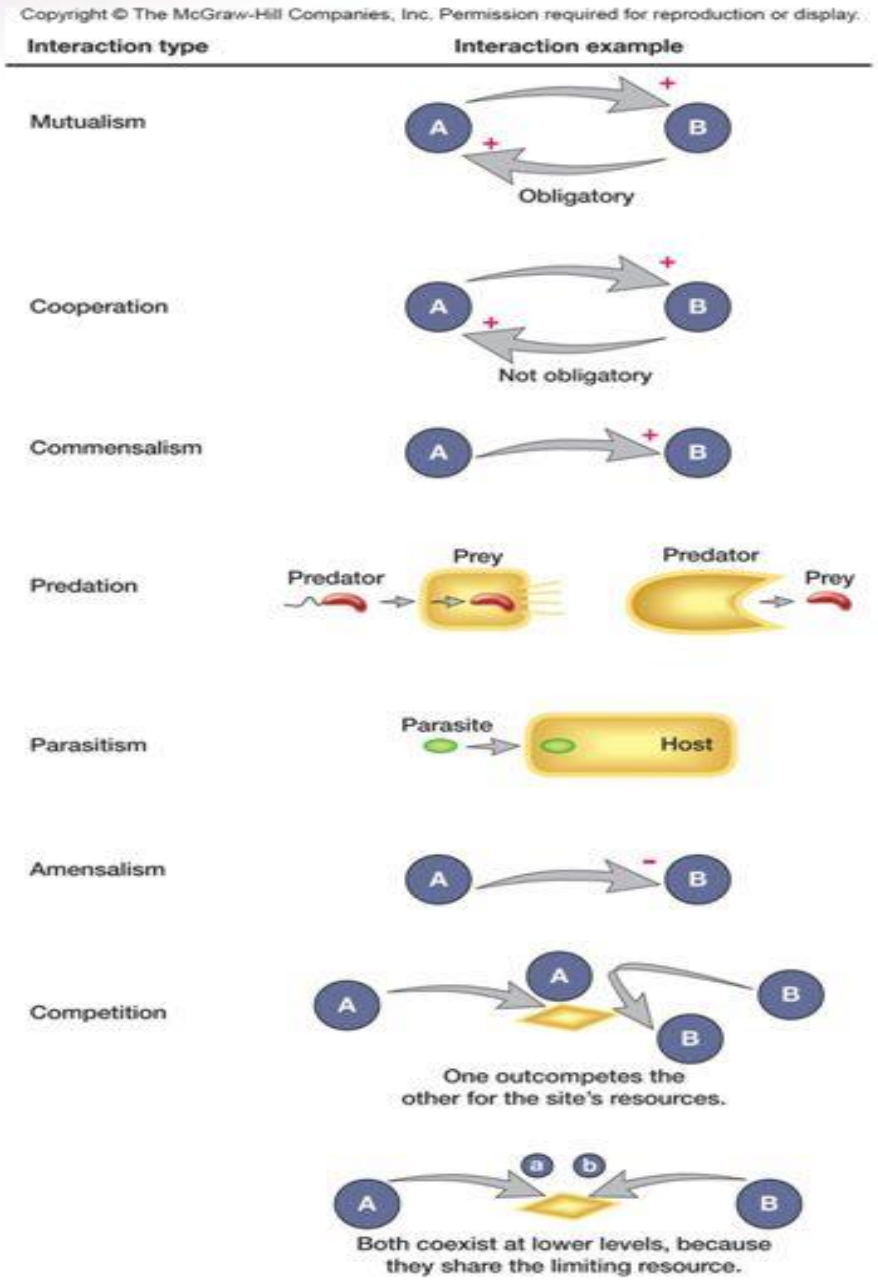
ARBIND KUMAR
ROLLNO-15/2019

- Different type of microbial interaction

Microbial Interactions…

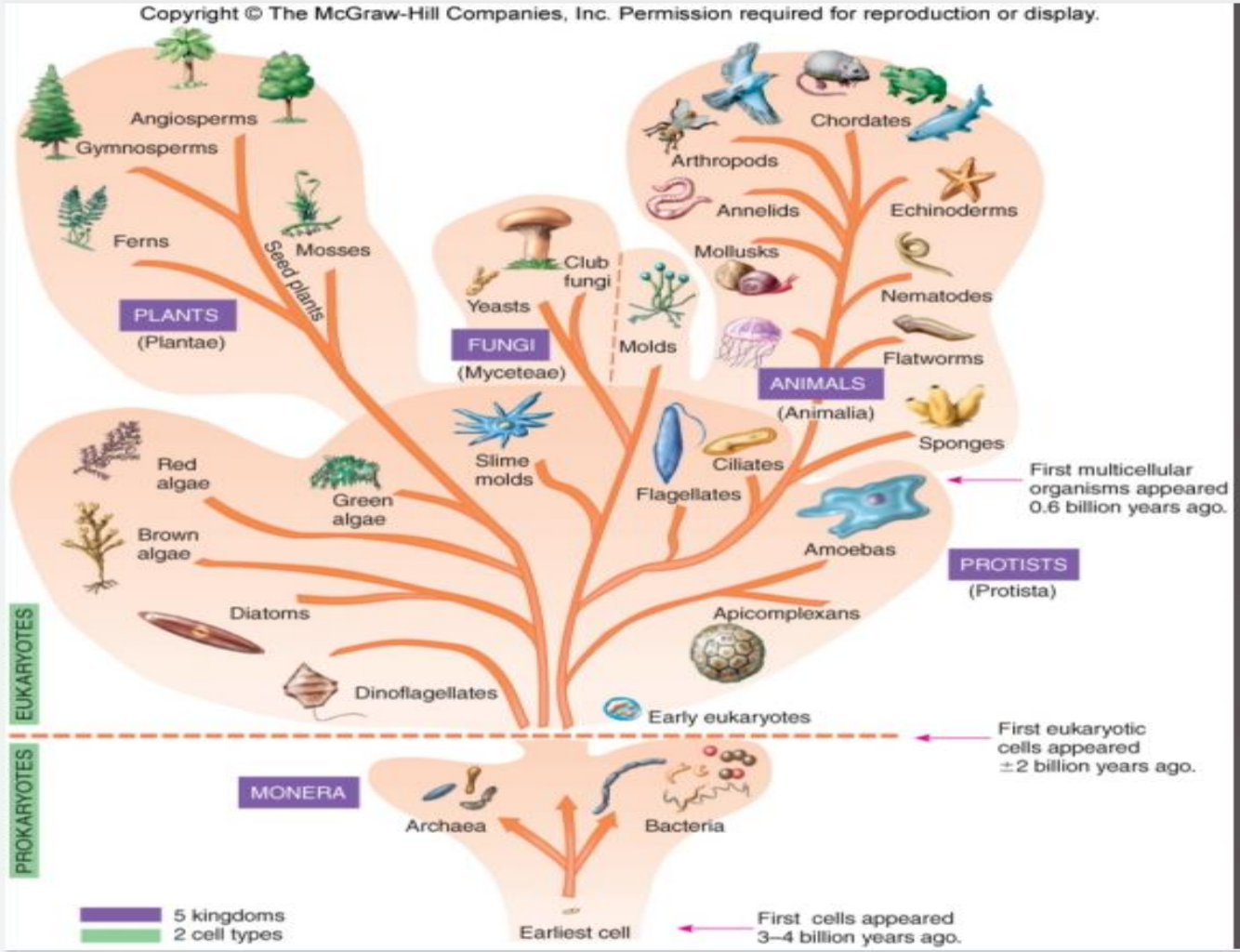
- Symbiosis = an association of two or more different species of organisms
- relationships can be intermittent and cyclic or permanent
- Types of interactions include
  - mutualism, cooperation, predation, commensalism, parasitism, amensalism, and competition



Microbes interactions

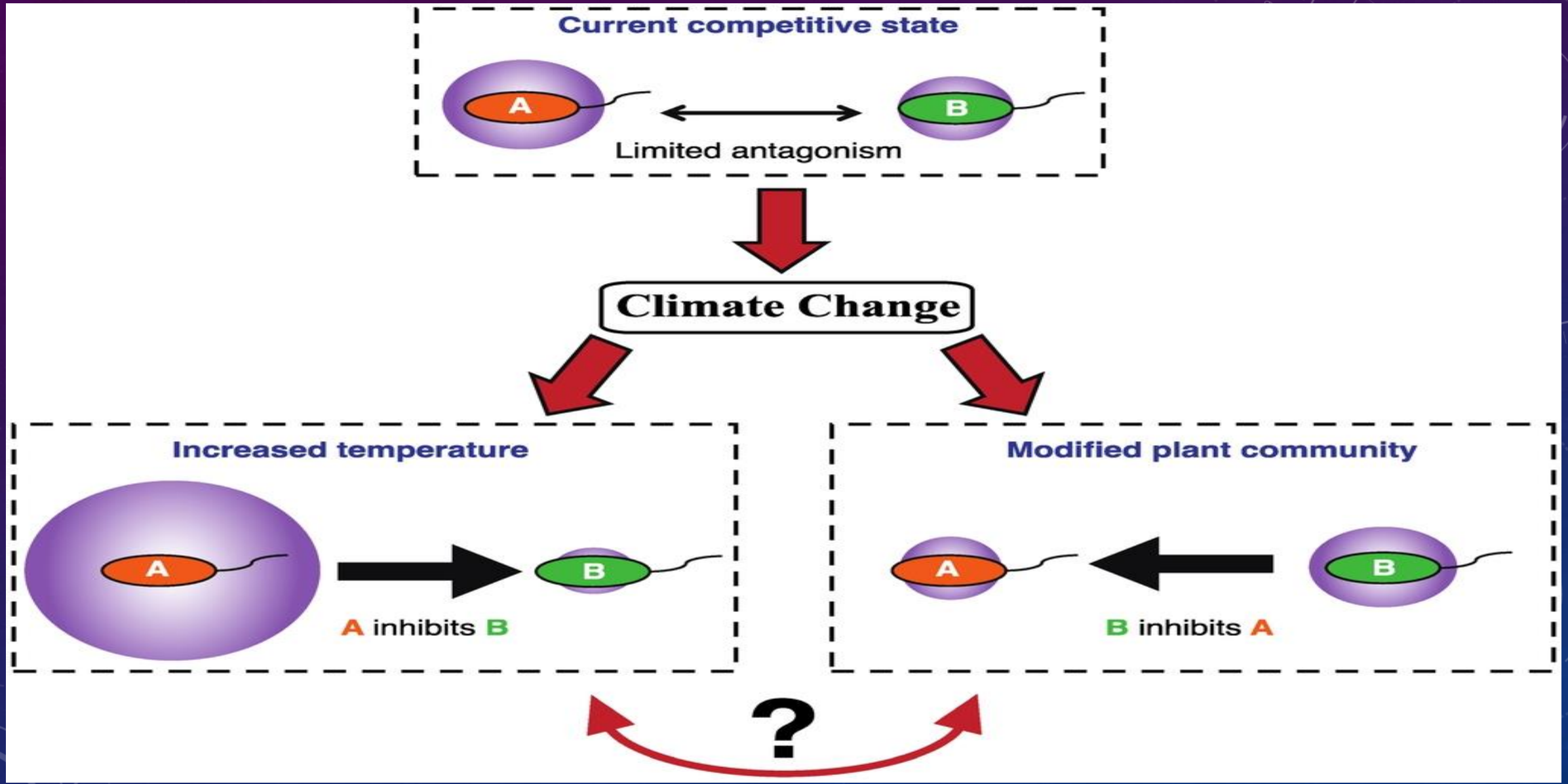
1. Nematode – Bacteria interactions in Pine Wilt Disease
    a. Terms that you will learn:
        1. Disease – Host – Pathogen
        2. Nematode
        3. Associated Bacteria

2. Insect – Bacteria interactions
    a. Terms that you will learn:
        1. Microbiome
        2. Parasitism versus Mutualism
        3. Endosymbiont



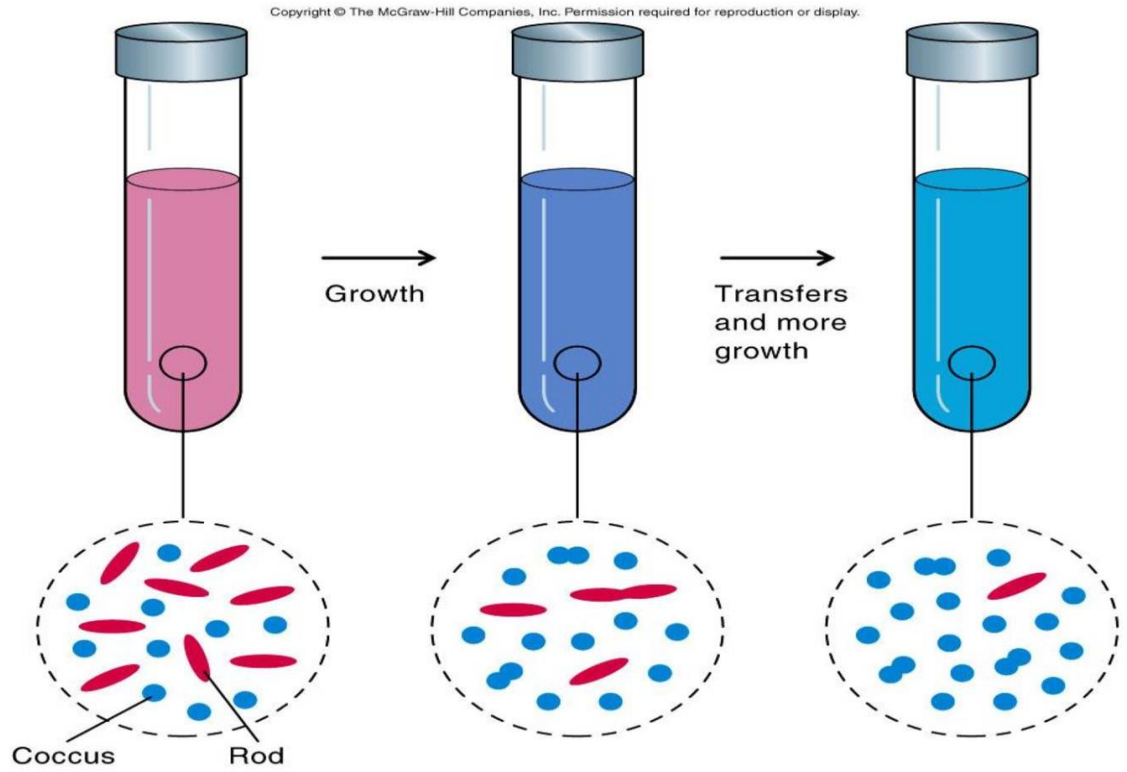
Microbes

- Microscopic organisms, single-cell or multicellular, which inhabit all kinds of environments;
- Bacteria, Archaea, Fungi, Protists, Viruses and microscopic animals;
- The oldest form of life on earth (3.5 billion years ago);
- Different shapes and ecological interactions;
- Play important rules on earth and in our lives;


Current competitive state
A
B
Limited antagonism
Climate Change
Increased temperature
A
B
A inhibits B
Modified plant community
A
B
B inhibits A
?

Principles of Microbial Ecology

- Microbial competition and antagonism
  - Results of competition evident among organisms
    - Ability to compete is generally related to rate of growth
      - Organisms that multiply faster yield larger population and use more nutrient supply
  - Antagonism helps determine make-up of population
    - Bacteriocines produced by certain species to kill other strains
      - Form of chemical antagonisms



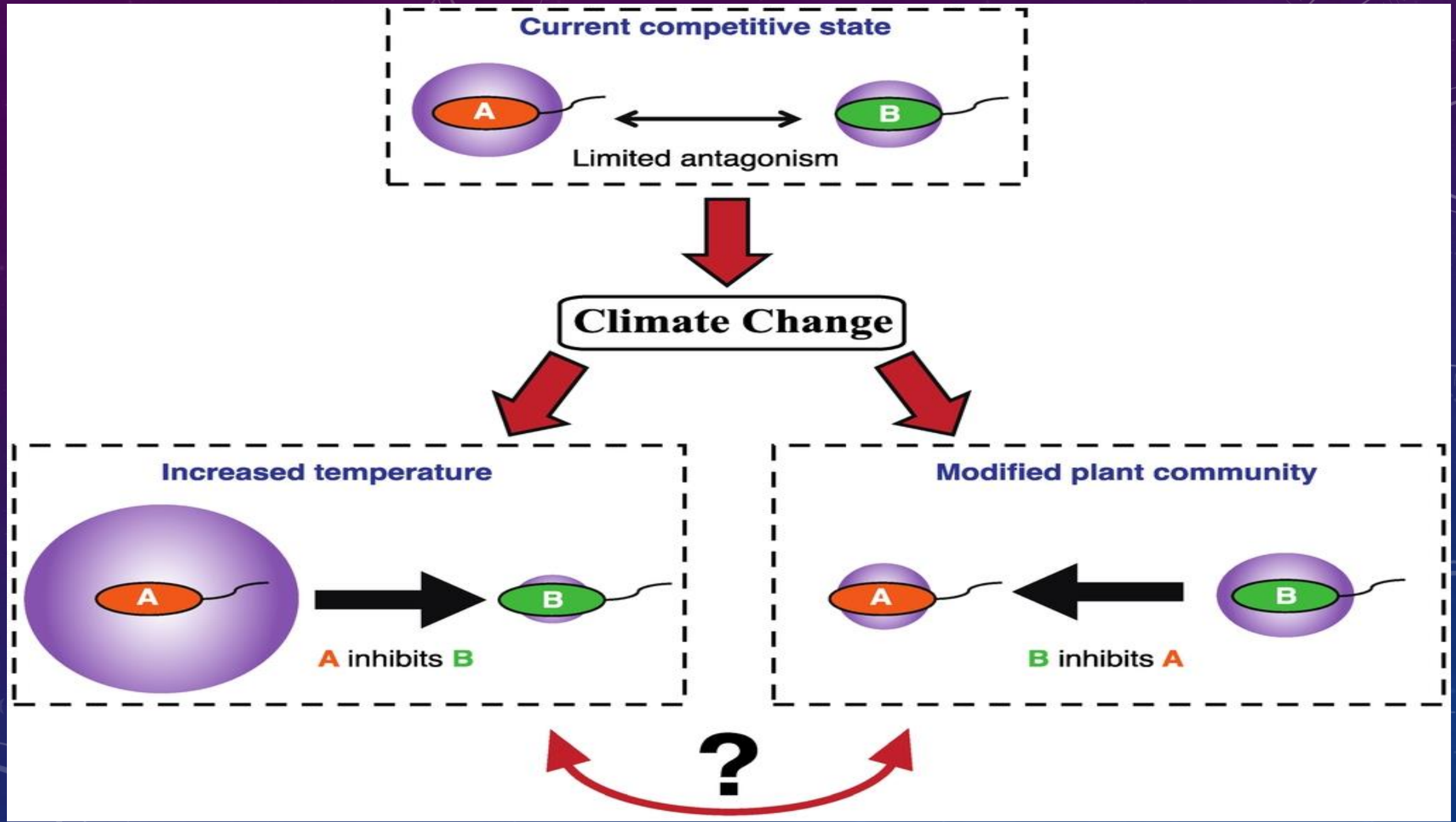
Microbial Antagonism

In nature, microbes compete each other for resources; nutrients and space

Some microbes produce toxins
that are harmful to other microorganisms

Infectious diseases are caused by microorganisms and a good strategy to fight such diseases will be to find such toxins (antibiotics) that are effective against the disease-causing microbes

Antibiotics which are tolerated by human body will then be able to control infectious diseases effectively in humans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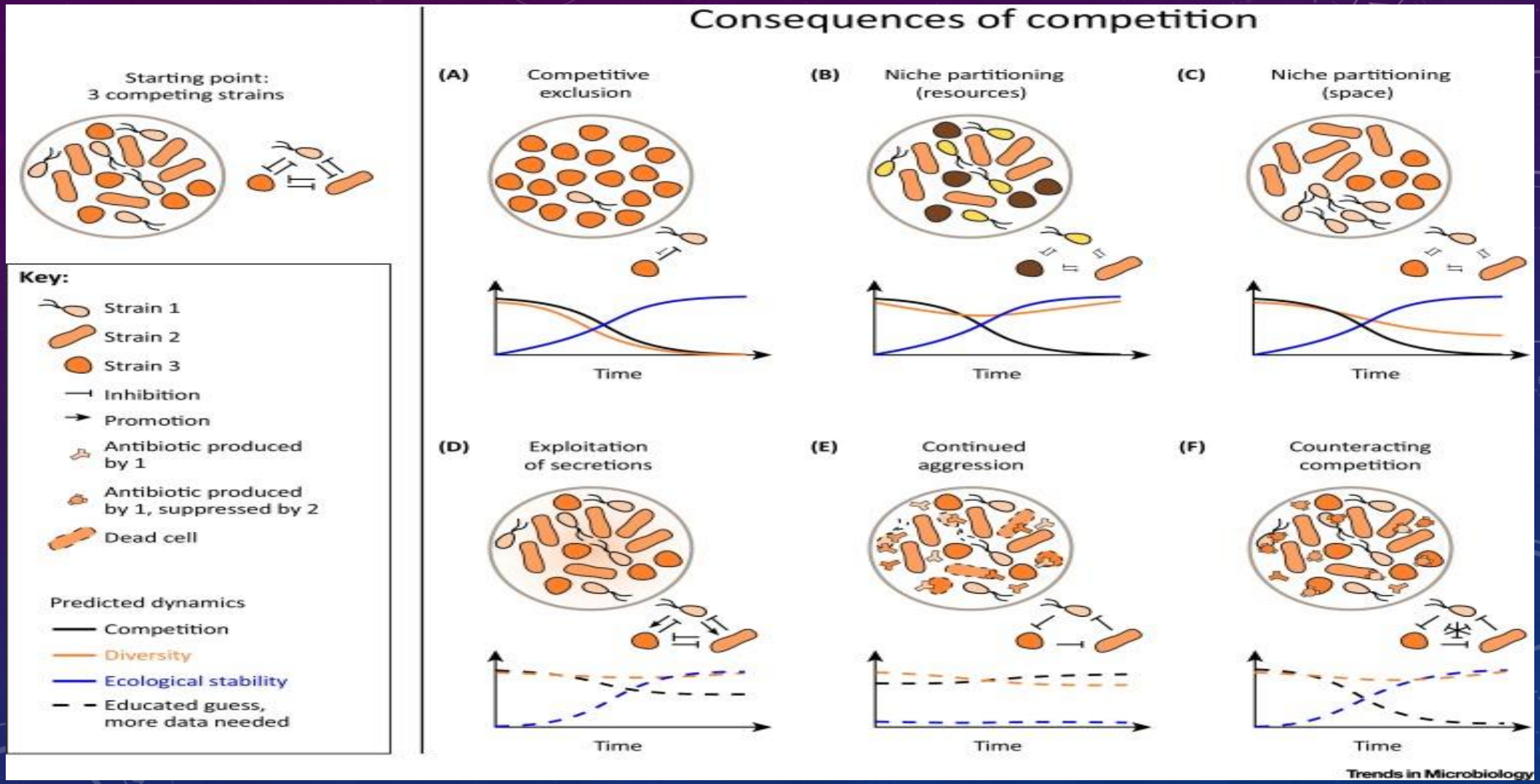
Normal Microbiota and the Host

- **Microbial antagonism** is a competition between microbes
- **Normal microbiota** protect the host by
  - Occupying niches that pathogens might occupy
  - Producing acids
  - Producing bacteriocins
- **Probiotics**: live microbes applied to or ingested into the body, intended to exert a beneficial effect


Consequences of competition
Starting point:
3 competing strains
Key:
Strain 1
Strain 2
Strain 3
Inhibition
Promotion
Antibiotic produced by 1
Antibiotic produced by 1, suppressed by 2
Dead cell
Predicted dynamics
Competition
Diversity
Ecological stability
Educated guess, more data needed
(A)
Competitive exclusion
(B)
Niche partitioning (resources)
(C)
Niche partitioning (space)
(D)
Exploitation of secretions
(E)
Continued aggression
(F)
Counteracting competition
Time
Trends in Microbiology