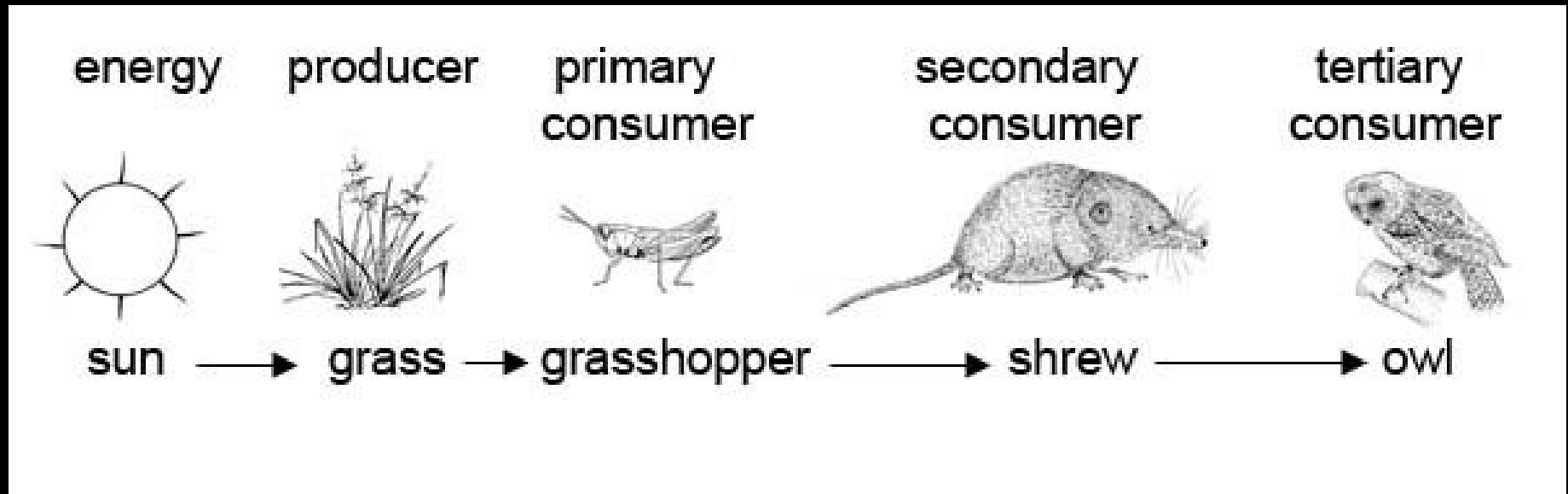


Web of Life

The world from the perspective of a gene



Food Chain

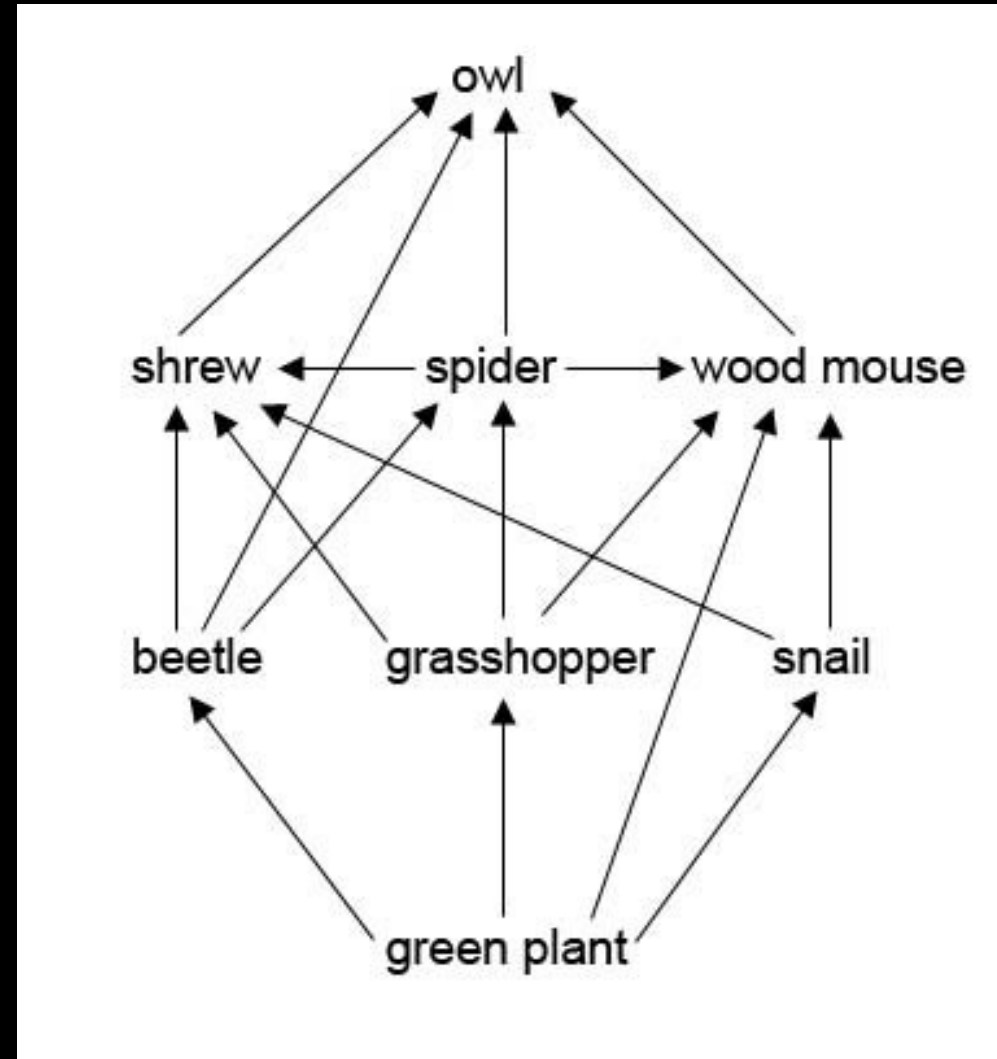


© 2009 Field Studies Council

- Linear Flow of energy
- Sometimes loops with decomposers
- Useful but not the whole story

Food Web

- Energy flow branched
- Lots of links
- More accurate representation



Phylogeny

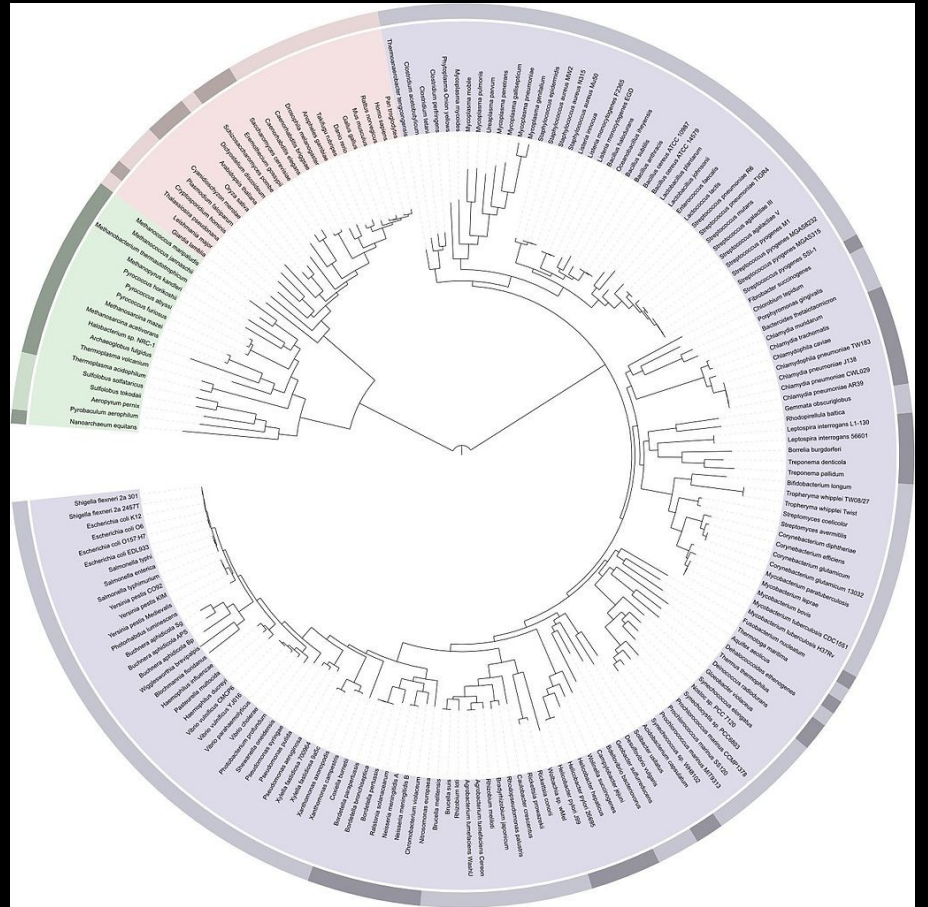
- Evolutionary relationships
- Linear, branching pattern
- Made in many ways
- Not always agreement

36

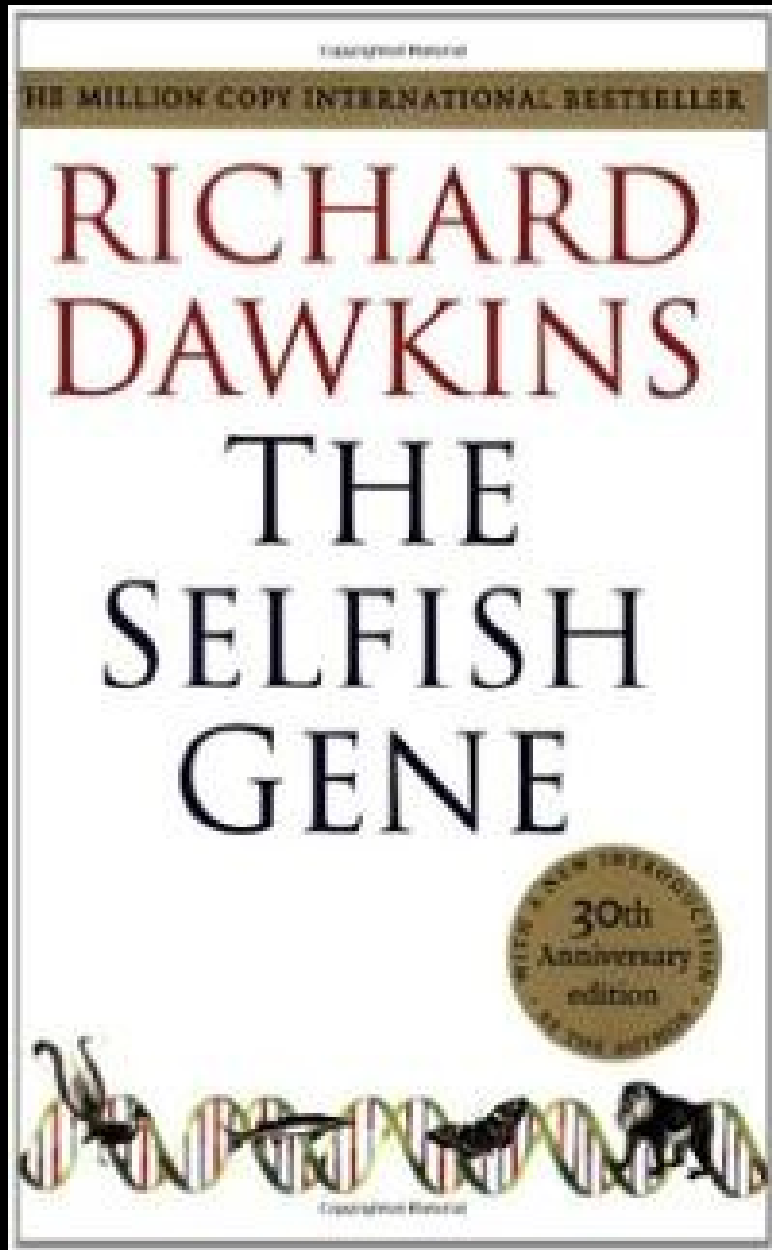
I think



There between A & B. various
 sort of relation. C + B. The
 first predation, B & D
 rather greater distinction
 than genus would be
 formed. - binary relation



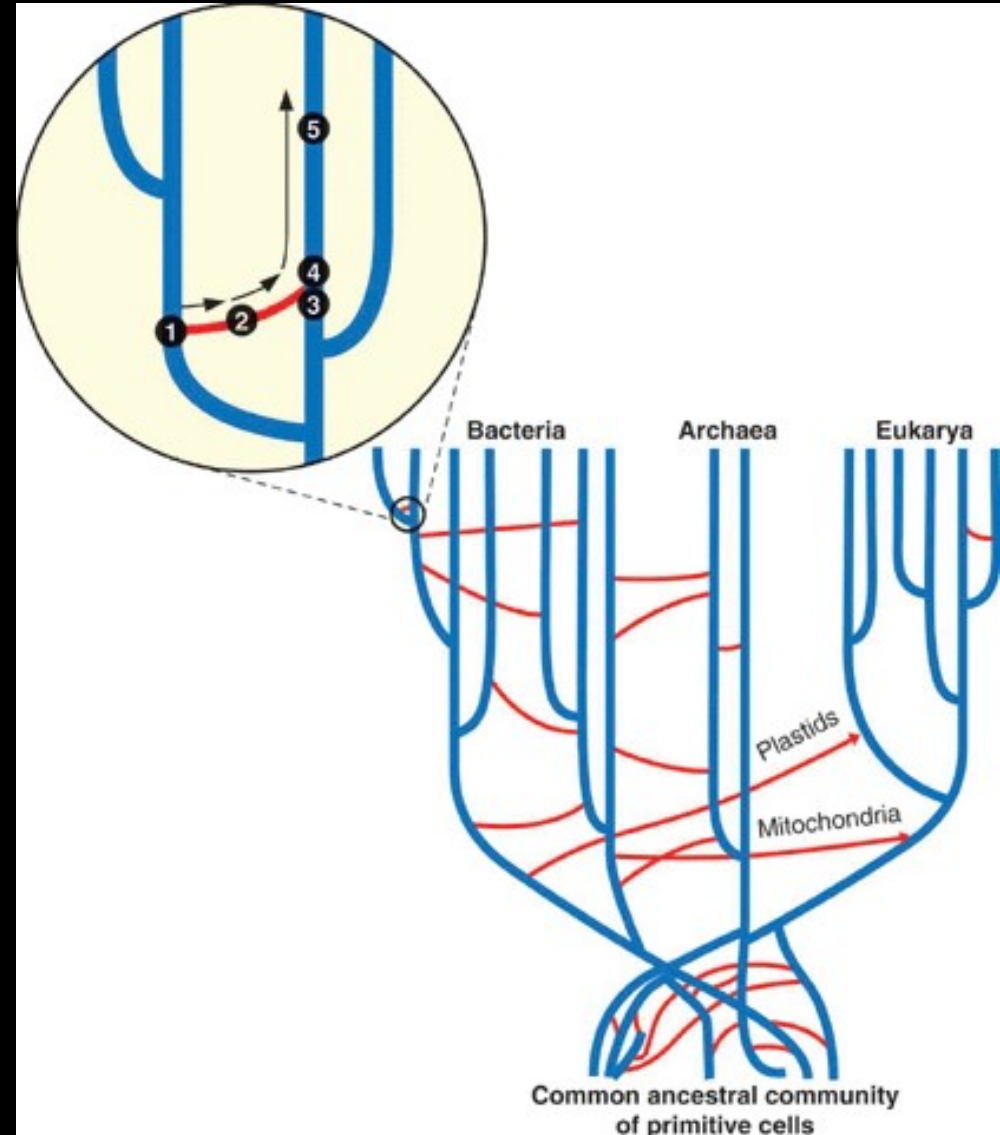
The Selfish Gene



- Published in 1976
- Gene-centred view of evolution is best explanation
- Genes are not always tied to their organism

Horizontal Gene Transfer

- Genes moving from species to species
- Very common in prokaryotes
- Significance in eukaryotes?

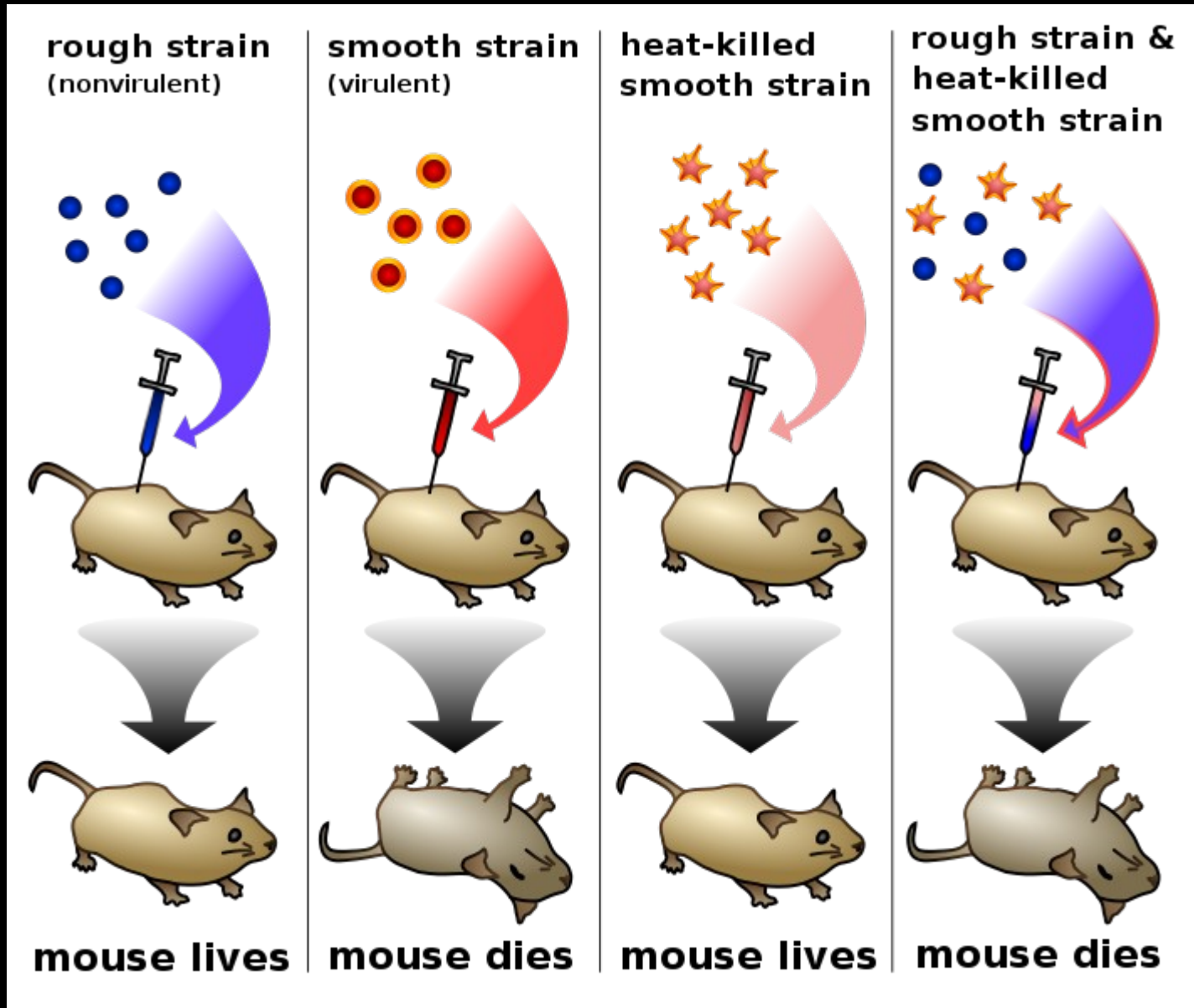


© Barth F. Smets & Tamar Barkay

Criticisms of HGT importance

- Fixation of HGT rare
- Vertical signal is much stronger
- Addition of new genes to network detrimental
- Only useful in changing environments

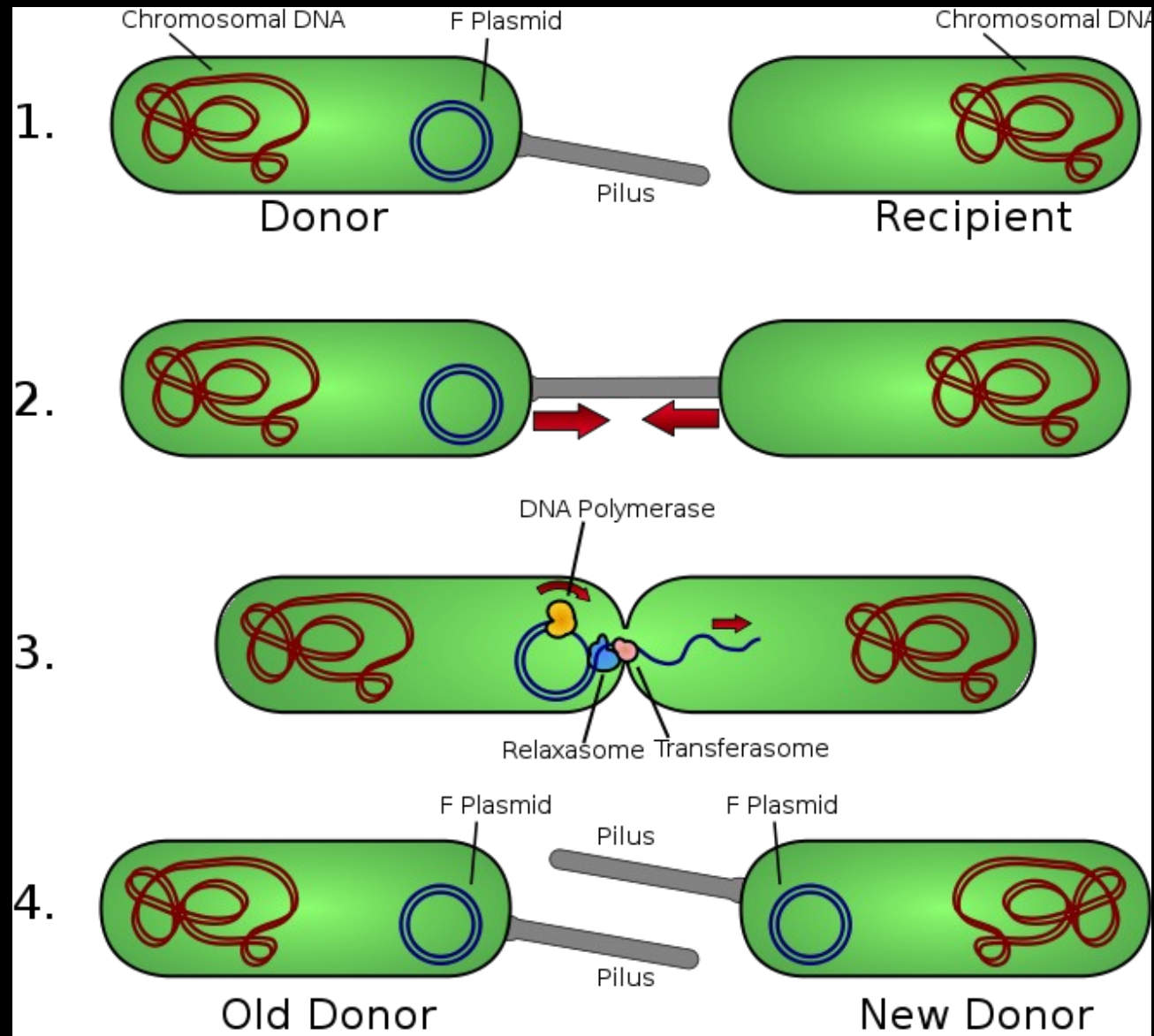
Bacterial Transformation



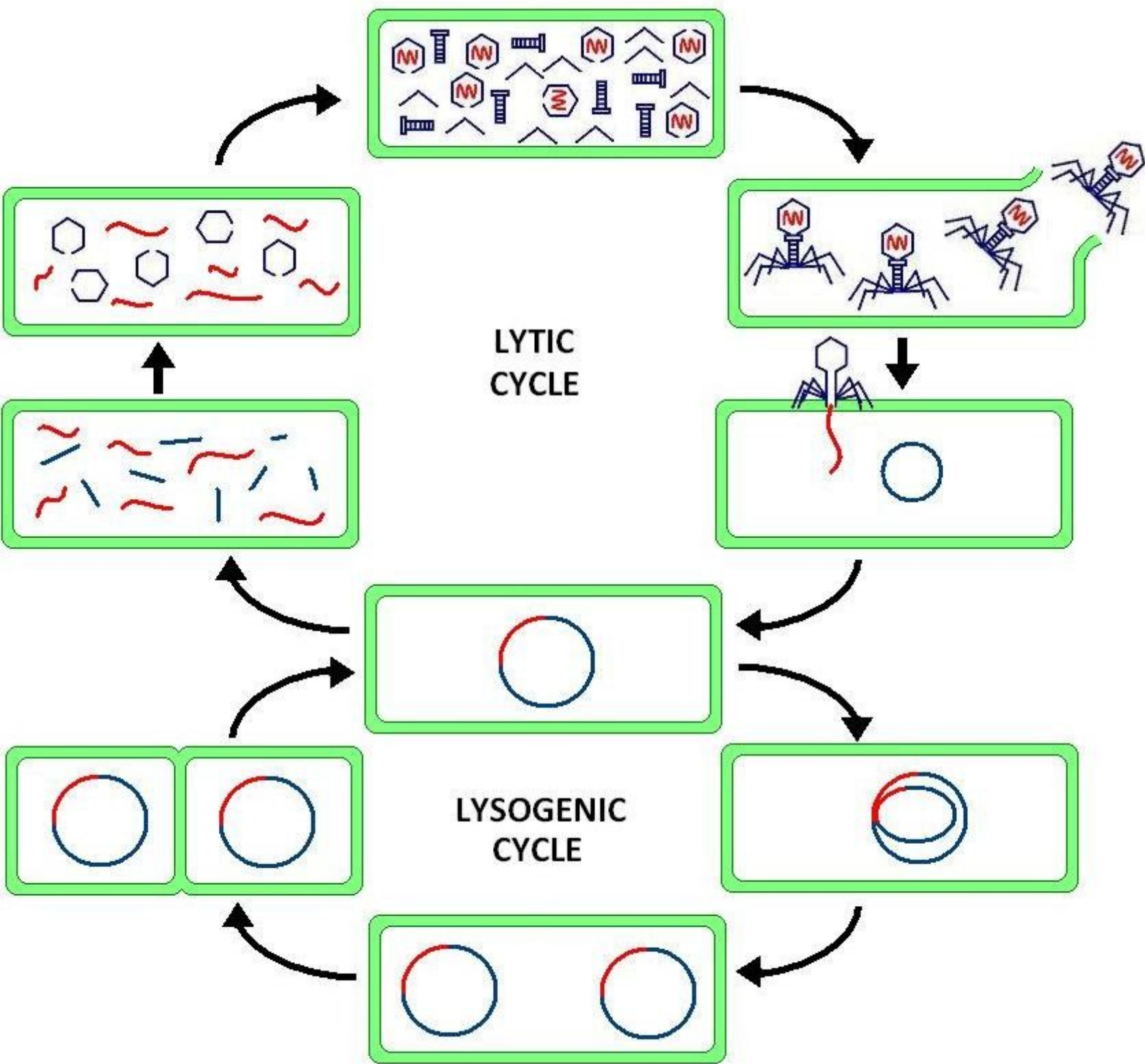
- Frederick Griffith, 1928
- *Streptococcus pneumoniae*

Bacterial Conjugation

- Transfer of plasmids
- Plasmids contain non-essential genes
- Can occur between bacteria and eukaryotes



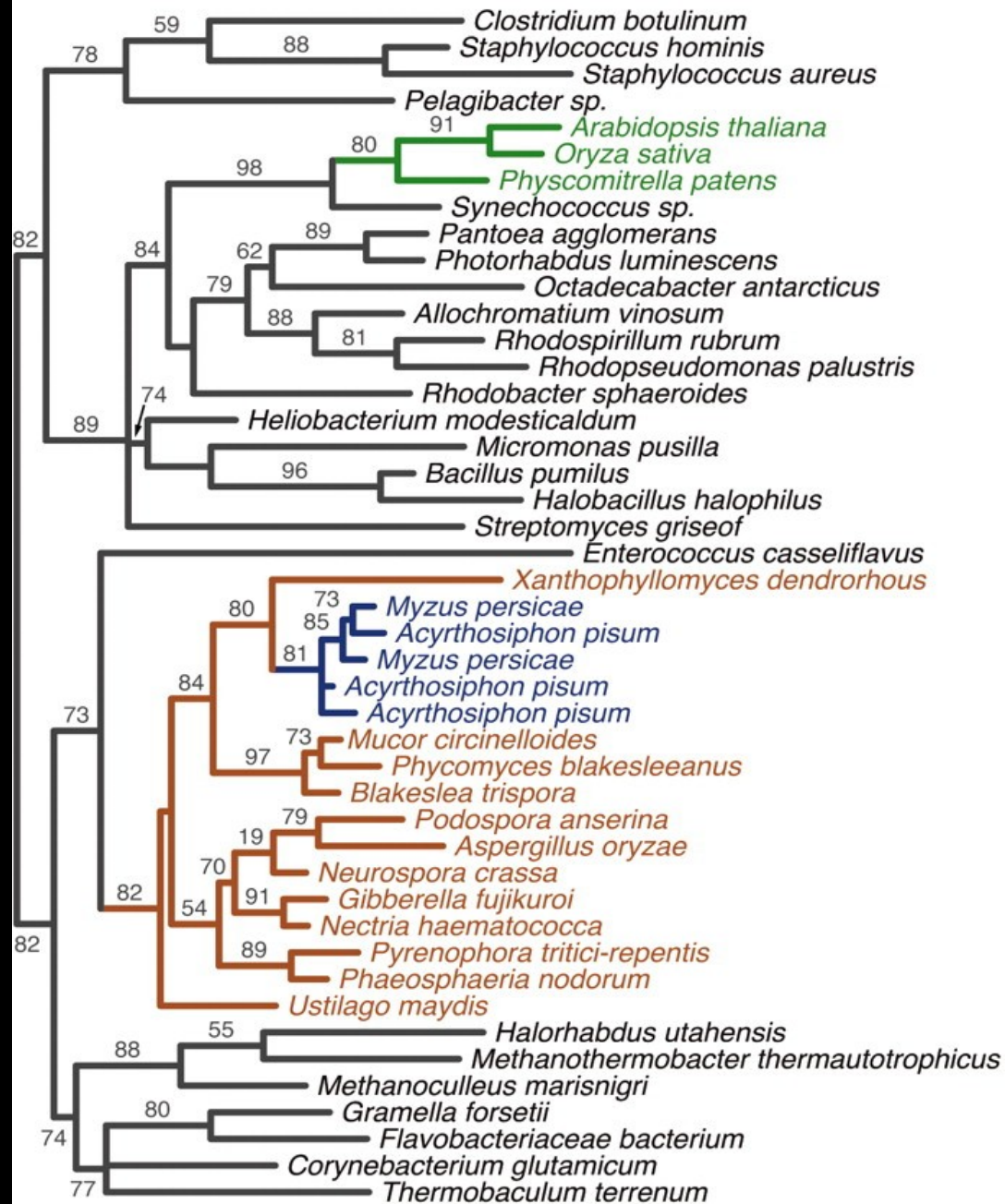
Viral Transduction



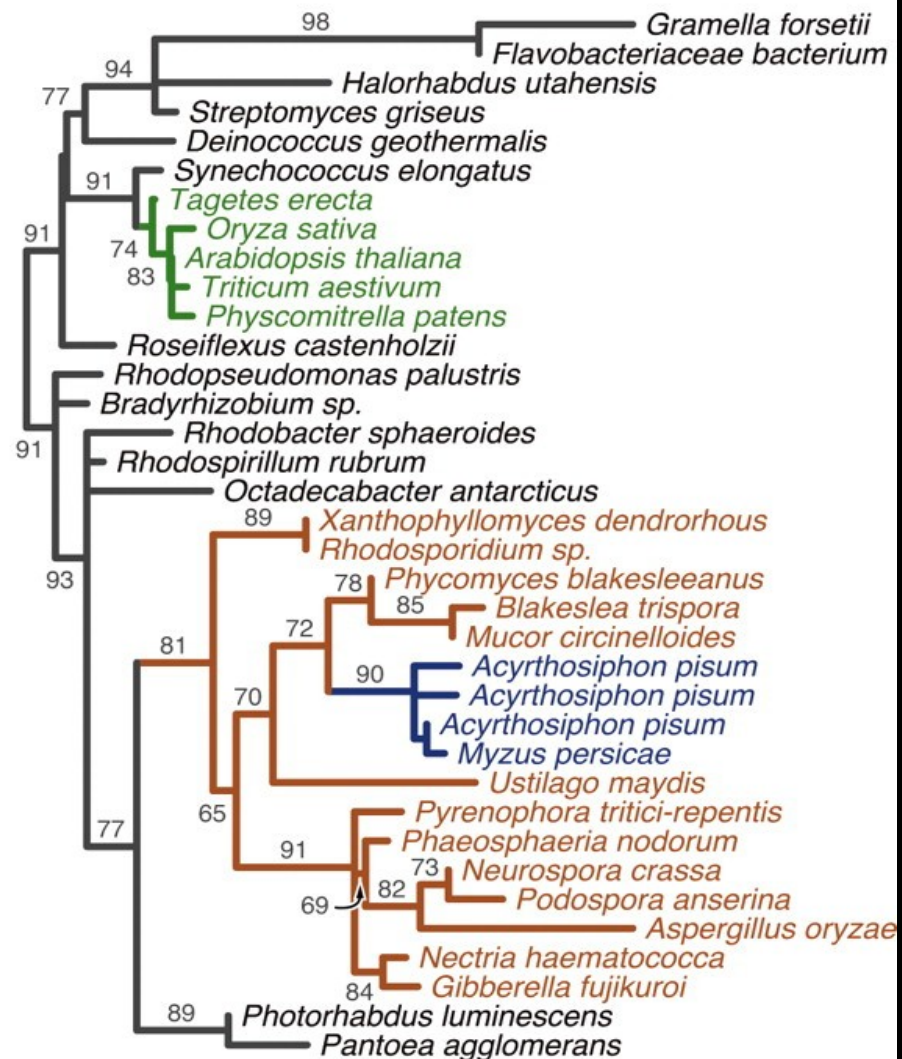
HGT Example 1: Carotenoids

- No animals produce carotenoids
- Reported carotenoid synthesis in aphids
- Carotenoids impart red or green colouring
- Not from plants or symbionts

A

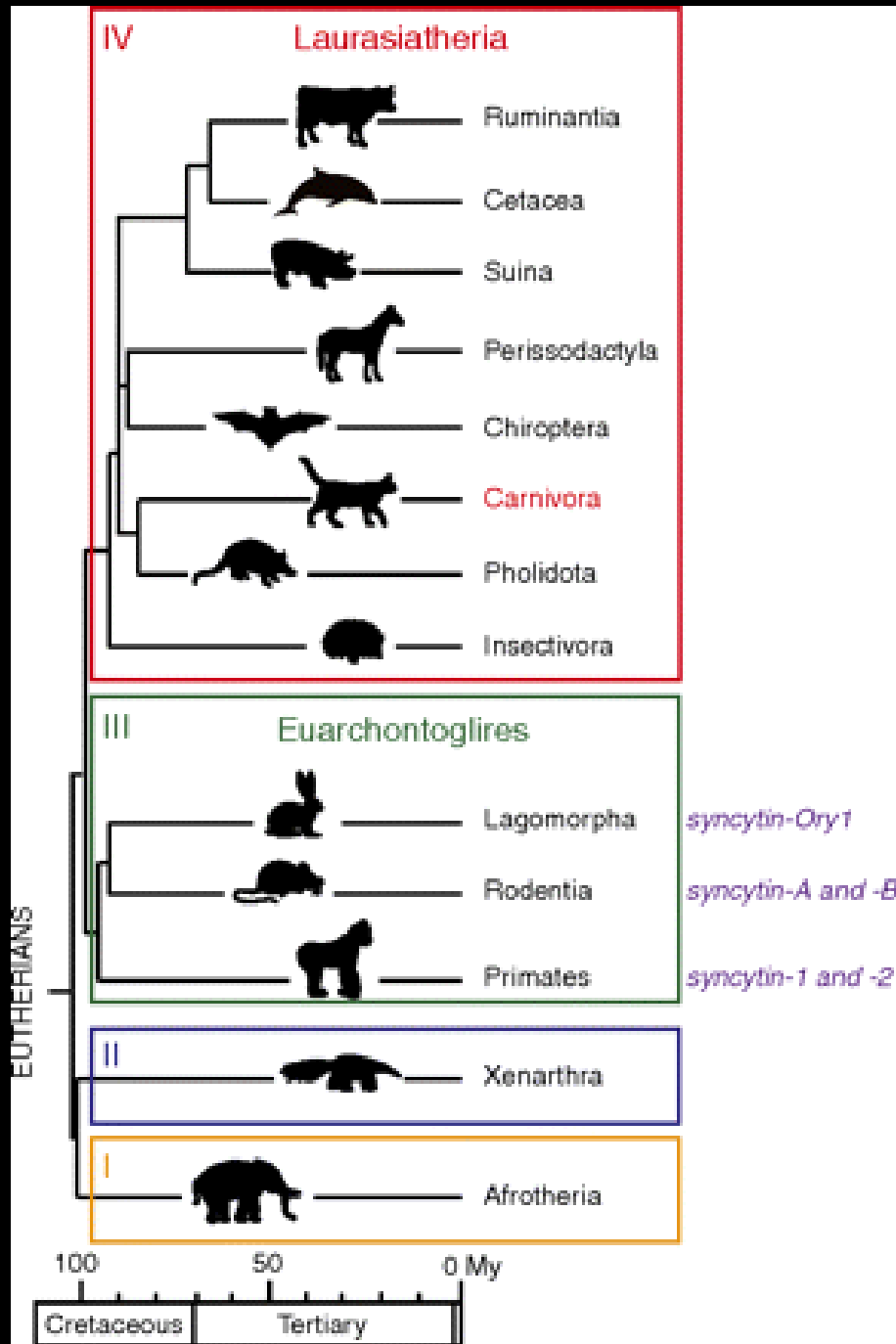


B



— Bacteria — Plants — Fungi — Aphids

HGT Example 2: Syncytins



- Retroviral origin
- Cell-cell fusion
- Essential for placentation
- Independently acquired in multiple lineages, incl. humans

The Microbiome

- Microbes are everywhere
- $1,7 \times 10^6$ – 40×10^6 viruses m^{-3} air
- $0,9 \times 10^6$ – 11×10^6 bacteria m^{-3} air
- 10X more bacterial than human cells
- Mitochondria is endosymbiont
- Influenced by mode of birth



Implications for identity

© Mattias Ormestad



Aliivibrio fischeri &
Euprymna scolopes

Rhizobium & legumes



© Ninjatacoshell

Main functions of gut flora

Metabolic

Fermentation of non-digestible dietary residue and endogenous mucus: salvage of energy as short-chain fatty acids, production of vitamin K, absorption of ions

Trophic

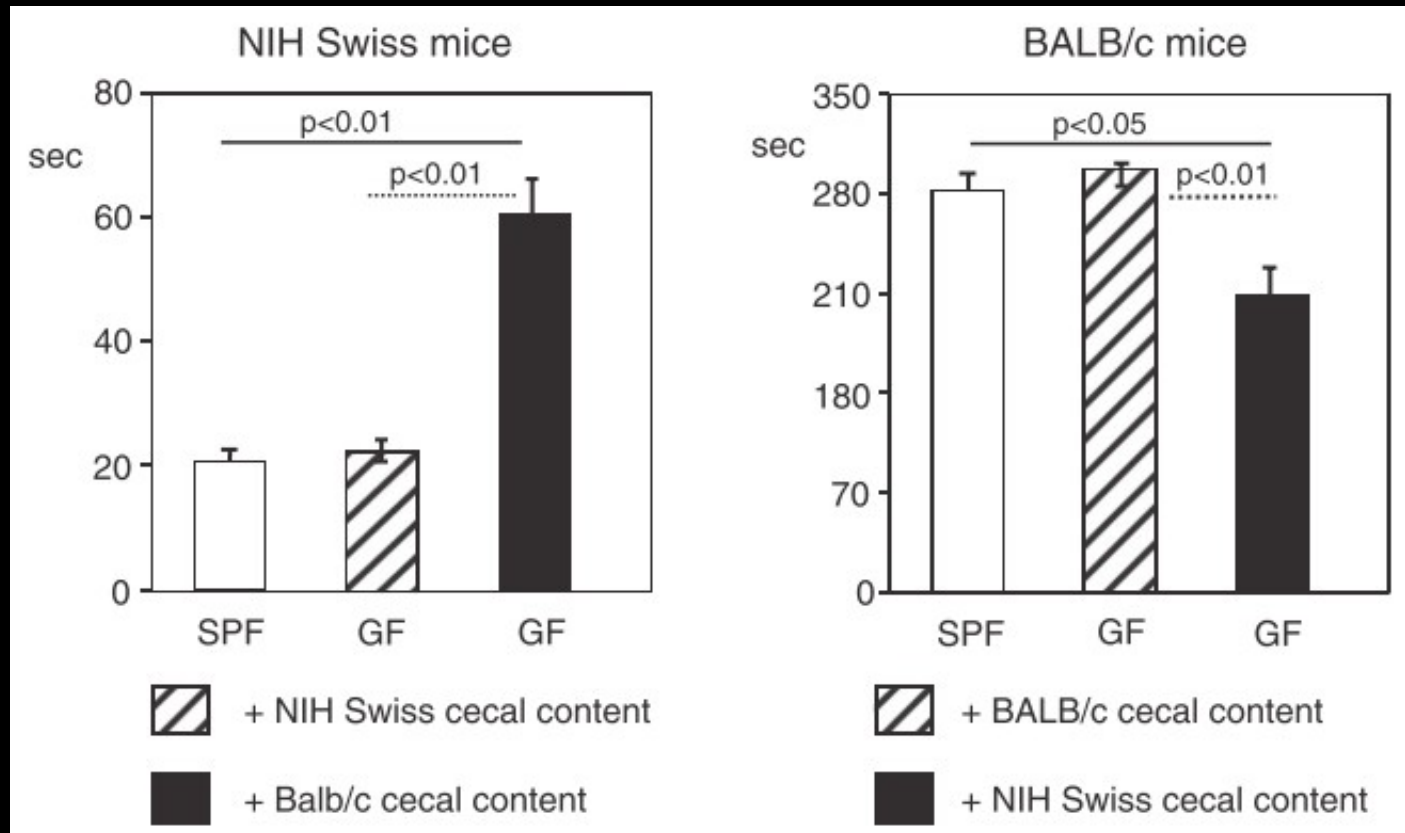
Control of epithelial cell proliferation and differentiation; development and homoeostasis of the immune system

Protective

Protection against pathogens (the barrier effect)

In humans...

Implications for identity



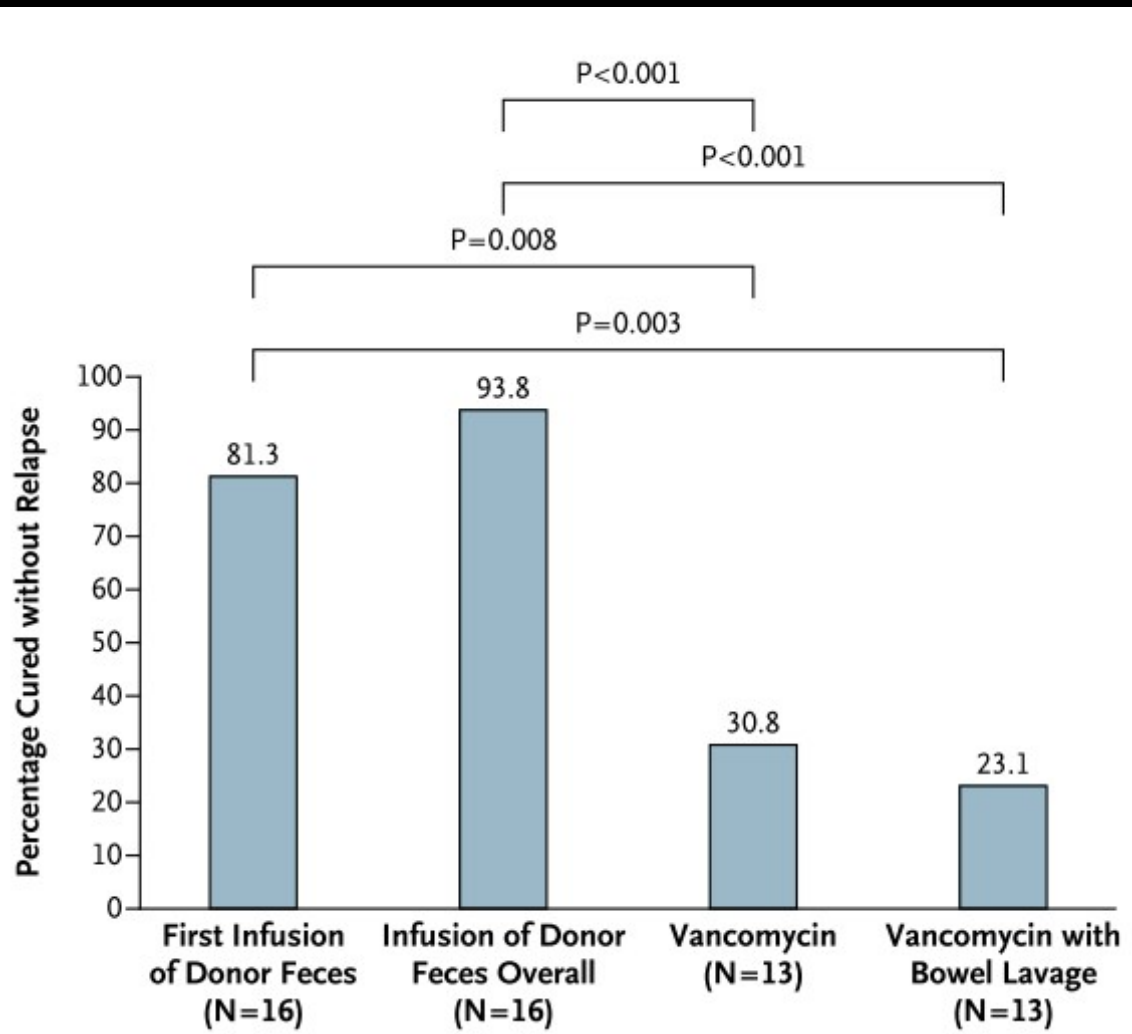
2003 Current Opinion in Microbiology

- Microbiome alters behaviour in mice
- *Toxoplasma gondii* infection alters rat behaviour

Micro Example: Faecal Transplants

- *C. difficile* infection causes diarrhoea to inflammation of colon
- Treated with antibiotics but recurs with decreasing susceptibility
- Faecal transplant can restore microbial balance
- Effective in 145/166 (87%) of reported cases

Micro Example: Faecal Transplants



- Trial stopped early
- 15/18 (83%) with vancomycin recurrence cured
- Minimal side effects
- Increased microbial diversity

CANADA

TRENDING

[Rob Ford](#) | [Mike Duffy](#) | [Nigel Wright](#) | [Grey Cup](#) | [UFC](#) | [Justin](#)

Toronto hospital building a revolutionary 'poop bank' as antidote against *C. difficile*



TOM BLACKWELL | 04/11/13 | Last Updated: 04/11/13 6:35 PM ET

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Conclusions

- Genes are mobile
- “Individuals” can be more than one species
- Fluidity of living organisms needs to be kept in mind

