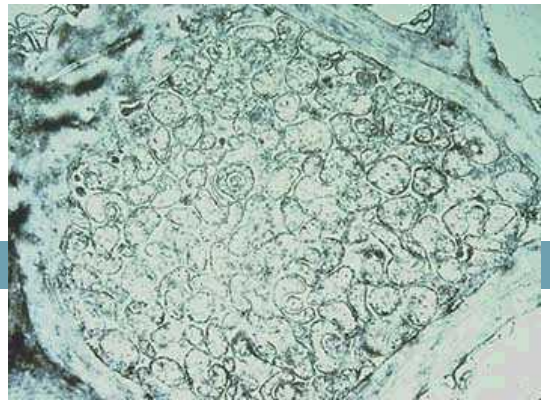
VECTOR TRANSMITTED PHYTOPLASMAS

Nomination - NPDRS Plan

Class Mollicutes



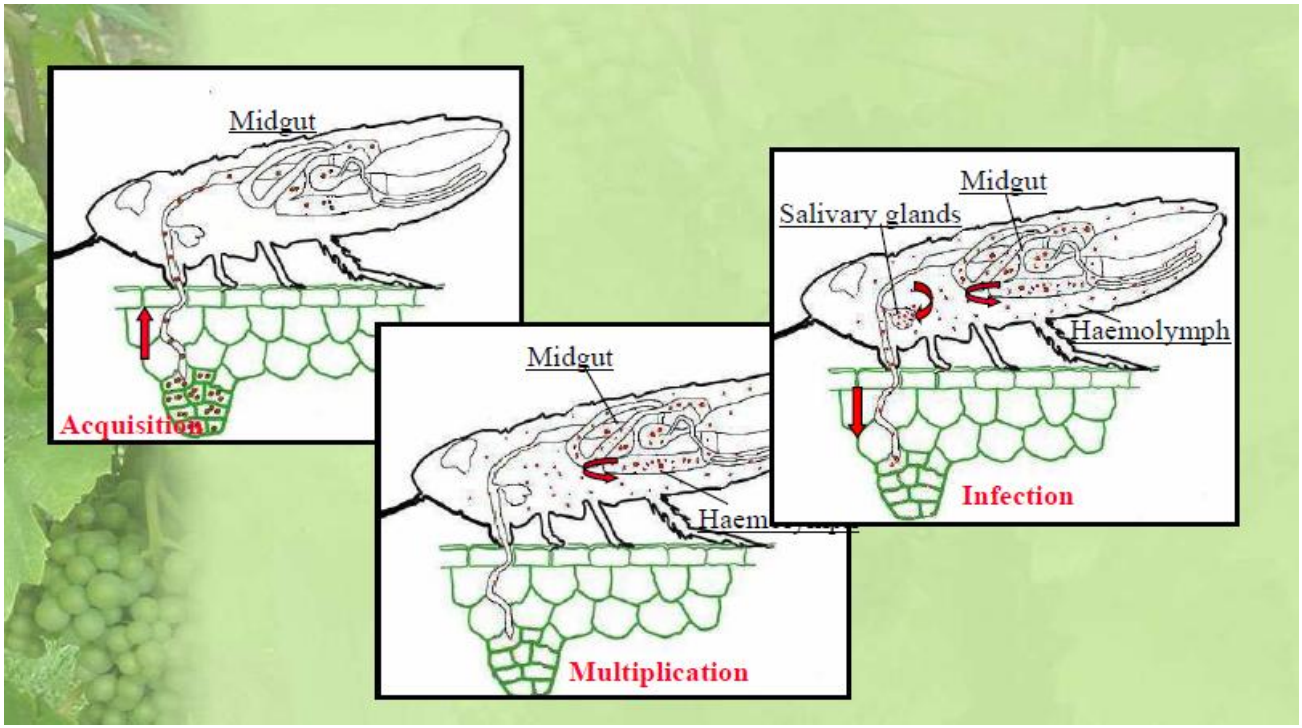
- Phytoplasmas, spiroplasmas & mycoplasmas
- Degenerate walled bacteria, not primitive precursors
- Clostridial /Bacillus precursors - **Reductive evolution**
- Osmotically fragile
- Morphology - **pleomorphic**
- Reside in phloem sieve tubes of infected plants, move systemically

Phytoplasma pathogenicity

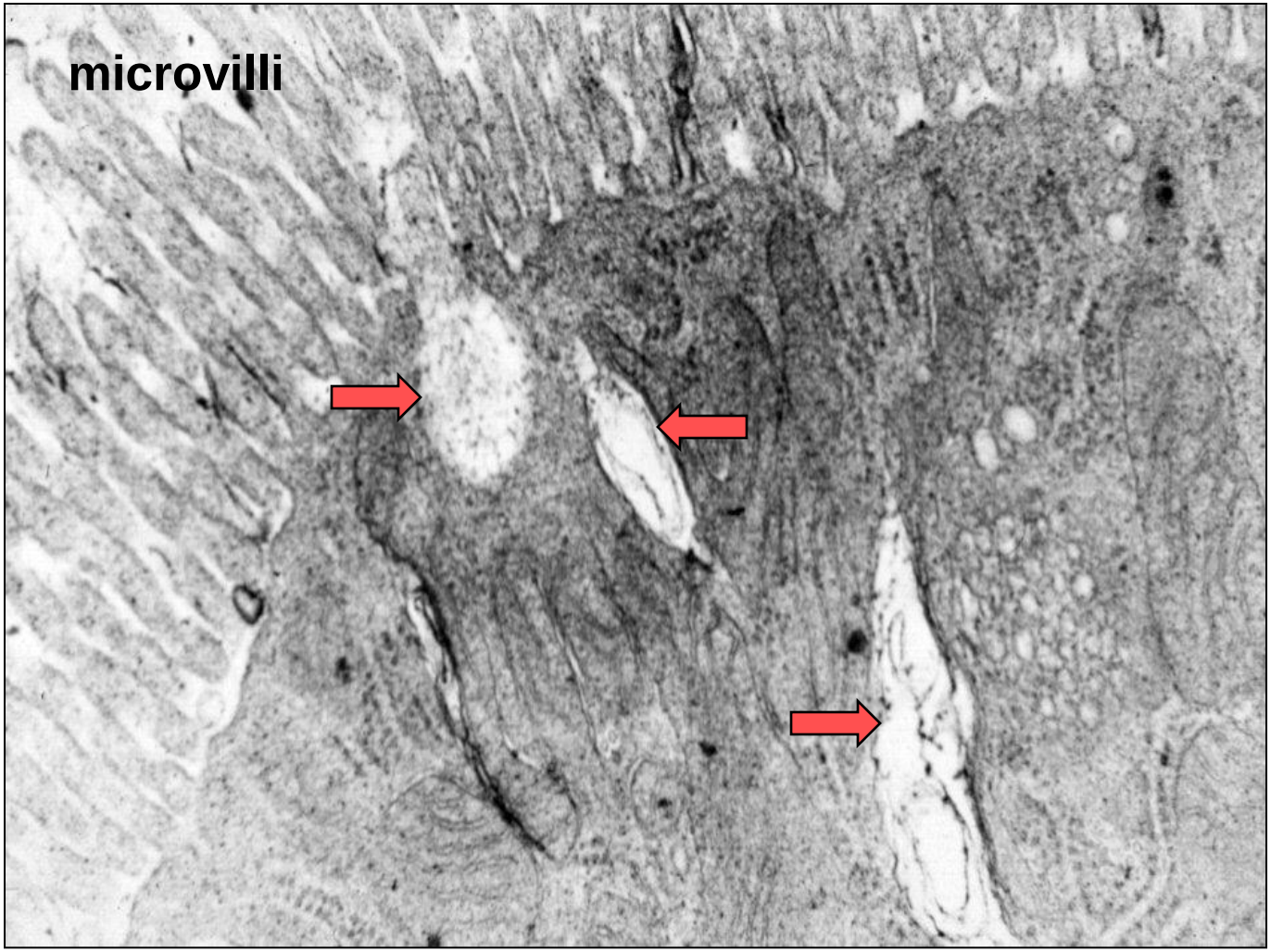
- Genus ***Phytoplasma*** contains numerous **"candidatus"** species
- Not cultivable – **obligate parasites** of plants and insects
- Size ~500 nm diameter
  - Tiny genomes (530 -1350 Kb)
  - AT rich, GC poor
  - Contain plasmids & viruses
- Not helical

Transmission - Insects

- LH are true alternate hosts
- Transmission is circulative – propagative
- Mollicute-leafhopper interaction varies

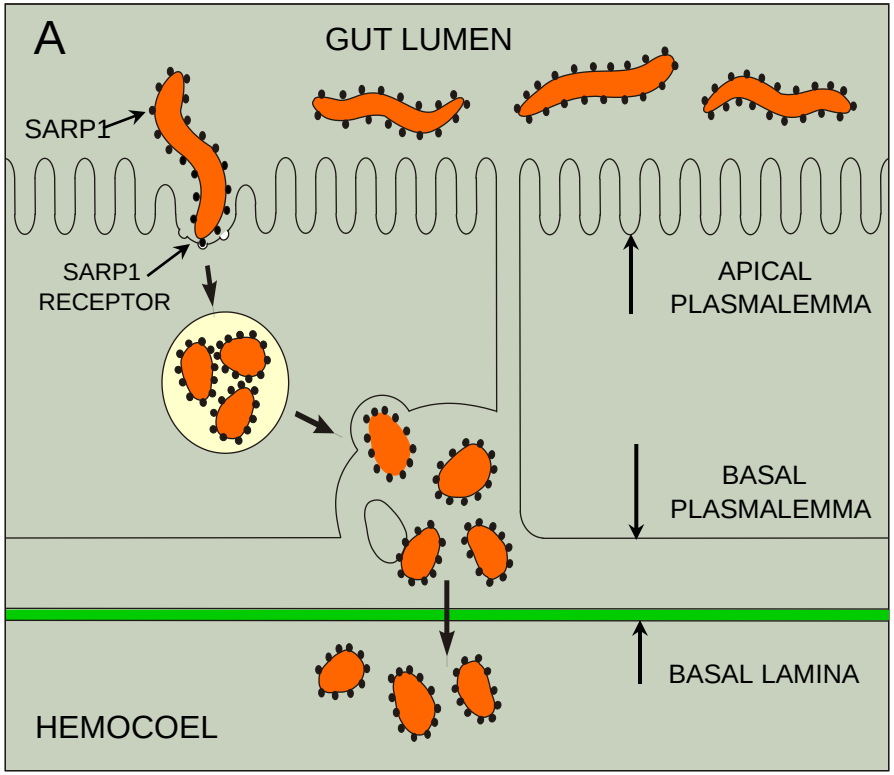


Mollicute entering leafhopper gut cells



A. Wayadande

Mollicute path within the insect vector



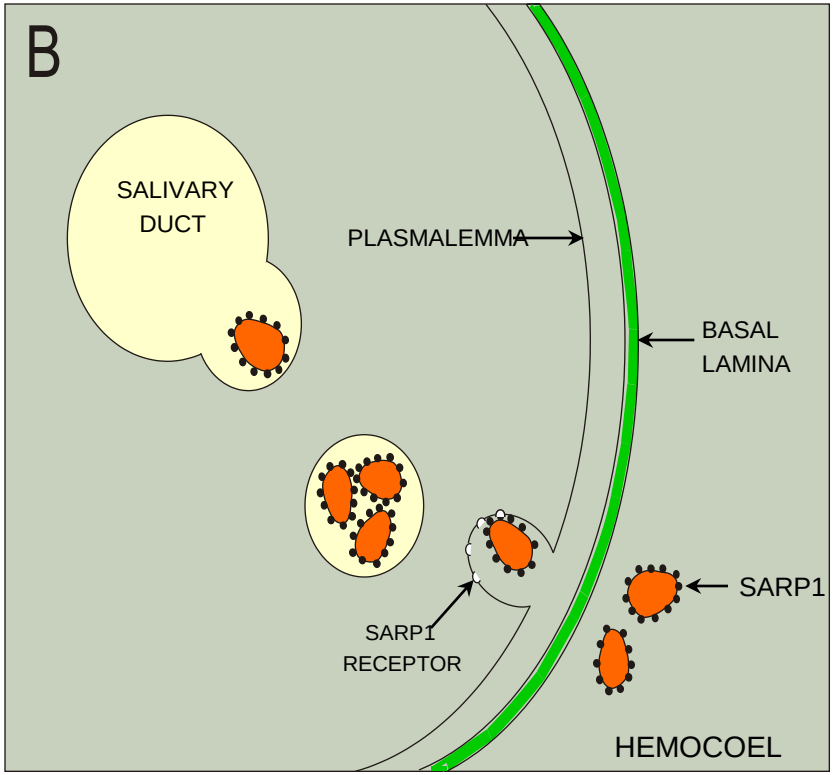


Diagram: A. Wayadande

All phytoplasmas are phytopathogens…

Pathogen	Disease	Host	Vector(s)
Candidatus Phytoplasma mali	Apple proliferation	Apple	Several leafhoppers, planthoppers, psyllids
Candidatus Phytoplasma asteris	Aster yellows	Many vegetables, fruits, ornamentals	*Macrosteles quadrilineatus* (Aster leafhopper)
Candidatus Phytoplasma australiense	Grapevine yellows	Grapes	*Scaphoideus titanus*

…and all are transmitted by insects

Aster yellows

Macrosteles quadrilineatus

Aster yellows in carrot

Aster yellows in lettuce

Grapevine yellows

Scaphoideus titanus

Apple proliferation phytoplasma

Witches' broom

Fieberiella florii is reported in parts of the United States and Canada.

Fruits small, off-color

April 9, 2013

New Apple Disease Found In Canada

The USDA Animal and Plant Health Inspection Service (APHIS) has been notified by the Canadian Food Inspection Agency (CFIA) that they have detected apple proliferation phytoplasma in an apple orchard near Kentville, Nova Scotia. The affected orchard has been placed under quarantine. ***The affected trees are Pacific Gala and were imported into Canada from the U.S. in 2008.*** This is the first APP detection in North America.

Management of apple proliferation

- APP, or '*Ca. P. mali*', is a quarantine pest in both Canada and the U.S.
- Use clean propagation material
  - Budding and grafting
  - Trade of infected rootstock, scionwood, or budwood
- Use of resistant cultivars
- Insect control
- Cultivation practices

- **Note:** APP genome has been sequenced – approx 600 kb