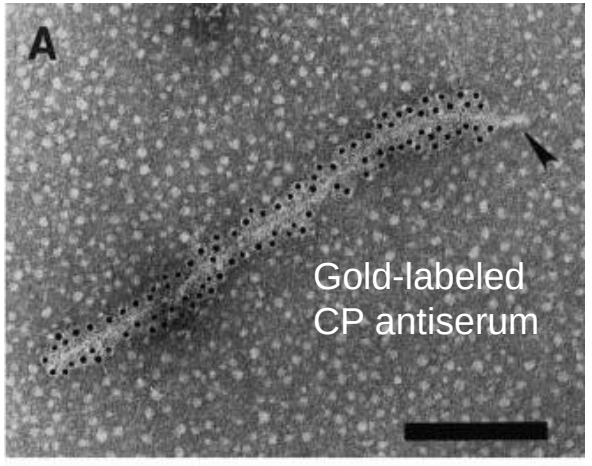
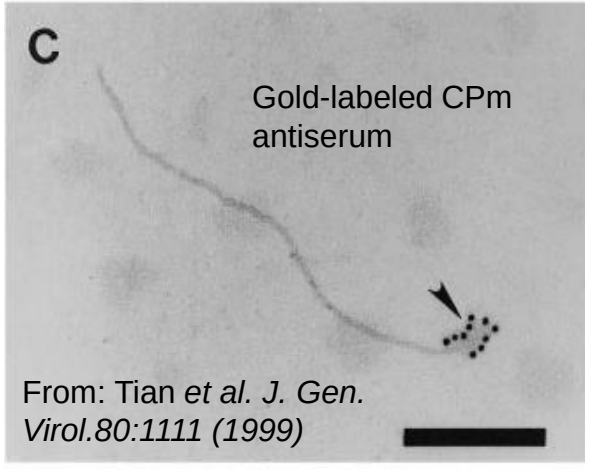
Citrus Tristeza Virus
Reminder

CTV Virion:

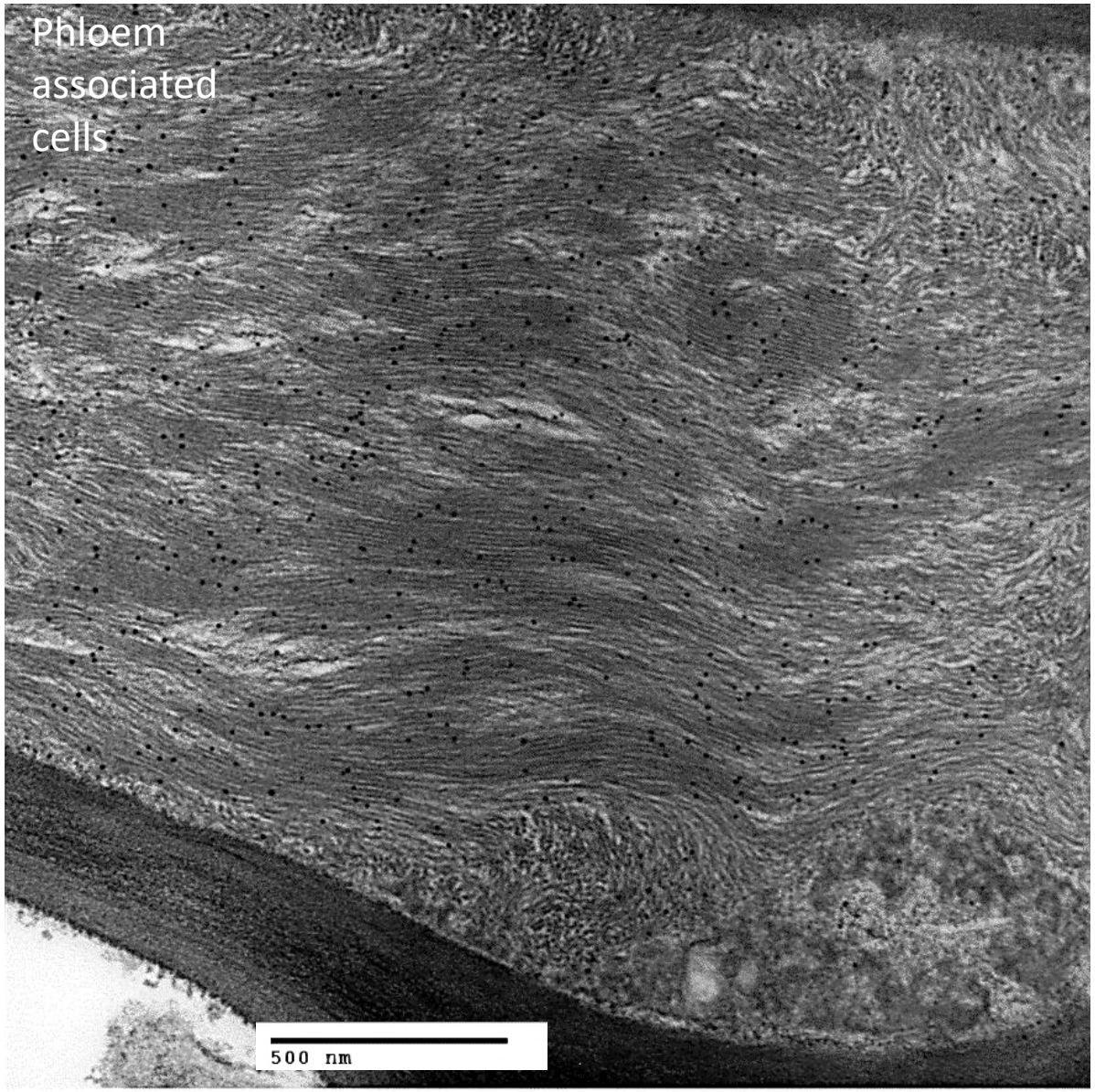
- long flexuous particles, 2µm long × 10–12 nm in width.
- The virions have helical symmetry with about 8-9 capsids per helix turn, and a central hole of 3-4 nm.





From: Tian *et al. J. Gen. Virol.80:1111 (1999)*

CP Antibody



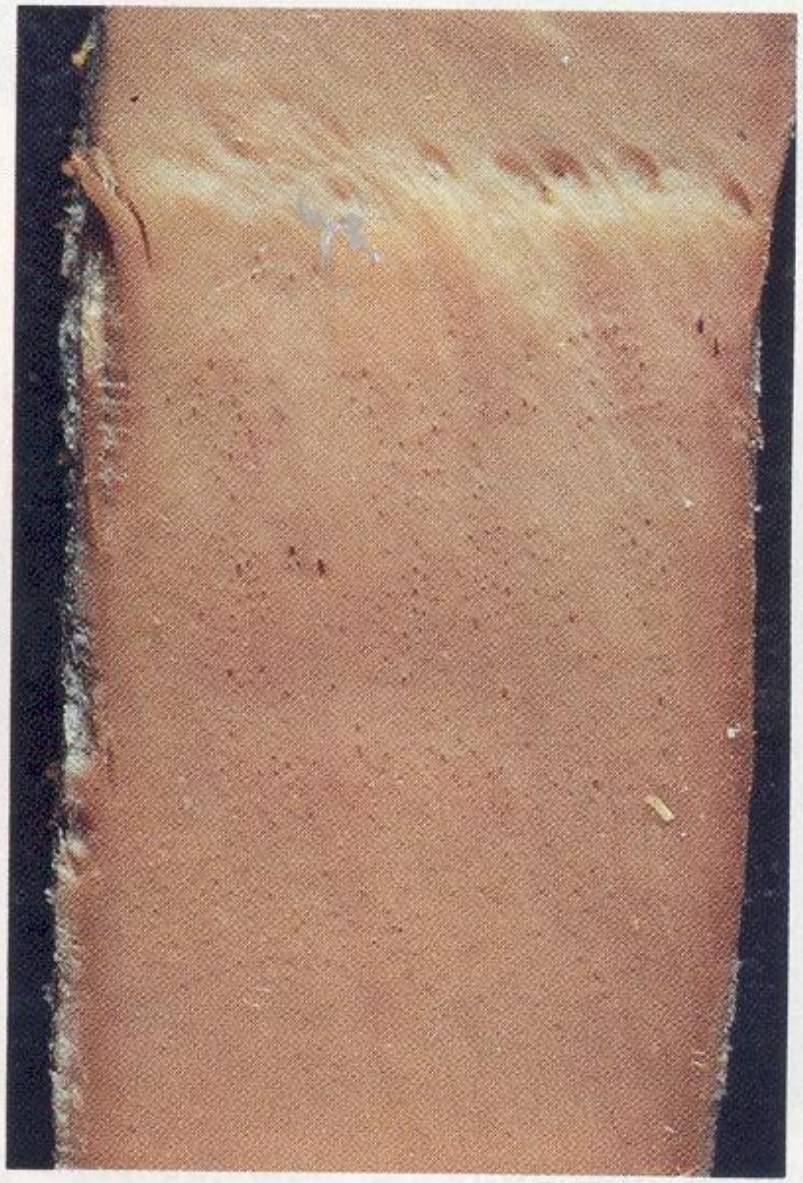
Brief History:

- CTV existed in Asia for centuries, with growers adapting tolerant varieties
- Out of Asia, citrus got heavily infected with *Phytophthora sp.,* which was managed by adapting the more tolerant **sour orange** rootstock.
- The result- citrus production in many areas was almost entirely based that single rootstock.
- This decision had grave effects when CTV pandemics swept throughout the world, causing ‘quick decline’ (death) of trees on this rootstock.
- Since the 1930's that the extent of this deadly disease problem manifested itself first in Argentina and shortly later in Brazil and California, with the death of millions of trees
- Switching to non-sour orange rootstock eliminated the danger from CTV decline.
- But now, with HLB, growers are switching back…

Citrus Tristeza Virus (CTV) – Decline

106. Tristeza-induced quick decline of a sweet orange tree on sour orange rootstock (left); the failure of most fruit to abscise indicates that the tree declined rapidly.

CTV decline is associated with death of phloem near the bud union, resulting in a girdling effect that may cause the overgrowth of the scion at the bud union, loss of feeder roots and thus drought sensitivity, stunting, yellowing of leaves, reduced fruit size, poor growth, dieback, wilting, and death.



107. Pinholing, or honeycombing, in the inner face of the bark of a sour orange rootstock below the bud union of a tristeza-infected tree.

Roots of declining tree – no feeder roots

Citrus tristeza virus (CTV) – decline

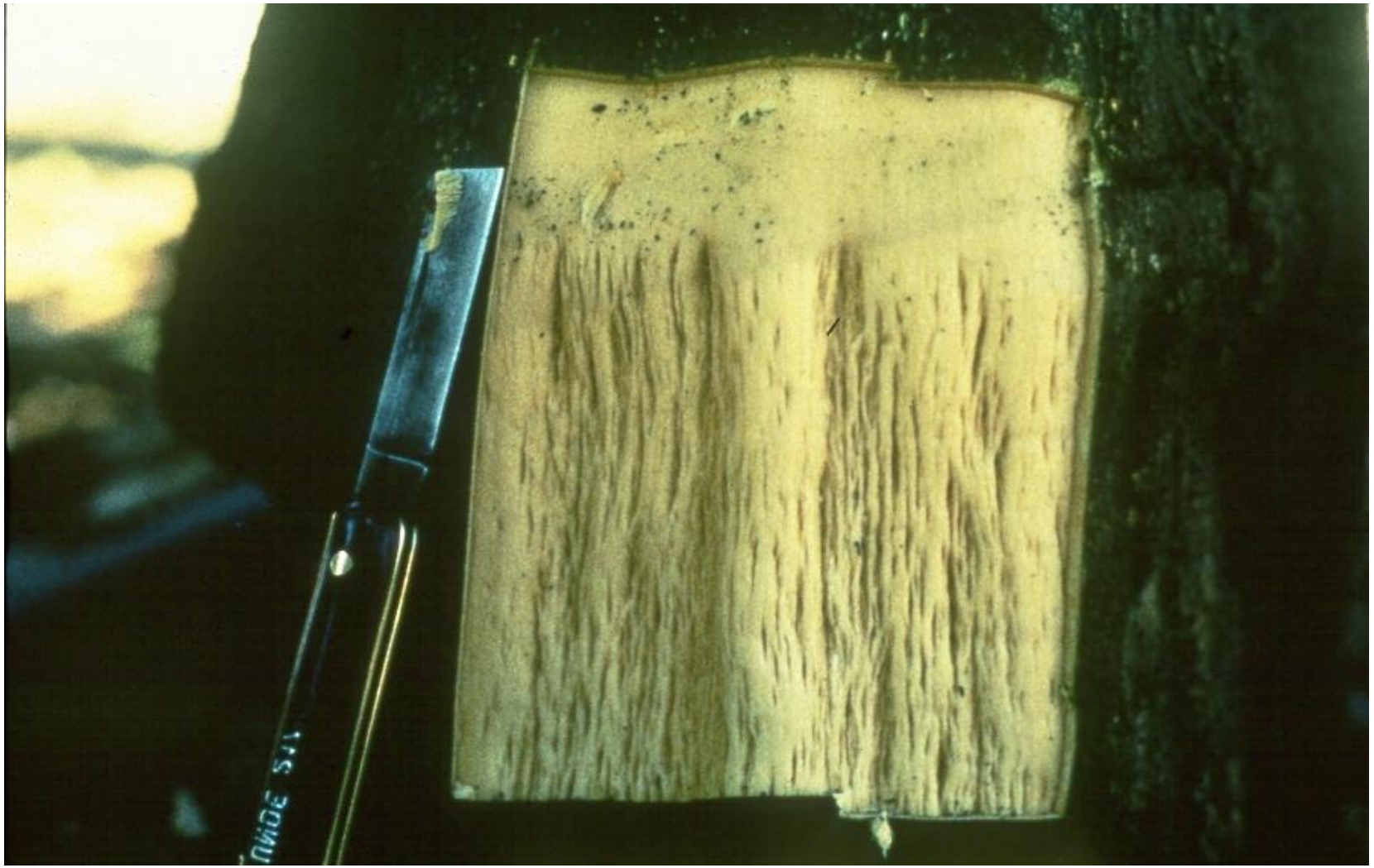
- **Transmission and Epidemiology**
  - aphid transmitted by a series of aphids, brown citrus aphid best
    - also melon, cotton aphids
  - transmitted in a semi-persistent manner – ~ 1 hr to ~ 24 hr

- **Identification**
  - in field, identify rootstock – sour orange
    - bud union staining, scion overgrowth, thickened bark at union
  - serology – ELISA detect CTV; can differentiate FL mild from decline
  - PCRs
  - biological assay in greenhouse
    - vein clearing and leaf cupping in Mexican lime

- **Control**
  - use alternative rootstock
  - use virus-free or decline-free budwood
  - Spraying pesticide to control vector (Aphids)
  - *(cross protection)*

Citrus Tristeza Virus (CTV) – Stem Pitting

Stem pitting results in pits in the wood under depressed areas of bark and are often associated with severe stunting and considerably reduced fruit production.



Duncan Graprfruit

Citrus tristeza virus (CTV) – stem pitting

no severe stem pitting isolates of CTV known to be in Florida (moderate isolates are here)

every effort is being made to keep them out

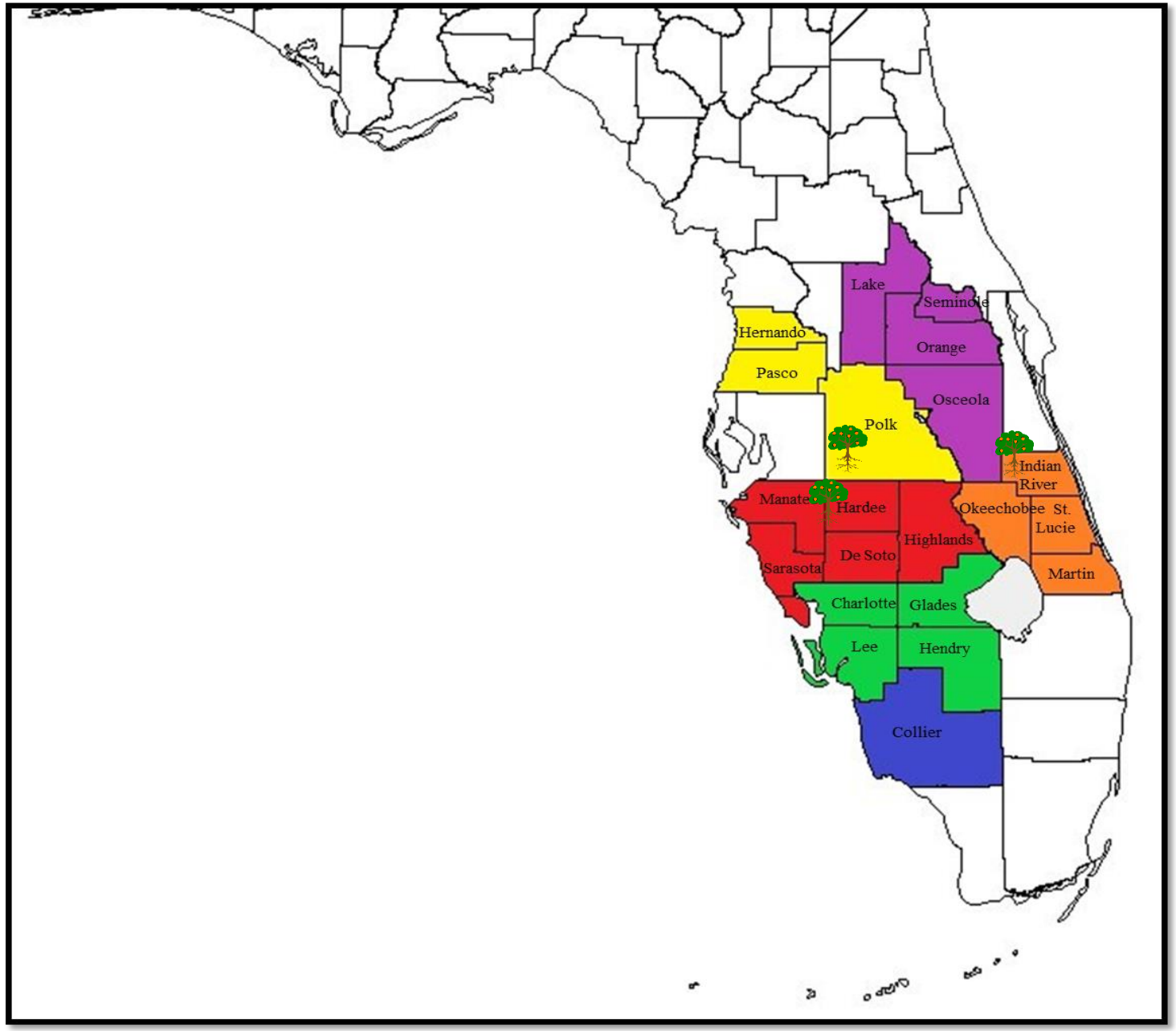
- **Host Range and Symptoms**
  - reduces vigor, reduces growth, reduces yield and fruit size
  - stem pitting is specific to virus isolate and host
  - some isolates cause stem pitting in grapefruit
  - some isolates cause stem pitting in sweet orange
  - some isolates cause stem pitting in both
  - In Florida, mandarins are more tolerant

- **Control**
  - keep stem pitting isolates out
  - mild strain cross protection

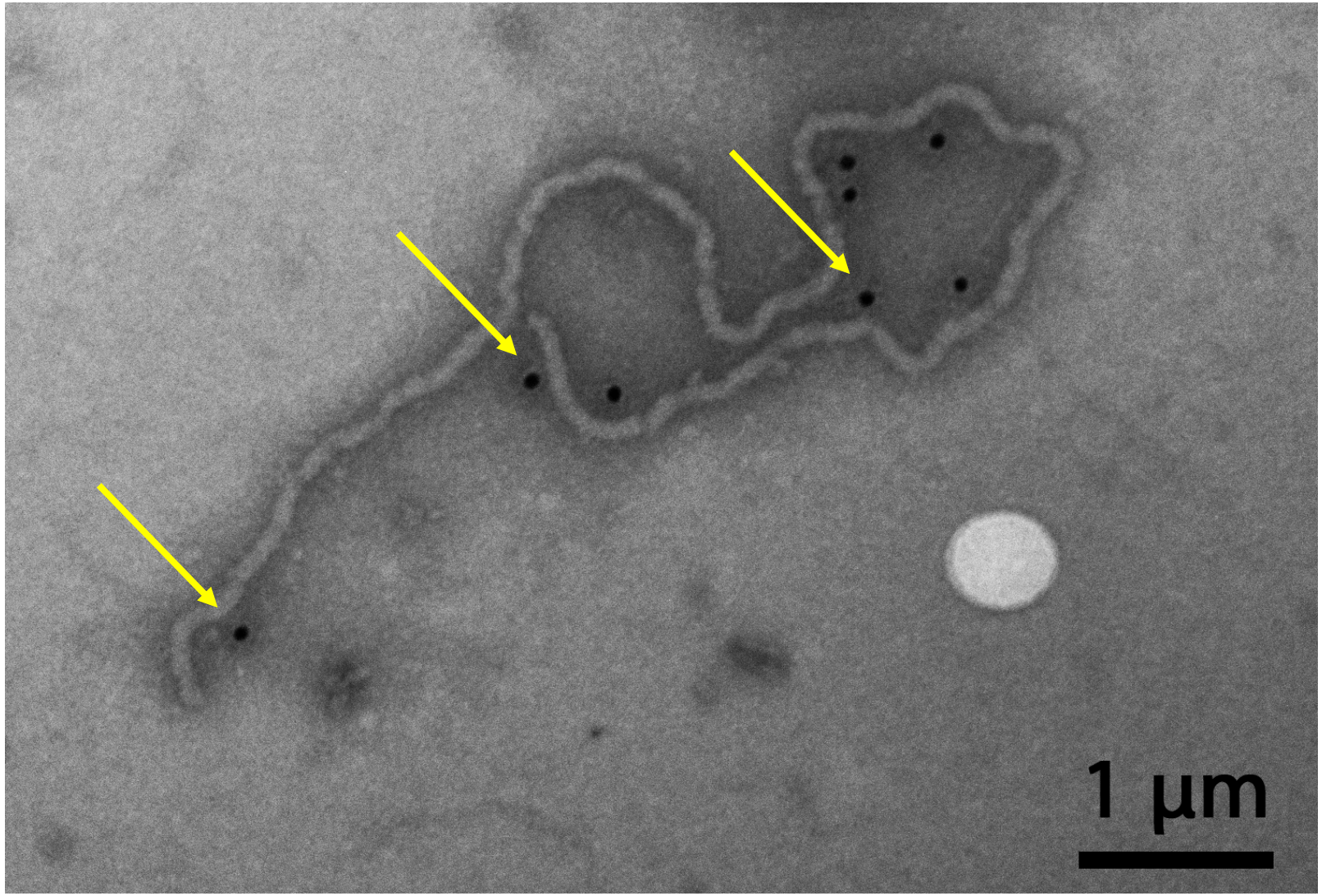
- CTV is transmitted aphids. The brown citrus aphid is the most efficient vector of CTV
- It is sometimes assumed the brown citrus aphid was eradicated by the psyllid spray programs, but this is **not** correct
- All aphids are capable of periodic outbreaks when conditions are right

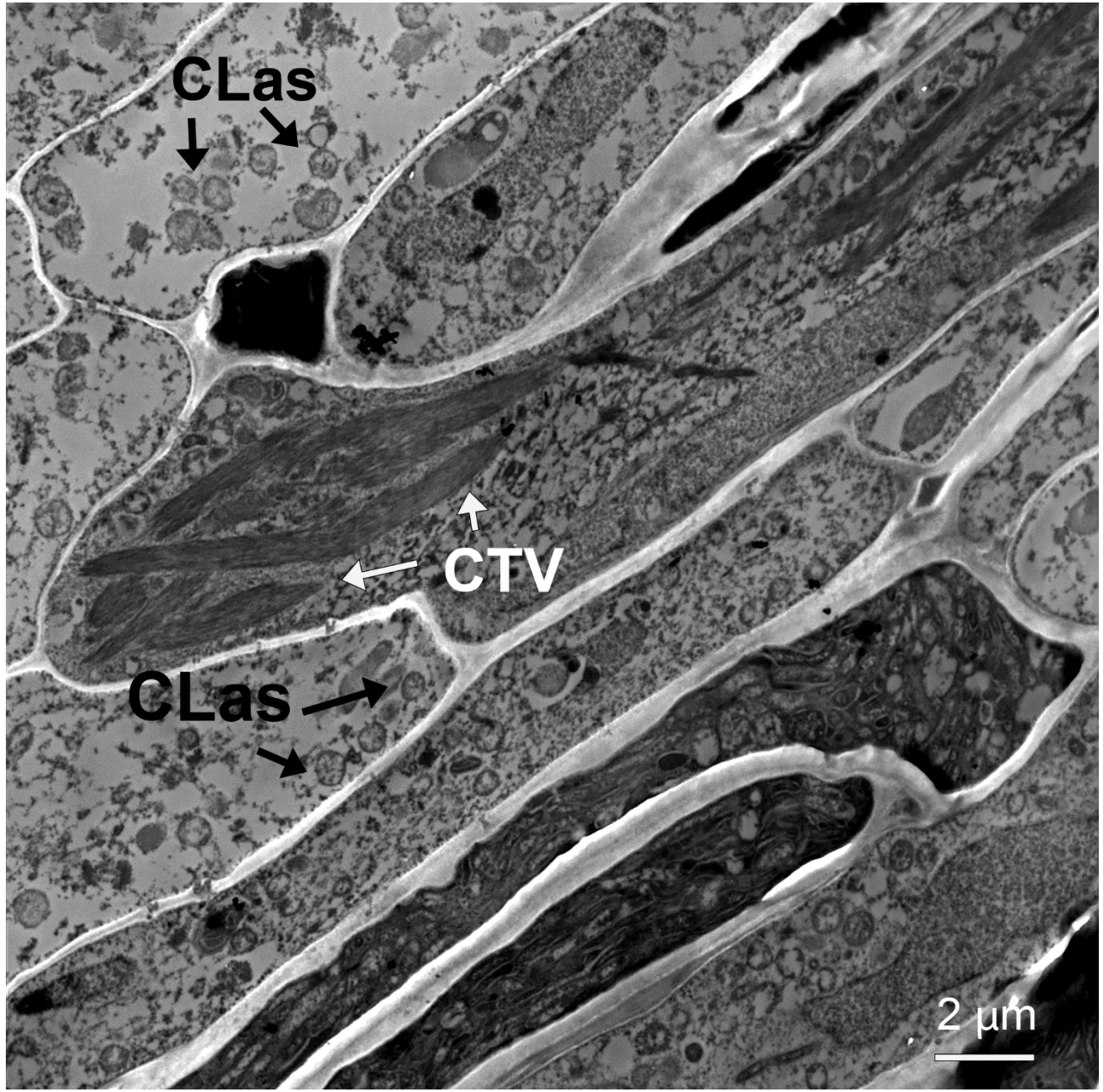
CTV IS STILL PRESENT IN FLORIDA

- Surveys were conducted to study the presence of viruses, including CTV, in Florida, using plant and psyllid samples
- Psyllids were collected from over 20 counties (Ozgur Batuman)
- Plants were collected from Polk, Hardee and Indian River Counties



- CTV was found **in each** psyllid sample analyzed
- CTV was found in trees on sour orange rootstocks in both Polk and Indian River Counties
- Results demonstrate CTV is still present in Florida


1 µm


CLas
CTV
CLas
2 µm

- **CTV is still present in Florida**
- **The virus can be transmitted to new plants, especially during aphid outbreaks.**
- **In switching to sour orange rootstocks there is always a risk of tristeza decline infection.**
- **We are looking to test trees on sour orange (amitlevy@ufl.edu)**

If you experience quick decline on sour orange:

- Contact your local UF/IFAS extension office or CREC
- Or Florida Division of Plant Industry 1-800-282-5153

Acknowledgement: *Peggy Sieburth*
William Dawson
Ozgur Batuman