"120 YEARS WITH CHESTNUT BLIGHT: WHICH LESSONS HAVE WE LEARNED?"

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Annual meeting of the
Forest Invasive Species Network for Europe and Central Asia (REUFIS) on
THE ROLE OF INVASIVE SPECIES IN URBAN FOREST PLANNING
Skopje, 4-6.VI.2025

Overview
Cryphonectria parasitica

Chestnut blight, canker

Kastanienrindenkrebs

Cancro del Castagno

Kastane Kanseri

Рак по питомиот костен

INTRODUCTION

Keywords:

invasive species,
introduced pathogens;
chestnut blight;
Cryphonectria parasitica
History of distribution and spread;

SPECIFIC ASPECTS

Reproduction;
Hypovirulence;
Vegetative compatibility and MAT;
Various methods for biological control.

Introduced "forest" plant pathogens = invasive species

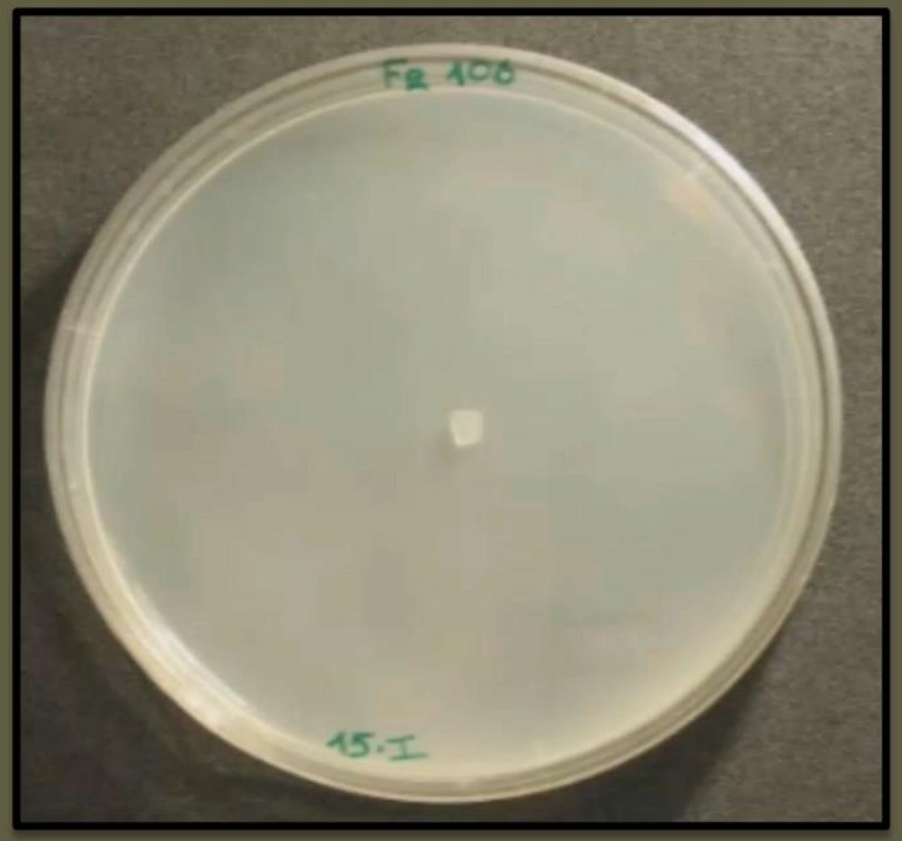
- *Phytophthora cinnamomi*
- Dutch Elm Disease (*Ophiostoma ulmi* & *O.novo-ulmi*)
- Chestnut Blight (*Cryphonectria parasitica*)
- Ash Dieback (*Hymenoscyphus fraxineus*)
- Canker Stain of Platanus (*Ceratocystis platani*)
- Box Blight (*Calonectria pseudonaviculata* & *C. henricotiae*)
- Dothistroma Needle Blight (*Dothistroma pini* & *D. septosporum*)


THE AMERICAN CHESTNUT
CASTANEA DENTATA

General symptoms

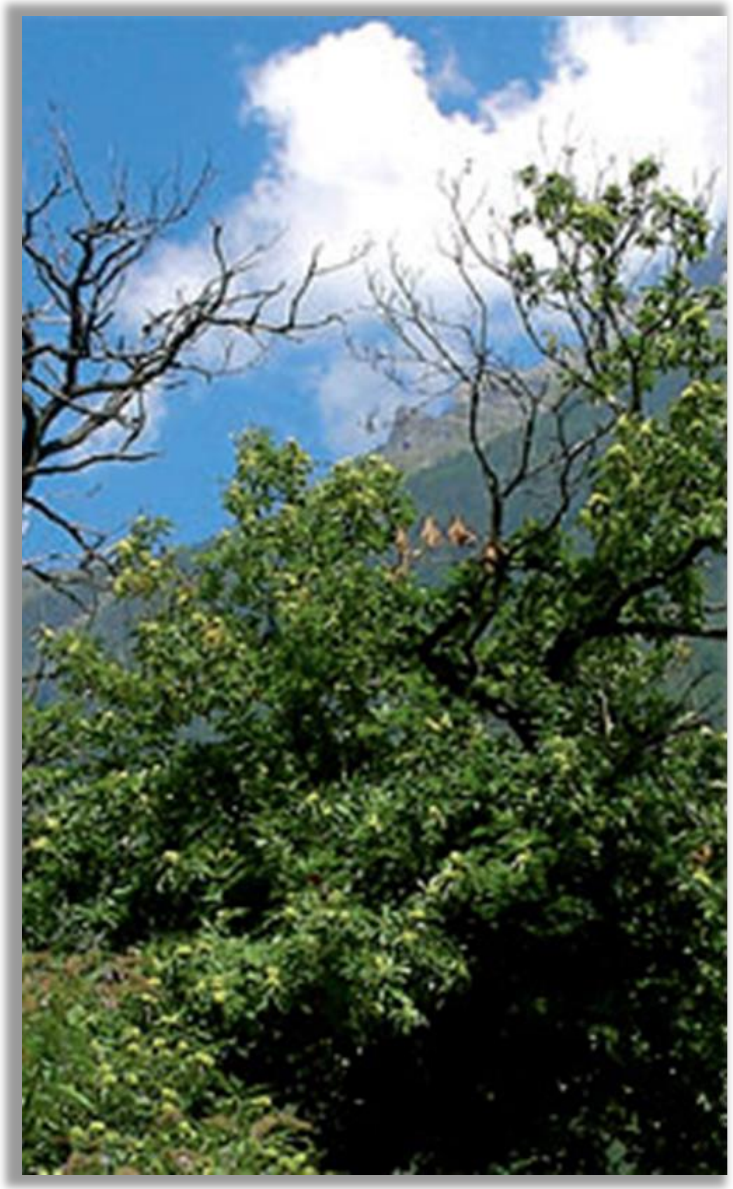
THE DEADLY FUNGUS
CRYPHONECTRIA PARASITICA

HYPHAE



NATIONAL CHESTNUT SYMPOSIUM

13-15th October 2022, Aydin Adnan Menderes University, Turkey



Host tree species

European sweet chestnut
Castanea sativa

up to 35m tall (4m diameter)

Host tree species

Chinese chestnut – *Castanea mollisima*

up to 18m tall, up to el. 2,440 m

Host tree species

Japanese (Korean) chestnut
Castanea crenata
up to 9m tall, up to el. 900 m

Symptoms 1/5

Initial change of color of the bark

Symptoms 2/5

Cracking of bark

Symptoms 3/5

Epicormic shoots

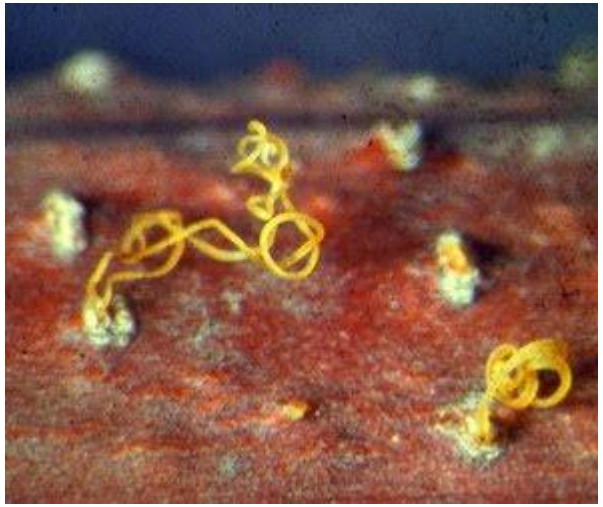
Symptoms 4/5

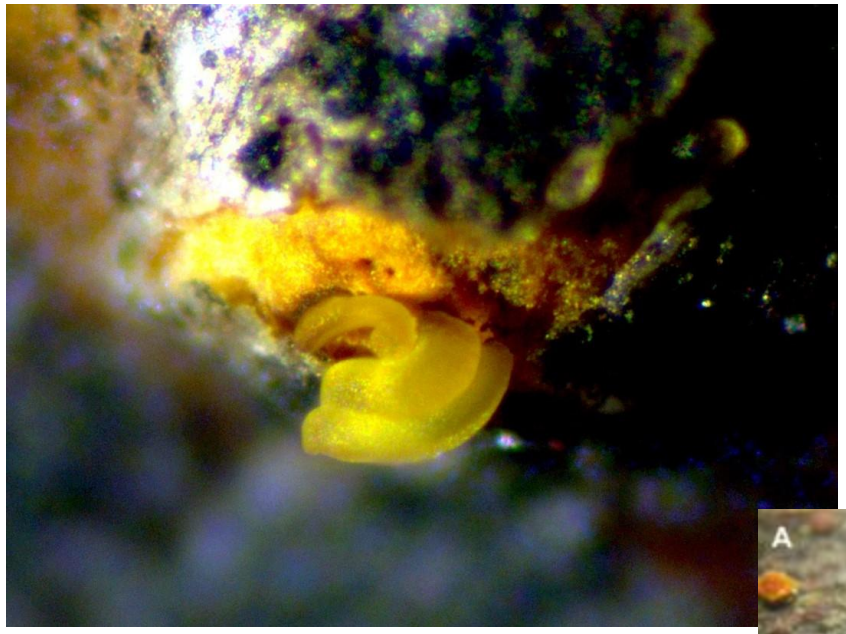
Yellowish–white mycelium is visible under the bark

Symptoms 5/5

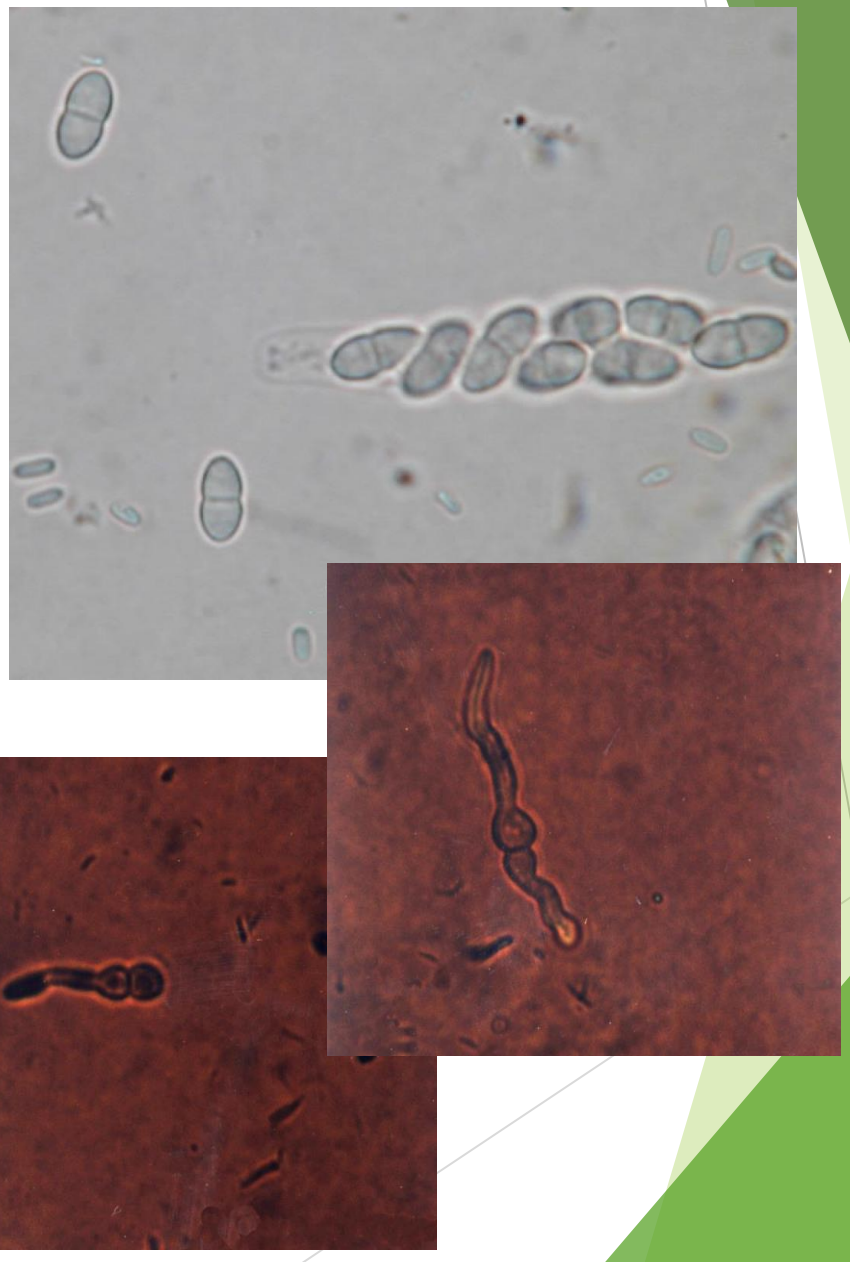
Stromata

Pycnidia





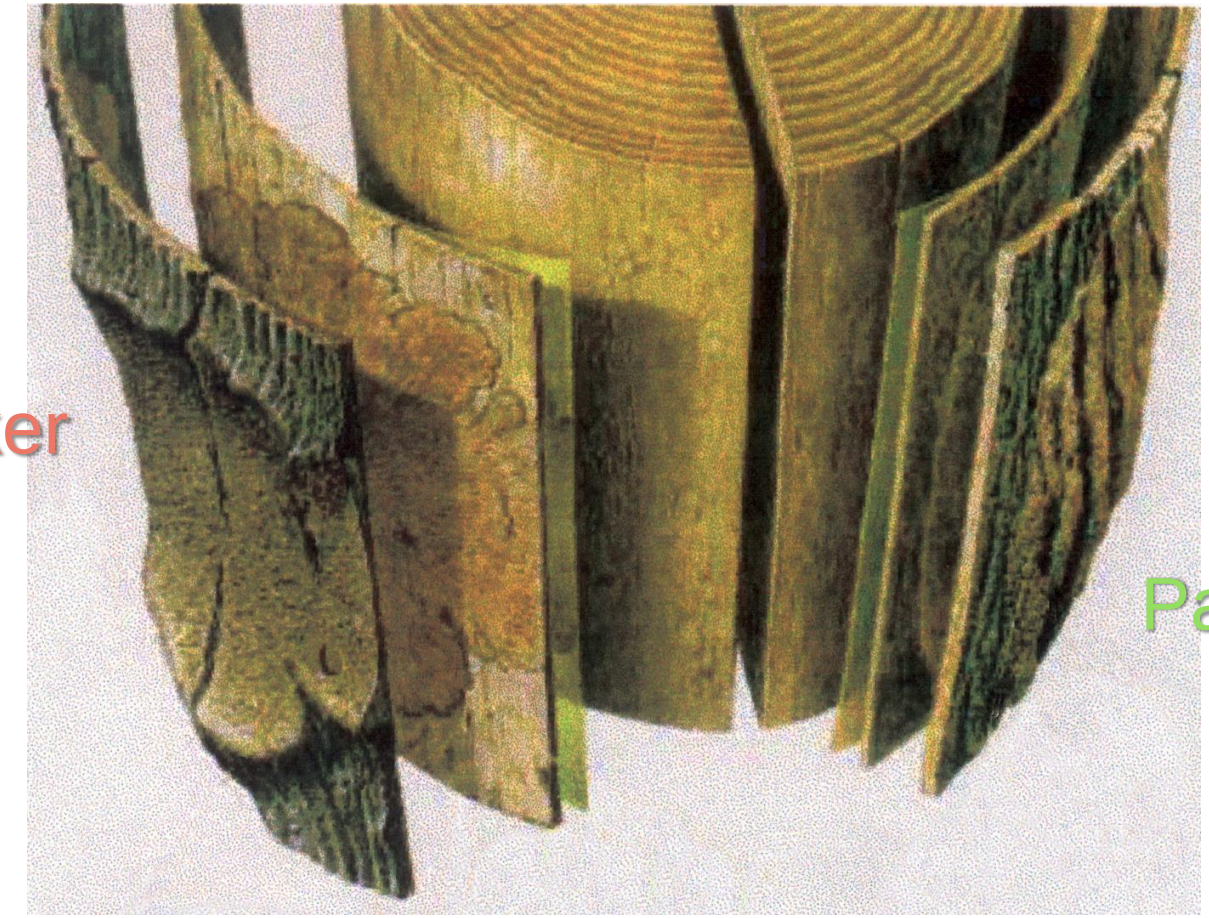
Perithecium, ascus, ascospore



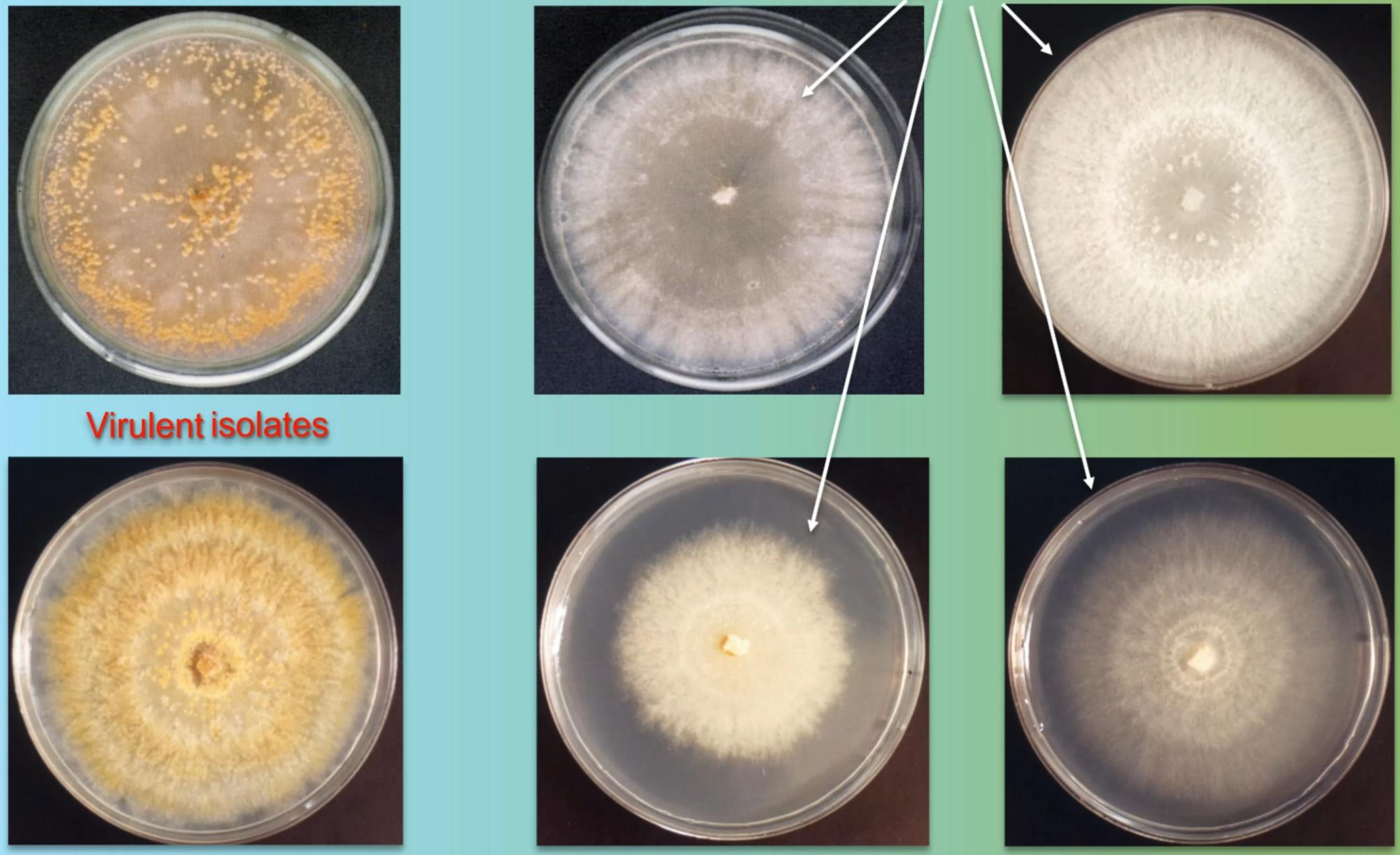
Hypovirulence = decreased virulence of the pathogenic fungus = the host plant survives

Active (deadly) cankers
vs
passive (healing) cankers

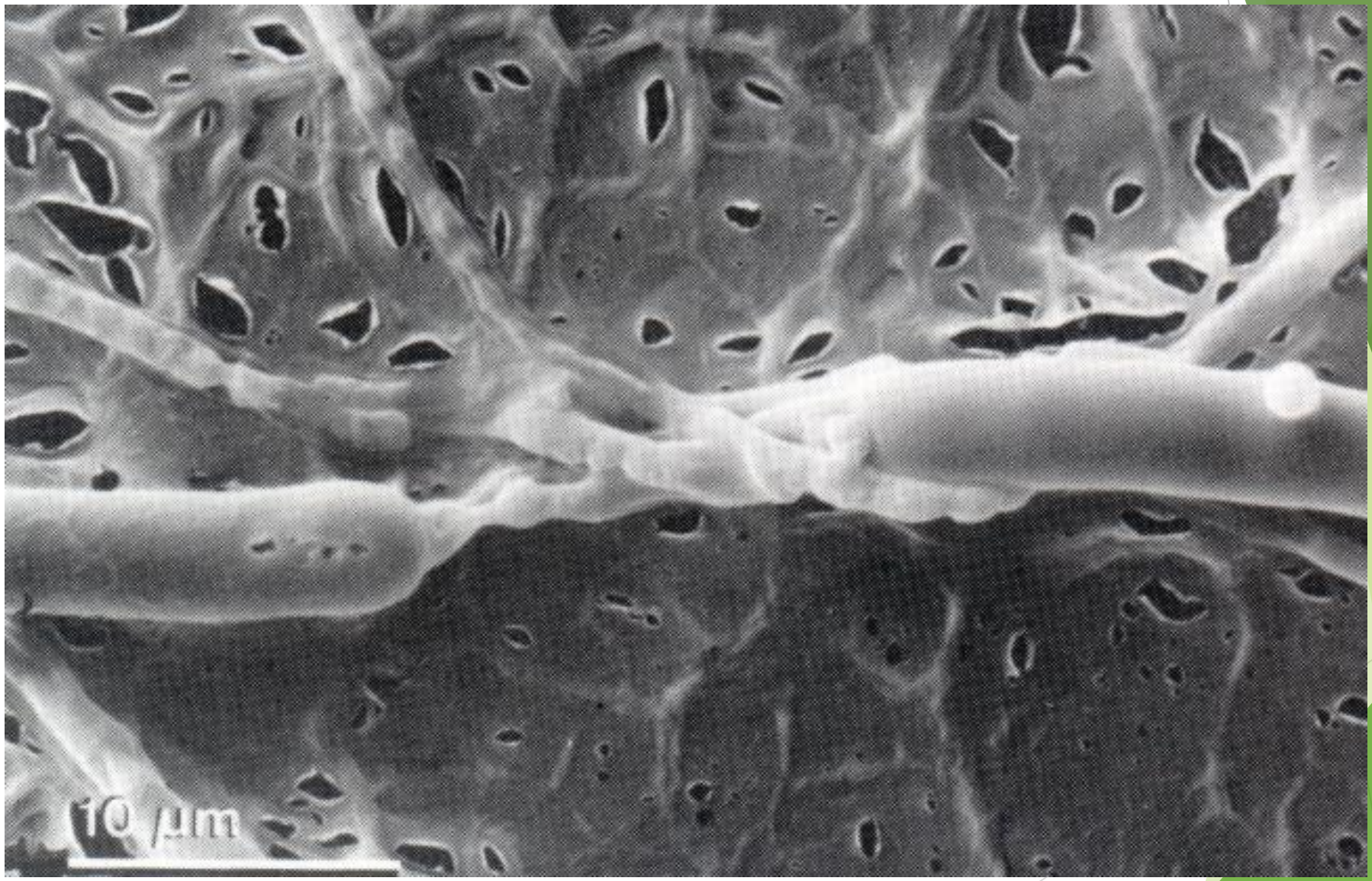
Active canker



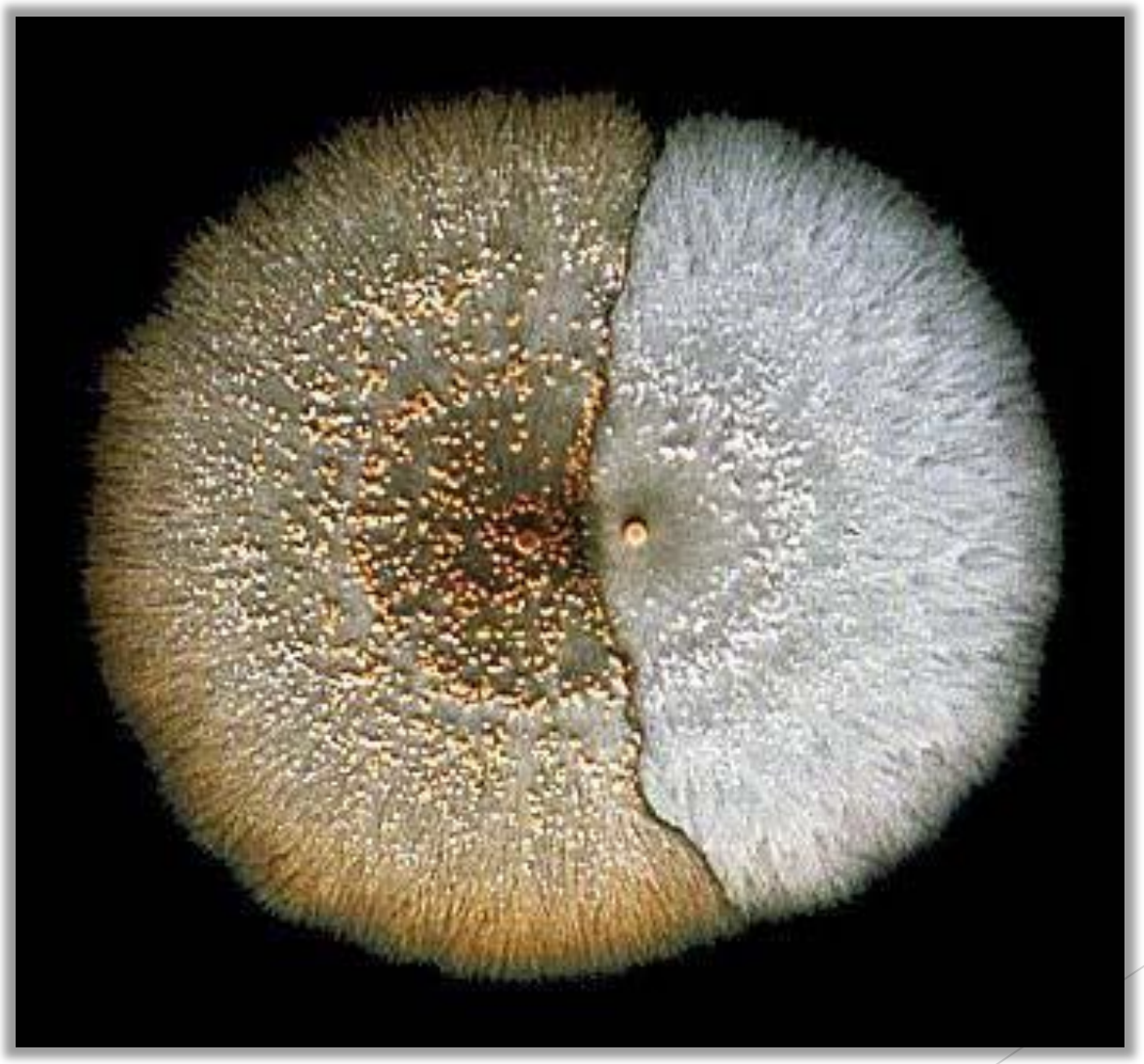
Passive canker

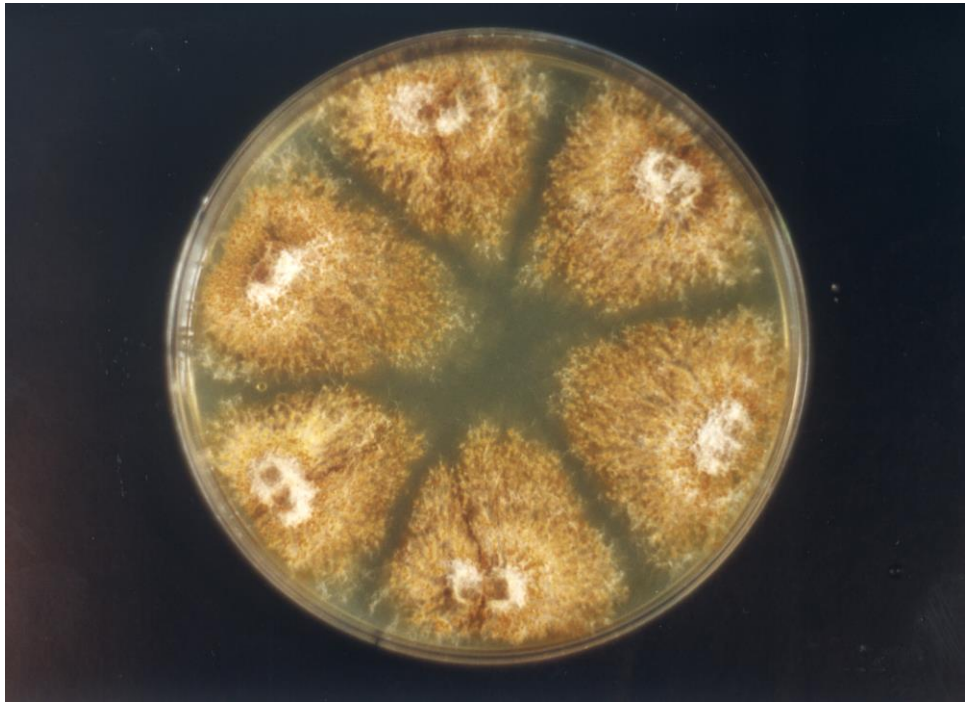

Hypovirulent isolates
Virulent isolates

Anastomosis between compatible isolates

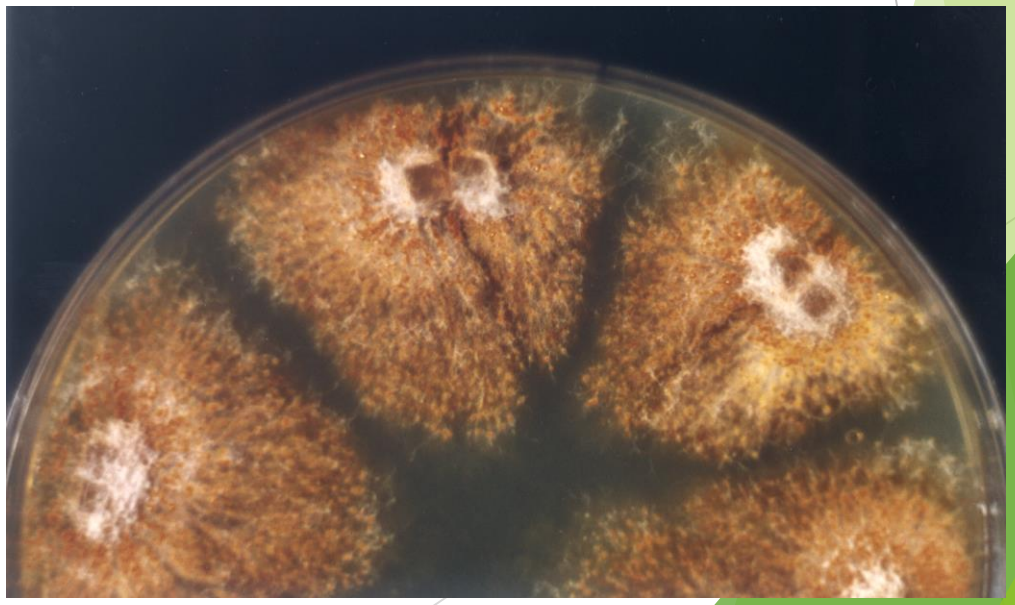


Vegetative incompatibility in *C.parasitica*

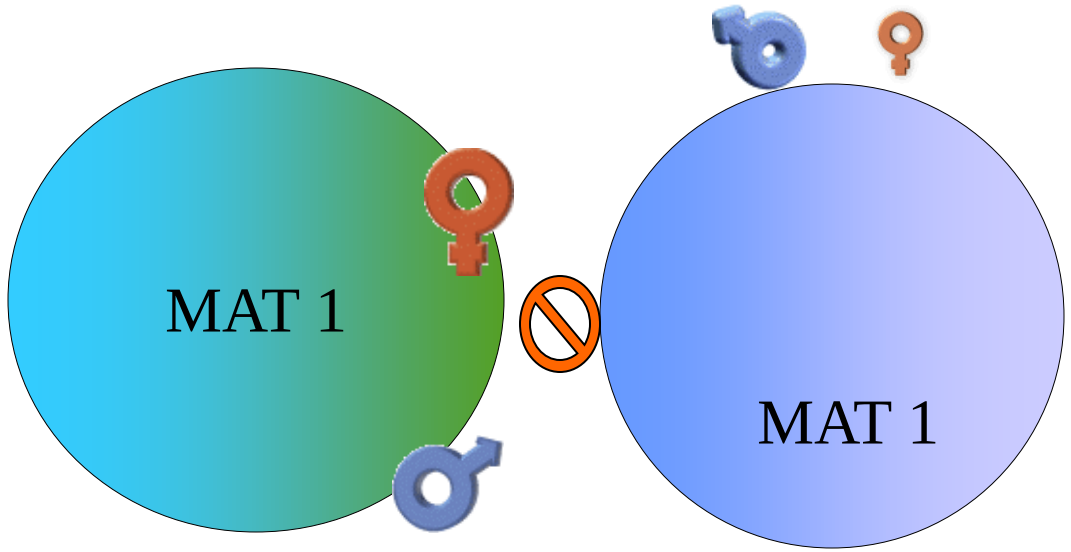




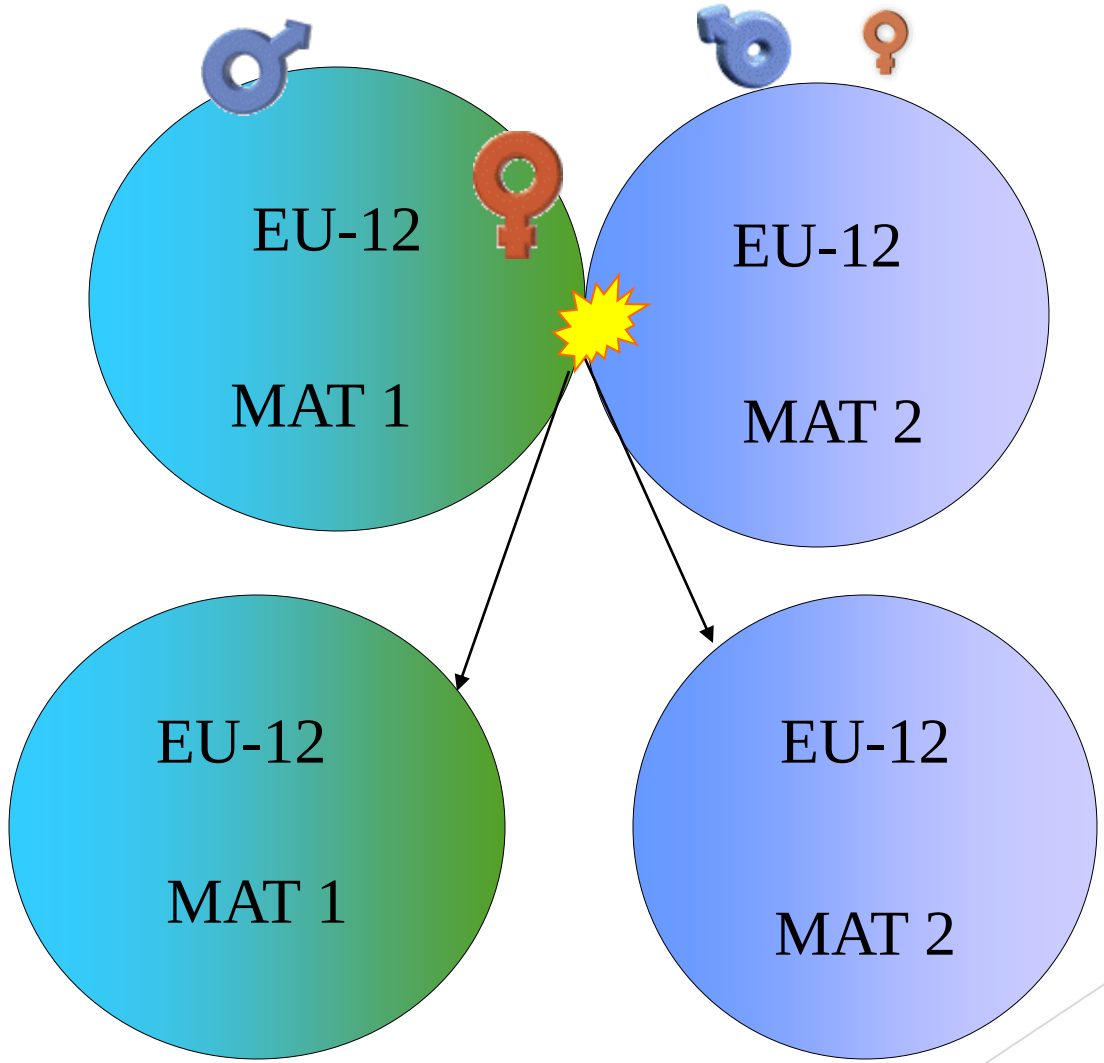
Assessing vc types of isolates of *C.parasitica*



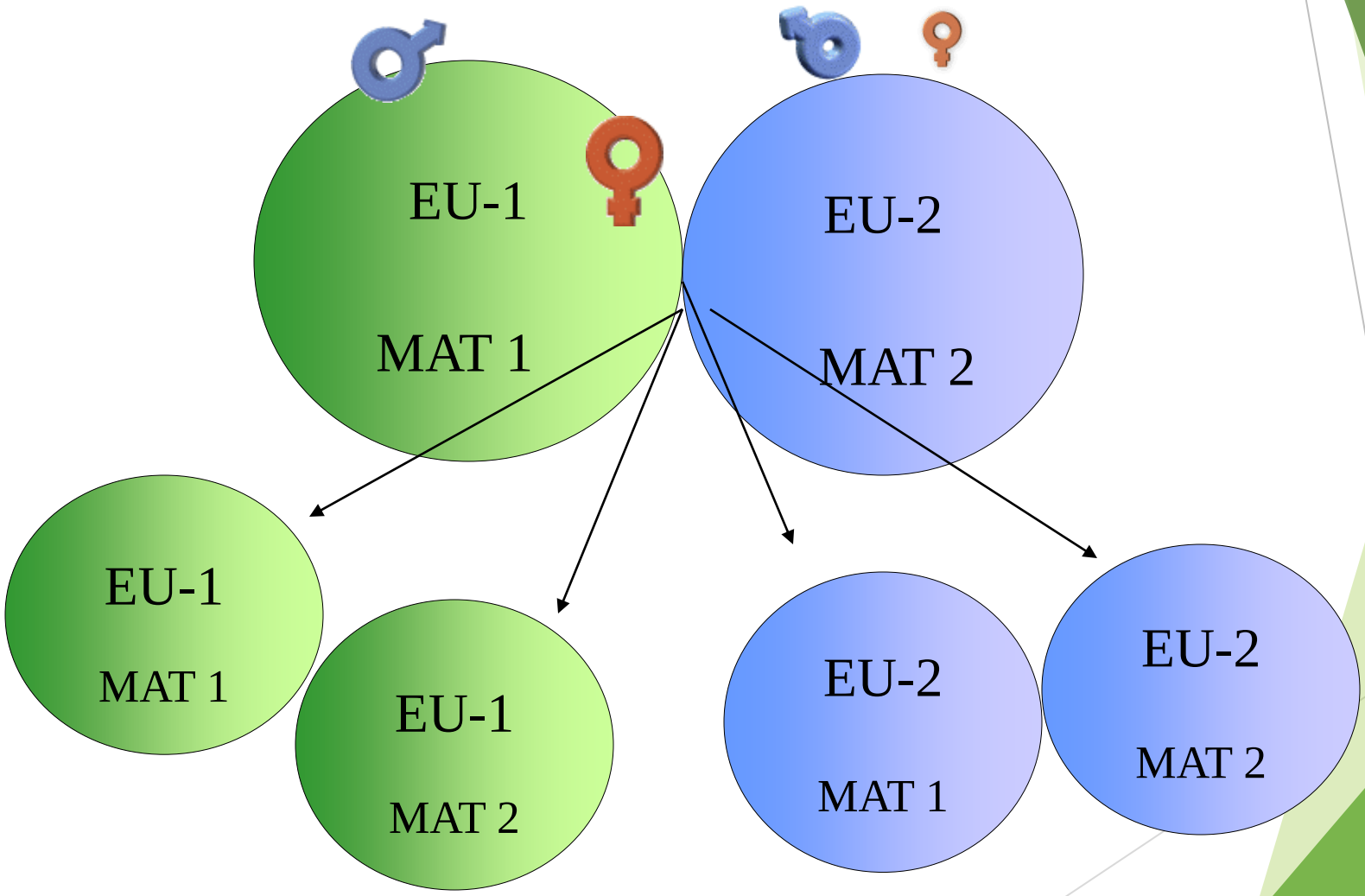
No sexual reproduction if isolates are of same mating type (MAT)



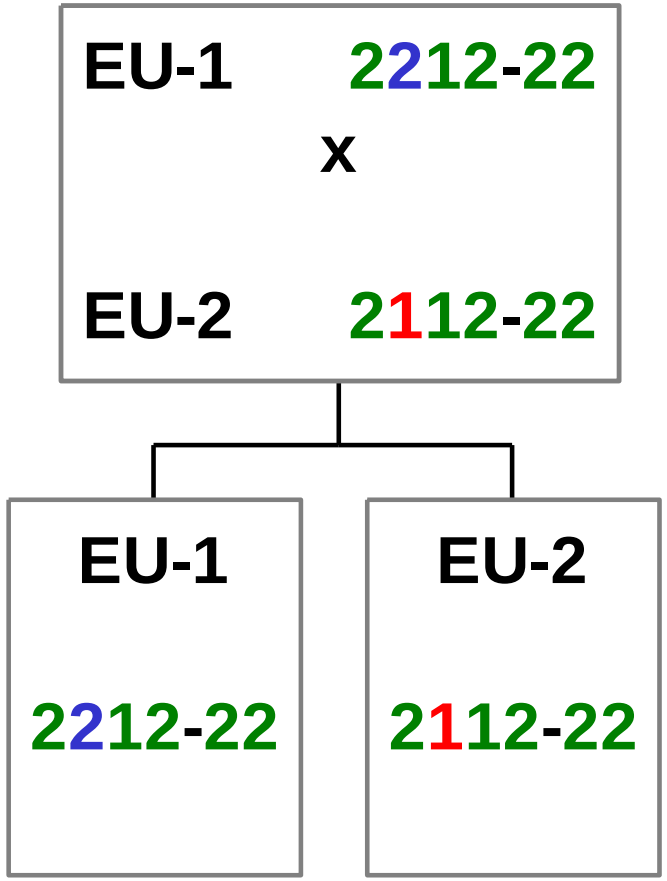
In sexual reproduction between isolates of a same vc type, the progeny is of the same vc type



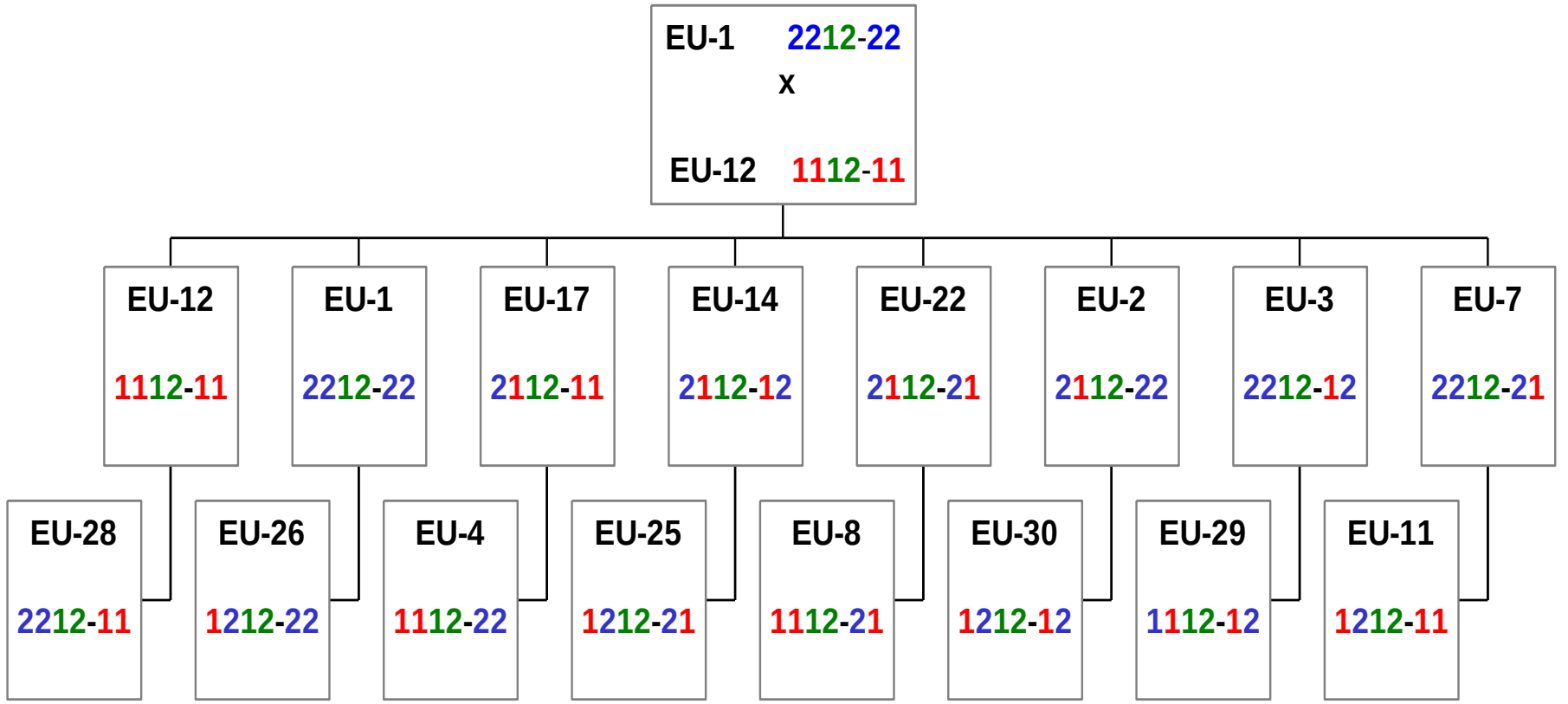
If 1 vic gene is different between the parent isolates, the progeny will be of the same 2 vc types as the parental



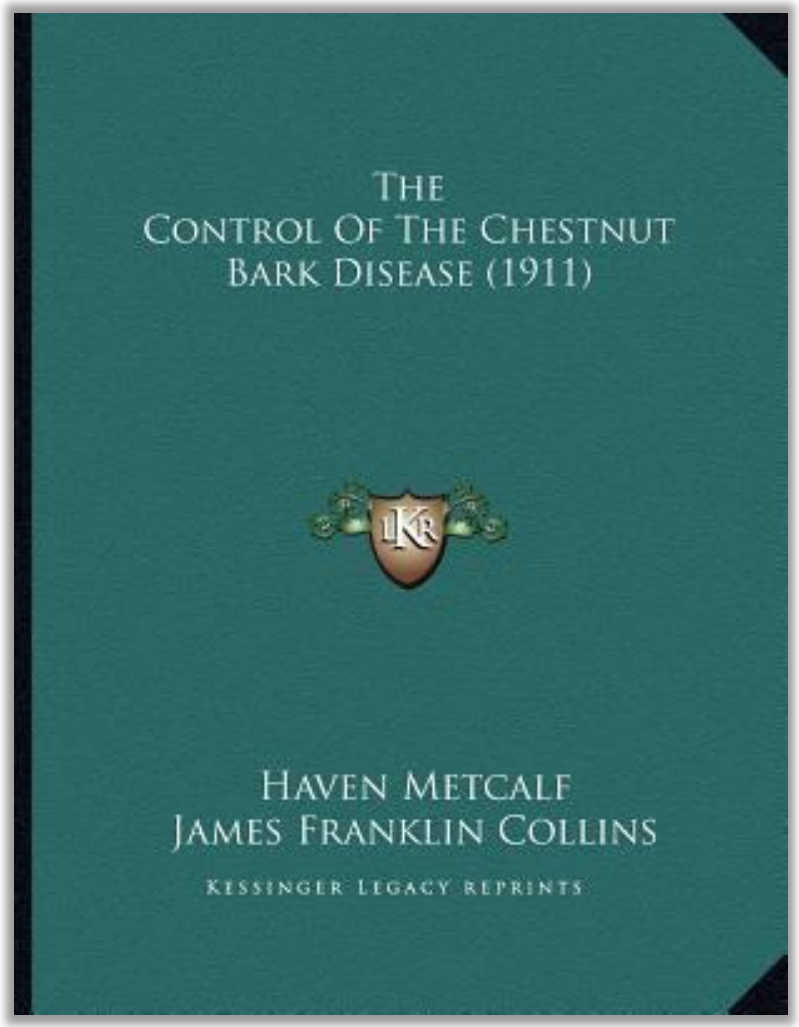
No segregation of *vic* genes



In sexual reproduction between 2 isolates different in 4 vic genes, the progeny 2^4 = 16 vc types!!!!

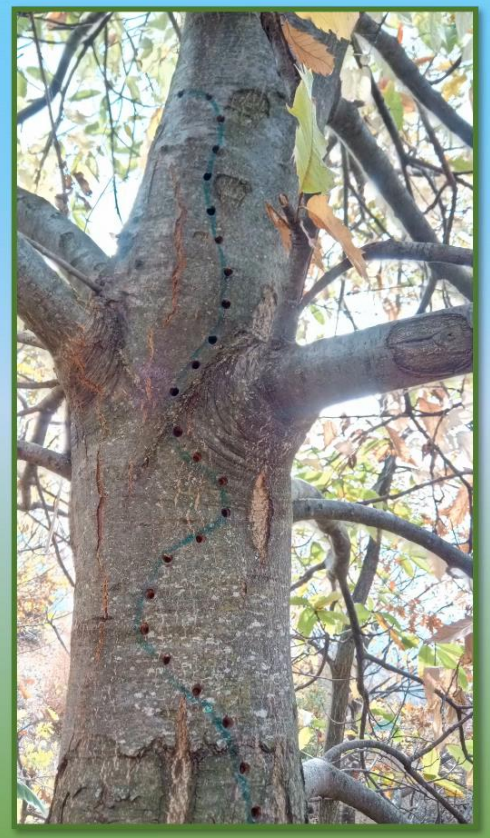


Control of chestnut blight



Direct treatment with hypovirulent paste

Inoculations are labor-heavy and can be dangerous



Hypovirulent strains are formulated as mycelium discs with polyethylenen glycol and hydroxypropyl methylcellulose, loaded into lead-free pellets that are used as carriers to inoculate cankers on chestnut stems by shooting an airgun.

A. Kunova,C. Pizzatti,M. Cerea,A. Gazzaniga,P. Cortesi (2017)
New formulation and delivery method of *Cryphonectria parasitica* for biological control of chestnut blight.

Trials investigating conversion of cankers induced by virulent inoculations by local natural hypovirulence

Canker 15 (remains virulent in the first year)

2014 11 28

2015 05 13

2015 10 14

Canker 17

2014 11 28

17a is hypovirulent

2015 05 13

17b, 17c are hypovirulent

2015 10 14

17a, 17b, 17c are hypovirulent

Investigating presence of *C.parasitica* in healed cankers (hypovirulent and virulent)