Some Resistance Genes against *Cryphonectria parasitica* May Be Strain-specific

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The goal of The American Chestnut Foundation (TACF) is to produce hybrid American-type chestnuts (*Castanea dentata*) with adequate, long-lasting resistance to *Cryphonectria parasitica*, the fungus that causes chestnut canker disease. TACF is engaged in a backcross breeding program designed to transfer resistance from Chinese chestnut (*Castanea mollissima*). Achievement of adequate, long-lasting resistance may depend on having knowledge of interactions between Chinese resistance genes and different strains of the pathogen. Third backcross hybrids derived from the "Clapper" source of resistance, along with Chinese, American, and F1 (Chinese x American) hybrid control trees were inoculated with mycelium of two fungal strains. Resulting cankers were measured at 11-12 weeks.

Three independent lines of analysis suggest the existence of at least one and possibly up to eight genes with a moderate or high degree of strain-specificity:
- Individual trees with extreme forms of strain-specific resistance phenotypes exist.
- Strain-specific phenograms show distinct inflection points and randomization of the second strain.
- Categorical genetic models (simplified phenograms) based on strain-specific genes provide superior fits to observed data.
- Quantitative genetic models based on strain-specific genes provide superior fits to observed data.

If strain-specific genes are confirmed in studies of long-term resistance of TACF hybrids, there will be implications for 1) the purpose and design of the central TACF breeding program in Meadowview, VA, 2) the purpose and design of the regional breeding programs in eight states, and 3) then number of breeding schemes advisable at the central and regional levels.