The Fungal Scourge (*Cryphonectria parasitica*) of the American Chestnut Tree **(***Castanea dentata* (Marsh.) Borkh**.).**

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It was the grounds staff at the New York Bronx Zoo that first recognized, in the summer of1904, a few scattered cases of fungal infection on American chestnut trees, *Castanea dentata*. Fig 1. Subsequently, in 1906, Hermann W. Merkel reported in the New York Zoological Society 10th Annual Report of the infection of many widely scattered trees of all sizes. The fungal infection was identified as the Asian bark fungus, *Cryphonectria parasitica* (formerly *Endothia parasitica*) now commonly called "chestnut blight".

Investigation showed that the chestnut blight fungus was accidentally introduced into the U.S. A. on imported Japanese chestnut trees (*Castanea crenata*).These trees were first imported as early as1876 by nurseryman S. B. Parsons of New York and again in 1882, William Parry of New Jersey imported 1,000 grafted Japanese chestnut trees. Unlike the Chinese and Japanese trees that are resistant to the fungus the American Chestnut is highly susceptible, allowing the fungus to spread and devastate the native chestnut trees throughout it's range.

The fungus is easily spread by the natural elements, birds, animals and insects, entering through the deeply fissured bark or wounds, growing through the vascular cambium and making sunken cankers that girdle the stem killing all above the canker. Saplings usually die in one growing season (Fig 2) while older trees may take several years.

Fig1.
Mature American Chestnut trees
(American Chestnut, 1914)

Fig 2.
Blight Canker on Chestnut Sapling
(American Chestnut Cooperators' Foundation)

Once the most common tree in the Appalachian Mountains, it is now scarce in the canopy of those forests. While not uncommon in the forest understorey- the blight does not kill the roots of the tree, so the chestnut roots send up new sprouts after the tree is killed, so that one can find chestnut shoots sprouting from a circle of dead stumps and shoots; the tree's former attempts at growth. The fungus usually does not attack the tree until the bark begins to fissure, so the young root sprouts can reach up to 30 feet high and 4 to 6 inches in diameter before succumbing to the disease. In sunny (disturbed) areas, this can allow them to reach a size large enough to flower and bear nuts.

The American chestnut tree is probably one of the finest of the world's trees. Before being ravaged by the blight it was not uncommon for a mature tree to have a diameter, at chest height, of 1 – 2 metre and 20 – 30 metre high, with one majestic specimen having a diameter of 5 metre! The shape is pleasing, forest-grown chestnut trees nearly always have long, straight, clear trunks, branching out into rather small, rounded tops, while for those growing in the open the trunk is short, dividing into three or four heavy horizontal branches to form a broad, beautifully rounded head. The tree flowers in July with sweet smelling catkins of pollen producing cream-coloured flowers, usually followed later by the rather insignificant spikes of green coloured female flowers that produce the chestnuts. The wood is quite valuable commercially as it has a high tannin content (up to ten to fourteen percent in very old trees) making it very resistant to decay, a brownish colour, straight grained with a pleasing pattern, fairly soft, medium strength and easily worked. It was used for furniture, home construction, flooring, piers, and plywood amongst other uses.

The lack of large trees in recent times has generated the recycling of old timber for modern furniture production. The chestnuts, as they are quite delicious and nutritious, were and still are, when available, an important food, for wildlife and much sought after as a delicacy in the human diet.
Whereas most fungi are inhibited by tannins, *C. parasitica* is unusual in that it uses tannins as a source of nutrients. It is therefore somewhat ironical that the high tannin content of the American chestnut tree is perhaps significant in its downfall and the success of the introduced pathogen *C. parasitica*.

Now the species is functionally extinct, despite ongoing efforts to develop a hybrid that can resist the fungus. Presently research is being done to genetically engineer resistant cultivars and cross with the Chinese chestnut. One interesting aspect of the research effort is to increase the pathogenicity of a virus, or so-called hypovirulence, to develop an economical biocontrol that attacks the fungus.
Neverthless, the downfall of this iconic tree has had one lasting benefit, for it lead to the enactment of Plant Quarantine laws in the U.S.A.