FORESTRY COMMISSION

BOOKLET No 3

CHESTNUT BLIGHT

caused by the fungus *Endothia parasitica*

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In Britain, the Sweet Chestnut, *Castanea sativa* Mill., is at the northern limit of its distribution, and as a forest tree it is of importance in the southern half of England only. Even in the south the tendency of chestnut, on certain soils, to become ring shaken when grown on rotations of over sixty years limits its value as a large timber tree. Nevertheless in parts of southern England, and particularly in Kent and Sussex, it is favoured as a coppice crop and gives high returns when used for hop poles and cleft fencing. So far, in Britain, it has not been seriously affected by disease, though the so-called Ink Disease, caused by the fungus *Phytophthora cambivora* (Petri) Buis., is destructive on badly drained soils, and particularly on soils subject to large fluctuations in water content. It is therefore a serious matter that Chestnut Blight, which has ravaged the native stands of chestnut in the eastern United States, should now have established itself in Southern Europe. The purpose of this Booklet is to describe, with the aid of coloured illustrations, the appearance of the disease, so that familiarity with the symptoms may lead to rapid recognition of the fungus, should it ever reach this country.

The disease, which is caused by the fungus *Endothia parasitica* Anderson et Anderson, was first discovered in New York in 1904; since then it has spread over the entire natural range of American Chestnut, *Castanea dentata* Borkh., which stretches from Maine in the north to Georgia and Alabama in the south. Except in the extreme south it has killed most of the trees, though some still continue to sprout from the base, these sprouts in their turn being attacked by the fungus. It is generally believed that the disease reached the United States from eastern Asia where the fungus occurs, but where the native species of chestnut are sufficiently resistant to escape serious injury. It is not known how it reached Europe. It was first recorded in Italy in 1938 but was almost certainly present several years earlier, and is now widely distributed there. Since chestnut is grown in Italy in pure groves for the production of nuts, the ravages of the disease are more noticeable there than in the United States, where chestnut usually occurs as one constituent of a mixed hardwood crop. The fungus has also been recorded in the Ticino (Tessin) canton of Switzerland, where it has done considerable damage, in Yugoslavia near the Italian border, in Spain, where it has remained strictly localised, and recently in two localities in the south of France.

The fungus attacks the bark, and usually spreads with such rapidity that the branch or stem is soon girdled; the disease can then easily be seen from a distance by the withering and subsequent yellow or brown discolouration of the leaves (Fig. 1). It is at this stage that Chestnut Blight is most easily confused with Ink Disease. If, however, the stem or trunk is examined more closely it will be found in the case of Blight that a definite canker or dead patch exists, below which the branches have healthy foliage; after a short time adventitious shoots are produced on the stem below the dead patch. With Ink Disease, which is primarily a root disease, the tree will be found to be dead right down to ground level and below, and no healthy foliage or adventitious shoots will be produced on that particular stem; nor is there ever any production of coppice shoots from the base of the tree, whereas with Chestnut Blight such shoots are usually produced for a long time after the rest of the tree is dead. Shoots of this nature are shown at the base of both the trees in Fig. 1.

On young smooth-barked branches the fungus-infected patches have a bright brown colour, which is in sharp contrast to the olive-green of the normal bark (Fig. 2). On slow-growing or older stems infections are not so obvious, but always show a certain degree of discolouration. If the bark and cambium are killed quickly, a sunken area results, but if the progress of the fungus is less rapid, new layers of bark are

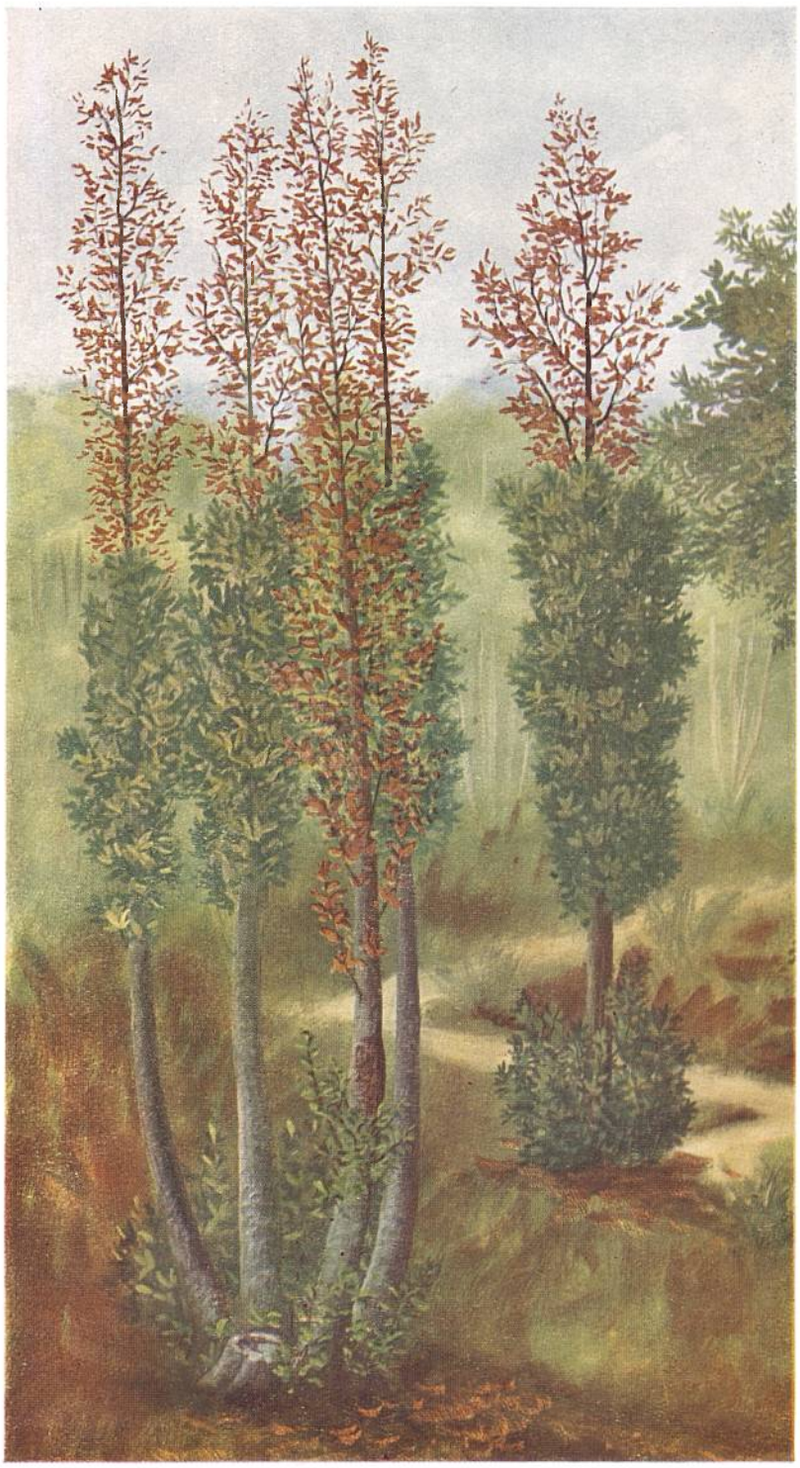

FIGURE 1. Diseased coppice chestnut, showing a canker, and the discolouration of the leaves on the affected portions of the trees.

FIGURE 2. An affected area on the bark of a young shoot. Note the contrast in colour between the diseased and healthy portions. Fructifications do not usually appear at this stage. *Two-thirds natural size.*

FIGURE 3. A more advanced stage of disease; the diseased bark is splitting owing to the production of wound tissue beneath. *Natural size.*

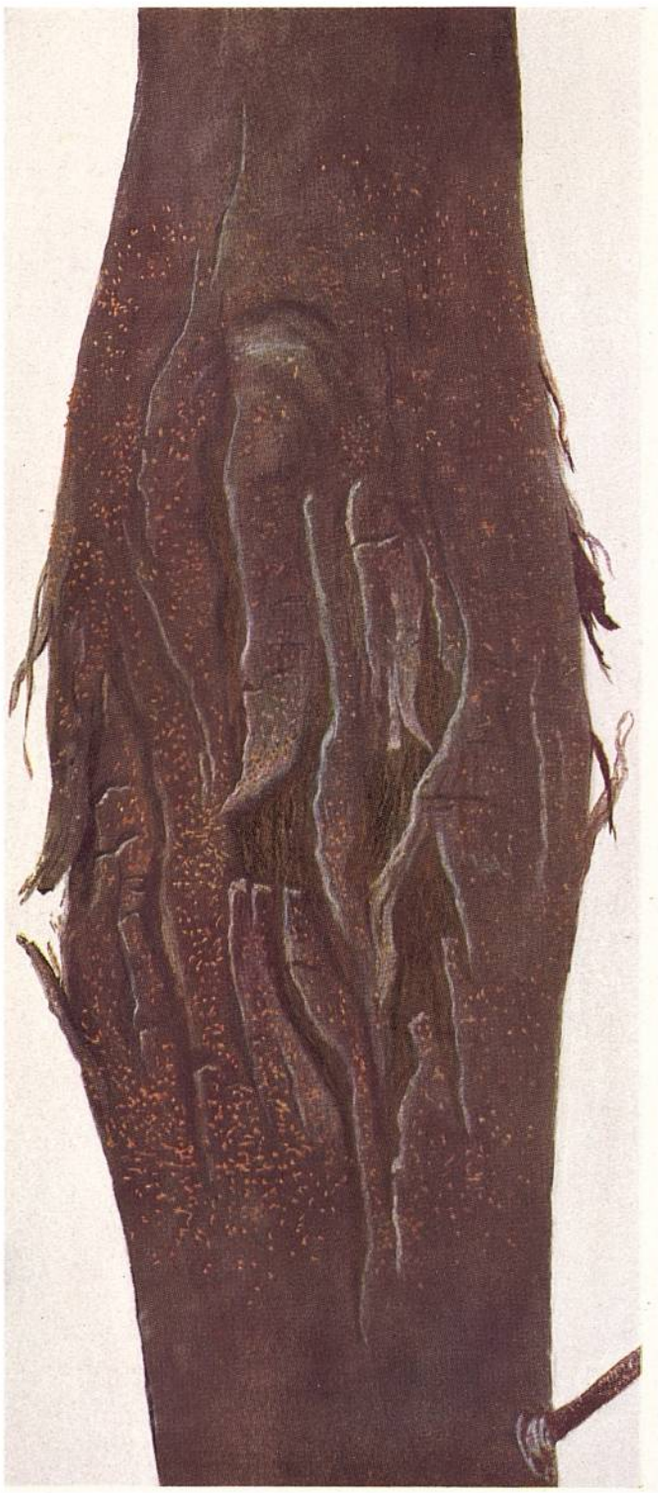

FIGURE 4. A diseased stem covered with orange spore-producing pustules. *Half natural size.*

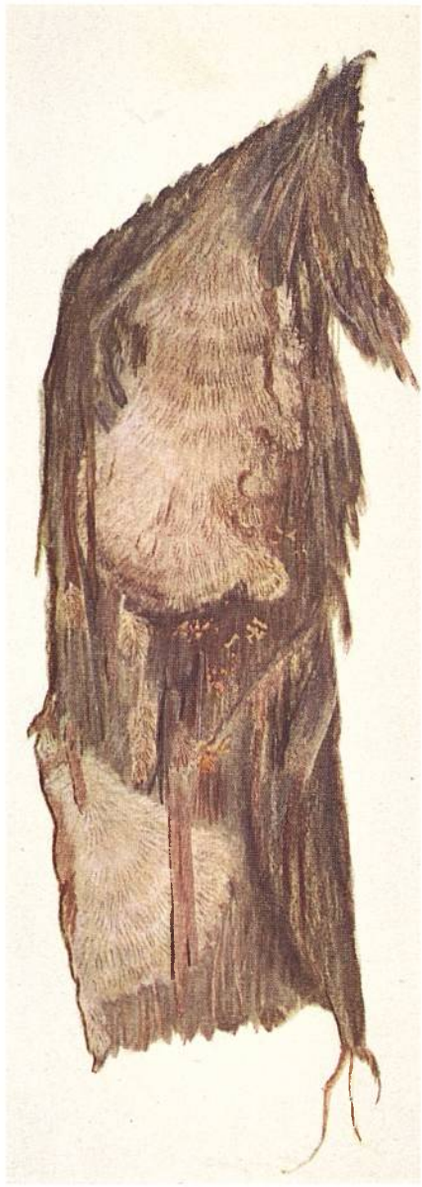

FIGURE 5. The mycelial fans disclosed by stripping the outer bark from a diseased stem. *Natural size.*

formed under the diseased area, and there is a certain amount of swelling accompanied by cracking of the outer bark (Fig. 3). Yellow, orange or reddish-brown fruiting pustules about the size of a pin-head soon develop in enormous numbers on the infected bark. During moist weather long orange-yellow tendrils made up of millions of spores sticking together exude from the pustules (Fig. 4). Another characteristic symptom is the formation of mycelial fans (Fig. 5) in the inner bark; these are pale brown in colour and can be exposed by cutting away the outer bark. The virulence of the fungus is such that death of the whole stem usually takes place before there has been much formation of healing tissue, so that real cankers with ridges of tissue round the edges, such as occur with larch canker or bacterial canker of poplar, are not found with Chestnut Blight.

Recently definite evidence of recovery has been found in Italy on coppice shoots arising from the stumps of several of the plantations, which were first attacked by the disease. Many infections were started, but nearly all of them are now healing from beneath, and the diseased bark is being gradually shed. In many cases the fungus has died out and all that remains is a slight swelling and roughening of the outer bark. If this tendency to recovery persists it will mean that the disease is behaving less virulently in Europe than in America.

Though the European chestnut may be less susceptible than the American species, it is certainly not resistant; and unfortunately none of the Asian species grows well enough to replace it. This is particularly the case in Britain, where these species are invariably injured by frost. Considerable progress has been made in America towards breeding hybrids resistant to the disease; but nothing has yet been produced which could be used with confidence to replace the present English coppice stands, even if such replacement were a practical possibility from other points of view.

As very large numbers of spores are produced, the disease is very easily spread. Spores are normally carried by the wind, and there is evidence that they can be carried longer distances on the feet or beaks of birds; there is thus a possibility of the disease reaching Britain quickly by this latter means. Further extension of the disease on the Continent seems almost inevitable, and though there is not a great deal of chestnut in those parts of France nearest to Britain, there is enough to suggest that eventually south-east England may be within range of windborne spores. Quarantine measures* have been taken which, it is thought, will greatly lessen the chances of the disease entering this country by direct importation, but it is obvious that vigilance will be necessary if we are to avoid the disease. Once it has gained entry, it will only be possible to restrain it if measures are taken while the outbreak is still small. Even in Italy, where recovery from the disease appears to be possible, the fungus has done a great deal of damage. It might well cause at least as much injury if it reached Britain. For this reason it is highly desirable that all concerned with the growing of chestnut trees should be familiar with the symptoms of the disease.

Reports of suspected cases of the disease should be sent to the Forestry Commission, Forest Research Station, Alice Holt Lodge, Wrecclesham, Farnham, Surrey. If material is sent it should be packed in a tin to prevent any risk of spreading the disease.

*Under the Importation of Forest Trees (Prohibition) Order of 1952, the importation of living chestnut trees, except under licence, is prohibited.

The paintings from which the illustrations were prepared, were made by Y. Guerrini under the direction of Dr. A. Biraghi, then of the Pathological Station of the Italian Ministry of Agriculture and Forests at Rome.

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