

A New Disease of Picea.

BY

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With Plate L.

Picea pungens is one of the most striking and ornamental of our exotic conifers, especially in its variety *glauca*, the light blue-green foliage of which at once arrests the attention of the observer in parks and policies where it is frequently to be met with. The species is one of the Western conifers, its native habitat being the Rocky Mountains of North America. It prefers a moist situation, but will not stand stagnant moisture, and it is not very sensitive in regard to smoke. The slightly bent quadrangular needles are seated on prominent cushions of the periderm. They are very stiff and sharply pointed. These features can be easily made out on Figs. 2 and 3. The buds are fairly large and conspicuous. The upper scales are adpressed, while the lower ones are prominently recurved. On rubbing the needles a peculiar pungent odour is set free. The prickly needles protect the tree very effectively against damage by deer and other browsing animals. They even protect the buds against the attack of squirrels. This species has as yet proved itself to be fairly hardy in Europe, being apparently free from any serious damage by insects or fungi, but unfortunately it does not appear to be entirely immune, as the following account of an apparently new fungus-enemy which has attacked it will shew:—

The fungus was found on a young individual growing among other ornamental trees in the pleasure grounds of an estate in Perthshire. This tree is shewn in Fig. 1. The branches on the lower part of the stem were more severely attacked than those

[Notes, R.B.G., Edin., No. XX, March 1909.]

higher up, although no part of the tree was entirely free from infection. The fungus attacks the buds, and in some cases prevents their further growth. If, however, the bud is only affected on one side a slight amount of elongation may take place, but in every case the result is a twisted shoot.

An external examination shews that the buds have become encased in a dense black sheath, the surface of which is thickly dotted with spherical papillæ each with a small opening at the top (Fig. 4). The general appearance of the disease is shewn in Fig. 2, while the lower left-hand bud of this twig is given more highly magnified in Fig. 3.

Microscopical examination shews that these papillæ are the fructifications of a pyrenocarpous ascomycete. The mycelium is intercellular, and penetrates the cortex in all directions. At first, apparently, the threads are single, but finally dense wefts and strands of tough pseudo-parenchymatous tissues are formed which divide the cortex into conspicuous quadrangular areas consisting of brown collapsed cells (see Fig. 4). The hollow space in the centre of these quadrangular areas was previously filled with a mycelial pseudo-parenchyma, but this easily drops out in mounting the section, leaving a hollow circular cavity behind. To the exterior the mycelium forms a dense black stroma, the surface of which is thickly dotted with the pear-shaped fructifications of the fungus.

The pear-shaped fruit bodies (pyrenocarps) have walls consisting of small-celled dark brown pseudo-parenchymatous tissue, very dense at the outside but becoming less compact inwards. The base of the pear-shaped cavity of the pyrenocarp is occupied by a distinct hymenium of paraphyses and asci. The development of the asci seems to be successive, at least they were found in various stages of maturity in each fructification. As they become ripe they push up towards the apical pore, hence the spores appear to be liberated gradually. The number of spores in each ascus varies from 4 to 6, arranged in a uniseriate manner, and they are of a dark brown colour, and measure 20 by 6 μ . They become multi-cellular by the formation of transverse and longitudinal septa. In outline they are torpedo-shaped with fairly sharply-pointed ends (see Fig. 5).

In material taken from the tree in the months of May and

August no asci were found, but specimens taken late in August and kept for some weeks in a moist chamber developed spores abundantly.

The fungus is one of the family of the Sphæriaceæ, and its fructification and spores seem to place it in genus *Curcubitaria*, of which I regard it as a new species diagnosed as follows:—

Curcubitaria piceæ, Borthwick, n. sp.

Mycelio intercellulare; peritheciis arcte gregariis, stipitatis, e stromatis effusis evolutis, nigris, carbonaceis; excipulo pseudo-parenchymatico, extus denso nigro, intus spongioso brunneo; ascis clavatis, 4-6—sporis; paraphysibus filiformibus; sporis uniseriatis, cymbiformibus, 4-10—septatis, muriatis, 20 μ longis, 6 μ latis. *Hab.* ad hibernacula Piceæ pungentis.

EXPLANATION OF THE FIGURES IN PLATE L.

Illustrating Dr. A. W. Borthwick's Paper "A New Disease of Picea."

- FIG. 1. *Picea pungens*; the tree on which the disease was found. The lower branches have been more severely attacked than the higher ones.
- FIG. 2. Twig with buds covered by the stroma and pyrenocarps of the fungus.
- FIG. 3. Lower left-hand bud of Fig. 2 more highly magnified, shewing the ostioles at the apex of the pyrenocarps.
- FIG. 4. Section across an attacked bud shewing the intercellular strands of hyphæ, the quadrangular patches of brown, collapsed cortical cells with hollow spaces in the middle, and the black stroma and pyrenocarps on the outside.
- FIG. 5. Asci of central pyrenocarp of Fig. 4 more highly magnified.

The first of these is the fact that the United States is a young nation, and that its history is a history of growth and development.

The second is the fact that the United States is a nation of immigrants, and that its history is a history of the struggle for a better life.

The third is the fact that the United States is a nation of free men, and that its history is a history of the struggle for freedom.

The fourth is the fact that the United States is a nation of progress, and that its history is a history of the struggle for progress.

The fifth is the fact that the United States is a nation of peace, and that its history is a history of the struggle for peace.

EXPLANATION OF THE HISTORY OF THE UNITED STATES

The history of the United States is a history of growth and development, of struggle for a better life, of struggle for freedom, of struggle for progress, and of struggle for peace.

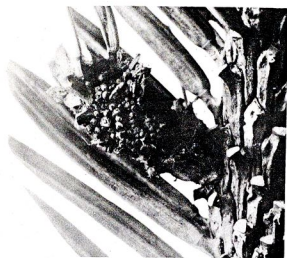
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Huth, coll.