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THE HOUSE FUNGUS, *MERULIUS LACRYMANS* (JACQ.) FR.

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Merulius lacrymans is one of the wood-rotting fungi which are destroyers of trees, lumber, structural timbers and other forms of wood. Under certain conditions, this fungus is especially harmful to the wood in houses and for this reason it is known as the *house fungus*. The presence of fungi in wood is generally shown by a white floccose growth or mushroom-like sporophore on the exterior of the infected material. The house fungus announces its presence, only too late, by a cottony mass of hyphal threads spreading over the infected surfaces or emerging through cracks between walls and floors. This circular to elliptical cottony mass of hyphae grows to be about one centimeter thick when the surface begins to encrust, wrinkle and turn a rusty color due to the formation of rusty-colored spores. (Text figure 1.)

The house fungus has received much attention in Germany where it has done considerable damage. Hartig (4)[1] and others have stated losses and described the action of the fungus on wood. Clinton (3) has given us an excellent description of its development and destruction of woodwork within a church at Stony Creek, Connecticut. The cost of replacing the rotting woodwork in this church was about one hundred dollars.

The observations following were made from 1922 to 1924 in the Social Room occupying a greater portion of the basement of Unity Church at Amherst, Massachusetts. The church was built by the Unitarian Society about 1894 and up to 1920, no fungous growth was observed in the church. The basement walls are principally constructed of bricks, the exteriors of which are mostly exposed to the air on all sides save the west which is covered by the soil used for grading the front yard on Pleasant Street. The slopes from Pleasant Street and the adjoining lots are such that most of the drainage is toward or near the basement of the church. The soil is composed of a layer of sandy-gravel, underlaid with 8 to 10 inches of loam which in turn is underlaid with clay. During each heavy rain, barrels of water ran through a cellar ditch which was dug for laying drain-tile. Due to these and other conditions, the basement was constantly in a damp condition.

The soil in the basement had been partly covered with concrete but over

[1] Numbers following authors' names refer to literature at the close of this article.

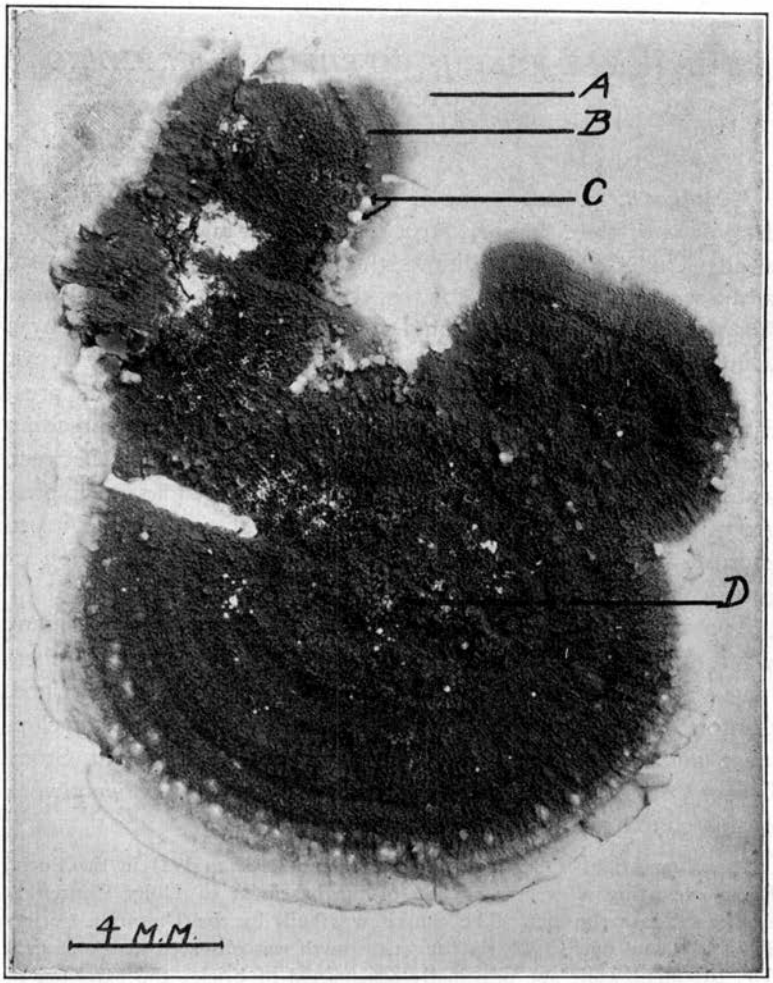

Fig. 1. Photograph of a sporophore of *Merulius lacrymans* growing on the basement floor in Unity Church at Amherst, Massachusetts.

A. New growth of advancing, floccose mycelium.

B. Rusty, sporulating surface. (Hymenium.)

C. Drops of water which have been excreted by the "tear fungus."

D. Note the concentric rings around D, the point at which the fungus first emerged through the cracks in the floor.

this and the uncemented portion was laid a pine floor. There were entrances from the church auditorium above into the Social Room below by the front and the back stairs. A fire-place was built in the eastern portion of the Social Room and a plastered wall divided the southern part of the basement into a kitchen and a furnace room with coal and wood bins. The kitchen was floored, lathed, and plastered like the Social Room, while the furnace room bore brick and stone walls and a cemented floor. Nevertheless, after each rain, pools of water remained on this cement floor for several days. Thus, ideal conditions were present for the growth of the house fungus: namely, a constantly wet basement, without fire to dry it during a greater part of the year; woodwork on damp cement overlaying constantly damp soil; plenty of soft wooden structures kept in a damp condition, and last, but not least, the house fungus brought in with the structural timbers. The woods noted in the structural timbers were southern pine, white pine, chestnut and whitewood.

In 1920, the fungus was not present in the basement for all the partitions and the floors were newly constructed at that time. In 1922, the pastor, Rev. H. G. Ives, called my attention to a sporophore on the bricks of a partition next to the furnace. On the wall opposite this partition a whitewood baseboard in the social Room had been accidentally hit and a portion had crumbled into small oblong pieces which easily powdered when pressed between the fingers. The exact starting point of the fungus is unknown but in one year it had spread from this baseboard to a distance of about 30 feet under the floors of the toilet rooms and Social Room, around the fire-place, to and up the back stairs, rendering them unsafe for use. Even the structural timbers above the stairs contained mycelium of the fungus. From here, it probably spread along the laths on the east wall to the kitchen.

Large masses of floccose hyphae emerged through cracks in the wainscoting and through cracks in the floors, sometimes completely covering the door sills. In one place, this mycelium was noticed coming from a door-jamb five feet above the floor. In another place, the white mycelium formed a root-like growth (rhizomorph) on the brick walls. Dried specimens of this material were placed in the crytogamic herbarium at the Massachusetts Agricultural College. Professor Stone showed by a "resonance test" how he could trace just were the fungus and rot had progressed under the floor. By tapping it with a hammer, the infected wood gave a muffled sound. A number of the two-by-fours were rotted completely from their mooring for about two feet from the floor. It was difficult to believe that this house fungus could have wrought so great a damage to these timbers during the short period of one year after the first sporophore was observed.

The repairs to the church were under the supervision of Dr. G. E. Stone who estimated the cost of replacing the rotted timbers with sound materials as $2,500. The whole cost of drainage, installing a better heating system, replacing the wooden floor with cement, reconstructing the walls, wood treatments and other repairs will exceed $5,000.

Professor A. Vincent Osmun of the Massachusetts Agricultural College reports the occurrence of this fungus as follows:

"The first occurrence of *Merulius lacrymans* (Jacq.) Fr. to come under

the observation of the writer in Massachusetts was 1911. In that instance the fungus had attacked the woodwork in the floor of a cellar coalbin in North Amherst. This was almost entirely destroyed by decay and the fruiting bodies of the fungus spread over several square yards. Specimens collected at that time are on file in the herbarium of the Department of Botany, Massachusetts Agricultural College.

"Since 1911 this fungus has frequently been reported in cellars and woodsheds from various parts of the state and in several instances serious damage was done to the woodwork.

"The most effective means of checking decay of wood caused by *Merulius lacrymans* seems to be admission and circulation of fresh air about the affected areas, but where this was not possible the use of a mixture of formaldehyde and water sprayed or doused over the woodwork helped materially in arresting development. Remedial measures were usually preceded by the tearing out and replacing of rotted wood."

The writer isolated, cultured and inoculated woods with this fungus. The greatest difficulty experienced was in germinating the spores and obtaining tissue cultures free from Penicillium sp. The germ-pores of the spores are covered by small caps which are soluble in an alkaline substance. Materials bearing matured spores were submerged for one minute in a one per cent solution of ammonium hydroxide, washed in three changes of sterile water and allowed to stand for one hour in a fourth change of steril water. Spores from this treated material were then transferred to water, agar and Tubeuf's solution, (6, p. 140). The spores germinated less than one per cent in water, about thirty per cent on potato agar, and good cultures were obtained on potato and Czapek's agars to which a few drops of Tubeuf's solution had been added. The cultures showed the house fungus to be *Merulius lacrymans*. It rotted whitewood, white pine and poplar very rapidly but chestnut and hemlock seemed more resitent to its action. However, it is too early to state the final results of these cultural studies. It was also noted that chestnut timbers in the church were more resistent than other timbers to the rotting by this fungus.

SUMMARY

1. *Merulius lacrymans* (Jacq.) Fr. which is commonly known as the "house fungus" destroyed a greater part of the floor and adjoining wooden structures in the basement of Unity Church at Amherst, Massachusetts.

2. The cost of replacing the rotted timbers with sound materials was estimated at $2,500. The total cost of repairs to prevent further progress of the fungus and desired conveniences was $5,000.

3. Whitewood, southern pine, white pine and spruce were rotted in about one year so as to render the lumber useless. Chestnut boards resisted the attack of the fungus.

4. Pure cultures of the fungus were obtained by submerging spore materials in a one per cent ammonium hydroxide solution, washing, and incubating in Tubeuf's solution on potato agar.

5. Inoculations show that the fungus rots poplar, whitewood and pines much sooner than chestnut.

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