

sources of infection. For the same reason, care should be taken to prevent spores being carried about on the feet to other parts of the building. Sometimes the penetration of the fungus into the sleeper walls is such as to necessitate their demolition and removal. The removal of such walls and the top soil is, of course, done before the main walls are brushed down.

3. Sterilizing the surfaces of the walls and site concrete now follows. This consists of applying a plumber's blow-lamp to the *whole* of the brushed surface. This destroys the spores, provided the flame when applied slowly and for a sufficient time renders the surfaces hot to the touch. To ensure complete success, however, it is advisable to follow this heat treatment by an application of a reliable antiseptic solution, which should be liberally applied in two coats. An antiseptic which is recommended is a 4 per cent. solution of sodium fluoride (6-oz. of the crystals being dissolved in 1-gal. of cold water); a 5 per cent. solution of magnesium silicofluoride ( $\frac{1}{2}$ -lb. of the salt per gallon of water) is also effective. Neither mercuric chloride (corrosive sublimate) nor zinc chloride (blue vitriol) is now advocated, as the former is dangerous to handle and the latter is only moderately efficient.

4. Necessary structural work, such as the insertion of a horizontal damp proof course, the provision of air bricks or grates and holes in division walls to ensure adequate *through* ventilation (see p. 15), the construction of sleeper walls and the laying of site concrete, is carried out.

5. Finally, the new floor timbers, skirtings and feet of architraves (finished with splayed joints) are fixed. The timber must be sound, well-seasoned stuff of good quality. The joists, underside of floor boards, backs of skirtings, wall plates, plugs and grounds should be treated with a preservative (see p. 12). Creosoting is the most effective treatment, but any of the water-soluble preservatives (sodium fluoride, etc.) may be used if the smell of creosote is objected to.

The above operations are costly and are only called for when the decay is widespread. In a mild case it may be only necessary to remove the decayed timber (together with at least 1-ft. of the adjacent sound wood) and replace it with sound preserved stuff after brush-treating as much as possible of the existing timber with preservatives. Every suspected case must be closely examined and dealt with on its merits. Any doubtful source of infection must be removed, otherwise the disease will again develop and further expense will be entailed. Experience shows that partial treatment only is a waste of money and materials, as subsequent extensive operations are usually necessary to effect a permanent cure.

Another species of fungus which produces dry rot in building timbers is *Comiophora cerebella* or Cellar Fungus. It only attacks wet timber, and the decay is usually confined to cellar, bathroom, etc. floors where there has been a leakage of water, and to leaky roofs. *Comiophora* presents a less serious problem than *Merulius*, as decay caused by it is at once arrested if the cause of the dampness is attended to and the timber is allowed to dry. The decayed wood is much

darker than that caused by *Merulius* and the cracks are mainly with the grain. The strands of this fungus are brown or almost black, bunches of the mycelium are absent, the hyphæ may produce small patches of yellowish skin, and fruit bodies are rarely seen in buildings. The characteristics of the two species are thus different.

INSECT ATTACK.—Wood-boring beetles are the insects which cause most damage to timber in this country, and of these the (1) Death-watch Beetle, the (2) Common Furniture Beetle and the (3) Lyctus Powder-post Beetle are the most important.

1. *Death-watch Beetle* (*Xestobium rufovillosum*).—These chiefly attack well-matured hardwoods in old buildings; softwoods and recently seasoned timber are rarely affected. The beetles lay their eggs in cracks and holes in the wood; white larvæ (grubs) which hatch out of the eggs are about  $\frac{1}{4}$ -in. long when full-grown, and after boring in the wood for one and a half or more years develop about August into pupæ (chrysalis) near to the surface of the wood; whilst the winged beetle is formed within a few weeks after pupation, it does not issue from the wood until the following spring. Much destruction is caused during the larval stage, as the grubs bore numerous tunnels of about  $\frac{1}{8}$ -in. diameter in the timber and produce dust during the process. In advanced cases most of the interior of the affected wood members are reduced to powder. Many thousands of pounds have been expended within recent years upon restoring oak roofs of churches and other ancient buildings (*e.g.*, Westminster Hall) which have been damaged very extensively by the ravages of the death-watch beetle.

The conditions of dampness and poor ventilation associated with dry rot are also conducive to attack by the beetle. Hence any treatment of infested structural timbers must include the provision of adequate general ventilation and air spaces round built-in ends of members, and the remedy of defects causing dampness. Badly infested timber must be removed and replaced by sound stuff free from sapwood. There are a number of proprietary insecticides on the market which are claimed to eradicate the beetle. The timber must be well brushed down and vacuumed to remove as much dust as possible before the solution is liberally applied by means of a brush or spray, and several applications are necessary to ensure sufficient penetration; creosote is sometimes used when discoloration and smell are not objected to. Such treatment should be renewed every three or four years.

2. *Common Furniture Beetle* (*Anobium punctatum*).—These attack both hardwoods and softwoods, and especially old unpolished furniture and panelling. The life-cycle and damage caused are somewhat similar to those of the death-watch beetle, except that common furniture beetles emerge from the wood in the summer, and the diameter of the bored holes is about  $\frac{1}{16}$ -in.

Insecticide treatment, as described above, is applied to prevent further damage by this beetle.

3. *Lyctus Powder-post Beetles* (*Lyctidæ*).—Grubs of these beetles cause extensive damage to furniture, internal joinery work such as panelling, and timber