and partly grown the shoots become stunted, so that the leaf-buds are much closer together than normally ; consequently, when leaves are produced they appear so compacted together that the shoot assumes a rosetted form. Infected shoots become weakened, and in many instances may be killed outright. Die-back of the tips of laterals is a common manifestation of leaf-curl. When blossoms are infected the petals become variegated, and are usually larger in size and much crinkled ; more frequently, however, the blossoms die and fall to the ground.

Young fruits when infected become much distorted, owing to the portions becoming greatly enlarged. Such fruits seldom remain long on the tree, as they become scabbed and cracked, and soon fall. Maturing fruits are commonly attacked—this phase of the disease being more common than is generally recognized—and as a result swollen irregularly shaped areas, usually bright-coloured, appear on the surface. These areas are much wrinkled (Fig. 2), and on peaches often appear as if polished, owing to the absence of those hairs which normally cover the surface. They are conspicuous on the fruits of the nectarine, as the bright coloration gives a false impression of maturity. Fructifications may develop on these areas, appearing as a delicate bloom ; they are unusual, however.

LIFE-HISTORY OF THE CAUSATIVE ORGANISM.

Leaf-curl is caused by *Taphrina deformans* (Fcl.) Tul.,* a fungus that differs from those discussed in previous articles of this series published in the *Journal* (see July and August last), in having only one spore-stage (Fig. 8) in its life-cycle. It differs again in that the asci are exposed at maturity and not enclosed in a receptacle, and so is, by mycologists, considered to be a more primitive form.

The leaves become infected shortly after they emerge from the bud, the hyphæ of the fungus growing between the leaf-cells ; the cells are not killed at this stage, but are stimulated to further growth. The hyphæ absorb their necessary food-substances from the leaf-cells, which in consequence become greatly altered ; the chlorophyll (green colouring-matter) is absorbed, and the cell-walls become thickened, so that the leaf changes colour and increases in size, becoming broader, thicker, and much blistered. From the leaves hyphæ may grow down the petiole (leaf-stalk) into the shoot to which the leaf is attached, which in turn is infected, and as a result becomes discoloured and swollen. As a rule the current season's shoots only are infected, but on rare occasions the fungus penetrates into the tissues of one-year-old shoots.

Following penetration of the leaf-tissues large hyphæ develop just below the epidermal cells of the upper surface. From these arise hyphal branches which penetrate between the cells of the epidermis and lie immediately below the cuticle, and there form a closely woven mass of mycelium. From this the asci arise as upright cells beneath the cuticle, and, as they develop, a blister becomes formed owing to the

* This organism is so widely known as *Exoascus deformans* that the writer hesitates to use any other name. Unfortunately, no satisfactory classification of this group exists, so that until one is forthcoming he believes it advisable to retain this and the two following species under the original generic name *Taphrina*.