Moulds in the Kitchen.

"Moulds" is an indefinite term applied to minute downy fungi which grow on the surface of matter. These fungi may be either saprophytic or parasitic. They belong to several different divisions, and this makes a description of them difficult to one with a meager knowledge of fungi in general.

Moulds grow on everything, from living plants to old shoes. They propagate by spores so light and small that they are easily carried about by the air and lodged everywhere to remain unobserved till the proper conditions of germination come. These conditions come with warm moist weather, and in such weather the housekeeper who has cold victuals on hand for a few days finds an abundant crop of these small plants. She finds them occasionally, too, in canned fruit, where the moisture is always present.

Four sorts of mould are of common occurrence in the kitchen: Mucor, Eurotium, Penicillium, and Trichothecium roseum. The life history of the first three is known. The last has been studied, so far as I know, only in

the conidia bearing stage.

Mucor, the common bread mould, is white at first, then black or gray. It grows vigorously, and will cover a piece of bread in a very short time, if it is kept warm and moist.

The genus Mucor belongs to the division Zygomycetes, order Mucorineae. The distinguishing characteristic of Zygomycetes is the production of sexual, or resting spores, by conjugation; that is, by the union of the protoplasm in two mycelial branches to form a zygospore (figs. 1-5). The order Mucorineae is characterized by the production of asexual, or conidia spores, by free cell-formation in a spherical receptacle (sporangium) at the end of the hypha. Mucor is distinguished from other Mucorini by the bursting of the sporangia coat to set the spores free (fig 6). In this, as in other moulds, the formation of conidia spores begins when the plant is very and continues as long as there is a good supply of moisture and nourishment, and the conidia spores will germinate, with proper conditions, almost immediately after they are matured. In Mucor, the resting spores are not formed till the supply of nourishment is nearly exhausted.

Eurotium (Aspergillus) grows in all kinds

of cooked food, and is the common mould of canned fruit. Its hyphae are white, and its conidia spores, which are so numerous as to cover the surface it grows upon, are of various colors — white, bluish green, olive green, and black. It belongs to the division Ascomycetes, characterized by the production of resting spores in asci, or sacs.

The development of the sexual organs of reproduction in Eurotium was studied by de Bary, who describes it as follows: While the conidia-spores are being formed, branches of the mycelium begin to coil loosely. After making eight or ten turns, the remaining five or six coils are packed closely together, making a hollow screw. This is the archicarp, or female organ. The archicarp is now divided by transverse septa into as many cells as there are turns in the screw. Two slender branches from opposite points on the lower turn of the screw grow up outside the archicarp, one growing faster than the other. This one is the antherid, or male organ. It fertilizes the archicarp by conjugation with its apex. After fertilization a number of filaments from the lower part of the antherid and of the archicarp grow up about the archicarp, growing together and completely covering

ish. These filaments are divided by transverse septa into cells, so that the covering, when developed, looks like parenchyma. The archicarp and its covering are called the perithecium (fig. 7). A layer of cells is formed on the inner surface of the covering, and these cells multiply by division and fill the interior of the perithecium, crowding apart the coils of the archicarp. These cells constitute what is called the filling tissue. While this process is going on, the archicarp is being divided into numerous cells, and from these cells numerous branches grow out between the cells of the filling tissue, form septa, and ramify. Their ultimate ramifications are the asci. During the development of the asci, the cells of the filling tissue disappear. The asci themselves finally disappear, and the perithecium, when mature, consists only of its covering and the spores, which may be released by pressure. The spores (ascospores) are in the form of bi-convex lenses, and eight of them are formed in each ascus.

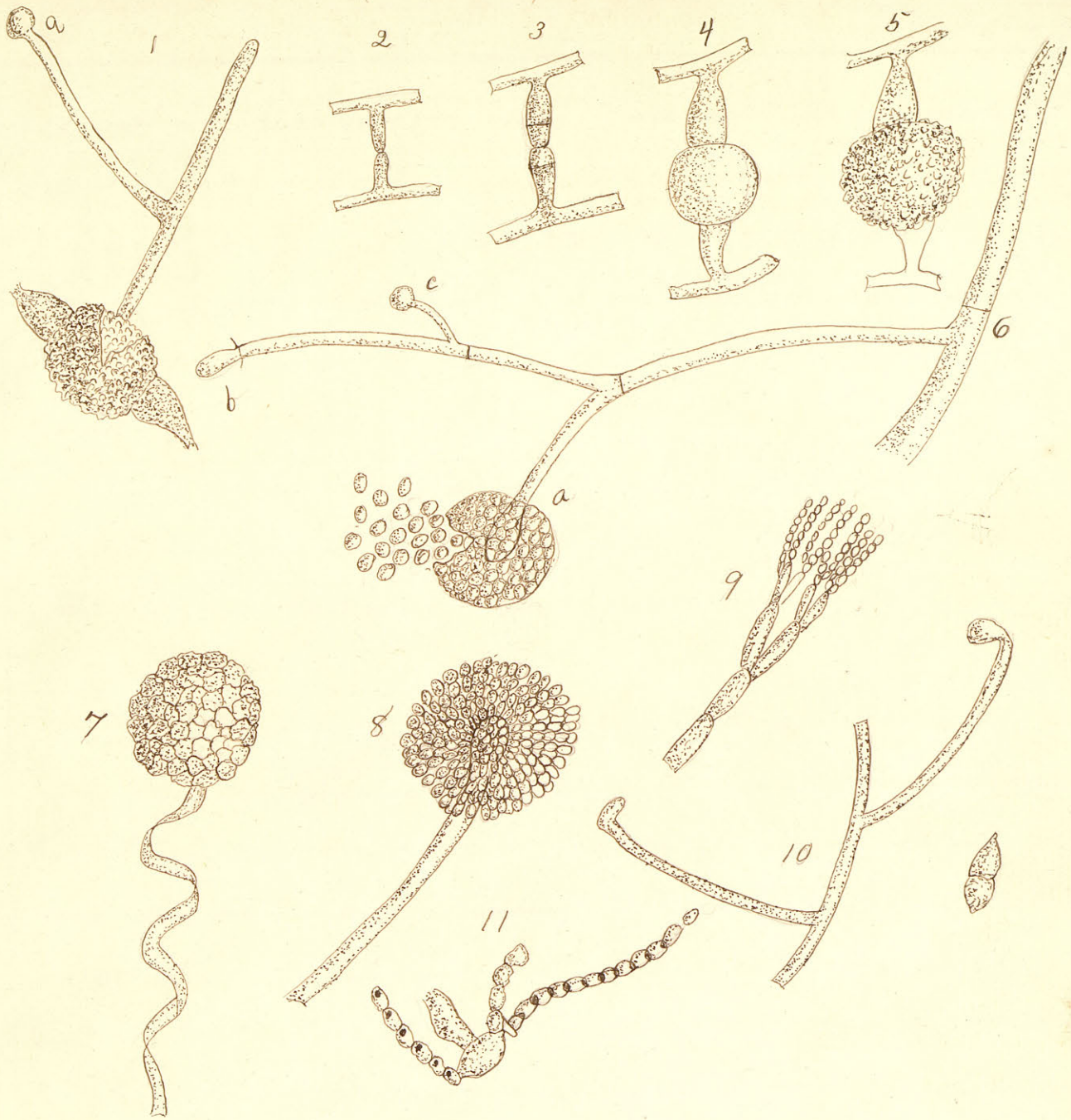
The peritheria, when ripe, are covered with a sulphur yellow powder, and the mycele with an orange powder. The peritheria and the mycele constitute the brown and yellow crust sometimes found on canned fruit which has been mouldy

a long time.

The conidia spores are produced as follows: Erect hyphae grow from the mycelium, swell at their upper end into globular form, and produce on the upper half of the globe a number of peg-like radiating projections (stirigmata); the stirigmata produce the spore in chains (fig 8).

Penicillium glaucum is a bluish-green mould, found in cheese, canned fruit, etc. It also belongs to the division Ascomycetes. Its sexual organs, which are produced only in the absence of air and light, are essentially the same as those of Eurotium, consisting of a coiled archicarp with an antherid growing from its base; but the archicarp is covered with from fifteen to twenty layers of filaments growing from its base and its sides. The conidia spores of Penicillium are produced in chains on the penicillate or brushlike branches of the hyphae (fig. 9).

Trichothecium roseum is a pale rose-colored mould appearing on decaying matter later than the other sorts. It differs in general appearance from the others in that its hyphae are decumbent, while the hyphae of the others are erect. Its conidia spores are borne singly, naked, at the ends of the hyphae (fig 10). They are ovate and septate. On



1-6. Mucor mucedo.—1 germinating zygospore; a sporangium; 2-5 stages in formation of zygospore. 6 hyphae with sporangia; a bursting sporangium and conidia spores; b columella with remains of sporangia coat; c young sporangium.

7-8. Eurotium Asperigillus glaucus.— 7 perithecium; 8 conidia spores.

9. Penicillium glaucum,—conidia spores.

10. Trichothecium roseum—hypha and conidia spores.

11. Mycele multiplying by division.

(1-5 after Brefeld. The others figures from nature)

account of their shape, this mould was classed by one botanist – Corda – with wheat rust, and named Puccinia rosea. It has been described under a number of names, but until its sexual reproduction is studied, its place in the natural classification cannot be found.

Besides the usual modes of reproduction, moulds sometimes multiply by division of the mycelium (fig 11). This is the method followed when the mould is kept in a liquid.

Moulds generally are voted a nuisance. Eurotium Aspirgillus glaucus is an exception, being cultivated on cheese for the purpose of improving its flavor and digestibility. Pasteur suggests that moulds will some day be utilized in industrial operations, on account of their power to decompose organic matter. He has found by experimenting that some sorts, when grown in the open air, produce considerable ammonia. Mucor, Eurotium, and Penicillium, grown in sugar solutions and propagating by mycelial division, produce alcohol to some extent. It may be said in favor of these small specimens of vegetation, that they act as scavangers, by hastening the decomposition of decaying matter.

The only way to keep moulds out of the kitchen is to keep things dry or cold, or dispose of food be-

for it has time to mould. The only way, theoretically, to keep them out of canned fruit is to boil fruit, can, cover and all that pertaine thereto, for two or three houre, and seal air tight and spore tight while hot. It is sometime said that fruit keepe better if it moulds. But if its is put up so it can't mould, it can't spoil.

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