way, and yet we are sure of more brood. I get nine frames into a hive only 11¾ inches wide; with even this number the bees will work in the sections far better than in the old way, when crowded down on five or six combs spaced away apart by bulged and thick comb. Such is sure to cause swarming, as instinct plainly teaches the bees that they must soon be unknown if no brood-one is provided; and how often we have found but little brood where there should have been an abundance, and yet the cause never occurred to us. This shaving and narrow spacing also prevents storing of pollen in the sections to a great extent, simply for the reason that there is plenty of room right among the brood, where it should be. When one has a large number of colonies, there is a great saving in the comb, which is quite an item.

Of course for winter the combs are spread and a stay like the above only ⅛ of an inch would please any one when he comes to move the hives into and out of the cellar, as they are simple and cheap, and remain nicely in place. Try it.

After trying about every method, I have proved the above method to be *the one*—also that it pays to use full sheets of foundation in sections, and to cover the boxes up warmly, and then rest assured if there is honey in the field, it will be carried into the sections.

From Gleanings.

Pollen and Pollen Grains.

PROF. COOK TELLS US SOME WONDERFUL THINGS ABOUT THEM.

POLLEN is the male element of plants, and corresponds to the sperm cells of animals. When we remember that no plant-ovule can possibly develop without the fructifying influence of these pollen grains, we understand how necessary they are in the vegetable economy.

Pollen grains are very small; often appearing, when shaken from the plant, like a cloud of dust. Their color is exceedingly varied. Some are almost black, others nearly white, though for the most part they are either orange or yellow. Their form is also extraordinarily diverse. Some are spherical, others cucumber shaped; still others crescent form, and yet others remind us of a dumb-bell. We have in our college library a book at least three times as large as the A B C, devoted entirely to pollen grains. In this volume are many pages used exclusively to illustrate the varied forms and markings of different kinds of pollen grains. So characteristic are the forms of pollen grains that we can often tell what plants our bees have been visiting, by simply dissecting their stomachs. The sculpture, or external markings of pollen grains, are quite as varied as their general forms. Some are smooth, others rough; some are ridged, others grooved; some are pitted, while others bristle with sharp points. Often these projections vary in the same pollen grains.

The pollen grains are developed in the anthers or ends of the stamens of the flowers. In order to fructify the ovules, these grains must lodge on the soft stigma, or end of the pistil. But frequently the stamens and pistils are in different plants. In other cases, where stamen and pistils are in the same blossom "Nature shows her abhorence of close fertilization" by causing the stamens and pistils of a flower to mature at different times. Hence the great necessity of bees and other insects for the performance of this important work in vegetable economy. They must carry the pollen to the stigma. Where any such union is so important, and yet in the nature of things accidental, Nature is always very lavish. Thus the female fish simply drops her eggs, or roe, in the water. The milt from the male passes into the same medium. Here the union must be accidental, and depends on favoring currents; hence the eggs and sperm cells of fish are numbered by millions. For a like reason the pollen grains of plants are exceedingly abundant, and far out number the seeds. Thus in the Chinese wistaria, a beautiful climbing bee-plant, illustrated in my Manual, there are, says Goodale, seven thousand grains of pollen to about thirty ovules. Hassall estimates that the number of grains in a single plant of rhododendron is seventy-two million six hundred and twenty thousand.

Each pollen grain is a single cell, having two coats—an outer, extine, and an inner, intine, for its wall. It is the extine which is beset with projections, in rough pollen grains. The extine is also frequently perforated. In this case the intine lines these holes, or openings.

As previously shown in an article *Gleanings*, the contents of each pollen grain is protoplasmic matter. This is rich in albuminous material. Indeed, the chemical composition of pollen is not greatly unlike that of some of our grains, as oats, barley, etc.

When the pollen grain lodges upon the stigma, if the latter be in a right condition, as shown by its adhesive secretion, the pollen grain increases somewhat in size, and soon a tube, sometimes more than one, pushes out through a perforation of the extine. The tube passes through the whole length of the style till it reaches the ovule