

**WHAT WE FIND IN HONEY.**

Among objects familiar to all, honey may be mentioned as one capable of affording the microscopist considerable entertainment. Before enlarging on this, however, perhaps it will prove of interest if we take a rapid glance at the composition of honey.

During the growth of flower buds, copious deposits of starch take place in their receptacles and disks. When the flowers open, this starch, by the absorption of oxygen and evolution of carbonic acid, becomes converted into sugar, to aid in the rapid development of the delicate floral organs. The excess of sugar thus formed, and naturally deposited in nectaries of flowers, is extracted from the latter by working bees. These deposit it in their crop or honey bag, and from this receptacle again discharge it when they return to the hive. But during this short interval the sugar, by admixture with the liquids secreted in the mouth and crop of the insect, becomes somewhat altered; so that the honey we obtain from the comb is perhaps not exactly of the same chemical composition as when it was sucked from the flower by the industrious bee. The solid crystallizable portion of honey consists of grape sugar (also called glucose or dextroglucose), which is abundantly diffused throughout the vegetable kingdom, being more especially a product of those plants or fruits which possess distinctly acid or sour juices. Another constituent of honey is an uncrystallizable, colorless sirup, as sweet as cane sugar, and called levulose. A mixture of levulose and glucose in equivalent quantities constitutes fruit sugar or inverted sugar. Honey also contains some cane sugar, which is usually the product of such plants as have little acid in their saps, and which also exists in the nectaries of some flowers, notably in those of cactuses, where the sugar is almost wholly of this kind. In addition to these sugars, we find, as constituents of honey, a small quantity of gum, mucilage, and a little wax. All of the sugars mentioned vary in sweetness; cane sugar, for instance, being popularly distinguished from other varieties by its greater sweetening power; three pounds being equivalent, in this respect, to five of grape sugar. Both the solid and liquid sugars of the honey have the same general properties, the liquid differing from the solid chiefly in refusing to crystallize, and in containing a mixture of various coloring and odoriferous substances characteristic of the flowers from which the bee extracted it. To such foreign matters as these honey owes the varied color, flavors, and odor which it has been recognized as possessing in different districts. To this

fact is due the high estimation in which was held by the ancients the honey of Mount Hybla, in Sicily, a locality noted as the habitat of thyme and an abundance of other odoriferous flowers. The fame of the honey of Mount Ida, in Crete, is owing to the same reason. Hence, also, the perfume of the honey of Narbonne, of Chamouni, and of the Moorlands of England when the heather is in bloom. It occasionally happens that these foreign substances possess bitter, narcotic, and poisonous qualities, as is the case with the Trebizond honey, which produces headache, vomiting, and even a kind of intoxication in those eating it; the poisonous quality being derived from the flowers of a rhododendron (*Azalea pontica*). It was probably a honey of this kind which poisoned the soldiers of Xenophon, as described by that general and author in his "Anabasis."

As might be expected from what has been said, then, when we place a small drop of honey on a slide, cover it with a thin glass, and examine it with a high power of the microscope, it will be observed to contain a large quantity of sugar crystals (Fig. 1), which will be found elegant objects when viewed with polarized light and the use of a selenite stage. But in addition to these constituents there are various foreign matters to be found in all honey, and among the most interesting of these are the pollen grains which the bee had detached from the stamens of the flowers in its nectar-gathering visits. By careful investigation, very many different kinds of pollen may be detected in any sample of honey, and the prevalence of one kind over the others will give a clue to the sort of locality the bees frequented in collecting their sweet spoil. In an examination made of a beautifully clear sample of honey, contained in a very white comb, a short time since, we found the varieties of pollen grains figured herewith, each of which is represented magnified 500 diameters. We are at present unable to assign them to the plants from whence they were derived, since no work has been as yet published giving figures of the pollen of our American plants.

Perhaps some of our readers who are microscopists, and

who have made the subject of pollen a specialty, will recognize our figures, and be able at once to identify them.

The pollen, Fig. 2, was the prevailing form, and the greater part of the honey had probably been derived from the flowers whence this variety came. The other pollens occurred in less frequency, but all in considerable quantity. In addition to the pollen grains, we found, in more or less quantities, scales from the wings of various butterflies, which had probably been brushed off these insects on their visits to the flowers in search of nectar, and which had adhered to the hair of the bees on the subsequent visits of the latter to the same blossoms. We found many brown fungus spores also, like those in Fig. 14; we are not able to place these definitely, as we are acquainted with several fungi that have spores very similar to this.

A few insect hairs, probably derived from the bee itself, completes our list of what we discovered on a cursory examination of a very nice sample of comb honey. It would be an interesting matter for those who possess microscopes, and who live in the country, to collect pollen grains for themselves, and compare them with those introduced into the honey by the bees.

**Chinese Rice Paper.**

The thick, soft, translucent material called Chinese rice-paper, is commonly supposed to be made of rice, or some sort of fiber obtained from the rice plant. A recent writer says that it is not so made, but is the pith of a *Fatsia papyrifera*, sliced thin. The tree grows about twenty feet high,

in our late war, a nation may find the cheapest market suddenly closed when the need of buying is greatest. Under conditions not dissimilar our Western farmers are learning the same lesson. "They were once bewildered," says our contemporary, "with the simple theory that each nation is for one thing—the United States for food, England for machinery, Italy for fine arts, and Germany for philosophy. How charming it all was, to be sure! We send to England our wheat, and England sends to us our hoes, and shovels, and drag chains. But as the Western farmer gets beyond a pioneer's position; as he finds it necessary to work with tools more useful than hoes and shovels; as the complicated machinery made in gigantic establishments at Springfield and Chicago, and a hundred other places, cuts down for him his grain and stacks it, cuts down his hay and tosses it into the loft for him—the farmer on the prairies has every reason to be thankful that the invention of this machinery was not left to people four thousand miles away, who had never seen a prairie, who knew nothing of an American summer or of the exigencies of an American harvest. He has reason to be thankful that, under the auspices of such men as Henry Clay and John Caldwell Calhoun, a diversified industry was forced upon this country, unwilling enough to accept it; that the foresight of the country's leaders almost compelled the country, against its will, to create the machinery, the machinist, the inventors, and the machine shops which now enable the farmers of this country to feed the world.

"If anybody supposes that the very existence of a great harvest will, by a natural law of evolution, develop the machinery which will reap it, he has only to travel through Southern Russia or through the fertile fields of Poland, and inquire how many centuries the harvests of grain have existed there without developing McCormick's reaper, or such a firm as Whitely, Fasselar & Kelley. The truth is, you must have your inventor, your machinist, and even your machine shop close by the field of their work and their triumph. They must know the need; they must talk with the men who feel it; they must see the early experiment; they must be able to correct, in person, the first mistakes. There must also be that sharp and generous competition between different shops which shall secure to the farmer the best result at the cheapest price, at his own door.

"No person, indeed, who sees the daily operation of agriculture at the West would, for an instant, relegate to Europe the manufacture of any part of the necessary machinery. Suppose a casting gives way in a Louisiana sugar mill. 'Buy where you can buy cheapest,' says Herbert Spencer. 'Telegraph to us in Birmingham the shape of your casting and its size, and in three weeks you shall have it renewed in the best workshop in the world.' To which, of course, the planter replies that at the end of three weeks his cane will be nowhere. He does not want to buy where he can buy cheapest. He wants to buy where he can buy quickest. The nearer the foundry the better.

"It is usual to reply to the repetition of such fundamental principles that, under the great law of accident, under this wonderful law of 'let-alone,' if the farmer wants a reaper he will surely get it somehow, and if the planter wants a cog wheel or a roller it will come to him somehow. Supply, it is said, will always meet demand. Supply meets demand when intelligent men come between and compel the supply. This city of Boston needed an easy highway to the Hudson. And long enough it would have continued to need it, if intelligent men had not forced an unwilling community to legislate, to incorporate, and to subsidize, until at last those railroads were built which Governor Rice so well called 'our open rivers to the West.'

"Every inch of railway in New England has been created by the principles which are at the bottom of the system of protection. If you want a man to establish a ferry, so that you shall be sure to find him there of a stormy night in December, you must encourage that man by certain privileges which you give him in pleasant days in summer. If you want men to establish the workshop which shall, in the end, train your inventors, make your reapers, and repair your sugar mills, you must at the outset give those men certain advantages for which, in the end, you will find you are repaid a thousand-fold."

**LICE ON CATTLE.**—An immediate and effective remedy for lice on cows and other cattle, also for ticks on pigs, is to wash the affected parts with potato water, or water in which potatoes have been boiled. One application is generally sufficient.

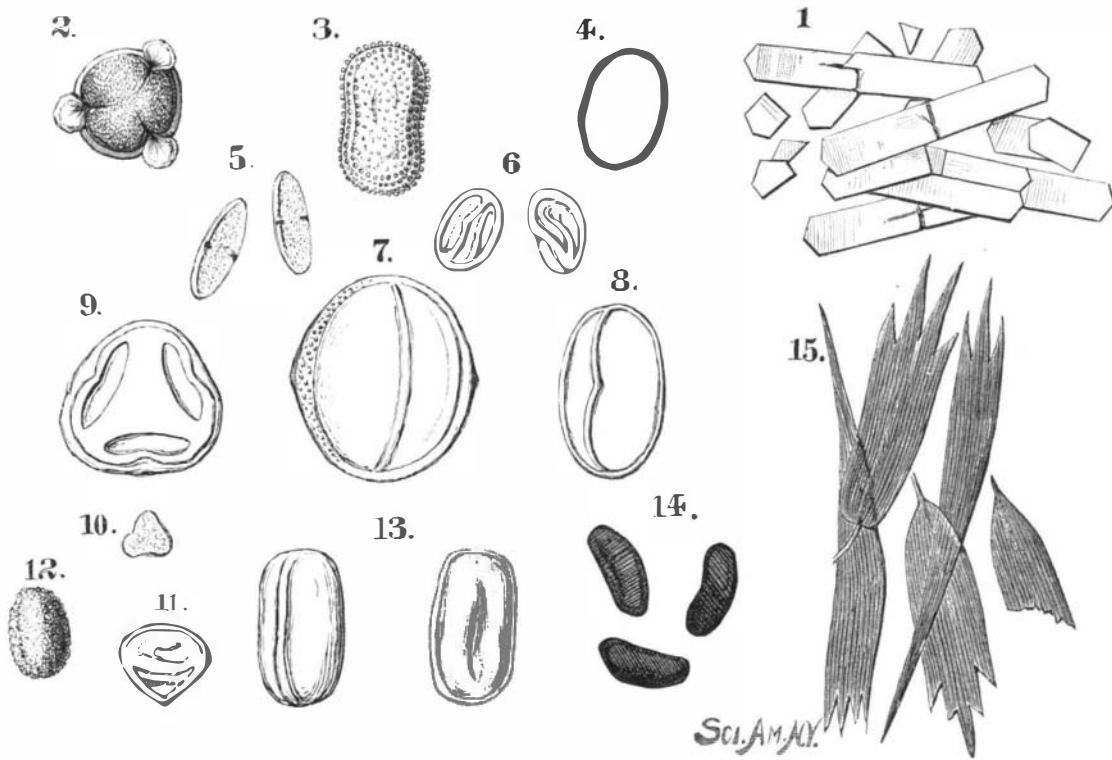


Fig. 1.—Crystals of Grape Sugar in Honey, magnified 100 diameters.

Fig. 14.—Fungus spores, magnified 500 diameters.

Figs. 2 to 13.—Pollen grains, magnified 500 diameters.

Fig. 15.—Scales from Butterflies' Wings in Honey, magnified 100 diameters.

and its pith is an extensive article of commerce in China, for it is used in the manufacture of many articles, especially toys and artificial flowers. The cylinders of pith exposed on removing the bark and woody fiber are rarely an inch and a half in diameter, and as the substance is delicate and tender, rare skill and practice are required to cut the whole stick from the circumference to center into one continuous sheet. A long, thin, very sharp knife is used for this operation. The largest sheets that can be obtained in this way are about fifteen inches long by ten wide. As soon as the sheets are cut they are spread out, all little holes carefully mended, and then they are pressed under weights until dry. The refuse scraps, etc., go to make pillows; the ordinary sheets are dyed brilliantly and sold to the flower makers, while the largest sheets are destined for the foreign market after being carefully painted by skillful native artists. There is no substance yet discovered that so well represents the delicate texture of the petals of flowers as this paper of pith, and it is exported to some extent by artificial flower manufacturers. The tree could no doubt be grown here, as our climate is much like that of China.

**Diversified Industry, and How to Get It.**

An Eastern contemporary discusses this question with uncommon force and pertinence. The free trade theory, "get your work done where it can be done cheapest," sometimes leads to painful, humiliating, if not disastrous results. Men are yet living who remember that period of national crudeness or national disgrace, when the United States could not so much as strike a medal in honor of its own victories. At the very moment when, in our diplomacy, we were defying England in a series of measures which led to the war of 1812, we had occasion to strike some medals for our naval heroes. At that time there was no machinery in the country strong enough for the purpose, and we had to ask the British mint, as a favor, to strike our medals for us.

"Nations have other functions than trade, other desires than to buy in the cheapest market. And, as it happened to us