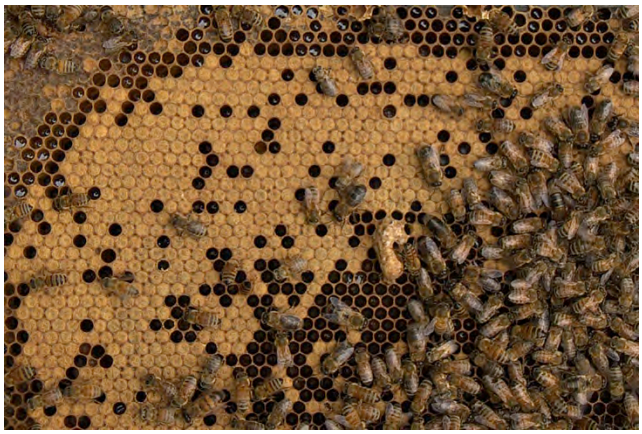
pollen

Nectar **...** *honey* **...** after all, they're *honey*bees. *Nectar* is the prime ingredient in the recipe for honey. That's why nectar is on the minds of those who farm these little animals. In fact, with anticipation, beekeepers call the period of abundant spring flowering the "honey flow". The trick to having bees overproduce honey (to allow sustainable harvest) is similar to the one used by dairy farmers, whose cows continue to produce "extra" milk as long as their udders are emptied on a regular basis.

Within a honeybee hive, there is constant assessment of honey stores and availability of empty wax cells **...** and this drives a primal instinct in the hivemind. As long as flower fields are available, foragers fill empty comb cells and transform nectar into honey. From the bee's perspective, the central purpose of honey is to allow colony survival during the *5 months of the year* when there is little or no nectar to be gathered (late fall, winter, and early spring). Honey is sustenance for the colony and fuel for the metabolic heaters who keep the cluster warm (at its center, the queen and brood comb stay at 90 degrees year-round).

Pollen, on the other hand is the source of protein to feed the extensive nursery - the brood, the developing babies in the sisterhood of the colony. Life is short for a bee [3 weeks from hatching of egg to emergence as an adult bee, 3 weeks to work inside the hive, 3 weeks to forage the fields]. In spring and summer, turnover is high, and each hive must produce many hundreds of new bees *daily* to replace the hundreds of daily losses and to grow the colony's population. Protein input is essential for growth of any animal.



Pollen mixed with honey (bee bread) is the diet of newly emerged adults, who will first serve as nurse bees. True to their names, bees at this stage have active glands, which secrete protein-rich bee milk ("royal jelly") that is fed for a while to new hatchlings and perpetually to the egg-laying queen. At the entrance of a hive, *pollen* is the incoming item easiest to notice: pollen foragers return with rear legs packed with grains of various bright colors. They scramble into the hive and proceed to unload and store their harvest in wax comb cells, for later use as needed by the nurse bees.

From the perspective of commercial beekeepers, pollen is the source of much of their income **...** not from *harvesting* pollen, but from the timely supply of hives to farmers for pollination of their crops. The mainline economy of modern beekeeping involves mass transport of hives - 500 on each flatbed trailer - to certain fields at certain times for certain fees **...** then on to the next job and the next and the next throughout the growing season **...** then back home to recuperate and rebuild and prepare for the next springtime cross-country odyssey.

However, although using honeybee colonies in such a way greatly benefits humans (whose burgeoning population has come to depend on efficient fruit and vegetable production by vast monoculture crops), there is a downside for the migrant workers. These seasonal gatherings of honeybee colonies from across the country allow pests and pathogens to be shared all around. Exposure to the chemical environment (pesticides, herbicides) of the agricultural industrial complex also takes its toll on small animals who depend on highly functional neurologic systems. Their intricate brains allow them to navigate back and forth to their own specific hive and to maintain complex communications with tens of thousands of sisters in their colony. Quite a conundrum (for the humans).


From the plant's perspective, pollen is the key to meaningful sexual interaction. Shortly after flowers first appeared 130,000,000 years ago, winged insects became important in the transport of mobile male plants (each encapsulated in a pollen grain) into the vicinity of female plants, where the males at least had a chance. Trees, bushes and herbs - all flowering plants (angiosperms) - are known to us in their large, dominant *sporophyte* phase. While well adapted for life on dry land, these plants cannot reproduce themselves**:** they depend on an *intermediate phase* - a tiny sexual generation - for that. The female is small and immobile, encapsulated in the recesses of a flower. The male is truly minuscule, adapted for travel through the air, shielded from harm, encased in a pollen capsule. Only when the pollen grain lands on a certain part of a nearby flower can the small male plant emerge and fulfill its purpose in life. Many plants depend on insects to move pollen efficiently from one flower to another. Pollen was part of the adaptation allowing expansion of plants beyond seashores and ponds and riverbanks and onto the vast expanses of dry land. Only when gametes fuse does a tiny embryo form, its development suspended in a seed, which the vegetable or fruit grows to surround. The message of vegetable or fruit is "*Eat me*," but the hidden agenda is to spread the seeds around.


A closer look at the structure of certain pollen grains and at the structure of certain parts of the honeybee shows just how much adaptation has occurred between the flower and the bee. Pollen grains fit together nicely and honeybees gather and pack them into the corbicula ("little baskets") formed by hairs on the tibia of their hind legs; a colony's harvest of pollen can amount to over 60 pounds per year. Other hairs on the bee (whether nectar forager or pollen forager) have static charge that holds stray pollen grains more loosely - this pollen provides service to the flowering plant - on and off from one flower to another. *Food for one, sex for the other* **-** the center of attraction is *pollen*.