

Three presentations this evening; almost more info than one can digest in one evening.

## Honey & Honeybees, by Tom Lawrence

[ESP Note: Honeybees are not native to the Americas, rather to Asia and Europe. They were brought here by immigrants, along with apples and other fruits. The original, wild, bee hives were in caves, rock cavities, or hollow trees. With time, people learned to make wooden hives to imitate the tree hives, and in modern times, to be efficient boxes with frames. The photo, right, is of Wooden hives in Lithuania. by Wojsyl, 2005 (from wikipedia<sub>1</sub>)]



### The Hive:

If you are interested in keeping hives, Tom recommends subscription to the [American Bee Journal](http://www.americanbeejournal.com), a monthly magazine (see <http://www.dadant.com/journal/index.html>).

Tom brought a sample hive, of the [Langstroth type](#)<sup>2</sup>. all boxes are 18 5/16" (front to back), and 14 11/16" (side to side), inside dimensions; they vary in depth depending upon intended use.<sup>2</sup> Boxes and frames are made of wood.

- **Landing, or Bottom Board:** it is from here they enter the hive, and it is fun to watch them when they return laden with pollen and nectar, as they tumble onto the board. This board supports the hive, and must be strong enough to support the weight of a hive full of honey, which may exceed 300 pounds!

It has a 3/4" rim around three sides. That space is left open on the front so that the bees can enter the hive. It extends about 2" in front of the hive to act as a landing board for the bees.

Some bottom boards are equipped with a screen to optimize air flow, aiding hive hygiene.<sup>2</sup>

- **Hive Body:** These are brood-chamber boxes (the bees live toward the center of the box, with honey frames to each side). Typically the honey produced here is used to feed the bees, rather than for human consumption. The boxes become too heavy to lift easily. Commercial hives use deep bodies (9 9/16" inside depth) for the brood chamber, but many hobbyists use medium bodies (6 5/8" inside depth).<sup>2</sup>

The middle part of the box is where the bees live; honey frames are placed each side of this middle area.

Several hive body boxes can be stacked, if desired. The most common stack is two hive bodies.



•**Supers:** These are used only for honey stores and to harvest the honey. Supers come in three sizes: medium (6 5/8" inside depth), shallow (5 3/4" inside depth), and comb (4 3/4" inside depth) supers. <sup>2</sup>

•**Queen Excluder:** Used to keep the larger queen from the supers, preventing eggs from being laid there. Placed between the upper hive body and the lowest super, it is a horizontal frame with a special wire or plastic grid, allowing smaller workers to pass. It can be removed when there is enough honey in the supers to keep the queen out.

- **Cloake board:** Specialized board inserted between two hive bodies, which allows insertion of a metal or wood panel to split the hive into two parts without lifting the hive boxes. Useful when separating one into two independent hives.
- **Escape Board:** used when it is time to harvest the honey in the supers, this frame is similar to a queen excluder but allows workers to leave the supers and not return. <sup>2</sup>
- **Honeycomb frames:** these are wood frames fitted with wax and wires, or plastic foundations in which the honey is placed. Tom says his bees prefer the wax foundations over plastic.

They come in sizes designed to fit the different sized hive boxes: shallow frames (for supers), medium frames (for supers or hive bodies) and deep frames (for hive bodies). Body and Super boxes hold 8 - 10 honey frames.



As the frames age, they darken from the honey, which in turn will darken new honey, which is not good. When they become too dark, they should be replaced.

- **Covers:** typically there is both an inside and outside cover.

The inside cover is similar to a queen excluder, but instead of the special screen, it is solid except for a communication hole in the middle. This hole allows for air circulation and for emergency feeding of the hive (with sugar water)

The outside cover is larger, constructed like a lid to fit over the top of the hive.

In the fall, the honey is harvested; honey from the supers is kept separate from hive body honey, as the latter is darker and less desirable. When harvesting before winter, about 90-pounds of honey is left in the hive bodies to feed the dormant bees through the cold season.



### The Bees:

›**Workers:** Fertilized females, who do most of the work of the hive, but do not mate unless the queen is lost, at which time one worker becomes the new queen. They gather pollen and nectar, and defend the hive from intruders.

To stimulate their immune systems and help them survive the winter, bees make a "Cleansing Flight" before going dormant in the winter.

- ▶ **Drones:** Unfertilized male bees (they only contain the DNA of their queen mother). They spend most of their lives in the hive, being cared for by the workers. Their main function is to mate. When the need is dire, they can leave the hive, either to help defend the hive, or to mate with another hive's queen.
- ▶ **Queen:** Each hive has only one queen. She can lay about 1000 eggs /day, and lives several years. She mates with 7 - 9 drones, but only needs to be fertilized once, as she can hold the sperm for the remainder of her life, using it only as needed.

When she first starts laying, the queen lays several queen eggs, which are fed more royal jelly to grow larger. After hatching, one becomes dominant and kills the others.

If the queen is lost from one hive, transfer some eggs (a comb) from another hive. The workers will then feed one worker more royal jelly to make her their new queen, who will then mate with a drone and begin laying eggs.

Eggs intended for workers mature in 18-20 days; for drones in 21 days. The slower maturation of the drones makes them more vulnerable to mites, which is not good.

## **Pollen & Nectar**

Worker bees can forage several miles, if needed, to find pollen and nectar. The pollen is carried in pollen sacs on their hind legs,<sup>1</sup> and nectar in their specialized honey stomach, which is in front of, and separate from, its digestive stomach.<sup>3</sup>

They use pollen as the hive protein, and nectar is the hive carbohydrate; both feed the larvae as they mature. Workers stockpile both pollen and honey to feed during the winter. However, you may need to augment this with sugar water.

Nectar can be used to make 9 pounds wax or 1 pound honey.

## **Tending the Hive**

At the start of the season, inspect the hives for activity, and the combs for eggs. It is recommended that you wear proper gear, including a suit and a helmet. Use the hive smoker to calm the bees and move them downward in the hive (they move away from the smoke).

Start from outside and work toward the center to avoid hurting the queen, inspecting each comb and replacing those that are damaged or diseased. However, in the case of certain diseases, the entire hive needs to be burned.

Place the queen excluder on top of the hive bodies, and then the supers above the excluder. Then replace the inner and outer covers on top. Once the supers have sufficient honey, remove the excluder.

In the spring, feed the hive with sugar water. Tom uses a plastic jar fitted with a filtering lid that allows the sugar water to drip out. Place the jar upside down on top of the inner cover, over the communication hole, so the sugar water will drip into the hive.

Periodically inspect your hives throughout the season, being observant for mites, mold and disease.

When disease is present, some can be treated with antibiotics, which is dispensed through the communication hole via sugar water.

### **Removing Honey from the Comb**

Tom uses an electric uncapping knife, but the old-fashioned way uses a capping scratcher.

Electric Method:

1. Uncap both sides of the comb using the electric uncapping knife.
2. Put honey and its detritus into centrifuge to spin the honey out.
3. Transfer to settling tank for several days; the detritus floats to the top. When fully settled, drain honey out of the bottom.

Old-fashioned method:

1. Uncap both sides of the comb using the capping scratcher, a special 'rake' or 'comb.'
2. Hang over tank to drain off the honey.

### **Commercial vs Raw Honey**

Commercial operations heat the honey (similar to pasteurization), but this denatures the enzymes. If you want to keep the honey raw (a living food), do not heat above 105 degrees. Above this temperature, the proteins in the honey, including the enzymes, begin to denature ("die"); they are fully denatured above about 140 degrees.

**Sources** (in addition to Tom's presentation):

1. [http://en.wikipedia.org/wiki/Beehive\\_\(beekeeping\)](http://en.wikipedia.org/wiki/Beehive_(beekeeping)) & <http://en.wikipedia.org/wiki/Honeybee> (text & photos)
2. [http://en.wikipedia.org/wiki/Langstroth\\_hive](http://en.wikipedia.org/wiki/Langstroth_hive) (text & photos)
3. [http://wiki.answers.com/Q/Where\\_do\\_bees\\_carry\\_nectar](http://wiki.answers.com/Q/Where_do_bees_carry_nectar)

## **Orchard Mason Bees & Bee Motels, by John Holbrook**

[ESP Note: Mason bees are native to the Flathead, as to most of North America. Traditionally they nest in holes and crack in wood created by other insects or the action of nature.]

Before beginning his presentation on mason bees, John shared an interesting tidbit about honeybees and the early research of UM's Jerry Bromenshenk: training honeybees to find ammunition and buried land mines, by mixing gunpowder with sugar water, giving the bees the scent and encouraging them to follow. Mr. Bromenshenk is now at the heart of research on Colony Collapse Disorder (CCD). Refer to the following for more:

- [Honeybees in the Ecosystem: Event Summary](#) for more on honey bees and CCD research.
- The Vanishing Bee (a 10 minute film trailer) at <http://www.vanishingbees.com/trailer.html>.

### **About Mason Bees**

Orchard mason bees are a solitary bee -- no hive, no swarm, no social hierarchy. They are gentle, seldom sting and are far more efficient pollinators than honey bees: 500 mason bees can do what would otherwise require 120,000 honeybees. But, of course, they don't make honey.

These bees evolved with stone fruits (plums, peaches, apricots, etc.), but also forage among huckleberry, blueberry, currant, apple and pear blooms.

After mating, the male dies and the female flies around until her ovaries develop, searching out an appropriate next hole. Then she gathers pollen, foraging up to 400 feet or so from the nest and taking 25 visits to and from the nest, to gather enough pollen to feed one egg. The pollen sticks to her furry underbody.

When she returns to her next she crawl or somersaults to the back of the nest hole and deposits the pollen, then goes back for more until she has enough.

Using her egg pointer (also called a barbless stinger), she deposits an egg next to the pollen (females first, males last). Then she forages for mud which she uses to build a thin wall to make a brood chamber for that egg; it takes many trips to get enough mud. When that brood chamber is complete, she repeats the process (pollen, egg, mud) until the hole is filled.

Female eggs are placed at the back of the hole; males in the front. The deeper the hole, the more females are laid. When the hole is filled except for a small "grooming vestibule" at the very front, she plugs the hole with more mud.

Each female bee lives about six weeks.

The egg hatches to a larva, which then grows a thin, silky cocoon to insulate the larva through the cold winter. This cocoon is a selective membrane, keeping water out, but allowing exchange of gasses (oxygen in, carbon dioxide and other waste gasses out).

## Bee Motels

Although mason bees can nest traditionally in trees, etc., you can also encourage them to live in your yard by providing bee motels: blocks of wood drilled with 5/16" holes on 3/4" centers. Hang them under cover, such as under the eaves, on the side of a building facing morning sun (not exposed to hot afternoon sun). The morning sun warms the nest after the chilly night, giving the bee energy to begin her day of foraging.

It's best to mount the blocks on a permanent structure, not on fence posts or deck railing, as ground and deck vibrations could cause damage to the nests when attached to the posts.

John builds his blocks out of 10" lengths of 2 x 6 boards, then drills 12 holes as deep as he can, 3/4" apart. He covers all but the top two holes with blue masking tape (painter's tape), so the bees can only nest in the uncovered holes. Then the next year, he uncovers the bottom holes which will be used by the emerging bees for their nests. Bees don't like to reuse old nests. John recommends attaching 1/2" hardware cloth over the nest holes, to protect them from the beaks of woodpeckers and flickers. (Refer to [The Essentialist: Pollinators and Their Habitat](#), or to John's [Orchard Mason Bee](#) handout, for more detail of this method).



John has also been experimenting with a different method of making bee nests. He starts with 1" boards and, using a router, cuts 5/16" wide grooves on 3/4" centers on both sides of each board. Then he secures two such boards together so that the grooves line up, making 5/16" tunnels. This method allows him to open the nests and isolate the cocoons. Once isolated, he candles them to determine whether they are viable, and whether they are male or female. (Refer to his [Extracting & Cleaning Orchard Mason Bee Cocoons](#) handout for more).

He is also experimenting with the use of parchment liners, per Randy Person's method (Refer to [Home Made Mason Bee Paper Liners the Work](#) for more).

NOTE: All handouts and files listed above are available on the ESP Website. Links are provided in the online version of this summary, and also on the [Home & Ranch Files](#) web page (<http://essentialstuff.org/index.php/2009/02/25/Cat/home-ranch/>).

## Other Considerations

Mason bees need good, damp, clay soil to make mud for their nests.

Although they do not succumb to the same diseases as honeybees, they are not without predators and disease. For example, the following feed on mason bee larva:

- Mites
- Beetle larva
- Wasps and yellow jackets
- Woodpeckers
- Flickers



## Montana Native Plants, by Tamus Gannon

[ESP Note: The Gannon's own Swan River Nursery near the intersection of Swan River Road and Montana Highway 35.]

### Samples

Tamus brought several easy-to-grow natives as examples, including red osier dogwood (pictured, right), Oregon grape, knick-knick, pasque flower.



### Changing Points of View

He told us the story of his interest in native plants. In Tahoe, where he is from, they require use of native plants in all new developments. When he moved here, he hoped to inspire Bigfork's residents with a similar vision, but their response was "why are you trying to sell us weeds?" (in reference to shrubs such as snow berries and service berries). They wanted showy ornamentals. So he cut back on his stock of Natives, until he was approached by a Whitefish developer who wanted to landscape Native. Since then he has expanded his native stock as more people get on the native bandwagon.

### Why Go Native?

Tamus cites the following reasons:

- ✓ Natives are not as devastated by disease as imports;
- ✓ They require less care (fertilization, water, etc.), but you may need to tweak soil mix, and add sulfur to acidify;
- ✓ They are beautiful, and many also provide fruit;
- ✓ They fit in, or "belong" with the surroundings;
- ✓ Good for the ecology of the area; they evolved here, and many are symbiotic with other natives. For example, indian paintbrush requires a host plant like Idaho fescue to survive.

The USDA Brochure: [Montana Native Plants for Pollinator-Friendly Plantings. April 2005](ftp://ftp-fc.sc.egov.usda.gov/MT/www/technical/plants/pollinator.pdf) (<ftp://ftp-fc.sc.egov.usda.gov/MT/www/technical/plants/pollinator.pdf>) is an excellent informational resource, and cites these additional reasons for going native:

- ✓ Reduce Pesticide Use: sequentially blooming annual and perennial plants provide habitat and winter cover for insects, enhance weed seed suppression, and provide some biological control of insect and disease pests
- ✓ Stabilize Soil & Provide Ground Cover: root systems hold soil in place and reduce risk of erosion;



✓ Act as Windbreaks & Shelterbreaks: taller trees and shrubs protect farmsteads, crops, and livestock from wind and dust damage and may help to filter wind-blown weed seed (*photo is Serviceberry*);

✓ Provide Wildlife Habitat: woody perennials provide food and shelter for many native wildlife species, and immature pollinator life stages.

## Miscellaneous

Like most species, natives are site and soil specific. Choose plants that are suited to the site and the soil, and amend soil as needed to keep them happy.

Start with “easy to do” natives.

Propagation: perennials are propagated mainly by seed. Arrowleaf Balsamroot is hard to grow from seed. Brett Thuma suggested it is easier to grow them from seed if you sow the seeds directly in the soil, rather than in pots for transplanting, as they do not like to be transplanted; and they take years to mature.

An experiment in Dillon demonstrated that sheep fescue is the best native sod alternative for our area.

Best soil mix for starting natives: compost, peat and sand (for drainage)