Introduction to Beekeeping

David Hoag
The Craft of Beekeeping

• Bee keeping is complicated!
• There is no single correct approach to beekeeping
• Continuously learn from your bees
• Continuously learn from other beekeepers.
• Get involved, develop your knowledge and your network!
Keeping Bees – First Steps

• Check restrictions for beekeeping in your area
• Talk with your family and neighbors before getting bees
  – Are there swimming pools nearby?
  – Does a neighbor have a strong allergic reaction to bee stings?
• Select your hive location carefully
  – Select a sunny location to set up your hives
  – Use fences, walls, or plants to direct your bees up!
  – Make sure it is easy to access and work on!
Strong bees starts with Setting up the Bee Hive

• Sunny & warm
• Wind break
• Morning sun on the hive opening
• Easily able to access hive from sides or back
Beekeeping supplies

- There is an overwhelming selection of options for the beekeeper
- There is no one “best” solution
- But there is a toolkit used by most beekeepers, and that is what we will look at today…
Langstroth Hive

- Telescoping cover and inner cover
- Honey supers
- Queen excluder
- Hive body
- Bottom board (screened or solid)
- Hive stand
Box options

• Hive bodies and honey supers come in 8 and 10 frame options
  – They are not interchangeable!
  – 8 frames are 20% lighter and are much easier to manage for the hobby bee keeper

• Hive bodies come in 3 depths: 9 5/8”, 7 5/8” and 6 5/8”
  – My backyard choice was to standardize on the 8 frame, 9 5/8 option
    • All equipment is interchangeable
    • I pull my honey frames one at a time (vs. pulling an entire box off), so honey super weight was not a problem.
Beekeeper’s Toolkit

- Smoker
- Hive tools
- Frame rest, and other tools
- Personal protection
  - Veils
  - Bee suits
  - gloves
Purchasing Equipment tips

• Local stores and on line catalog options

• Stick with one supplier for hive components
  – Sizes differ a little between companies, so different parts of a hive may not fit well together
  – Some companies offer discounts for larger purchases.

• You can save money by building your own
  – Many good plans on line
  – Need table saw and hand tools
  – Time consuming, but very rewarding
Getting bees

• Get your equipment up and running before you get your bees!

• Three options for getting bees
  – Purchase a package of bees
  – Purchasing an existing hive or a nuc
  – Collect a Swarm
Bee Packages

• What you get:
  – 3lb of bees and a queen
  – Bees are bred to be predictable and easy to work with

• When:
  • Once a year only
  • Order before March for delivery in April

• How to get one:
  • Contact your local bee guild
  • Carrier Bees or other local bee supply business

• Cost: Around $170
Purchase a Hive or Nuc

• What you **may** get:
  – Queen, bees & larvae
  – Pulled frames
  – Unknown temperament and origin

• When:
  – Any time available

• How to get one:
  – Craigslist or contacts at a bee guild
  – You swap out new frames for “pulled” frames and must have all other equipment ready to go

• Cost: 5 frame colony $180  (craigslist quote)
Catch a Swarm

• What you get:
  – Local bees
  – Unknown temperament
  – Unknown queen

• When:
  – March through April

• How to get one
  – Join your local bee guild and get on the swarm list
  – Join your local bee guild and join the swarm team
  – Craigslist

• Cost: Free to $110
Now that you are all set up,
Let’s talk a little bit about Bees
The Queen

- Queens are “made” by the workers
  - To replace a failed queen
  - Or to swarm

- The queen as the ovaries of the “super organism”
  - Can lay up to 1500 eggs per day
  - Can “choose” to lay worker eggs or drone eggs

- “The queen is dead! Long Live the Queen!!”
  - Unproductive queens are replaced by the colony
  - She can live up to 7 years (but 2yrs is more normal)
The Worker

• All female bees

• Any worker bee had the potential to become a queen
  – All bees are fed royal jelly for the first 3 days of life
  – Worker bees are switched to pollen and nectar diet.
  – Queen bees are fed royal jelly their entire life

• Workers live around 6 weeks
Drones

- The male bees in the hive
- Entire role is to take mating flights, seeking out other queens to mate with
- They are expendable when times are tough
Honey Bee Lifecycle

<table>
<thead>
<tr>
<th></th>
<th>Egg</th>
<th>Larva</th>
<th>Pupa</th>
<th>Total Development Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Queen</td>
<td>3 days</td>
<td>5 1/2 days</td>
<td>7 1/2 days</td>
<td>16 days</td>
</tr>
<tr>
<td>Worker</td>
<td>3 days</td>
<td>6 days</td>
<td>12 days</td>
<td>21 days</td>
</tr>
<tr>
<td>Drone</td>
<td>3 days</td>
<td>6 days</td>
<td>14.5 days</td>
<td>24 days</td>
</tr>
</tbody>
</table>
Foraging

- Worker bees forage for pollen, nectar, water and tree resins (propolis)
- Food that is not consumed by the colony is stored and consumed when no food is available

Trophallaxis
Nectar

- Nectar is converted into Honey or Wax depending on colony needs
- Nectar is “ripened” into honey
- Honey is then the “heat source” – carbohydrate – for the colony.
Pollen

- Pollen is the protein for the colony and is essential for colony survival
- Pollen is a key trigger for colony expansion or contraction throughout the year.
Water

• Water is essential to the bee, the bee colony, and to honey production.

• A bee colony can consume up to 1 liter of water per day
Propolis

- Bees collect plant resins (sap) and use it to seal small gaps in the hive
Hive Inspections

• Use a checklist
• Start with the outside
  – Activity level
  – Pollen coming in
  – Dead bees on the ground (type? Age? Cause?)
  – Signs of ants or other predators
  – Condition of equipment
• Inside
  – Seasonally predictable
  – Brood patterns
• Be respectful, be intentional, be quick
When to Open a Hive

• Best to inspect when most of the bees are out foraging.

• Sunny, warm, and wind free days
  – 65 to 95 degrees

• Mid day is best. Target 10am to 4pm

• If your bees are happily going about their business, they are less likely to be concerned with you.
Preparations before Opening

• Smoker is full, lit and smoking before you open a hive.

• Bee suit is clean and your veil is on.
  – You don’t want to have bees flying before you put that veil over your head.

• All supplies you might need are with you and ready to be used
  – Do not leave an open hive unattended
  – Do not leave your smoker unattended
  – Do not leave the hive open longer than absolutely necessary
Calm Bees:
Tips When Opening a Colony

• Stand on the side or the back of the hive, not the front.
  – Standing at the front will prevent foragers from returning

• Be gentle. Avoid bumping or snapping sounds which will alarm the bees

• Use enough smoke to make the worker bees comfortable

• Avoid crushing bees!
Strong colonies: 
Let the bees do the fighting for you

• A focus on STRONG colonies will reduce impact of disease.
  – Good colony location (sunny and warm)
  – Room to grow when they need it
  – Feed when they need it
Colony health

• Strong colonies maximize new bees (recruitment)
  – The queen has sufficient room to lay eggs
  – Plenty of nurse bees to take care of brood
  – Adequate food stores in the hive

• Strong colonies minimize death (Attrition).
  – Loss of bees through wear and tear, disease, and starvation,
  – Attrition is reduced average lifespan of the worker

• Our task is to maximize recruitment potential while minimizing attrition.
Maximizing New Bees

• Good colony location

• Equipment in good shape
  – No cracks or gaps that would let predators or bad weather into the hive
  – Equipment is serviceable (safe for you)

• Room to grow when they need it

• Feed when they need it.
  – Don’t take too much when harvesting honey.
Room to Grow: Seasonal Changes in the Hive

Typical colony population growth curve (very approximate)
Adding a Second Brood Box

• Colony growth happens very fast!
  – One bee takes roughly 5 times the space of a brood cell.
  – The colony needs to take full advantage of nectar and pollen flows in order to survive the winter.

• Colony is telling you they need more room when:
  – There are lots of bees
  – The hive is heavy
  – White wax
Two Brood Boxes, Lots of Bees
Adding a Honey Super

• Just another name for a box with frames
  – Often a Medium or Shallow box
  – Consider weight when determining what you are going to use for honey supers

• Use a Queen Excluder to keep the honey free from brood

• Don’t mix honey frames with brood frames
Two Brood Boxes, Lots of Bees
Other Options

• Check to see if there are bees in both boxes
  – Bees may have entirely moved up – leaving the lower box empty.
  – You may want to swap box positions.

• Check for queen cells, especially if both boxes are stuffed with bees
  – They may be preparing to swarm
  – Options may be to split the hive or let them swarm
Too Few Bees

• Queenless hive or failing queen
  – Hive inspection reveals no brood, or spotty brood.
  – Hive inspection reveals no queen
  – Hive inspection reveals queen cells.
  – Bees are loud and agitated
  – Possible solutions:
    • Requeen
    • Combine colonies

• Disease, starvation…
  – Increase bee longevity
Increasing Bee Longevity

• Focus on the big items
• Focus on those items we can control
• Learn from your bees and learn from other bee keepers.
Colony Threat: Starvation

- Spring is a high risk
  - Lots of new brood
  - Low food stores
  - Winter bees too tired to forage
  - Spring rains or frost can kill food supply or prevent foraging.

- Watch carefully!
  - Heft the box to check weight
  - Look for capped honey
  - Feed if at risk!
Colony Threat: Ants and Wasps

• Strong, healthy colonies are rarely killed by ants and wasps
  – Ants can push a weak colony out of the hive
  – Wasps feed on brood and can overrun a colony

• Simple preventative maintenance usually does the trick
  – Set wasp traps out early in the year
  – Use ant barriers or traps if needed
  – Don’t use spray insecticides around your hives!
Colony Threat: Varroa destructor

- Breeds in capped brood cells and feeds on larva and adult bees.
- Mite infestation can kill a bee colony.
- Biggest risk is in late autumn through early spring
- Infested colonies will often have large number of bees with deformed wing virus.
- Try to keep mite levels below a 1% infestation rate in adult bees
Deformed Wing Virus

- Numerous bees with stunted wings in front of the hive
- Most visible indication of a heavy Varroa mite load
Testing for Varroa

• Slide in a solid bottom board for 24 hours
  – Recommendation is to use white board with cooking spray so mites stick.
  – Carefully remove board and count mites
  – This is a crude measurement, but may be sufficient to determine any action needed

• Bottom board count tolerances:
  – Spring: > 10 mites
  – Fall: >50 mites (personally, I think this is way too high)
Closer look at Infestation Rate

- Rate affected by bee population changes
- A manageable mite load in one month could quickly turn into a major issue later on.
Bottom line with Varroa

• Your colonies will have Varroa mites
• They become a serious risk to colony health when the ratio of mites to bees is too high
• Your task is to learn how to read the signs and take appropriate action
Treating for Varroa

• Large, healthy colony in a good location is your best defense!
• Use screened bottom boards so mites naturally fall out of the hive
• Treat with formic, oxalic acid, or with a miticide in fall and spring.
• Rotate treatments to reduce resistance.
• As a beekeeper, continue to learn and adapt
Chemical Treatment for Varroa

- Mechanical methods are usually insufficient to control varroa.

- Two “soft chemical” treatments using chemicals already found in honey should be considered:
  - Oxalic Acid vaporizor (new to U.S. beekeeping!)
  - Formic Acid: MiteAway Quick Strips
  - Amitraz: ApiVar
  - Thymol: ApiGuard

- Most treatments may slow or stop egg laying for a week or two. Be careful with use.
Colony Health Summary…

- There are many pressures on bee colonies, and will likely be more over time
- A focus on STRONG colonies will reduce impact
  - Good colony location (sunny and warm)
  - Room to grow when they need it
  - Feed when they need it
  - Stay on top of varroa
- Continue to learn and adapt
Maintenance schedule

• Late winter / Early spring
  – check reserves. Feed pollen or sugar if necessary
  – Treat for mites
  – Give additional brood space as needed

• Spring through summer
  – Treat for mites
  – Give additional brood space if needed
  – When the bees are ready, use queen excluders and add honey supers
Maintenance schedule

• Late summer into fall
  – Test for mite load
  – Treat for mites as needed
  – Pay attention to pollen flow and feed as needed
  – Remove supers

• Winter
  – Prepare for the early spring build
  – If needed, reduce them down to one hive body.
  – Don’t feed (fruitless foraging)