

1. Introduction
2. This discussion is about Swarming, not Absconding. Absconding means the entire colony deserts the hive and leaves all the valuable resources behind. Usually there are some very serious problems for the colony and their desertion is a last-ditch effort to survive. Usually, they don't survive.
3. The honeybee colony needs nurse bees to feed the rest of the hive, foragers to gather nectar and pollen, and the ability to pass on the species to the next generation. How the colony is able to delegate the correct number of personnel for each task is a process that has developed over the last 120 million years. How do they know how to do this?
4. A British beekeeper's words is the most revealing. "*The bees have their definite plan for life, perfected through countless ages, and nothing you can do will ever turn them from it. You can delay their work, or you can even thwart it altogether, but no one has ever succeeded in changing a single principle in bee-life. And so the best bee-master is always the one who most exactly obeys the orders from the hive*"—
5. Most colonies will swarm if they are strong enough. If they swarm you have lost a great deal; most of the workers have left, the honey crop will be reduced, and the colony will need to raise a new queen. Without controls most healthy colonies will try to swarm twice during the season.
6. Swarming is dangerous. The swarmed colony usually has everything it needs to survive and about 80% do. Unfortunately, 20% of virgin queens don't survive through their mating flights and as most of the varroa mites are housed in the brood, not many leave with the swarm. If the hive survives, it will try to swarm again. Without swarming there would be no honeybees anywhere!
7. There are two seasons for swarming behaviors; one to reproduce the colony in the spring and the other to relieve congestion of a colony during honey flows
8. The colony works well to stay alive and productive, the queen lays eggs that become drones and workers. However, colonies naturally fail and new ones are necessary to keep natural balance. It is incumbent on the healthier colonies to attempt to reproduce, even though it is very dangerous. It ensures honeybee survival by creating the next generation. It is a hardwired instinct that is triggered by conditions in the springtime.
9. Reproduction swarms occur when the weather is warmer and about two weeks after the spring nectar and pollen becomes plentiful. It is heavily dependent on the weather occurring over a 2-6 week period.

10. The reproduction swarm must be well planned. The requirements include the presence of mature drones, sufficient daylight hours, warm enough temperatures to congregate in exposed areas perhaps for days, no freezing temperatures, and mild winds. Even when conditions are right, these hives have about a 25% chance of surviving through the next winter. Those statistics require two or more swarm attempts each year to maintain feral colony levels.
11. Colony congestion is the other reason for swarming. It can happen anytime throughout the season. When there isn't enough space in the hive there is limited egg laying. There literally is a housing shortage, and the young nurse bees, have limited job opportunities. They have heightened energy levels due to their increased levels of vitellogenin resulting in disturbance and unrest. The nurse bee numbers are compounded by the pollen foragers staying in the hive. The decreased volume of young brood hormone levels results in a decreased drive for pollen foraging.
12. Having a lot of bees with lots of resources is great, but it can be too much of a good thing. The competition for space to store resources and raise brood becomes a signal to swarm. The colony has everything it needs to survive, so it is time to split.
13. As I mentioned, the queen's mandibular hormone is deficient: she's aged, the hormone is spread from her mouth through feedings by the nurse bees who then distribute to others throughout the hive. But there's limited space for movement, not enough pheromone for the population of bees, resulting in an increased urge to swarm.
14. What needs to be done? Examine the brood chamber. Wall-to-wall brood on several frames means that it will only be days before lots of new bees will be emerging. This severely compromises the hive as each bee takes up the equivalent space of four brood cells.
15. Look closely at the brood area of the frames. This picture looks like a spotted brood pattern such as you might see with a laying worker problem, but it isn't.
16. A close-up of this area on the frame attempts to show that workers are placing nectar and sometimes pollen in the areas where there should only be eggs and larvae. It is a sign that all the honey supers have been filled and the foragers are continuing to bring in nectar. There isn't a regulating force to quit nectar foraging and the house bees are attempting to store the nutrients wherever there is room. . Sometimes a recently purchased nuc can also have so many bees that they will swarm.

17. The young nurse bees have been hanging out on the bottoms of frames and on the outside of the hive. A hot day may require hive members to beard on the outside of the hive to reduce their body temperature from endangering the hive, but we don't normally have days that warm around here. The nurse bees are just waiting for a signal to swarm.
18. What conditions are required for congestion swarming? Once the checklist is complete, a countdown to swarming begins. Favorable weather, adequate nutrition stores, many well-nourished young workers, queen cups which eventually become queen cells with the laying of an egg, and the severe congestion situation. no space left.... The attendants feed the queen a less rich form of Royal Jelly, she slims down to an acceptable flight weight, and her pheromone levels decrease even more.
19. The weather is good, workers gorge themselves on honey to supply the swarm's need for the trip, they push the queen to the entrance, and between 40 and 70% of the hive make a mad rush to leave the hive within 10-15 minutes. They make an initial stop to check to make sure the queen is in attendance. Remember, she hasn't used her wings in months, so she tires quickly. The average age of the bees in the swarm is about 7 days younger than those left behind. It is an advantage to have healthy, young workers to build the new hive.
20. Once it happens, there is little anyone can do to stop it. I once saw a swarm in flight. It was a couple of feet thick, thirty feet long, and flying about 20 feet above the ground. The buzzing sounded like a dozen bicycles racing by and was gone in ten seconds.
21. The swarm may stay close for a short period of time. Their goal is to find the location for a new hive. It usually is within a mile of their original home. They may make several bivouacs along the way as they usually travel up to a quarter of mile between spots. Scouts look for appropriate locations for the new hive and report back with waggle dances. If there has been an extended weather delay it is possible that unmated queens have emerged and have joined the swarm.
22. Importantly, how can we prevent swarms from occurring? The hive must be examined regularly. Is the colony full of fuzzy looking bees with nicely trimmed wings? They are the newbies! Older bees are balding and have tattered wings, But I think that would be hard for me to see!
23. Is the hive full?.... No room left anywhere. Check the honey supers. Are they full or are there is ample frames with open combed honey? This is a very bad sign if you don't have the resources handy to alleviate the situation.

24. Is there backfilling in the brood area? The honey, pollen, nectar in the brood frames should be in a nice pattern around the brood, not mixed within the brood. Larvae will naturally be laying in a bit of liquid nutrients, but seeing nectar without larvae in the cell is a bad sign.
25. Has there been bearding? The bees may be attempting temperature or humidity controls, but it often is overcrowding and a signal of impending swarming.
26. Bearding is a sign of overcrowding. There literally isn't enough room in the hive for all the bees. It is an urgent message to check the status of the hive.
27. Check for swarm cells. It is normal for the workers to create queen cups, but finding eggs in them means the colony is planning to raise queens and swarming may be imminent.
28. Queens cells used for swarming are more commonly found near or on the bottom of frames. They are well organized as they are planned and not placed haphazardly as in the case of emergency or supersedure cells.
29. Unfortunately, if a hive is compromised, a swarm is inevitable. Not enough queen pheromone, The pheromone excreted by glands on the queen's feet and should prevent requeening and swarming isn't being spread by the worker's movements. Too many bees, too little pheromone. The swarm has to happen.
30. There are management actions that can help prevent swarming
31. Prevent springtime swarm triggers by providing room for successfully overwintered hives. Most of the cluster will have migrated to the top of the hive. Add supers with combed frames on top of the hive early in the season. The bees usually won't move down in the hive and the lack of working space above will trigger a swarm. If you don't have combed frames a reversal should be done. Take the top boxes that have any bees and move them to the bottom and place the unoccupied on the top.
32. Prevent backfilling by adding supers with drawn comb. Undrawn foundation will take too long to be of benefit. If the super is completely filled, it may be necessary to put some of the frames in the top of the box so the workers will begin work in the new super.
33. Some beekeepers add a super by alternating full and empty frames in the boxes. Using sugar supplements during nectar shortages usually help this situation as the workers can keep building comb.

34. Move excessive frames from a robust colony to one that is weaker. Split the colony with either a walk away split or provide a queen or make a nuc with the frames and adding a queen.
35. As a last resort, having a swarm trap nearby (within a mile) may help prevent your losses. There are lots of resources that explain the requirements and locations for the traps. Some beekeepers have kept traps within 50 feet of their apiary that were successful in recapturing their swarms.
36. It is important to check the swarm traps frequently during the swarm season. There may be a few scouts checking out the box and the swarm may move in. The presence of pollen foragers means the swarm has arrived. Transfer the swarm trap soon and best in the evening when most of the bees are inside.
37. Effective actions to prevent swarming include regular hive inspection to note overcrowding, putting supers on when the current one is 70-80% filled, inspecting when the spring temperatures are consistently above 55 degrees, requeening every 1-2 years, split productive colonies, balance resources, and set up swarm traps
38. Don't clip the queen's wings. The workers may kill her and if not, she can't fly. She might try and fall and climb to where the swarm can find her. If you don't make space available, don't put a queen excluder on the front of the hive or cage her for a period of time.... It only delays the inevitable
39. Is it safe to be near a swarm? Bees less than 21 days don't have an effective stinger, Worker bees filled with honey have trouble stinging, and frankly, the bees don't have any resources to defend other than the queen who is safely in the middle of the swarm. They do get a bit more agitated when their food supply is dwindling. When gathering a swarm it is probably better to wear a veil as a precaution.
40. There may be some residual scent year after year as swarms tend to land in the same locations. They usually are on limbs or in bushes but we've captured two that were on the ground. Perhaps the queen just wasn't up to flying any further.
41. If you see or are alerted to the presence of a storm you need to be ready to move quickly before they get away. Each swarm situation is different. Locations can be on the ground, in a location that is easily reached, or somewhere up in a tree. Retrieving a swarm from inside a building usually requires the removal parts of the wall or ceiling. No matter what equipment you bring, you will probably need something else to successfully accomplish the capture.

42. My best advice is to be calm, more slowly, and avoid sudden movements which sound good until you realize that you have to shake things quite vigorously to dislodge the queen and her swarm from the tree branches when you are straddling a limb twenty feet up in a cedar tree. But all you need to do is to get the queen into the box and the rest of the swarm will readily follow. One retrieval required balancing on the top rung of a ten-foot ladder leaning against a four-inch diameter maple sapling and attempting to sweep the swarm that I could just reach with one hand while holding a cardboard box and the tree with the other. The bees were falling all around me but I managed to get the most of them into the box. Did I mention that I didn't have any protective gear with me this time? I handed the box down to Barb who set it on the ground. Before I could get down the ladder the swarm had returned to the same location and I had to brush them all back in again. The second attempt must have successfully captured the queen as the bees all fled the tree to join her in the cardboard box.
43. The picture on the left is me without protective gear again up a tree reaching high above me to shake the swarm into another cardboard box. It didn't work so I had to cut the branch the swarm was on. The picture on the right is Barb and our granddaughters successfully retrieving a swarm that had landed in tall grass that required scooping up handfuls of bees and placing them in the box. A net was useless in the tall grass.
44. Another capture was a swarm on the bottom of a lilac bush. I took a limb trimmer to cut the swarm out.
45. Although the swarm stayed on them the branches were too big for my box so I transferred them directly into a hive
46. Working slow and calmly the bees were safely secured in a new home.
47. The queen's pheromones are the major signal to the hive. The mandibular pheromone attracts attendant nurse bees to feed and groom her. The pheromone prevents worker ovaries from maturing, attracts drones during her mating flight, and keeps the swarm together when swarming occurs. The tarsal gland is spread from her feet as she walks over the comb and the workers spread it with their movements. It inhibits swarming and queen cup construction.
48. The queen signal pheromones control multiple activities. When they are compromised, e.g., the pheromone levels decreased by age, the colony begins a process of queen replacement and/or worker bees start to lay unfertilized eggs.
49. What is the scientific explanation for the phenomenon of swarming? The queen's major pheromone is created by her mandibular gland. It is spread throughout the

hive by the attendant nurse bees when they feed her and then feed others. The mandibular gland development is dependent being fed rich Royal Jelly and number of her mating partners, poor pollen source or low number of suitors results in poorer function. Even the best glands eventually degrade over time. When the level drops too far the nurse bees begin feeding better quality and quantities of Royal Jelly to certain larvae to create a new queen.

50. The queen's signals control most of the colony's functions. For this discussion sufficient levels of the pheromone maintains the hive, but when it fails those regulating activities fail.
51. The brood produce pheromones that triggers their being fed by nurse bees That also stimulates the foraging for pollen. It also prevents laying worker development and the levels differentiate the healthy and diseased larvae which affects hygienic behaviors.
52. Lastly, developing worker brood store great volumes of a rich protein in their fat bodies called vitellin (Vg) that has positive effects on the colony. High levels promote health and longevity. Higher levels fed to larvae result in pollen foraging rather than nectar. It also creates the nursing urges of hive hygiene, feeding brood, building comb, and processing nutrients. However, the levels drop after two to three weeks and that results in the urge of foraging and colony defense due to higher levels of Juvenile Hormone.
53. Randy Oliver created a graph of these control chemicals and the effects on the colony
54. Essentially, the various levels of the chemical controls can result in the requirement to swarm. Essentially, there are too many bees in the hive. The queen's mandibular pheromone has deteriorated and the little she has doesn't spread adequately throughout the hive. She can't move far so the tarsal hormone isn't spreading either. She has laid large numbers of eggs resulting in high levels of brood hormone initially but older brood have little pheromone and none from capped brood. The new bees have high levels of vitellogenin. All of the controls that prevent swarming have been degraded and the colony as a whole takes action.
55. Although a hive in good status often smells like lemon pledge or a banana when the alarms are being raised, I usually can't smell it. Say nothing about discerning the dozens of other odors from the pheromones. So what can I do about swarming. It is a natural instinct to swarm to reproduce. Strong, healthy hives will try to swarm every season and sometimes even more often. The hive needs to be examined on a regular basis.

56. But how do the bees accomplish the organizational behaviors in the colony?

Although the honeybee's brain is relatively large for an insect, it is very tiny...the size and weight of a large grain of table salt. A major area of the brain is used for sight. Smell, taste, vibration, temperature, humidity, wind speed and other sensations are sensed by the antennae and transmitted to other areas of the brain. A third area is reserved for cognitive skills such as remembering the location of food sources and the shortest path to reach it. The honeybee brain controls individual behaviors but isn't designed to organize the complex workings within the hive.

57. So what does control the hive operations. The hive is dark and the youngest workers avoid light so visual cues aren't effective. Bees do buzz in different levels when they are happy and disturbed, but their sound can't control behaviors other than to alert when disturbed. Their dance does describe nutritional source locations. Perhaps taste may have a little effect. It is the odors, hormones, and other pheromones that control the hive processes.