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1. What Is A Queen?

a. **There are a number of ways to think of the queen honeybee.**

- i. **The mother of the bees in the colony:** This is the most common narrative...the queen lays all the eggs in the colony, and is the “mommy” of the hive. Certainly this is true and valid...but far from a complete understanding of how the queen fits into the superorganism.
- ii. **The daughter of the colony:** Assuming that the queen wasn't introduced by a beekeeper, the queen is most likely the daughter of the previous queen. ...but since the raising of queens is either a collaboration between the queen and the worker population, or the activity of workers alone (ie an emergency queen cell), it isn't quite proper to call her the daughter of a queen..she is a product of the colony. Her mating is the product of her environment.
- iii. **An “un-stunted” worker:** The differences between a queen and a worker are not genetic...any properly fertilized larva has equal potential to become either. The differences are in the orientation of the cell and in the diet fed the larva. It is the lack of specific proteins in the larval diet that keeps a worker from fully maturing sexually. From most perspectives, the queen is the “natural” female form of honeybees. There are many cues besides diet that keep even mature workers acting reproductively...from becoming more “queen like”...a lack of pheromone produced by open brood is what leads to laying workers.
- iv. **The ovaries of the superorganism (and the testes):** If you consider the superorganism of the colony as an organism, the queen is the only individual within that system that is capable

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of providing full reproductive capabilities for the colony....producing both eggs and sperm.

v. The sperm bank of the superorganism: This is the case in at least two different ways.

1. The queen, after taking mating flights early in her life, never mates again. A queen that is 3,4,5 years old that is producing worker brood is using sperm that she collected in her first two weeks of life (feeding and nourishing them all the while). Over the lifespan of the queen, she is using this “banked” sperm.
2. Because of the rather curious haplodiploid genetic system of honeybees (where the drones a queen mates with have no influence on the drones she produces), when a queen produces drones, it is a genetic throwback to the generation before. The drone produced by a queen is “of the queen’s parents mating”, not “of the queen’s mating.”

vi. The monarch....or the sex slave?: It's good to be the queen...or is it? Once mated, the queen need never leave the hive (unless she is part of a swarm). She need not feed nor clean herself (and she will neither go hungry nor soiled). She doesn't need to care for her sons or daughters.

On the other hand, all she really does is lay eggs, and produce the right smells so the other bees don't supercede her. When she stops being able to perform either task, she is done.

vii. A co-father of another colony?: Each drone that mates with a queen is an intermediary mating mechanism between his “mother” and his mate. Remember that the drone is a haploid clone of his mother...like an egg or a sperm. Each drone

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produced by a given queen is different, but each sperm produced by a given drone is identical.

b. As a beekeeper, the queen is important to you because...

- i. She (a mated queen) carries all of the genetics for the entire colony:** As far as genetics go, your mated queen is what you've got. Drones from other colonies in the area can influence the genetics of future generations...but until the hive supercedes, swarms, or has its queen replaced by the beekeeper, nothing in the hive shifts genetically.
- ii. She (potentially) carries genes that will influence local populations and local matings...yours, others and ferals:** If the goal is localized stock improvement, then keeping stock that is adapted locally will provide drones to surrounding bees (kept and feral), will cast the occasional swarm of desirable genetics, and of course, provide desirable drones for your own queens to mate with. If these localized genetics are selected for survival and production with minimal interference from beekeepers, then an actual localized population can be established and improved upon.
- iii. The sperm she carries must be viable, at least for her “serviceable life”:** Beekeeper applied treatments of all sorts have been demonstrated to impact the long term viability of drone sperm and queen fertility. Remember that the queen mates only once, and if we want long lived, productive queens, they have to have collected sperm that can live as long as she will be productive. Treatments that are demonstrated to impact fertility are baseline in mainstream queenrearing operations, ...things you do not want your queens (or drones mating with your queens) exposed to if you want to maximize her productivity and lifespan.

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- iv. **The interplay between _her_ behavior and the behavior of her offspring (the family dynamics) is what defines the characteristics of the colony:** Basically, the only way to evaluate a queen is to have her head a colony of her own offspring. We can't quite separate the concepts of “queen” and “colony” when it comes to characteristics....they originate in the queen (and her drone mates), and are expressed, executed, and measured in the performance and behavior of her non-reproductive worker offspring.

2. Why Bees Make Queens

- a. **The colony needs a queen:** By this point, there should be an understanding of the role and importance of the queen. A colony can't function for long without one. Evolutionarily, making sure the colony has a functioning queen has been pretty high on the list of priorities for millions of years. It is a trait that is pretty thoroughly selected for.
- b. **Queens don't live forever:** *“A dead queen is not to be mourned for long. It is an event that provides opportunity for progress in one's breeding program. Yeah!”* –Keith Richards
Death is inevitable, and the progression of genetic recombination (through sexual reproduction) is what allows for large and small scale adaptation...and what allows a population to always have a wide variety of approaches to survival being tested all the time.
Honeybees generally will, if at all possible, produce a queen if they are queenless and have the appropriate resources (and they will try even if they don't have the resources).
- c. **The colony needs to reproduce:** There are always losses and gains within stable (and non-stable) populations. There is always accident, disease, parasite, predator, environmental changes, etc chipping away at population numbers. If reproductive pressure wasn't strong

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enough to push back effectively, we would not have bees all these millions of years later.

3. How Bees Make Queens On Their Own

- a. Supersedure:** Supersedure is the smooth transition of one regime (or one generation) into the next. The workers (and possibly the queen) are involved in the process, and after the virgin emerges and mates, she kills the old queen. It is estimated by some that up to 10% of colonies have two queens (usually a mother/daughter)...I think that is a little high, but it is true that once you spot the queen, you stop looking for “the other queen”. Eventually, the daughter queen takes over. Generally, a few cells are produced, and they are generally in the middle of the comb.
- b. Emergency:** An emergency queen is one that the bees make if they need a replacement queen suddenly, and no specific preparations have been made. A “walk away split” produces emergency cells. Putting grafted cells into a queenless cell starter also is producing emergency cells...but presumably extraordinary provisions are being provided in a cell starter. Well fed queens are the best queens, no matter how they are produced. There is some controversy over the overall fitness of emergency queens, but our experience is that if done in times of abundance with proper resources, excellent queens can be obtained. A few to a many cells may be started by the bees, and they will do so where there are appropriate aged larvae.
- c. Swarm:** Reproduction on the colony level. Sometime around the time the old queen leaves the hive, a new queen (or queens) emerge. Secondary swarms (with virgin queens) can issue over the next several days. A few to many cells are produced when the bees are preparing to swarm, often on the bottom edge of combs. A hive with limited room and incoming nectar and pollen that produces a large number of cells is probably preparing to swarm.

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4. What Resources are Required for Bees to Make a Queen?

- a. Motivation:** Bees that “want to make queens” are essential for rearing queens on any scale. Proper motivation (through beekeeper actions such as crowding, concentrating nurse bees, using a queenless starter, using a queenright finisher with an excluder, confining nurse bees, feeding, etc) is a key component for rearing queens successfully. When you see it for the first time, you will know what it means for a starter to be “ready” for cells...you can almost feel it as you remove the cover from the colony.
- b. Food/Stores:** No matter the size of your cell builders, make sure there is a good supply of stores (honey/nectar and pollen). I say “pollen” instead of “beebread” here because you are looking for that fresher pollen that still appears “dusty” on the surface...usually the same stuff the bees are bringing in. For raising brood, this is (by all accounts) superior to stored beebread with a shiny honey cap.
- c. Foragers and/or feeding:** Although food stores are important for stability, raising well fed queens (especially more than a few at a time) requires that the population of bees raising the queen feel “prosperous”. By this, I mean that the bees both have stores, and the feeling that more food continues to be available...and incoming. Cash flow. This is not unlike the kind of cue that motivates a business (or family) to expand.

The obvious way to provide incoming food is to feed the bees. I generally feed by smearing a bit of crystallized honey on the top bars once a day...but I don't always feed.

One of the resources in a colony is “foragers”. Foragers are already oriented to return to a hive (any hive) at a specific location. By moving (or breaking down) a relatively strong hive, and leaving a cell builder in its place, the cell builder will (assuming weather and flow cooperate) have a strong compliment of foragers, and a plentiful

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supply of incoming food to fuel the nurse bees and queen rearing activities.

You can always shake more nurse bees into a cell builder, but you can't increase the number of foragers quickly by shaking bees...if you need foragers, take them from a strong hive by moving it to a different location within the yard.

- d. **Young Nurse Bees:** Young nurse bees are the bees that are best able to feed and care for the developing queen. How can you distinguish a nurse bee from other workers? You find nurse bees tending to open brood...they are the workers you will find attracted (and clinging to) frames of open brood.

Nurse bees can be shaken off of open brood comb (make sure not to shake the queen....or the other queen...or the virgin queens). If you want to be sure you don't inadvertently move a queen, you can shake all the bees through an excluder. Nurse bees can also be obtained by moving capped/emerging brood into cell builders. Obviously, there is no boost in nurse bee population until that capped brood has emerged and hardened.

- e. **Larvae of the proper age:** The larvae available to the cell builder (or simple queenless split) is the raw material out of which a queen is produced. Well fed (not dry looking) young larvae up to about 3 days old are what is needed. Remember that eggs will become young larvae that can be raised into queens, but only if they remain in the comb (grafting eggs doesn't seem to work..even though it seem obvious that it should).
- f. **...all of this available in “times of abundance”:** The best queens are produced under conditions of abundance. Many of the procedures and steps outlined in systems of rearing queens are in place to insure success even under non-ideal conditions (early/late in the season, during a dearth, etc.). If you raise your queens while the bees are

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under conditions of abundance (by manipulating the colony strategically in coordination with weather/climate conditions), very little work is required on the beekeepers part.

- g. Raising an extraordinary number of queens requires extraordinary resources:** This is a key concept in rearing quality queens. If you are trying to force an unnaturally small number of bees to produce an unnaturally large number of queen cells, the resources listed above must be present in unnaturally high concentrations. Also remember that newly capped brood won't be a resource for almost 2 weeks...and will take up space (space that still must be thermo-regulated) in the colony.
 - h. Open brood:** Open brood (other than that being used to produce queens) can either be present or absent in the cell builder. If it is present, take note that the bees might try to make cells there as well, and that the open brood will draw nurse bees (and brood food) away from the potential queens, and won't contribute to the population of nurse bees for more than 2 weeks.
- 5. Why Beekeepers Should Raise Their Own Queens**
- a. “Queen rearing is too important a task to leave to someone else” – James Powers**

This quote is actually real. James Powers (in the 1960's) pioneered the modern migratory commercial beekeeping style that is still in favor today.

The truth is that at any scale, raising quality queens is resource intensive. The larger breeder (or any breeder with more demand than supply) is always trying to maximize production using the least resources (this isn't a criticism...it is their job to be efficient). When raising queens in small quantities, the beekeeper can easily afford to overstock cell builders with resources, assuring well fed queens, on the beekeepers own schedule.

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b. “*The only beekeepers with good queens are those that are raising their own*” –Albert Einstein

Once you get involved in selecting and breeding your own bees, you are involved with your own stock, and on the road to the perfect queen.

Sadly, there is no (and will be no) perfect queen, only a road perpetually leading towards her....but you are better off on that road than not on that road. You will see your bees quite differently when you start noticing (rather uniformly) traits and behaviors you don’t see in other bees...when they “feel like” your bees.

c. A tangible role in improving stock locally: Inevitably you will have more virgins and/or cells than you can really use. Inevitably your bees will cast drones (and the occasional swarm) in to the environment (and the hives of other beekeepers). Sharing stock and helping other beekeepers raise their own queens benefits all beekeepers and all beekeeping. This is a “big picture” goal that we should not lose sight of.

d. Nutrition is at least as important as genetics: Although you should start your breeding/selection with the “best” stock you have available (however you qualify “best”), remember that selection is largely a subtractive process. This is not about bringing in “better” genetics (except at the very beginning of a program), but is about starting with some genetics, and breeding mostly from the best performing.

e. Breeding locally surviving bees in the local environment under local conditions is the most likely way to improve local stock: It is unlikely that a “superbee” or “supertreatment” will be developed that simply frees beekeeping from impacts of disease, parasites, climatic variation (certainly not in any kind of “natural” context). The only way to adapt bees to your location and your management is to

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select from those that do so best. There is no shortcut. There is no “success” beyond constant improvement and adaptation.

6. How Beekeepers Make Bees Make Queens: In the most general of terms, beekeepers provide resources (as described above) and the bees make the queens. The details can be as simple as a walk away split (“split the hive in half, and walk away”) or as complex as a daily rotation of bees/cells/mated queens in a closed population breeding program with isolated mating yards. This guide is largely designed to help you understand all of these approaches as you encounter them, and help you understand why they work.

7. How You Can Raise Your Own Queens

a. Walk Away Split: It is that simple. Split. Walk away.

There does, however, need to be an understanding of what resources go where...and once you understand them, you are going to want to do something to balance them to your own best advantage. Although we do perform walk away splits for various reasons (often in the city where we want to keep the swarming urge well suppressed), we never simply split a colony in half and walk away.

As in the example above regarding cell builders, if one has to move a strong hive with many foragers (and you aren’t trying to remove bees completely from the location), it can be done during the day while foragers are out. A relatively small queenless nuc (a couple frames of brood, bees, stores) can be left behind in the location. The foragers will provide the feeding, and assuming all goes well, in a month you will have a laying queen.

But timing is the problem. In a walk away split, it takes 2 weeks for a virgin queen to be produced, another week or two for her to mature, mate, and start to lay a regular pattern....and 3 weeks after that the first new adult population is added to the queenless split. Over that

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6 (or more) week period, bees are dying of old age, and the population is out of balance wrt age/caste. Although walk away splits are convenient for seldom visited locations and easy to perform, their resource intensiveness (6+ weeks and a nuc full of bees to produce/prove one queen) quickly makes them not the best option for most of us most of the time.

- b. Split with Queen Cells:** It's always a good idea to have equipment on hand...nuc boxes are always useful. What do you do when you think your bees are going to swarm? Cut out cells? Do they swarm anyways? Do the bees have a way to make a queen? Are you now spending \$25 on a queen that will replace all the genetics in the hive instead of building upon them?

Depending on circumstances, you might want to split off the laying queen and let supcedure cells come to term and take over (all the while, if there is a flow on, the bees are not distracted by raising brood, and can really pack away the honey). You find queen cells on 4 separate frames and make up 4 nucs with brood, bees and stores...the foragers and the queen are not likely to swarm after being broken down severely and left with little/no open brood or eggs.

Caution! Open queen cells are safe to handle and quite sturdy. Capped cells between 10-12 days old are fragile, and you will likely damage them if you shake bees off of frames. The problem is, when you find a capped queen cell, you don't know how old it is, or if you've just damaged it by having shaken the bees off (which were hiding the queen cell, which is why you didn't know not to shake the bees off of it). If you think you would like to make a split as you inspect a colony, proceed gently, and use a brush (or some grass). If you are gentle with the cells, they will likely remain undamaged.

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- c. **Crowd bees:** Contrary to some folk bee-wisdom, using queens from swarm cells does not select for bees that are genetically predisposed to swarming. Swarming is how bees reproduce on a colony level. It is how bees become more bees. It is not a nasty behavior to be bred out of honeybees.

There are many cues that help the bees decide (collectively) to cast a swarm...the most obvious (to our perception) seems to be crowding. A hive full of honey and/or stores...incoming nectar and no place to put it (or to lay up more brood), the colony backfills the broodnest (fills cells of emerging brood with nectar before the queen can lay in them) and prepares to swarm...it begins to raise queen cells. As we've mentioned before, one of the characteristics of queen cells produced under swarming conditions is that they have been produced under conditions abundance, not out of desperation. Such cells are almost always very well fed and have sufficient nurse bees to care for the cells the colony has decided to raise....without all the prep work from the beekeeper.

The beekeeper can accomplish the same thing (on the beekeepers schedule) and still have the bees do almost all the work.

If you want to replicate these swarming conditions, it's simple, just take an established colony (a strong one), and compact it to a single box, or even a 5 frame nuc box. This compacted colony can be queenright or queenless. Make sure there are eggs and/or young larvae in the hive, and shake the bees from the strong colony into the compacted box. The extra frames (with stores and/or brood) can be distributed to other colonies, or used in making up splits.

Suddenly you have thrust the bees into exactly the situation described above...too many bees for the space they have, no place to put the incoming stores or raise brood. The bees will start to raise

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queen cells, and you can either cut them out of the comb, or use the entire comb with the cell to finish the process.

- d. **Crowd bees/trim comb:** The only real problem with the above procedure is that the cells are built where the bees can do so easily...often in the middle of a comb, often in clusters. When the bees are (without these manipulations) preparing to swarm, they can choose locations on the comb where they can easily raise queens....when you force the issue, they simply don't have the time to prepare, and they will have to quickly work with whatever brood is in the hive. The biggest problem the bees appear to have with this is properly reshaping the comb (around the already laid up eggs/brood) to raise queens. If in addition to crowding the bees, you trim (cut) off some brood comb in an area where there are eggs or really young larvae. The trimming can either be straight across or zig zagged (following the pattern of eggs/brood)...the goal is to tear/roughen up the bottoms of the cell walls, making it easier for the bees to draw queen cells down along the rough edge. With a little preparation and forethought, you can make this trimmed com the only frame that has eggs/open brood...making finding all the queen cells an easy task. Some may well be too close together to separate easily, but if you check them often as they are being drawn out (over the first few days), you can cull some of the individual cells in clusters, and end up with the number of cells you want, all easily individually separable from the comb.

8. How You Can Raise Your Own Queens More Efficiently

- a. ***“When it comes to raising queens in quantity, you can either do a lot of work, or you can graft and Doolittle.”*** —Salvador Dali

One of the most difficult things to see in an enthusiastic beginner or intermediate beekeeper is the reluctance to pick up a grafting tool for the first time. It is perceived to be difficult and the most

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“advanced” of beekeeping operations. Not so...all beekeepers should at least know how to raise their own queens with confidence. It really isn't that hard, and the consequences of screwing up are milder than a sting on the fingertip.

If your needs are the occasional queen cell or a few splits to make up some modest losses, the above options should suit you just fine. But if you want to produce good queens efficiently (and in some quantity), it's hard to consider any option other than grafting. If you don't think your eyesight can support such a venture, find a family member or neighbor with sharp eyes to help..even if you pay them \$20 for 15 minutes of grafting, you could produce 90 cells (with enough preparation and enough resources committed) from that 15 minute grafting session.

The specifics of “how to graft” are a little beyond the scope of this document. If you read all of this and you are excited, go order some grafting tools and some cups and start practicing (at least). I like to use a microscope slide for practicing...you can see what you are doing and maneuver without the interference from the cell cup walls, and if you have a microscope, you can take a look at various magnifications, and even see the larva breathing and eating. It might take a few or a few dozen tries to get the hang of it, but once you feel comfortable grafting onto a glass plate, set up a cell starter and try a batch...if by tomorrow they haven't taken, try another batch.

- b. Mating nucs?** Mating nucs are small nucs used specifically to allow queens to mate before moving them to another colony as a mated queen. It is not necessary to have mating nucs if you are simply doing your own increases, splits, and nucs...you will simply put the ripe cell or the virgin queen in a queenless nuc and let her mate and turn over the hive with her progeny.

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If your goal is to produce mated queens, however, you want to mate each queen with a few resources as possible. This could be 2 frames of a 10 frame box, half a 5 frame nuc, a mini mating nuc with mini frames, or even a top bar hive divided into sections.

You will need to leave each queen in her mating nuc at least until you start to see eggs. Common practice (and wisdom) is to wait until brood starts to emerge...by that point the brood pattern can be evaluated. Evaluation of other aspects usually have to wait until the queen has been heading a mature colony for some time.

- c. **Starter/finisher?** You will need bees of some kind to build your cells...queenless, queenright, mishmash of bees from 5-6 hives, confined or free flying...whatever it is, we will call it a “cell builder” ...a box of bees specially provisioned to build queen cells.

The configuration we use most often is a queenless starter, and a queenright finisher...pretty standard among breeders.

The starter (in our operation) is usually made up of two 5 frame deep boxes. The bottom box has a screen over the bottom (and it is set in such a way that there is plenty of ventilation. The bottom box also has no frames in it (initially).

The top box has (ideally), frames of honey or ripeish nectar in the outside positions, and frames with plenty of fresh (still “dusty looking”) pollen, some capped brood and some open brood surrounding the center frame position.

There are many ways of stocking such a starter, just keep in mind the comb, the cluster, and the cells. You want a huge cluster of young bees hanging off the 5 combs on top. Your cell bars will be largely open (compared to comb), and you want the bees covering the brood and stores on either side to be clustering through the space the cell bar frame is in. When you go to give the starter a cell bar

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frame, the bees should be spanning the gap (at least a little) where the cell bar frame is to go.

I usually end up shaking a bunch of nurse bees from other colonies into the empty bottom box as a way to “overstock” the cell starter (the ability to overstock the starter is one of the best reasons to raise your own queens).

If you use your starter over and over, it will need to be replenished with young bees (and examined for queen cells....carefully). You can shake more nurse bees in, or you can put a frame (or two) of capped brood in the (otherwise empty) bottom box (you will, of course, have to wait for them to emerge and mature a bit before they will be of use to you).

The queenless finisher is traditionally 2 or 3 full sized boxes. The queen is confined to the bottom box with an excluder and capped brood/empty brood comb. The middle box can have whatever (or it can be absent), and the top box has open brood (the young nurse bees migrate onto the open brood as they emerge below the excluder). The cells are placed in the finisher 1-3 days after grafting (depending how the operation is set up), among the open brood/nurse bees...but decidedly above an excluder. It is worth investing in a quality metal excluder and making sure it never gets bent. A queen getting through an excluder can wipe out a hundred or more ripe cells.

Cells are removed from the finisher X days after grafting (this is after their sensitive period, but hopefully before they are emerging).

Every week or so, the beekeeper goes through the hive and rotates the capped brood below the excluder, the eggs and the open brood above...finding the queen is almost mandatory...you want to make sure to put her down below the excluder and get the excluder in place.

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The reason for this starter/finisher system is efficiency. A queenright colony (which is relatively stable) can cap and incubate hundreds of started cells at once without much attention from the beekeeper, where as a starter is much more limited (and management/input intensive). Cells can be rotated through the starter and into the finisher. Hundreds of new cells can accumulate in a finisher, while 30-40 at a time are run through the starter. When the whole process is done in one cell builder, it is difficult to have the bees maintain the older cells and start new ones. When a few queens are needed however, there is nothing wrong with shaking a bunch of nurse bees into nuc and giving them some grafts 24 hours later....allowing them to start and finish the cells (it always helps to feed or make sure there is food coming in).

- d. **Cloake Board:** I have very mixed feelings about the Cloake board. In one way, it is my favorite piece of beekeeping equipment (even though I've never owned one). It actually “cloaks” the queen from the cells (or the other way around)...but the origin of the name? The Cloake board is named after Harry Cloake, the inventor....not the ‘cloaking’ nature of the device!

The Cloake board is rather simple. It is always used with a queen excluder (some have excluders integrated into the device). A shallow shim to place between boxes with a groove all the way through so the beekeeper can slide a thin board between boxes...separating them completely from one another, creating a queenless “starter” full of nurse bees in the top box. The hive is later converted to a finisher (described above) by removing the sliding board, with the queen laying in the bottom box and the open brood/nurse bees in the top finishing the cells.

When one wants a queenless starter, slide the board in, wait 24 hours, cut down any queen cells the bees have started, and place

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your grafts. After 24-48 hours, remove the board and the cells are in a queenright finisher.

This is a smart and efficient way to do things. My only objection is that this is often recommended to beekeepers new to queen rearing as a “system”. It's not a system, it's a simple tool that is handy and useful...but we often hear beekeepers say they are waiting to get a Cloake board to start raising queens. The only thing the Cloake board actually does in the “Cloake board system” is allow you to slide a board between the boxes. That's nice not to rile the bees up by opening the hive, but let's not forget that it isn't that hard to separate two boxes, place a simple sheet of plywood or masonite (or even a telescoping cover) over the bottom box, and put the top box back on top. Do not let the lack of a Cloake board postpone your introduction to queen rearing any longer than it takes to cut a scrap piece of plywood with a skillsaw.

Remember, in order to maintain this colony properly, you are going to have to rotate open brood above the excluder and capped brood below (making absolutely sure the queen is below) on a regular basis (weekly?). It isn't as if a Cloake board allows you to leave the hive alone...it just means separating the boxes two fewer times when raising queens...not a big savings on a small scale.

- e. **Graftless System:** There are a number of products sold that allow you to raise cells in artificial cups without grafting. The queen is confined to a cage with only beekeeper supplied “fake” cells to lay in. When the larvae emerge and are very young, the fake cells are removed, separated, and oriented vertically. This is very much like grafting, except the beekeeper need never handle the larvae directly. These systems work, and many beekeepers use them with great success. At first, It seems like less work than grafting, but remember

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that first you have to find and catch the queen to put her in her cage (without injuring her). Come back when she has laid up most of the artificial cells to release her. Come back 3 days later and put them in the starter. When I'm grafting I go out to the yard, find some brood of the proper age, bring them in the kitchen, graft and place in a starter. 15 minutes in one operation without having to find the queen.

Doubtless there are those for whom grafting isn't convenient, and for whom one of these graftless systems is a fine choice. There is nothing wrong with the queens one produces with any of these systems, and you should use what works for you...just remember that grafting is not as hard as you think, and a few failed practice grafts costs you almost nothing.

9. **The Mating Game** *“Everything about the breeding system of the honeybee appears to be designed specifically to avoid the kinds of pure matings and pedigree strains that man is always trying to achieve in his selected stock. Perhaps through their very nature the bees are trying to tell us how best to work with them, and we simply aren't listening.”* -
L. Ron Hubbard

- a. **Don't restrict drone production in your good hives:** You are a lucky beekeeper indeed if you live in a place where the available drone genetics (from feral and/or kept colonies) is better or as good as what you could supply and maintain from your own selected stock. Allow your good colonies to produce drones, especially in areas where you are “flying virgins”. You can even transport capped drone brood from good colonies in other apiaries to colonies in your mating areas.

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If you are restricting the drone populations in your good hives, you are restricting the influence of your good hives in your breeding program. You are not taking full advantage of any progress you are making.

- b. Flood:** The most common way used to influence the “male” end of breeding honeybees is to flood the area with desirable drones. In theory, one is supposed to have drone colonies surrounding the breeding yards at a distance of about a mile. In practice, most small to medium scale breeders appear to achieve good results with the drone colonies in the same yards as their mating nucs.
- c. Isolate:** There are two kinds of isolated mating yards...something on an island where the beekeeper can control the drone population tightly, or somewhere where bees do not prosper and there are no other beekeepers. With no overwintered bees in the area and no new bees being brought in (besides yours), you can reliably control the drone population. Remember, however, such an area might have sporadic flows, but you are selecting it because it will not support bees year round. You may well have to feed.
- d. Give “Drone Mother” queens to your neighbors (after you turn them into beekeepers):** With a little ingenuity, you can use the “Tom Sawyer” approach to maintaining local drone populations in your area. Instead of (as Tom did) getting your neighbors to paint your fence, you get them to keep bees and produce drones for you. Give them free queens to stock their hives (and to participate in the local breeding program)....and encourage them to allow for drones in their hives as part of the breeding program. Remember that drones produced by the virgin queens are undiluted genetics of their grandparents generation. Give away virgins grafted from good “grandparent” colonies that you are not necessarily going to graft from...from colonies that have traits you want to reinforce.

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- e. Don’t rely on pedigree genetics...grow your own:**