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**There are queen
cells in my hive -
what should I do?**



Pictures courtesy of Wally Shaw, Brian Jones and Claire Waring



Introduction

You have opened a hive and found queen cells. First of all, don't panic and, whatever you do, on **NO** account adopt the Dalek strategy of 'exterminate them, exterminate them'! It did not work for the Daleks - they lost out to Dr Who every time - and it will not work for you. Destroying queen cells to prevent swarming never has been and never will be a successful method of swarm control. If you destroy one lot of queen cells the bees will immediately make some more and will probably swarm earlier than normal in their development - often before the first cells are sealed. If you destroy queen cells twice you run the risk of the colony swarming and leaving behind no provision for a new queen. Any delay of swarming that you induce by destroying cells will probably result in the prime swarm being larger than it would have been if you had not interfered. Once a colony of bees is triggered to swarm nothing will stop them and all the beekeeper can do is to control the situation by some form of artificial swarming - and even then the eventual outcome is not a foregone conclusion. If you approach the problem logically and find out exactly what stage of the swarming process the colony is in, you will stand the best chance of successfully intervening; **not losing bees, saving as much of your potential honey crop as possible and not ending up with a queen-less colony.**

Just occasionally queen cells are torn down and the colony seems to go off the idea of swarming. It is said that this can happen naturally if an abundant flow of nectar comes on stream or that it can be artificially induced by removing several frames of brood and replacing them with foundation. The intervention of a nectar flow is outside the beekeeper's control and the 'shock' introduction of foundation may work occasionally but is certainly not to be relied on.

Hive Diagnosis

Before you contemplate any management of a colony that has developed queen cells you have to understand what is going on - what stage in the swarming process has the colony reached? All the information you need to make this diagnosis is **'written'** there on the (brood) combs and to a lesser extent the bees. But before you make this diagnosis you have to know how to the **'read'** the combs - what you are looking at and what else you need to look for. To be able to do this effectively you must have a basic knowledge of honey bee biology and behaviour.

Types of Queen Cell

There are three different types of queen cell:-

- 1) Swarm cells
- 2) Supersedure cells, and
- 3) Emergency cells

It is important to be able to correctly identify the three types of queen cell (see also Figures 1-3). Only the presence of **swarm cells** means that the colony is intent on swarming. The other two types are there for entirely different reasons and this does **NOT** include any intention to swarm. Supersedure and emergency queen cells do not usually require any intervention from the beekeeper - **except to leave the bees strictly alone and let them get on with it**. So, how do you tell the difference between the three types?

1) Swarm Cells



These are developed from queen cups and are entirely vertical. The cells are long and usually to be seen hanging on the edges of the frames; either along the bottom bars or in recesses on the sidebars. Occasionally some cells will be on the face of a comb. In terms of number, there are rarely less than 5-6, most typically 10-20 and possibly up to 100 of them. As the name suggests, the colony is producing new queens so that it can swarm. When swarm cells are present the beekeeper needs

to do something about it or the colony will inevitably swarm. Swarming will usually occur around the time that the first queen cells are sealed (**day 8**) but it can occur earlier, especially if you have previously destroyed queen cells. Swarming can also occur early for no reason that is apparent to the beekeeper. It can also occur later if delayed by poor weather and, in extreme cases, the queen cells may be ready to hatch and 'warder' bees are keeping the young queens penned in their cells until the prime swarm (containing the old queen) can depart.

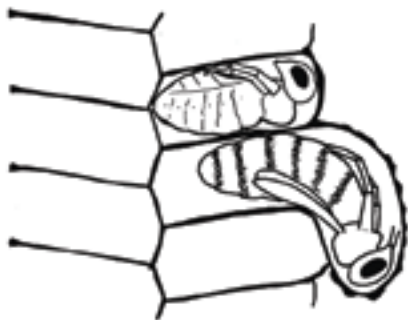
2) Supersedure Cells



Like swarm cells, these are entirely vertical but are usually located on the face of the comb. There are usually only 2-3 of them grouped together on the same comb. The intention here is to replace the existing queen who they have decided is not up to the job. She may be old, she may be damaged and probably a host of other things of which we are not aware. Unfortunately bees seem to be unable to detect when a queen is running out of sperm and is destined to become a drone-layer. Normally the old queen

is retained until her replacement has successfully mated and started to lay. In some cases, mother and daughter will co-exist in the hive for some time in apparent harmony but eventually the old queen will disappear. If supersedure cells are found in a colony, **beekeeper should leave well alone and hope the outcome will be successful.** Early spring and late autumn attempts at supersedure are often unsuccessful and the situation needs careful watching to see that the colony does not become queen-less.

3) Emergency Queen Cells



An emergency queen cell at day 14 (2 days from emerging) with a worker sister at same age

These are produced in response to the sudden loss of the queen. This type of queen cell is produced in a real emergency and all the colony wants is to get a new queen as soon as possible - it does **NOT** want to swarm. The queen may have died suddenly of natural causes or the beekeeper may have killed her or spilt her onto the ground during hive manipulations.

Emergency queen cells are also produced if the beekeeper deliberately removes the queen from a colony. If a colony loses its queen more than 4-5 days after she last laid there will be no brood young enough to make an emergency queen. Instead of being developed from an egg or larva in a queen cup, emergency queen cells are based on existing eggs or young larvae in a normal horizontal worker cell. Nurse bees start to feed the selected occupant with royal jelly and the outer rim of the cell is extended downwards to make room for the increased size of a queen. The cell is therefore part horizontal and part vertical with a right-angle bend in the middle. At first sight emergency queen cells look rather unimpressive and they are easily overlooked. There is a firmly rooted dogma in beekeeping that queens developed in emergency queen cells are inferior to those from swarm cells. Despite, from the outside, looking smaller than



swarm cells, emergency cells normally produce perfectly good queens. The idea that emergency queen cells produce an inferior queen (a 'scrub' queen) is probably based on last-ditch attempts by beekeepers to re-queen colonies that have been queen-less for some time by giving them a frame with eggs or young larvae on it. Such colonies do not have enough nurse bees of the right age to produce a fully developed queen.

There are some circumstances where swarm cells and emergency queen cells can co-exist in a colony. For example, if a colony swarms early (before the swarm cells are sealed), the workers may respond to the loss of the queen by making some emergency cells. This is in direct response to the sudden loss of queen pheromones in the colony. The same thing can happen if the beekeeper removes the queen when making an artificial swarm. In neither of these cases are the emergency cells of practical significance as they are so much younger than the swarm cells and are unlikely to survive to maturity. However, there is one situation where emergency queen cells can matter. That is when a colony has already swarmed and the beekeeper has been forced into culling all but one (1) of the remaining queen cells to avoid the production of a cast swarm. If the culling is done immediately after the swarm has departed, then there may still be eggs and young larvae present from which the bees can make emergency queen cells. This happens after the beekeeper has closed-up the hive believing that everything is under control. Being in swarming mode, the bees will treat these emergency cells as swarm cells and may use them to cast swarm. The principle here is that it is not the type of cell that matters but the behaviour programme the bees are on that determines the outcome.

Some Other Basic Facts you Need to Know

The developmental stages of the three types of brood (queen, worker and drone) and timing (in days) are shown on the centre pages. In order to understand what you are looking at in the hive you need to familiarise yourself with the key developmental stages and their timings.

Queen Cell Development - The earliest you can identify a viable queen cell is when it is already 3 days old - an egg in a queen cup does not necessarily mean it will become a queen cell. The critical decision for the colony is made when the egg hatches out (**Day 3**) and the nurse bees start to feed the larva with royal jelly. A queen cup with a pool of royal jelly and a tiny larva in it will almost inevitably be taken full term to become a sealed queen cell. Sealing takes place on **Day 8**, ie. the larval feeding period is just 5 days. Once queen cells are sealed it is difficult to know how old they are without breaking one open to take a look. There are usually cells covering a range of ages present, so you really need to look at several cells in different part of the hive to be sure.

Emergence of queen cells occurs on **Day 16**, ie. 8 days after Sealing. A newly emerged queen cell usually has a hinged lid attached but it is also quite common for the bees to close the lid and reseal it - look for a line round the tip of the cell (a sort of 'tear here' line). You may be surprised to find an occupant in such cells; usually it is a worker bee that has gone in to do a bit of cleaning work and has been sealed in by some tidy-minded sister. If the bee is head-down in the cell it will be a worker but, if it is head-up, it will be a queen and she will just be waiting for you to open the cell for her to walk out. Again, do not panic and kill her! Let her walk off into the colony because this is an extremely easy (even advantageous) situation to resolve (see Step 7 below).

Worker Brood Development - If when you open the hive you find sealed (or point of seal) queen cells the colony may already have swarmed. You may already have some clue as to the situation from the number of bees in the hive being less than you expected. Confirmation that the colony has not yet swarmed is to find newly laid eggs (standing on end in the bottom of the cell) or, better still, see the queen herself. If there are only eggs lying down in the cells then this is ambiguous and you really need to see her (the queen) to be absolutely sure. If there are no eggs then the colony has almost certainly swarmed and the age of the youngest larvae will tell you when this happy event (happy for the bees but unfortunate for you) occurred.

Eggs hatch on **Day 3** and worker brood is sealed on **Day 9** (emerges on day 21), so there are 6 days of feeding and the bigger the larva the older it is. The reason you need to know when the colony swarmed is so that you can assess how imminent is a cast (or secondary) swarm? It is also useful to know when the swarming actually took place so that you understand how you managed to miss seeing the warning signs - this is an important learning situation! If there are no unsealed larvae in the colony - only sealed brood - then it is at least **9 days** since the colony swarmed and you are in serious trouble because a cast swarm is imminent or has already occurred - for how best to recover from this situation, see Steps 4 and 5 below.

Drone Brood Development - Drone brood is sealed on **Day 10** (emerges on day 24 or even as late as day 28). There is not much to be said about drone brood except not to rely too much on the information that can be gleaned from its stage of development. In a swarming situation, drone brood is the first to be neglected by the worker bees; it may be poorly fed, remain unsealed for long periods and even die. Unsealed worker brood is also subject to a higher mortality rate in a queen-less, post-swarmed colony.

Diagnostic Tree and Remedial Management

The main period for swarming is May-July with a peak in late May and most of June. Outside this period swarming is less likely but can still happen. It is possible for a colony to go from no obvious signs to actually issuing a swarm in 5 days - or less if they go before any queen cells are capped. In order to catch swarming in the early stages, regular hive inspections are required but how often should these be done? It is difficult to lay down hard and fast rules because it depends on your knowledge of your bees and the area in which you keep them. Swarming is also highly dependent on weather; good weather with a nectar flow tends to suppress the swarming urge and poor weather with little flying time tends to promote it. As a rough guide, during periods when there is increased risk of swarming, inspections should be done every 5 days. When the risk is considered to be lower, 7-10 day inspections will suffice. One of the advantages of keeping bees on a two-box system (brood and a half or double brood) is that queen cells will usually be started on the bottom bars of the upper box. If no other management is required, a swarm check can be accomplished by simply lifting one side of the upper box and looking for signs of queen cells on the bottom bars. This type of inspection is not 100% reliable but good enough in most cases. Single box systems will require the removal of at least some frames to check for queen cells. Regular inspections (swarm checks) will ensure that you never need to use the later steps in this diagnostic tree. Steps 1-3 cover pre-swarming development, with Step 3 putting the beekeeper on amber alert. Steps 4-9 deal with increasingly more advanced stages in the swarming process and each step contains instructions to help you to identify what stage the colony is in (**Investigation**) and what to do about it (**Remedial Action**). Steps 10-12 deal with problems that may arise after the swarming process is over and the parent

colony (the one that had the queen cells) has not returned to normal with a laying queen - a rescue programme.

Step 1 - There is drone brood in my hive.

Investigation - None necessary. This step is included because it is a widely held myth that the presence of drone brood means that the colony is preparing to swarm. The presence of drone brood is merely an indication that the colony has reached a certain stage in its spring build-up when it can 'afford' to produce and support drones. All healthy, successful colonies produce drones as part of their normal development, usually starting in mid-March and continuing until sometime in August. Many of these colonies with early drone brood will make no attempt to swarm during the season

Remedial Action - No action is required. Just rejoice that the colony is developing normally but be aware that the presence of drone brood means that the Varroa mite population will start to grow more quickly and now is the time to find out if the colony has any problems in this direction.

Step 2 - There are queen cups in my hive.

Investigation - Check to see there are no cell contents; no eggs and particularly no young larvae in a pool of royal jelly.

Remedial Action - If there are no contents no action is required. Like drones, the building of queen cups (practice cups or fun cups), mostly on the bottom bars of frames, is a natural stage in the build-up of the colony and does not mean that swarming is imminent. Cup building happens because the queen is no longer regularly walking on the edge of the frames and leaving her footprint pheromone there - presumably because she is too busy with other matters and the hive is also becoming more congested.

Step 3 - There are queen cups with standing-up eggs in them in my hive.

Investigation - Check that no cells have gone a stage further and contain a larva in a pool of royal jelly.

Remedial Action - If there are only standing-up eggs no action is required except to go onto amber alert - this may be the start of something more serious. However, many colonies will have eggs in queen cups several times during the season and still make no attempt to swarm.

Step 4 - There are queen cups with contents (larvae and royal jelly) in my hive and some of the cells are starting to be extended.

Investigation - This is a sure sign that the colony is almost certainly going to swarm, so it is red alert time. Now you need to find what stage of development the swarm cells are in so that you can estimate the time to their being sealed and therefore the likelihood of swarming in the near future. Just occasionally a colony will swarm prematurely - before there are any sealed swarm cells - so it is as well to check this has not happened. Is the colony smaller than you expected, are there newly laid eggs or, better still, can you see the queen? If you think it has already swarmed you need to go to Step 5.

Remedial Action - If all the cells are in an early stage of development then you probably have time on your side (1-3 days?). But do not procrastinate; remember that some colonies swarm prematurely. So, in reality, you have to prepare to do an artificial swarm on the colony as soon as possible. There are many methods of artificial swarming to be found in beekeeping books. All methods involve splitting the colony in some manner, usually with the queen and flying bees in one part (the artificial swarm) and the brood, swarm cells and non-flying bees (the parent colony) in the other. The queen and

flying bees are usually left on their original stand and the parent colony is moved to a new stand or placed on a split-board (an intermediate floor) on top of the artificial swarm. If you have no previous experience of doing an artificial swarm, you need to read a book carefully and select a method that suits you (and the equipment you have available) and then go for it. If you have a mentor with experience of artificial swarming, take advantage of some help.

Step 5 - There are sealed queen cells in my colony.

Investigation - Now you must seriously consider whether or not the colony has already swarmed. The first clue is the number of bees in the hive. Are there fewer bees than when you last looked at them? Are the supers full of bees? Next look at the brood - are there newly laid eggs? Can you find the queen? If there are no eggs, what is the youngest brood you can see? If you can find eggs or have seen the queen you are in luck and the colony has not yet swarmed - but it may do so at any moment if the weather is good and it is before 16.00 hours. If you decide it has not swarmed, go back to Step 4 and make an artificial swarm. If you decide it has swarmed then there is only one option open to you.

Remedial Action - All you can do now in this situation is to prevent a cast swarm and the loss of more bees - and probably any chance of a honey crop from this hive. To do this you have to thin out queen cells until the bees have no option but to settle down with the only emerging queen. But what rule do you follow? There is a range of opinion on this matter. The most common advice is that you select an unsealed queen cell in which you can see a healthy larva and destroy **ALL** the rest (sealed and unsealed). If there are no unsealed cells you will have to settle for a sealed one - the best you can find and preferably one in a well-protected position so there is no chance of accidental damage during manipulation. Another option is to leave 2 queen cells of the same age so that there is a backup if

one cell is faulty - and the bees also have a choice. But how do you know the cells you choose are the same age? Usually two or more cells side by side on a comb are the same age but this is not guaranteed. Personally, I do not see the point in the unsealed cell option; bees will not seal queen cells when the occupant is already dead and all you are doing is foregoing the advantage of a sealed cell that will hatch earlier. Some queens die in the cell after it has been sealed but you can not avoid that possibility - but you must be aware it can happen and be prepared to take remedial action. **The golden rule of this recovery operation is that you MUST destroy ALL queen cells apart from the one (or two) that you select.** To do this properly it is usually necessary to gently shake or brush bees from the combs so that you can see what is there. Be particularly careful not to miss any cells in awkward corners at the bottom of the combs and tucked in to the sidebars - failure is not an option! Some books say you must not shake frames or you will dislodge larvae or pupae in the queen cells. However, as long as you shake gently there should not be a problem. If the colony has only recently swarmed (less than 4 days), there will be eggs and/or young larvae present from which emergency queen cells can be made. You will need to return in 2-3 days time and check that none have been started as this could undo your previous good work, enabling a cast swarm to occur.

Step 6 - My hive has definitely swarmed and is left with the remaining bees, brood and numerous queen cells.

Investigation - This colony will almost certainly produce a cast swarm if you do not do something to prevent this happening. How urgent the matter is depends on how long ago swarming occurred and how mature the queen cells were at this time. If you saw the hive swarm or caught a swarm which you know came from this hive then you are already in possession of the information you require, ie. you know how long it is since the hive swarmed. If you do not have this information you have to find out by looking at the brood. Find the youngest brood and

count back and you will know roughly how long it is since the swarm took place. How mature are the queen cells? You will find this out as you start to thin them (see Remedial Action, Step 5). If you find that queen cells are starting to hatch as you look through the hive, go to Step 7.

Remedial Action - Same as for Step 5.

Step 7 - My hive has swarmed and there are emerged and sealed queen cells present.

Investigation - This sounds like a rather tricky situation but this is not the case. If the hive has already cast swarmed it has happened and there is nothing you can do about that - it is also difficult to be sure unless you have seen or caught the swarm. The best indication is a marked reduction in the number of bees in the colony. If it has not cast swarmed then you are in luck and it is usually possible to prevent this happening.

Remedial Action - Examine the remaining sealed queen cells which are probably on the point of emerging anyway. You may find that they start to hatch as you look through the hive. This happens because your blundering around has distracted the 'warder' bees that were keeping queens penned in until the colony wanted them to emerge. The bees have a plan which you are now going to upset! Investigate the unsealed cells carefully using a knife blade or scalpel and, if the queens are mature and ready to go, help several of them to walk out into the hive - the more the merrier! The point is, that you do not know if there is already a virgin queen (or queens) loose in the hive so you are making sure by letting the so-called 'pulled virgins' go. Having had your fun releasing virgin queens into the hive, you now have to do what it says in Step 5 and carefully destroy **ALL** the remaining sealed queen cells. Releasing all these queens into the hive at the same time seems to force the colony to select from the available virgin queens and settle down to get her mated.

Step 8 - I think my hive has just produced a cast (secondary) swarm.

Investigation - This is very similar situation to Step 7. You need to find out if there are any un-emerged queen cells in the hive. You also need to look at any brood to find out how long it has been since the prime swarm departed.

Remedial Action - If there are some un-emerged queen cells, release some virgin queens and then destroy all remaining queen cells. If there are no un-emerged queen cells you have to decide whether there is a virgin queen in the hive? There probably is but, if you want to be sure, you can insert a 'test' frame containing eggs and young larvae taken from another hive. If in a few days time there are no emergency queen cells on this frame, then there is a queen present and it is simply a matter of waiting for her to start to lay. If queen cells are produced, then there is no queen and you can either allow these cells to produce a new queen or, if you have a source of more mature queen cells from another colony, you can introduce these to the hive and save some time.

Step 9 - My hive has no unsealed brood, a limited amount of sealed brood and no sealed queen cells.

Investigation - The age of the brood will give some idea when the original swarm occurred. Uncap a few cells and assess the age of the occupants. There should be a virgin queen in the hive so you need to ask yourself whether the colony is behaving queen-right; does it seem settled or are the bees running around, fanning their wings and making a 'roaring' noise? Another question to ask, is there a laying arc? This is a semi-circle of cells on frames, usually in the middle of the hive, that have been kept free of nectar and are highly polished ready for a queen to lay in them. Neither of these 'signs' are completely foolproof.

Remedial Action - There is not much you can do in this situation except check if the colony has a queen by inserting a 'test' frame and see if queen cells are made (see Step 8). It is always advisable to do the test sooner rather than later because, if there is no queen, you have just been wasting time waiting for something to happen. If the message is in the affirmative (no queen cells are made) all you can do is wait for her to start to lay.

Step 10 - My hive has no brood and no sealed queen cells, help!

Investigation - You now have very little information to tell you what has happened and when it happened. You may be able to see the remains of some queen cells but it will not be possible to tell how old these are. All possibility of swarming is now over and it is just a question as to whether or not this hive will get a new laying queen.

Remedial Action - Again you can use the 'test' frame method to find out the queen status as described in Steps 8 and 9 - sooner rather than later.

Step 11 - My hive has no brood apart from that on a 'test frame' it has received but NO queen cells have been produced.

Investigation - Failure to make queen cells on the 'test frame' is because the colony thinks (or thought at the time you introduced the frame) that it has a queen - in other words there is (or was) a source of queen pheromone. The first question in this situation is how long is it since a queen cell could have emerged? There is probably no way you can tell by looking at the frames so, if you have no information from previous inspections, you can not answer this question. If you do know the probable emergence date then it is reasonable to expect a laying queen in 3 weeks or, at the absolute limit, 4 weeks.

Be aware that queens that are late coming into lay are subject to a higher failure rate (at some time in the future) than queens who start to lay on time. You can assess the behaviour of the colony as described in Step 9; is it behaving in a calm manner, does it have a laying arc? You can also look to see if you can see a queen but non-laying queens are difficult to find. You could give the colony another 'test frame' but time is running out for them to be successful in producing a new queen.

Remedial Action - To be successful in re-queening by any method (a 'test frame', a queen cell or a queen) you must find the source of queen pheromone and eliminate it. You need to search diligently for a queen and, if you find her, you must kill her - providing you are convinced she is never going to lay. If you have been successful in this task you will now be able to re-queen the colony. However, introducing a mature queen cell from another colony or a laying queen is likely to be a better option than a 'test frame' at this stage. Virgin queens are notoriously difficult to introduce but worth a try if that is all you have.

Step 12 - My hive has got a drone-laying queen.

Investigation - A drone-laying queen can be identified by the presence of brood in worker cells that has domed capping - like the capping on drone cell but not in a drone-sized cell. This means that the queen is laying unfertilised eggs when she should be laying fertilised ones. This can be due to a variety of reasons; she may not have mated properly, she may have run out of sperm or she may have some internal defect. Initially, such a queen may lay both fertilised and unfertilised eggs, producing a mixture of normal and abnormal worker brood. Things can only get worse (not better) so now is the time to take action.

Remedial Action - This is exactly the same as for Step 11 - you must find the queen and eliminate her before you can

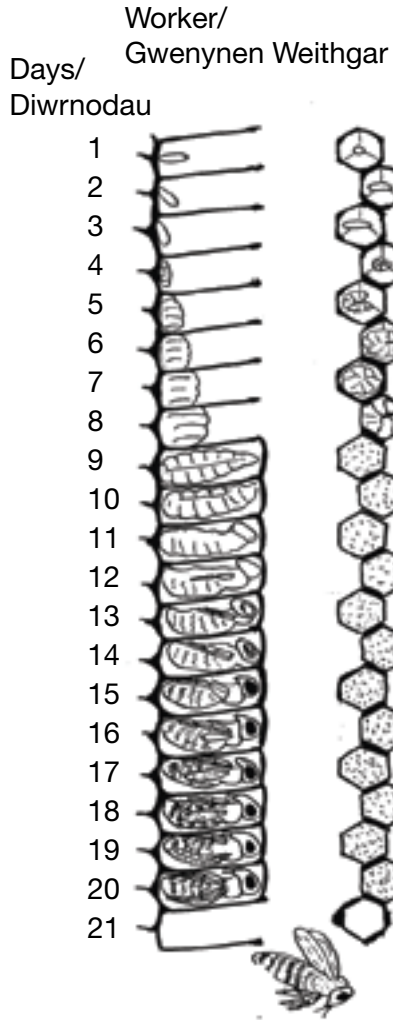
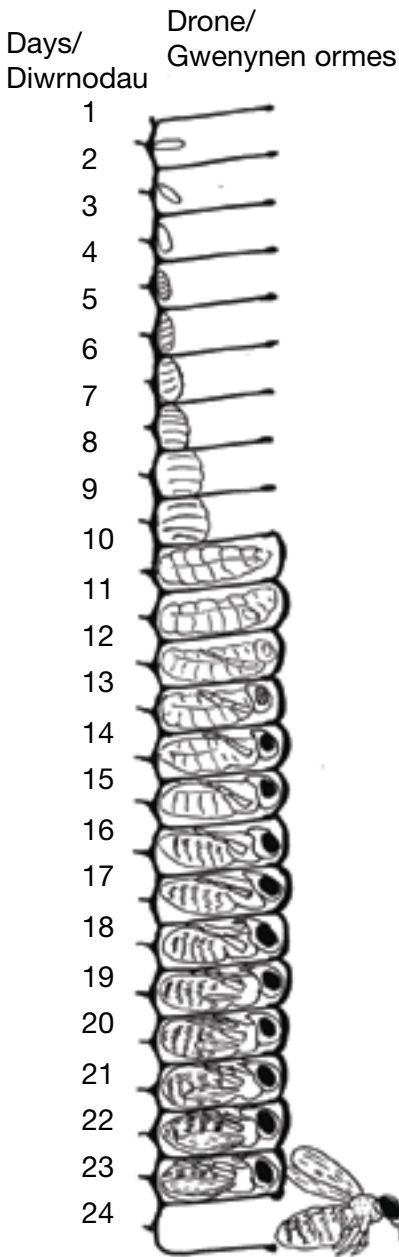
re-queen. Occasionally, worker brood with domed cappings is not produced by a drone-laying queen but by laying workers. This is not easy to diagnose. The signature of laying workers is that the brood is patchy with little pattern, eggs may be laid on the side of the cells and there may be more than one egg/cell. A colony with laying workers will usually accept a mature queen cell.

Failure of the Prime Swarm

Some beekeepers adopt the practice of clipping the queen. The end of one wing is removed with sharp scissors so, that when the prime swarm attempts to leave with the old queen, she is unable to fly properly and falls to the ground in front of the hive. After a period of getting nowhere very fast, the workers will abandon this un-airworthy queen to her fate and return to the hive. Here they will await the hatching of the first virgin and, as soon as she is ready to fly, they will usually swarm with her. Wing clipping is usually employed to lengthen the time between inspections to check whether swarm cells have been started. There are pros and cons to the practice, the discussion of which is beyond the scope of this leaflet.

However, failure of the prime swarm does occur naturally from time to time. This happens when the old queen, for reasons that are not usually obvious, is unable or unwilling to fly and the prime swarm is aborted in favour of the first virgin to emerge. Often there is little evidence as to what has happened, except that you appear to have a colony that has swarmed (it has no queen) but does not seem to have lost any bees - which is good! There is another possible outcome to this situation about which you need to be aware. The non-flying queen will sometimes crawl under a hive stand or similar refuge and the swarm will try to establish themselves in an unsuitable (for them and the beekeeper) place. The swarm can be recovered from where it has settled and re-housed in a hive. But, if it has been there

sometime before it was noticed, then it may be necessary to remove it to a new location - theoretically at least 3 miles away but a shorter distance will usually suffice. The remedial action for the parent colony (the one from which the swarm has issued) is the same in all cases; the queen cells must be thinned in order to prevent a cast swarm (see Step 5 for details).



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