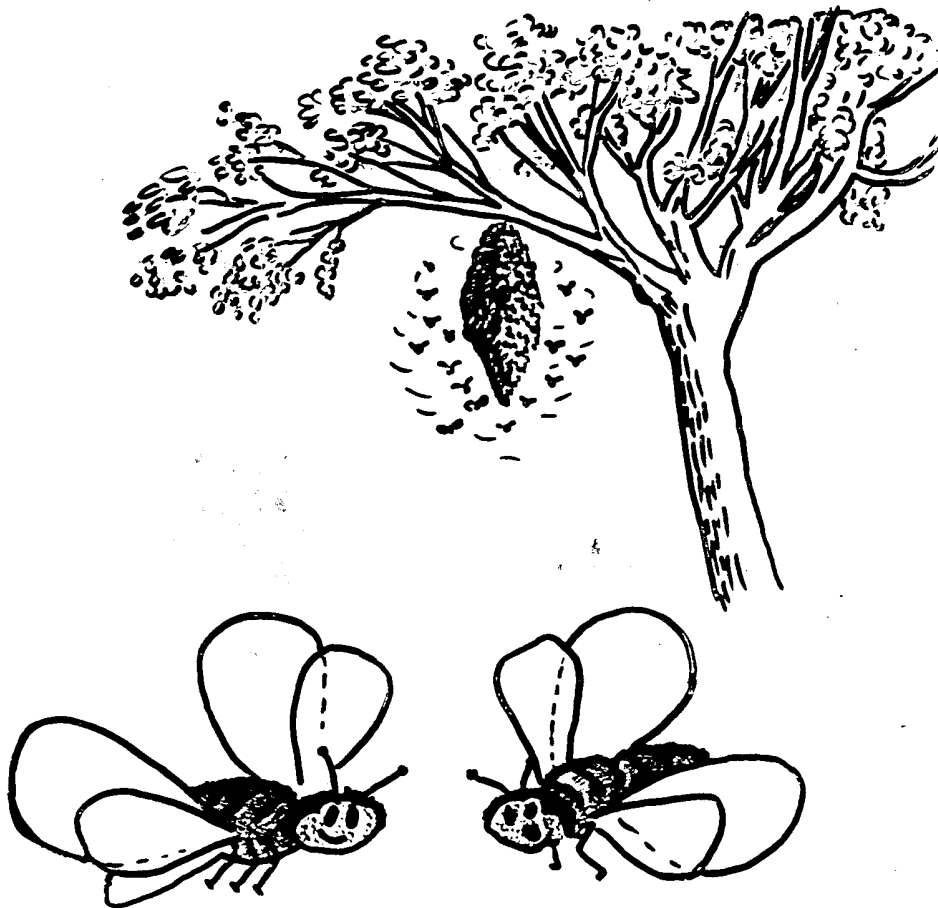


# SWARMING



*I think we need a new social secretary.  
This is the fourth mystery tour we've had this year!*

In the Middle Ages, animals were sometimes tried in a full court of law for crimes such as exerting an evil influence on a human being. If found guilty they were sentenced to death. In the eleventh century St. Bernard excommunicated a swarm of bees for buzzing too loudly while he was preaching.

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Revised 2010.

C:\My Documents\NBKA Beginners\Swarming.

## Swarming

*A swarm of bees in May  
Is worth a bale of hay;  
A swarm of bees in June  
Is worth a silver spoon;  
But a swarm in July  
Is not worth a fly*

Between about May and July, colonies may become overcrowded and swarm – that is, the old queen and roughly half the colony (maybe 20,000 bees) will leave and find a new home elsewhere, unless captured and placed in a hive. The old skeppist beekeeper relied on swarms to replace the bees he had killed for their honey. He killed the bees that had produced most honey and selected bees that were prone to swarming – the opposite to bee breeding today. Losing half the colony can reduce honey yields – and terrify the neighbours. Beekeepers are, of course, the largest employers of female labour in the country! Nowadays swarming is a trait one wishes to minimise, although it is impossible to eradicate completely – it is the natural method of reproduction and survival.

“At present there is still a popular belief in the minds of the public that the issue of a swarm of bees is an Act of God. The time must come when it will be widely realised *that the swarming of bees is very largely under the control of the beekeeper.*” *MAFF Bulletin 206 – Swarming of Bees.*

**Swarm control** involves actions taken to avoid the issue of a swarm, when queen cells are in the process of development for the purpose of swarming.

**Swarm prevention** is achieved by having young queens from a low swarming strain, providing space (supering), ventilation, etc.

### Signs of Swarming

- ❖ Colony strong at egg laying peak.
- ❖ Drones present.
- ❖ Queen cell cups/cells present containing eggs/larvae/food.

### The simple rules are:

- ❖ Dry queen cups (nothing in them or egg only) – the situation can be left until the next inspection.
- ❖ *Charged* queen cups containing brood food – initiate swarm control procedures.
- ❖ Sealed queen cells – **too late – the swarm has emerged!**

If all the queen cups have a dull matt finish on the inside, preparations for swarming have not started – the cells will be polished before the queen lays in them.



Over the years there have been three main theories of swarming:

- ❖ In 1890, Gerstung postulated that as the colony builds up an excess of nurse bees & brood food is developed – the brood food is used in queen cells built to absorb the surplus.
- ❖ In 1921, Demuth suggested that congestion was the cause of swarming.
- ❖ In 1953, Butler identified *queen substance* – a *pheromone* that inhibits the workers from producing queens.

***Congestion causes:***

- ❖ Overheating.
- ❖ Reduced brood area.
- ❖ Reduced honey storage.
- ❖ Reduced comb building.
- ❖ **Dilution of *queen substance*.**

An old queen produces less *queen substance* and the colony is more likely to swarm or supersede (q.v.).

Swarming may result from starvation (hunger swarm), absconding or mating flight.

The preparations for swarming begin about 2 – 4 weeks before the first swarm issues, during a period when colonies are becoming congested because of the worker population's rapid growth. The first sign of swarming preparations is the appearance of new cups in which queens can be reared. Workers build and tear down queen cups (*play cups*) throughout the season, but the number of unoccupied cups increases during the spring, prior to queen raising. Queen rearing begins when eggs are laid or placed into the queen cups. Most of the eggs in queen cups are laid by the queen, but workers can and do move a small number of fertilized eggs or very young larvae from worker cells into cups. Once the eggs hatch into larvae, the workers provide the special feeding that turns them into queens rather than workers.

Brood food consists of a clear component produced by the hypopharyngeal glands and a white component produced by the mandibular glands. *Royal Jelly* contains equal amounts of each component – fed to queen larvae in quantity. Worker food contains 20% – 40% of the white component for the first 2 days, but on the 3<sup>rd</sup> day only the clear component is given and honey and any pollen it contains. The quantity and composition of brood food determines whether a fertilized egg develops as a sterile female, the worker, or a fecund queen – anatomically different from each other.

Queen cells are elongated downward as the immature queens develop until they are sealed at the end of the larval feeding period. Queen larvae and pupae in the cells are frequently destroyed during their development by the workers or the queen – usually other queens are being developed. An average of 15 – 25 queen cells are sealed prior to and immediately after swarming. This ensures that at least one virgin queen will emerge after swarming. The number of queen cells is indicative of the *swarminess* of the colony. Colonies most commonly swarm the day of sealing the first queen cell, usually 8 – 10 days after queen rearing commences. However, the weather and internal colony factors may alter the timing of swarming. For example, queen cell destruction during poor weather prior to swarming may improve the chances of survival. It may be that poor quality larvae are destroyed. Swarming colonies must have a large adult population and maximum brood to compensate for the loss of bees.

The queen is fed more frequently and lays more eggs until the week before swarming, when workers feed her less, her egg laying decreases and her abdomen decreases in weight so that she can fly with the swarm. The workers also shake, push and bite the queen, which forces her to keep moving. The queen frequently examines queen cells, sometimes damaging unsealed queen cells in which she may earlier have laid eggs. The bees usually slow down in their work after queen cells have been started, especially during the few days just prior to the time the swarm issues. The foragers stay in the hive in increasing numbers instead of working in the fields, bringing about a crowded condition sometimes resulting in a great cluster of bees hanging on the outside of the hive during hot weather (not to be confused with clustering outside the hive during hot weather, when there is a dearth of nectar). A more reliable sign is the lack of the usual flight at the entrance. An examination of the supers will show them to be crowded with bees – these idle bees are usually filled with honey, which makes them appear large because of their distended abdomens. The only certain indication of swarming is the presence of queen cells. Scouting for new sites may begin at this time – *bait hives*, especially in out-apiaries, may be useful to attract swarms. It is possible to buy pheromone lures to make the hives more attractive to scout bees and swarms. Because of the unpredictability of the day or the time of swarming, workers engorge with honey for about 10 days prior to swarming. Both workers that go with the swarm and those that remain behind carry an average of 36 mg of honey in their stomachs compared with 10 mg in non-swarming bees.

Swarming starts as a disturbance that is propagated by the *Schwirrlauf* or whirr dance in which workers make straight runs across the combs without pausing. About every ½ - 3 seconds they vibrate partially spread wings and make contact with other non-dancing workers for about 5 seconds. During this contact the bee that has been dancing pipes like a queen, except the sound is continuous and not pulsed. These contacts induce others to dance resulting in a chain reaction. Finally (usually late morning or early afternoon) the bees pour out of the hive and take to the air. The queen is chased, bitten and pulled along with the excited workers. The *prime* swarm contains young workers (70% less than 10 days old) and a few drones (1%). The swarm settles nearby checking the queen is present. Close examination of the outer surface will reveal, after about 1 hour, dancing bees. Scout bees searched for a site before swarming – this is reconfirmed using the wagtail dance. There may be wagtail dances indicating different locations, but eventually a decision is made and the bees move to the chosen site.

Scout bees at the new site begin performing a *break* dance about 30 minutes before the swarm



becomes airborne – a sound may be heard at this time. This dance is a signal to the scouts to return to the swarm and act as guides – the *Nasonov* gland is exposed.

Virgin queens begin to emerge about a week later. The first virgin queen to emerge may kill still confined queens ('princesses') by stinging them through the cell walls. However, it is more likely that a cast or afterswarm will issue 2 –4 days after her emergence (8-9 days after the prime swarm). This can happen each time a virgin queen emerges until intervention by the workers or the beekeeper. Obviously, casts become progressively smaller and unviable.

*The intention of a colony to throw a cast is indicated by the piping of the virgin queens. Instead of the princess who emerges first being allowed to destroy her royal sisters still in their cells, she is prevented from so doing by the workers; she becomes angry and runs over the combs in an excited*

*manner, stopping every few moments to pipe, the note being answered on each occasion by the imprisoned princesses.*

*Bee-Keeping Old and New – W. Herrod-Hempsall.*

v. Addenda – Queen Piping.

In olden times, the first & second casts were called *colt* and *filly* respectively (in some areas, *smart* and *squib*).

Supersedure is the replacement of the queen without swarming. Usually, but not always, the queen is old and producing insufficient queen substance to inhibit queen rearing. The criteria used to differentiate between swarming and supersedure overlap.

Supersedure:

1 – 6 queen cells.  
Same stage of development.  
Occurs anytime.  
Cells built lower centre of comb.  
Colony often weak.  
Mother sometimes present with daughter.  
Worker cells contain eggs.

Swarming:

4 – 20 queen cells.  
Different stages.  
Seasonal.  
Cells built near bottom of comb.  
Colony populous.  
Mother left before daughter emerges.  
Eggs absent.

Emergency queen cells are built from worker cells. They may be built anytime when eggs are present and if the queen has been killed.

Stocks should be selected that routinely supersede rather than swarm. However, swarm prevention prevents identifying such colonies!

Reproduction by swarming is a risky process – few survive in cold climates. It is not surprising that there are correlations between swarm size, timing, growth, etc. Larger and earlier swarms survive longer than smaller and later swarms. Hence, “A swarm in July, is not worth a fly” – or “Let the b---s fly”!

*Un essaim du mois de Mai  
Vaut une vache a lait.*

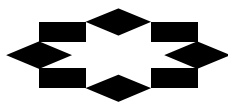
*A swarm of bees in May  
Is worth a dairy cow.*



**Swarm Control**

*providing an endless opportunity to fiddle!*

- ❖ Simplest method - collect the swarm. An old beekeeper had an armchair in his apiary, where he sat to watch his bees during the summer months. If a swarm issued, he collected the swarm and returned to his chair. A workable method of swarm control!
- ❖ **All control methods involve the separation of queen, brood and flying bees.**
- ❖ Breaking down queen cells is not a method of swarm control - it is a method of deluding yourself that you have done something positive!
- ❖ **Mark and clip queen.** This may seem a bit daunting to a beginner. Practice on drones (they have no sting), **but** use a different colour than that used to mark the queen (unless you kill the marked drones). There is a good description in Ted Hooper's book *Guide to Bees and Honey*. *BBKA* also produce a leaflet.
- ❖ Queen marking pens are available from equipment suppliers or use *Tipp-ex* Correction Fluid (available in a wide range of colour)s - allow time for the solvent to evaporate before releasing the queen. Nail varnish should not be used - the acetone dilutant smells like the alarm pheromone isopentyl acetate and may induce the bees to sting the queen. Try not to mark other than her thorax or other bees! A grass stem is often neater than when using the brush provided.
- ❖ To clip the queen's wings, catch her by the wings by following her about the comb from behind. Once caught with the right hand (if you are right-handed), let her grip the middle finger of your left hand with her legs. Hold the thorax **gently** between the ring and index finger of your left hand. Place the scissors on her back - **wait** and check she hasn't put her leg up to push the scissors away. If clear, clip one wing. Five-legged queens get superseded (replaced). If you clip one wing, this enables you to catch her by the wing next time.
- ❖ Alternatively, you can use a press-in cage (*Crown of Thorns*), which is placed over the queen on the comb (choose a flat section) – mark the queen through the threads. The threads can be varnished to improve strength. A marking cage with a plunger is also available.
- ❖ Clipping the queen's wing does not prevent swarming, but it will prevent the old queen leaving with the prime swarm.
- ❖ **Ten day inspections.** If queen rearing begins with a newly laid egg, then a 7 day inspection cycle would be sufficient (3 days egg + 5 days feeding). However, they may choose a 1, 2 or even 3 day old larva to become a queen – therefore, they can have sealed queen cells in 3 days following the last inspection. If the queen's wings are clipped, the swarm cannot leave. The swarm will have to wait for a virgin queen to emerge. This will be in 10 days time (2 days feeding + 8 days pupa).
- ❖ **If on inspection, queen cells are found – don't panic!** Stop, think, have a cup of tea. Has the swarm left – is the queen still present? If you remove all the queen cells **and** the queen is not present, you have problems!



### When queen cells are found...

- ❖ Sealed cells:

No queen/swarm gone> leave only 1 unsealed queen cell or divide into nuclei.

Clipped queen/swarm returned> remove queen to nucleus (frame brood, 2 frames stores) – add extra bees or remove to another site, small entrance, feed after 3 days if on same site.

❖ Sealed/unsealed cells:

Queen present/colony not swarmed> *'Artificial Swarm'*.

The *parent colony* is moved to the side with entrance facing at 90 deg. the original. A new brood box and floor are placed on the original site. The queen is transferred from the *parent colony* on the comb on which she is found (**all** queen cells are removed) with adhering bees to the new brood box. One or two combs of brood and bees are placed either side. Any queen cells should be removed. Bees from two combs are shaken into the brood box. Drawn combs (or foundation) are used to fill the box with frames. Any supers are added over an excluder and a crown board and roof placed on top.

The *parent colony* has all the remaining queen cells removed except one<sup>1</sup> open cell containing a young larva – shake bees off remaining frames<sup>2</sup> to uncover hidden queen cells (not essential if flying bees are removed). Replace removed frames with drawn comb or foundation (or use a dummy board).

Foragers from the *parent colony* will return to the original site. After a week, the *parent colony* can be moved to the other side of the original site turning through 180°. The new foragers will find their hive gone and will go to the nearest one – the one on the original site. The brood box containing the queen should be checked for queen cells after 7 days and, if found, removed.

1. One (or more) queen cell can be used to make a nucleus colony as back-up.
2. Don't shake queens cells that are going to be retained.

**Artificial Swarm without finding the queen:**

When queen cells are found, move the parent hive. Place one comb of brood (no queen cells) in a new brood box on the original site – add drawn combs or foundation. Brush all the bees from the old brood box into the new one. Put the queen excluder on then the supers & the bees they contain – then the cleared brood box and combs (replacing the missing comb with drawn comb or foundation), crown board and roof. Next morning, remove the upper brood box and place on a new floor and cover with a crown board and roof. Overnight, the bees will have re-arranged themselves. The queen will be below the excluder in the new brood box. The nurse bees will have climbed up through the supers to tend the brood. When you separate them, you will have completed the first stage of the artificial swarm, without finding the queen.

Eventually, if increase is not required, the old queen can be killed and the new queen united to the original colony (using newspaper method).

**Suggestions to deter bees from swarming:**

- Remove some bees and brood to make a nucleus.
- Remove some brood to another colony
- Exchange a populous colony with swarm cells with a weaker colony in the apiary.

- Give the colony another super with empty drawn comb and foundation (placed immediately on top of the queen excluder).
- Remove the supers and bees – unite these to a weak colony with newspaper.

### **Addenda.**

International Queen Marking Colours:

White year ending 1 or 6.  
 Yellow                      2 or 7.  
 Red                          3 or 8.  
 Green                        4 or 9.  
 Blue                         5 or 0.

### **Will You Raise Good Bees?**

Rather than buying 5 different marking colours, mark queen with any available colour & use a coloured drawing pin on the hive.

Use *Dymo* tape to identify queens/hives e.g. 1/10. You can buy plastic numbers which are pinned on the hives. However, when you move queens (e.g. when you do an artificial swarm), the number needs to go with the queen. The solution is to pin the number to the roof and move the roof to the new hive.

### **Finding The Queen**

1. When you have to get rid of an unsatisfactory queen, put her in a matchbox and place her in the freezer. If you have difficulty finding the queen in a colony, take this old dead queen out of the match box and pin her to the top bar of the middle frame. Close the hive. Wait 10 minutes and then quietly open the hive. The queen you want to find will be there, busily trying to get rid of her opponent!
2. For this method you need two queen-right colonies. To find the queen in hive 1 take a frame of emerging brood from hive 2 and shake off the bees. Exchange it for a similar frame from hive 1. Close the hives and wait 20 minutes. The queen will be on that frame (because it smells different to her).
3. Shake all the bees through a queen excluder over an empty brood box.
4. The queen is often on the next frame to be examined i.e. she moves away from the light. Remove some frames (shake off bees), and arrange frames in pairs. Leave for a time, and then inspect each pair – the queen will be found on an unexposed frame.

### **Queen piping:**



Piping describes a noise made by virgin and mated queen bees during certain times of the virgin queen's development. Fully developed virgin queens communicate through vibratory signals: *quacking* from virgin queens in their queen cells and *tooting* from queens free in the colony, collectively known as piping. A virgin queen may frequently pipe before she emerges from her cell and for a brief time afterwards. Mated queens may briefly pipe after being released in a hive. The piping sound is variously described as a children's trumpet tooting and quacking. It is quite loud and can be clearly heard outside the hive. The piping sound is created by the flight motor without movement of the wings. The vibration energy is resonated by the thorax.

Piping is most common when there is more than one queen in a hive. It is postulated that the piping is a form of battle cry announcing to competing queens and the workers their willingness to fight. It may also be a signal to the worker bees which queen is the most worthwhile to support.

The piping sound is a [G#](#) or [A<sub>4</sub>](#). The adult queen pipes for a two-second pulse followed by a series of quarter-second toots.

From *Wikipedia*, the free encyclopedia.

When I talk to an audience, I always ask for a show of hands of who has actually heard queen piping and the result is usually about 50% of the beekeepers present. Then I ask who reckons to hear it at least once every year and further questioning establishes that all these people have more than 20 hives. This is more or less in line with my own experience; with an average of 8 hives over 20 years, I have heard it just 3 times. What this means is that an average beekeeper with 2 hives is likely to hear it once every 25 years! Clearly it is a pretty rare phenomenon.

Piping is the sound a queen makes when she detects the proximity of another queen and the words used to describe it are bleating, honking, croaking or mewing. For my money, the nearest sound I can think of is the crying of seagulls when they are competing for your sandwiches. The only time you get two queens in the hive is around swarming and they will usually be virgins that have emerged after the swarm has left.

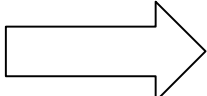
*Listen to the Bees* by Rex Boys (writing about Eddie Woods' *Apidictor*, used to analyse hive sounds & predict swarming).

### **Web Sites:**

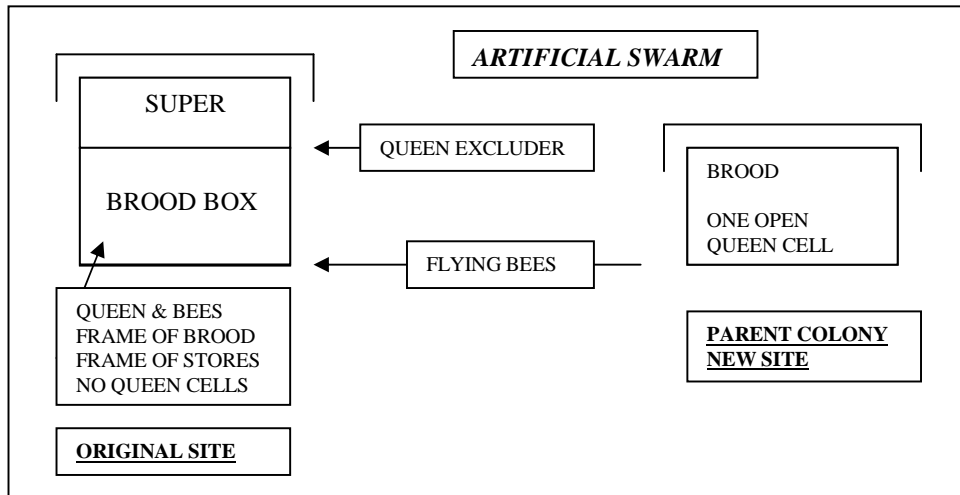
Typing "Swarm Control" into *Google* (or other search engine) will provide a wealth of information.

At the time of writing, it is possible to find audio recordings of queens piping (*YouTube*).

### **Swarm control – queen cells & queen present.**

- Queen
  - Brood
  - Flying bees
- 
- Separate one from the other two.

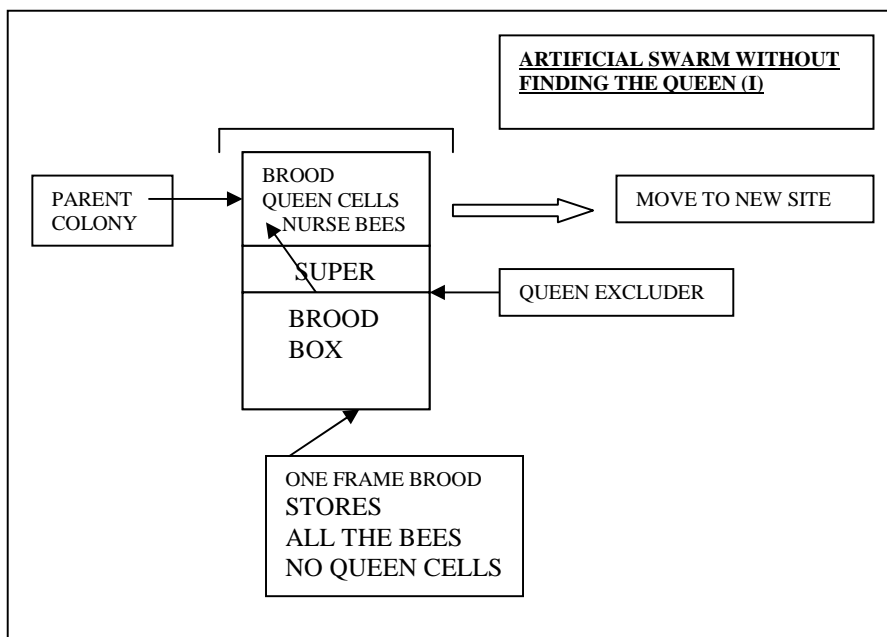
In the following methods, replace moved frames with comb or foundation.

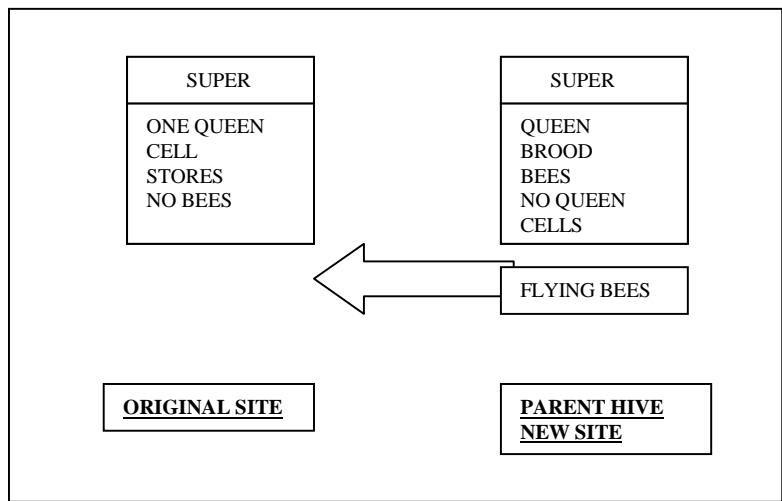
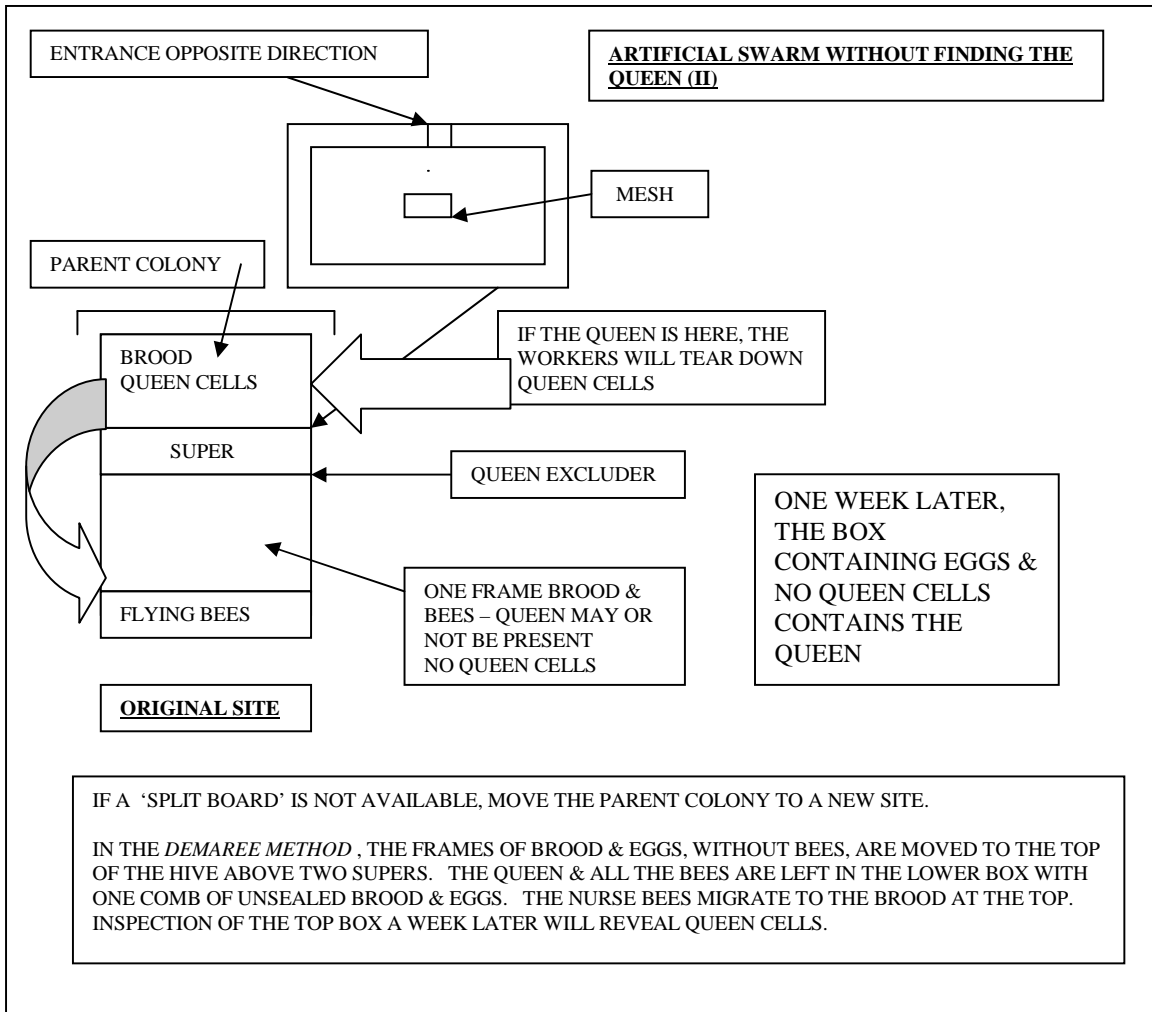


**N.B. Do not shake queen cell you select to develop a queen – brush bees off combs. When you have chosen the queen cell, the bees can be shaken off the combs to expose remaining queen cells for removal.**

**NUCLEUS.**

Remove queen on frame with bees to nucleus hive – remove queen cells. Add two frames stores & frame of brood (add extra bees if kept in same apiary). Check for queen cells & remove after a week. Leave one open queen cell in parent hive. The nucleus hive can be placed on the original site to collect flying bees from the moved parent colony.





Brian P. Dennis 2010

This article was originally written by Brian Dennis for the Northamptonshire BKA Beginners Course. In some areas I thought I should edit the text or make comment to refer the reader to relevant pages on the Dave Cushman website, to explain a point a little more fully or to add comments, based on my own experience. As a matter of courtesy I have resisted that, but remind the reader of the wealth of information displayed on the Dave Cushman website, which should be read in conjunction with this. Please bear in mind there may be slight differences of opinions and methods, but that's beekeeping!  
*Roger Patterson.*

This article has been printed off Dave Cushman's website. <http://www.dave-cushman.net/>