



**THE AMATEUR BEEKEEPER'S ASSOCIATION OF NSW INC.**

**BETTER APICULTURE THROUGH KNOWLEDGE**

# BEGINNING IN BEES

**HUNTER VALLEY BRANCH  
NEWCASTLE BOTANIC GARDENS  
HEATHERBRAE NSW**

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## INTRODUCTION

These notes have been developed and updated from original notes issued to Farrer Memorial High School Beekeeping Unit students in the 1970's and prepared by Mr B A Ward, District Livestock Officer (Apiculture) South Eastern and Illawarra Region, Department of Agriculture NSW.

Beekeeping is a fascinating pastime and has attracted people since early civilisation began. With such a long history, the science of beekeeping is now highly developed and the humble honey bee is the most studied insect in the world.

Such a vast field of knowledge often overwhelms the novice before he has a chance to grasp the basics. This booklet aims to give some elementary facts essential for prospective beekeepers. It may not be the only way of doing something or necessarily the best way for the individual, but the detail set out herein will provide the novice with a start. As one gains experience, does further reading, etc., the changes of seasons and flora take on a new and significant meaning.

### **Before setting out in Beekeeping consider these points:**

- Bees sting and beekeepers get stung. If you do not want to get stung or are allergic to bee stings, do not keep bees
- Bees require attention and work. Regular inspections are necessary if hives are to remain healthy and productive
- Small numbers of beehives are not a commercial unit. To make a living at least 400 hives or more are needed
- A great deal of knowledge is needed to manage bees efficiently. The best way to start is with two or three hives, building up as you gain confidence and experience
- City conditions provide only limited forage for bees and large yields of honey cannot be expected
- Neglected beehives are a nuisance to the public and are a disease reservoir
- If you are not prepared to look after hives properly, do not get any
- All flowers are not necessarily useful for bees and usefulness varies with season. Trees are generally more useful but some flowers and shrubs are only good if areas of them are large.

### **What you will need (minimum):**

One full depth hive, complete with frames, foundation, lid and bottom board.

Additional second box (super), frames and foundation, full depth.

Smoker

Bee veil

Hive Tool

Nucleus colony of bees with a laying queen

## GLOSSARY

Apiary	One or more hives
Bee Escape Board (clearer board)	A board fitted with bee escapes and placed between supers to allow the bees to escape from the top super
Bee Smoker	Equipment required to manage bees
Bee Space	The space provided as a passageway for bees. It should be 10mm. Bee space is provided between, above and below the frames and combs in a colony
Beeswax	The substance from which the bees build their comb. It is secreted in the form of tiny scales from wax glands in pockets formed by the overlapping of the first four segments of the abdomen of the worker bee
Breeder	A queen complying with the requirements of a selected tested queen and from which queen progeny have been produced. Such progeny are outstanding in size, general confirmation, markings, etc
Brood/Brood Chamber	A term applied to the area of eggs, larvae and pupae of other developing bees
Cappings	The beeswax sealed on filled cells, used to seal both brood and honey
Colony	A unit of bees comprising queen, workers, drones and their combs of brood and stores with all its products and parts
Comb	The cellular structure of beeswax built by the bees to live in and house their stores and young
Comb Foundation	A thin sheet of beeswax bearing the impression of the cells. It provides the mid-rib (centre) of a honeycomb, causes bees to build straight comb with all worker cells and strengthens the comb for extracting. May also be embossed plastic sheets
Drawn Comb	Combs built upon an artificial base called foundation
Drone	The male bee. It is large with square ended abdomen and has no sting
Drone Cell	See honeycomb
Excluder	Wire or plastic grill placed between the brood box and honey super so that only worker bees can pass through
Hive	A specially constructed box with moveable frames to house a colony of bees
Hive Strap	A security strap which holds the hive together for moving, commonly called an Emlock

Honey	Bee food made by worker bees from nectar and stored in honeycomb until needed to feed their young or feed the whole colony in times of shortage of external food supply
Honeycomb	The structure built by the bees in which to store honey and pollen and raise young bees (brood). There are two hexagonal cell types, worker which are smaller and drone which are larger with a domed cap
Honey Flow	A term linked to the availability of nectar in an area and how much honey can be expected to be produced from bees gathering it
Laying Queen	The only fully developed mated female bee. Is capable of laying eggs which produce queens, workers and drones
Laying Workers	Worker bees that have laid in a queenless hive to try and raise queen cells
Mailing Cage	Wooden or plastic cage to hold a queen bee and worker escort bees, to send through the post
Mis-mated Queen	Mated with a drone of a different race, may not produce workers of the desired temperament or performance
Nectar	A sweet substance secreted by the nectary of flowers. It is held in the calyx tube of the flower and contains approx 70% moisture
Nucleus or Nuc	A small colony of bees, usually of three or four frames, may be used to start a new colony, prevent swarming, queen mating, etc
Pollen	Is a very nutritious food, high in protein, collected from the anthers of flowers and used by the bees in the preparation of royal jelly. It is carried on the hind legs of worker bees in small sacs, and varies in colour. It is stored in cells adjacent to brood
Propolis	A gummy resinous substance gathered by bees from various plants and used to gum up cracks
Queen	The only fully developed female in the colony and mother of all the workers and drones in the colony. There is usually only one queen in the colony
Queen Cell	Cell built by the bees to raise queen bees
Robbing	The apiarist removes (harvests) honey from the hive
Robber Bees	Worker bees collecting exposed honey or stealing from another weaker hive
Sealed Brood	Brood which has been capped, usually after the larvae is approx 5 to 7 or more days old
Super	The upper hive box or boxes used to store honey, as distinct from the "Brood Box"
Swarm	A massed group of bees with a queen, in search of a new home

Swarming	The impulse flying of a group of bees when a queen leaves a colony to start a new colony
Worker Bee	An incomplete female bee that is the main worker bee in the hive

## THE LAWS OF BEEKEEPING

Before proceeding you will find the terms defined in the Glossary on page 3 very helpful. Get your terminology clear from the start

### **A Summary of the Apiaries Act**

#### **Registration:**

All persons who keep bees must register their bee hives with the Department of Primary Industry. A beekeeper must register his apiary within 14 days of commencing to keep bees and renew the registration when due. The registration is due every two years. Registration forms are available from the Department of Primary Industry

Costs of registration are:	\$40.00 + levy	1 to 10 hives	\$3.00
		11 to 20 hives	\$6.00
		21 to 30 hives	\$9.00 etc

The levy fees go into the Bee Diseases Compensation Fund, for approved payments in respect of serious brood disease outbreaks.

#### **Identification of Apiary:**

It is compulsory to brand all brood boxes in the apiary with the Apiarist's registered number, within 60 days of notification of your number. The branding must be done in such a manner that it cannot be obliterated by painting.

#### **Disposal of Hives:**

Beekeepers who dispose of their hives, (by selling or giving their hives away or disposal by other means), are to notify the Department within 21 days of disposal, giving the new owner's name and address. The notification form is part of the registration certificate.

#### **Hive Equipment:**

Honey bees can only be kept in frame hives and the bee combs must be readily removable from the hive for examination separately without cutting the combs.

#### **Honey Not to be Exposed:**

The Apiaries Act requires that "no persons shall suffer or allow any honey, or honeycomb, receptacle or article on or in which honey is deposited and which is in his possession or under his control to remain exposed in a manner or under conditions which would provide robber bees with access to the honey". The practice of placing cappings or burr comb outside the hive for bees to recover the honey is illegal.

#### **Notification of Disease:**

A beekeeper who finds disease in his apiary must immediately notify the nearest inspector or apiary section of the Department in writing. The most important disease is American Foul Brood (AFB), see Diseases, see also appropriate "Agnotes" as issued by the Department for more detailed information.

## BACKYARD BEEKEEPING

Beekeeping can be one of the most rewarding hobbies. However bees may be a constant source of worry to neighbours. Over the past few years closer settlement coupled with a steady increase in hobbyist beekeeping and a steady anti-bee propaganda by the media and so called conservationist groups publicising unproven information on the so called detrimental effects of honey bees on the environment and their dangers to human life. This has resulted in a steady increase in complaints to the Department regarding bees kept by neighbours. Beekeepers can minimise complaints by giving proper consideration to the following points. It must also be realised that some neighbours have their minds made up and that they cannot be confused with facts. See appropriate "Agnote".

**Placement of Hives** – Aspect – Hives should be in a warm sunny position, preferably with a north-easterly aspect. Hives placed in a damp cool position may be constantly troubled with dysentery, which often shows on the neighbours washing

**Obstruction to Divert Flight** – Bees can be conditioned to fly in a certain direction or height by simply placing some simple type of obstruction in their flight path. If forced to reach a height of about 4 metres to cross this obstruction, the bees will fly at this height and will not bother pedestrians or neighbours. A suitable obstruction could be a lattice trellis or wire trellis covered with a vine, also a hedge or bushy shrubs

**Nearness to Dwellings** – Putting hives as far from one's own house as possible often means that they are close to the neighbours' houses or paths. Think of the neighbour first as this may be the main source of complaint

**Number of Colonies** – Generally 3 or 4 hives would be enough for the average urban backyard. Numbers of hives often alarm neighbours more than the strength of colonies involved. Hive management and placement is therefore important. Often an out-apiary permits better management and provides better conditions if more colonies are wanted

**Provision of Water** – Bees may cause trouble when they look for water from neighbours taps or swimming pools. A tub of damp sand suitably located near your hives will provide an ideal watering place

**Temperament of Bees** – Bees can vary greatly in temperament and you need to ensure that you keep a docile strain. Caucasians are well known for their docility as are most modern strains of Italians. Savage or aggressive hives should be re-queened with a queen of a known docile strain

**Regular Re-queening** – Bees may become less docile as the queen ages. For this reason consider re-queening at regular intervals of about 18 to 24 months. If your hive for some reason supersedes its queen and raises a new one, this virgin queen may mate with drones from a temperamental strain of bees in the locality

### **Hive Management** –

*Open hives* on warm sunny days when there is no risk of thunder storms. Mid-morning to mid-day is possibly the most suitable time

*Use adequate smoke*, but do not over smoke as this will disorganise the bees to the extent that they become savage. Experience will tell

*Time of manipulation*, never leave the hive open for long periods, generally up to 15 minutes or so, and much less if bees are inclined to rob

*Honey accessible to robber bees* can set the bees in an uproar and can result in weak hives being completely destroyed by robbing. It is an offence to leave honey exposed to robber bees

*Ventilation* – Small hive entrances and lack of adequate supers will result in over-crowding of the hive and in due course the bees will swarm. Often the

swarm will settle in the neighbour's yard and the sight of these 20,000 to 30,000 bees, unwelcome visitors, can be alarming to some people. Over-superning (too many boxes) is bad hive management and may again lead to dysentery and subsequent 'spotting' of the neighbour's washing

**Education** – See appropriate "Agnotes", issued by the Department of Primary Industry. Education is perhaps the most important aspect to consider. If more people were informed of the negligible danger of bees that are managed properly, less friction would result between neighbours

**Notification of Intention to Keep Hives** – it is courtesy to discuss the matter of keeping hives in your backyard before doing so and wherever possible advising your neighbours on the benefits of having bees in the community

**Interest Neighbours in Beekeeping** – It may be possible at some time to provide your neighbour with protective gear and show him the inside workings of a hive

**Surplus Honey** – Should surplus honey be extracted, a small jar of honey given to the neighbour may soothe the worst of stings **Note: Giving honey is illegal!**

**Swarming Bees** – Advise neighbours of the relative docility of swarming bees and urge them not to interfere with the swarm in any way

**Importance of Bees** – Stress the importance of bees for pollination of home gardens. But for the work of honey bees many fruit crops would be virtually non-existent

**Pesticides** – It would be wise to stress to your neighbours that the indiscriminate use of toxic pesticides is dangerous to bees. Far too many bees are killed because backyard gardeners spray their fruit trees and vegetables with toxic chemicals at wrong times, eg when trees are in full bloom. When dangerous pesticides are to be used move the bees away. It is better than losing them altogether. Never spray bees directly with pesticides. Spray less toxic pesticides late in the evening

There are many traps and penalties in the Act which is administered by Apiary Inspectors who under the present system have absolute authority. The Amateur Beekeeper is usually judged to be in the wrong

**Treatment of Stings** – Often the correct method of removing bee stings is not known to people in general. If the sting is removed correctly very little pain will result. When removed quickly and correctly very little venom is injected and any reaction is localised.

- ✧ Scrape the sting out with a knife or similar instrument, a sharp finger nail is satisfactory
- ✧ Try not to rub the area as this only spreads the venom
- ✧ Do not try to pull the sting out by gripping it between your fingers, this will inject more venom and cause the reaction to be worse. Severe reaction may follow
- ✧ An ice pack applied to the area will slow down the movement of venom
- ✧ Chemists may supply, without prescription, diphenhoramine tablets (50mg), which are used to treat more severe reactions. A number of these products are available, of which, Avil® and Benadryl® are readily available

**Avoiding Problems with Stings** –

- a) Proper use of protective clothing, veil and smoker
- b) Use rubbing alcohol with wintergreen essence to cover sting odour and clean wound
- c) Length of colony examination, weather conditions and behaviour of beekeeper

- d) Some bees are more defensive. Recognise defensive (do not say “aggressive”) actions of bees, flying into veil, tendency to sting, flighty response to smoke, flighty response to movement of frames
- e) Work smaller colonies to gain confidence. Colonies on a nectar flow work much more easily
- f) Use spray or ointment to reduce itching. Use cold to reduce swelling and initial discomfort. Scratching sting sites may lead to infection
- g) Reactions to stings:-
  - 1) Normal Reaction – pain, weal forms, local swelling, redness and then itching. May last 1 to 7 days. Swelling is variable but if it remains at the sting site the reaction is normal
  - 2) Allergic Reaction – must recognise as more severe than normal. Exaggerated response, swelling at site and elsewhere on body, nausea, dizziness and maybe unconsciousness, hives or itching on other parts of the body, headache and a generalised poor feeling
  - 3) Anaphylactic Shock – most severe and immediate reaction. Usually will manifest itself in 10 to 15 minutes. Rush individual to hospital or doctor to get a shot of adrenaline or the individual could die, use of epi-pen indicated
  - 4) Toxic Reaction – from multiple stings – too many – too rapidly, will not lead to any allergy but discomfort will be greater.

**REMEMBER:- “BETTER APICULTURE THROUGH KNOWLEDGE”**

## WORKING WITH BEES

Before working a hive of bees make sure you are properly equipped. You should have the following items:-

- ✧ Smoker – to calm the bees – the fuel is bag, bark, dry leaves or pine needles
- ✧ Protective clothing – overalls, jacket, hat, bee veil, gloves
- ✧ Hive tool – for prising apart the hive components (a flat screwdriver can be used in an emergency, but will damage the timber of your supers)

**To light the smoker** – First a small amount of fuel is lit and placed in the smoker. The bellows are gently pumped to keep the material burning. Gradually add more fuel, then increase the pumps on the bellows until a good fire is alight. The smoker can now be packed with fuel and the lid closed. When properly lit the smoker should give off clouds of smoke when the bellows are pumped.

### OBSERVE BUSHFIRE PRECAUTIONS

**Open the Hive** – When the smoker is properly alight and the protective clothing adjusted, move to the hive and stand to one side of the entrance. The following steps can now be taken to inspect the hive:-

- 1) Give three or four puffs of smoke into the entrance (for guard bees), aim the smoke at the bees. Remove the hive strap (if fitted), place the ends of the strap to the rear of the hive to avoid standing on or tripping over the strap
- 2) Prise open the lid on one side and puff smoke across the top of the frames, wait for about a minute
- 3) Remove the lid and mat (if any) and place them to the front of the hive, upside down, but not directly in front of the hive entrance. Remove any supers and stack them criss-cross on the upturned lid
- 4) Puff smoke across the frames and then prise the wall and second frames from the wall and its neighbours, crowd the balance of the frames. Carefully lift out the 2<sup>nd</sup> frame, vertically, trying not to roll or crush bees. This is safest for a full brood box, if there is space in the brood box just about any frame can be loosened and lifted out. This will come with experience
- 5) Inspect the frame and then lean it on its end bar against the opposite front corner of the hive. Progress across the box inspecting all frames, replacing them in the box in the same order as they were removed. When the last comb has been seen, replace the first comb in its position
- 6) Progressively inspect supers in the same manner, replacing them on the hive as you go
- 7) When the lid has been replaced, the inspection is complete

**Note:** Victorian practice recommends lid placement to the front of the hive

NSW practice recommends lid placement to the rear of the hive

The former is suggested here for the following reasons:

It provides an unobstructed passage for bees between the supers and the hive entrance

It provides more clear space around the hive for observers, clear of confused flying bees

Observers should not stand in front of the hive, in the flight path of the foraging bees, as this can aggravate the hive

Try both methods, experience will solve the problem

- 8) Do not use excessive smoke
- 9) Do not leave the hive open for long periods, consider about 15 minutes a maximum
- 10) Movements should be smooth and positive. Do not jerk or drop frames or knock boxes

In an inspection, check the frames and combs for breakages and damage, check brood for disease and presence of the queen (indicated by eggs and small larvae), check for fresh nectar and pollen and use them to evaluate the hive generally. Healthy brood at each larval stage is "C" shaped and is a pearly white with no blemishes or discolouration.

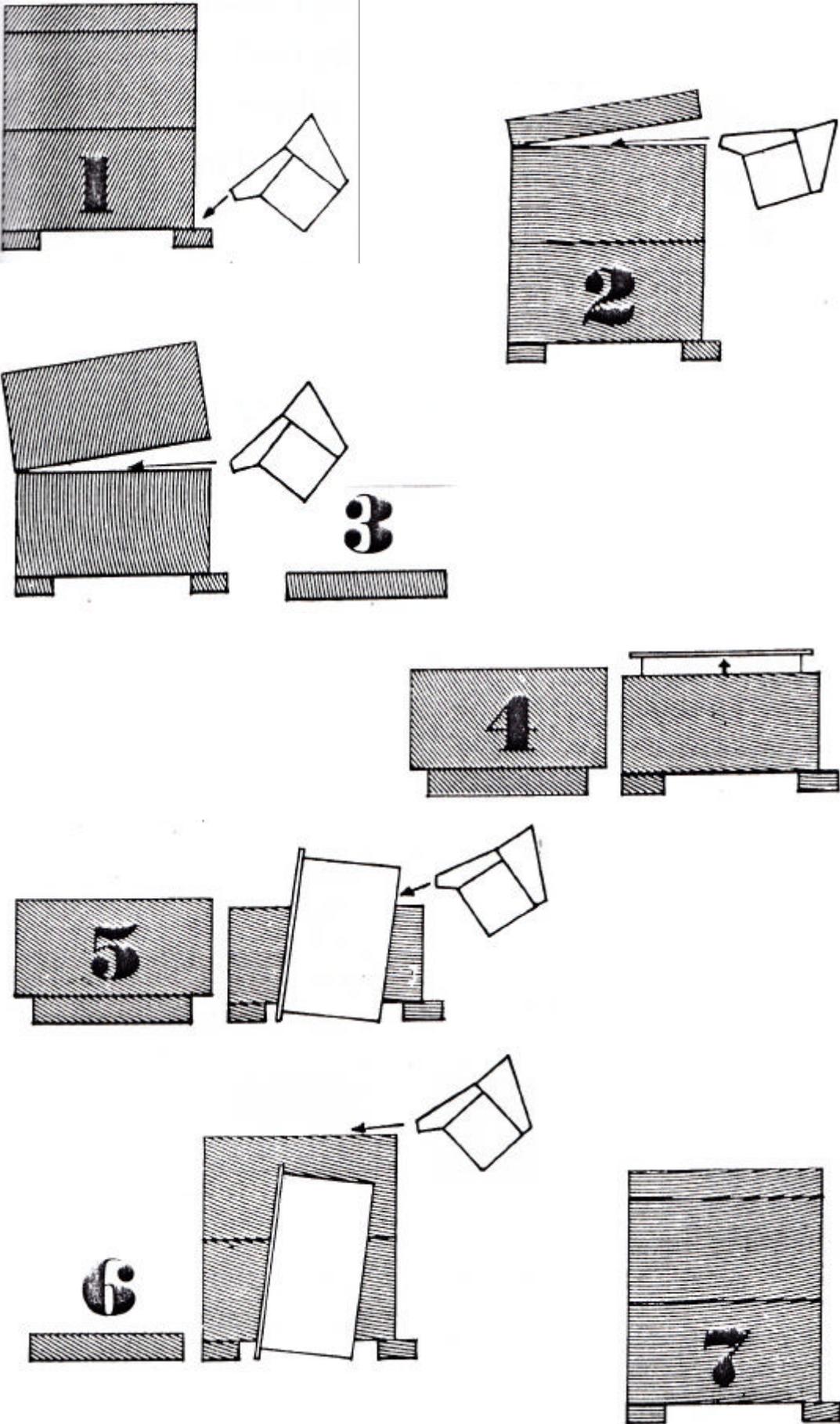
### **Observation & Performance Checklist:**

Name:

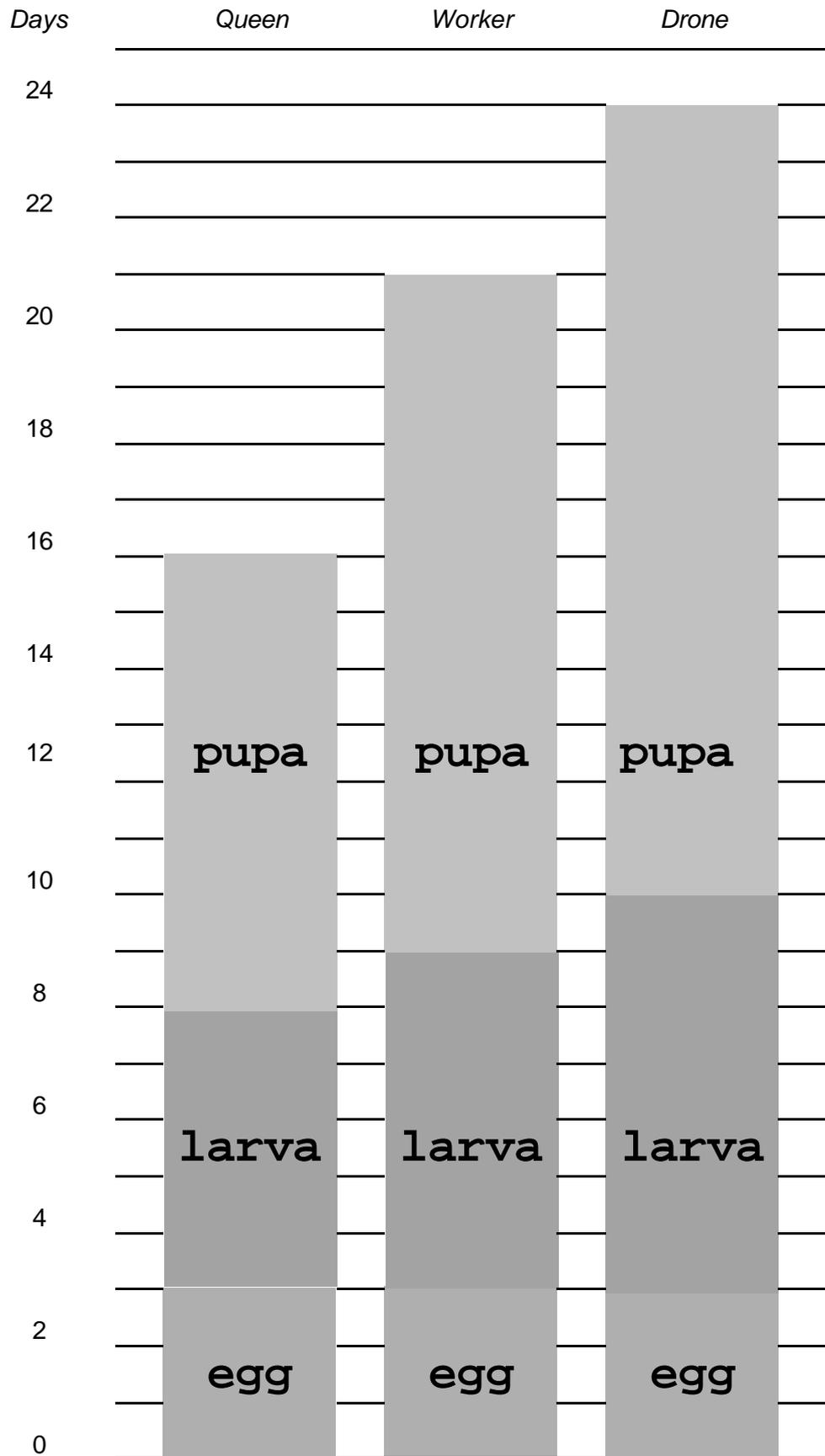
Tasks:

- 1) Don and adjust personal protection equipment (PPE) correctly
- 2) Light and check that smoker is operating correctly, use suitable fuel
- 3) Check hive vicinity for any OHS hazards
- 4) Approach hive correctly and smoke entrance
- 5) Undo hive strap and place safely
- 6) Use hive tool to raise lid and puff smoke under lid
- 7) Place hive components correctly
- 8) Use hive tool to loose and manipulate frames
- 9) Lift out frame of bees gently, firmly and safely, and place correctly so as to proceed to next frame
- 10) Identify correctly, the hive components, the composition and standard of the frame components, ie. Frame condition, foundation condition, brood condition, as required for the inspection
- 11) Correctly replace frames in hive (brood nest, honey super, queen excluder)
- 12) Correctly reassemble hive components
- 13) Maintain safe handling procedures to keep bees calm
- 14) Have OHS consideration of other participants around the hive

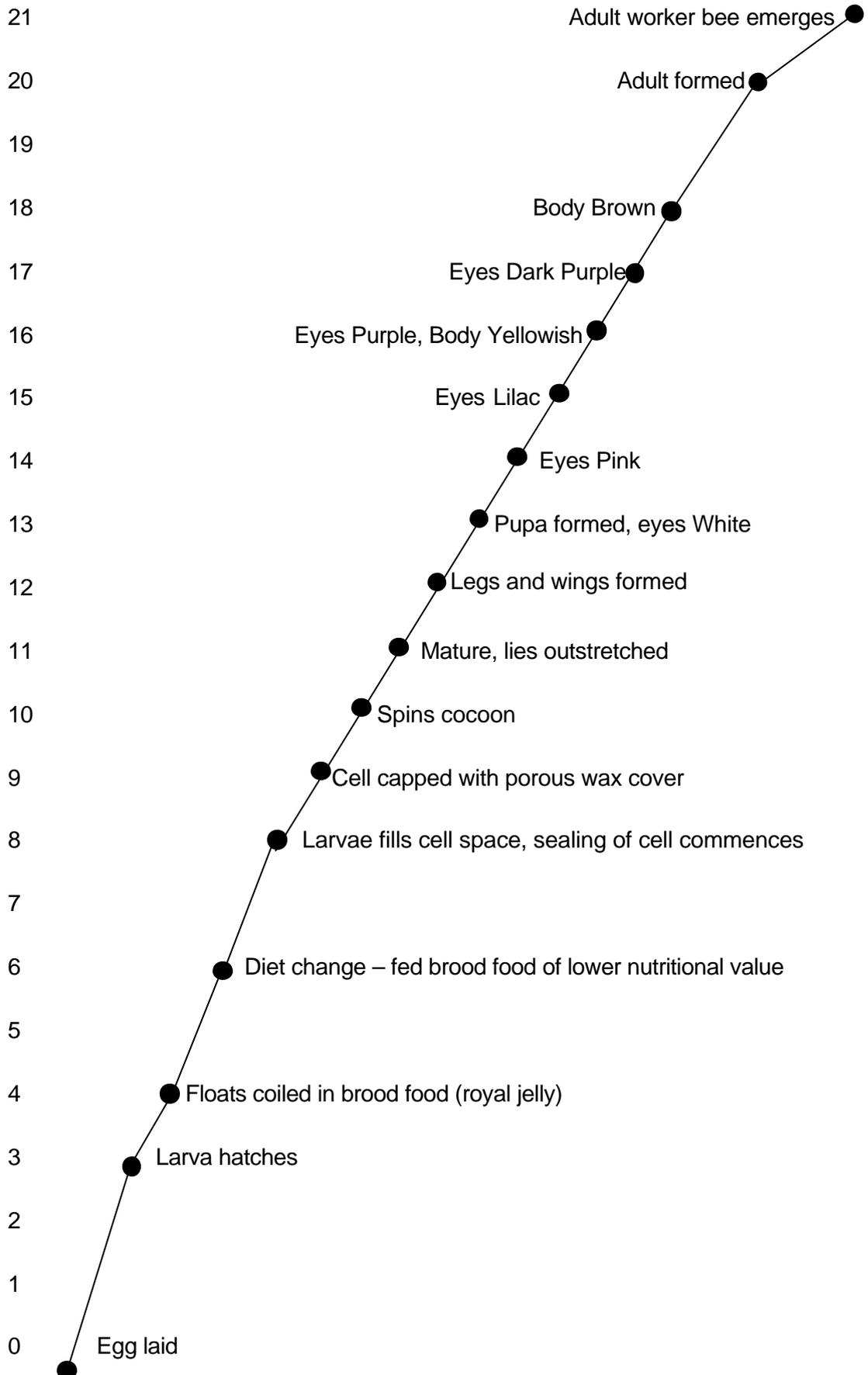
INSPECTING A COLONY



**Length of developmental stages of  
Queen, Worker and Drone  
by days**



### Development of Worker Bees by Days



## ASSEMBLY AND PROTECTING BEE BOXES AND FRAMES

Beehive equipment can be bought or homemade. The best homemade equipment can be almost equal to the factory made product. However, most homemade equipment falls far below factory quality. Unless the beginner has the correct tools, woodworking skills and a cheap supply of good quality timber, he is advised to use factory made equipment. Standard sizes are essential for interchangeability, for those intending to make or assemble their own. Better still purchase a complete hive unit and use it as a template to copy from. Whether factory or homemade, the equipment should be assembled correctly. Hand holds or cleats should be on the outside, pieces properly nailed together, and the finished job well painted.

**Boxes** - Nail all boxes both ways on the corners. Dovetailed boxes can be nailed through each lug of the box. Glue lap jointed boxes and also nail them both ways. All boxes should be preserved against dry rot. A commonly used preservative is copper naphthenate in a solution of equal parts, copper naphthenate, diesel & petrol, boxes are dipped or liberally painted. Boxes should be dried for at least two weeks before painting.

Two or three coats of good quality exterior paint, applied in accordance with the manufacturer's instructions, should be provide reasonable protection.

**Frames** - These are important as they support the internal structure of the beehive. The top bars require two nails and glue to prevent pulling from the end bars. Bottom bars require gluing and one nail. Wires should be tight (so they twang when plucked), the holes in the end frame bars should be protected with eyelets or staples to prevent the wires pulling through the timber and becoming loose. Frames do not need painting.

All nails used in softwood should be cement coated or equivalent type as sold by beekeeping suppliers. Use only proper bee frame wire. The wax foundation should be firmly fastened to the wires. Invert the frame and slip the foundation into place by weaving it through the wires. The top of the foundation should be firmly located in the groove of the top bar. The wires are embedded in the foundation using an electric embedder or a spur wheel embedder. An alternative to wax foundation is embossed plastic foundation, this is installed in accordance with the manufacturer's instructions.

Bottom boards can be made from any material such as tin, hardboard or timber, but must be well protected by painting as this is the first site of rot attack.

The best covering for lids is metal, as the lid is the weather shield of the hive. This is usually fixed over an insulated layer of masonite or similar, over a frame of similar dimensions to the super.

Hive closers are not essential but they do make the moving of hives easier.

Hive straps or fasteners are essential for moving hives and it is good practice to fit them to minimise accidental displacement of the supers.

In hot weather ensure that nucs or hives do not overheat by providing ventilation or move with open entrance at night.

## ACQUIRING BEES HIVES AND COMBS

One of the first problems confronting a prospective beekeeper is where to get the bees. There are several ways this can be achieved and will depend on how keen the person is to achieve his goal and also to a large extent where he lives and his finances.

**Buying hives** - The ideal is to buy a hive as a going concern, but this is probably the most expensive. It should be in good condition and meet the following criteria:

- ✧ Hive material sound and well assembled
- ✧ Combs, mostly worker comb, drawn on properly embedded foundation
- ✧ Colony is crowded with bees with plenty of brood and ample stores of pollen and honey

Dry rot and white ant damage are obvious flaws to look for, and there are less obvious evils which detract from the value of the hive. A close inspection may reveal that the combs are in poor condition, i.e. broken, full of holes, large sections of drone comb, dark heavy comb with very small cells following years of use. Damaged frames which would need to be replaced.

Have someone with a good knowledge of bee diseases, inspect the hive before purchase, unless the present owner is prepared to give you a certificate of disease free.

**Nucleus Colonies (nucs)** - A nucleus colony is a small hive holding only a few full depth frames. They are made up complete with honey, pollen, brood and enough bees, together with a laying queen. These are sold by some queen breeders and may be shipped round the state.

When a nuc is received, put it in the position the future hive is to occupy. When the bees have settled down, the entrance block can be removed and the bees released. The bees are left for a few days after which they can be transferred to a full sized hive.

When transferring to a hive, move the nuc to one side and stand the hive body in its place, lift the frames out of the nuc and place them in the hive, in the same order. Put a couple of extra frames in the hive to allow for expansion, after that add more frames as needed, i.e. before the bees start filling up the rest of the hive with their fixed combs.

**Package Bees** - These may be bought from some queen breeders and are treated similar to a nuc colony.

**Hiving a Swarm** - This can be a practical proposition provided you have the materials on hand at the time the swarm is available, i.e. a complete hive with some combs and foundation. It is not worthwhile if you have to put the swarm into any old box and then have to set about obtaining a proper hive and then transfer them at a later date.

If the swarm is hanging from the limb of a tree or where it can be reached from below, lift a hive body containing a few combs and some brood (if possible), underneath the swarm and shake or scrape the bees into the box. A short sharp knock that jars the limb is best. If the fall is short place the box on the ground or on some support and allow the bees to fall into the box. When the bees are observed going into the box put the lid on so that they will go in through the entrance. On dark or as required close the entrance and move the box to its hive position.

When the swarm settles away from the apiary and it is not practical to carry a bee box to the site, use any type of box or carton that will hold the bees. Often it is necessary to shake the bees into the makeshift box, leave it until dark, or until the bees have settled down and then take it home to the apiary. Allow a while for the bees to calm down after their ride home before trying to transfer them to a hive, otherwise they may take to the air again. Place the box containing the swarm in the position where the hive will stand. If it is late leave it stand overnight and hive it next morning. Place some frames of comb or

foundation into the hive body and simply pour the bees in. Give it a sharp knock on the corner and the bees will pour easier. When the bees are in the hive add the right number of frames to fill the box. A frame of brood from another box is a good guarantee against the swarm absconding.

If the swarm has settled on some flat object such as a fence post or trunk of a tree, get as many bees as possible into the box by scraping, then put the box down and let the rest fly in. If using an open box cover the top with something, leaving only a small opening for the bees to use as an entrance. Make sure that the box is much larger than the swarm of bees to prevent overheating.

Check the swarm for any signs of bee diseases six weeks after hiving.

Transferring a "feral" colony - Where a colony is established in an accessible position the colony can be transferred directly into a regulation hive. This should not be attempted by the inexperienced beekeeper or where the colony is located in a wall cavity or ceiling where the building may be damaged in the process.

Firstly, inspect the location of the colony to determine if it is feasible to remove it without causing damage. If it is, proceed to phase two.

Prepare a double regulation hive with six frames, i.e. two frames of brood (from another hive), two frames of pollen and honey and two of drawn comb or foundation. Place these in the bottom box, place a queen excluder on top and the empty super on top of this.

Secondly, expose the combs of the colony by removing any external covering. Cut the exposed combs out with a suitable long knife, shake or scrape adhering bees in front of the prepared hive. Put honey comb into a suitable bee proof container for later extraction. Place the brood comb (less bees) neatly, into the top box by leaning it on its edge, during this process examine the brood and comb for disease. When as many bees as possible have been shaken in front of the hive and all suitable brood comb has been placed in the top box. Close the hive. Nurse bees will come up through the excluder to look after the brood and the balance of the bees will be in the bottom box, together with the queen. After a few days check for the queen laying in the bottom box and add the balance of frames to fill the box. When brood in the top box has hatched, cull the comb and replace with frames. If all went well, you have a regular hive comprising bottom brood box and top honey super, re-queen as required. There are other methods which can be tried as one gains further experience in handling bees and bee behaviour.

If possible get to know an operating beekeeper and seek his advice.

Join a local bee club or association, which has regular meetings and instruction days. Good second hand equipment, hives of bees, nucs etc. may be available from time to time, at reasonable prices.

## ROBBING THE HIVE

When a hive of bees stores honey in excess of its needs, then the beekeeper can harvest the surplus. The novice should take the surplus honey only. Bees require stores for wintering and for times when no nectar is available.

Extract only mature honey. Bees cap the cells as the ripening is completed and unsealed honey has a high moisture content which will ferment. A good rule is to take only frames which have three quarters or more of their area capped.

**To Rob a Hive** - Combs of honey are taken from the hive, the bees are shaken or brushed off back into the hive. The combs of honey are placed in another box where they are covered and then taken for extraction. After extraction they are returned to the hive from which they came. Using a bee escape board is recommended as the hive is less disturbed when removing honey in backyards.

**To Extract Combs** - If an extractor is available, the combs are uncapped with a hot knife and then placed in the extractor baskets where the honey is spun out. The wax cappings and the adhering honey can then be squeezed and drained in a cheese cloth.

A simple method for one or two combs is to cut the comb out of the frame and squeeze the honey out (cheese cloth). If the wires are cut then the whole frame has to be rewired and new foundation added. A less destructive method is to scrape the comb back to the foundation with a sharpened spoon and squeeze the honey out, as above.

**To Clear Honey** - Extracted honey is placed in large containers where it is left to stand for a day or two. Pieces of wax, bees, air and froth rise to the top where they can be skimmed off and discarded.

**Note:** Cappings and skimmings from the honey must not be exposed to robber bees. If you want to feed it back to your bees then they can be placed in trays in an empty super above an active colony of bees, preferably late in the afternoon to prevent robbing.

Do not take too much - leave at least three frames of honey in a two deck hive

Do not rob brood frames - usually located in the bottom box

Do not rob unsealed honey.

## RE-QUEENING HIVES

The queen bee is the mother of all bees in the hive, so by replacing her, the whole hive can be changed. A queen may be either purchased from a queen breeder or, for more experienced beekeepers, is raised from their own reliable stock. Queens should be replaced every one to two years in order to maintain a desirable strain of bees. After re-queening the worker population is changed within six to eight weeks.

Hives are re-queened when the bees are on favourable conditions and are collecting good supplies of honey and pollen. Very weak hives or hives headed by a failing queen should be given a frame or two of sealed brood to ensure the re-queening is successful. Hives that have lost their queen and have developed laying workers are very difficult to re-queen and are best united with an active hive.

### **Finding the Queen is the most time consuming part of re-queening. A few tips are:-**

- ✧ In the early morning a queen is nearly always found in the centre of the brood nest
- ✧ A queen excluder over the bottom box simplifies the job by confining the queen to the one box. If there is no excluder and there is brood in two boxes, look for the old queen first in the bottom box, but do not replace the second box as she may run down
- ✧ When looking for queens use a minimum of smoke. As each comb is withdrawn, glance at the adjoining comb first, then examine the comb at hand
- ✧ Starting from the centre of the box is quicker than going from one side. Removing the centre frame in a crowded box is more likely to damage the queen. Working from the side across is safer and not much slower
- ✧ Very difficult queens can be found by shaking bees through the excluder
- ✧ If the colony is particularly vicious, move it a few feet and turn it around. Stand another hive in its place to catch the field bees. Only nurse bees will remain the next day and then the hive can be searched
- ✧ A spot of coloured lacquer on the thorax makes queens easier to find

**Introduction** - For the beginner, the use of cages is the best way to introduce queens. If a queen is bought then the mailing cage can be used. The old queen is killed when the new queen is on hand. Any obstructions are removed from the candy end of the cage and it is placed in the brood nest of the hive. The bees must have access to the gauze cover and the candy end of the cage

Very valuable queens should first be introduced to a small nucleus colony which when the queen has been released and is laying, can be united with the stronger colony to be re-queened. In this case the stronger colony should be made queenless the day before uniting.

## INCREASING THE NUMBER OF HIVES

Whether expanding operations or just replacing dead hives it is important to understand how to increase the number of hives. Artificial increase (using management techniques), is far safer and more reliable than haphazard swarm catching or expensive hive purchase.

**Dividing strong colonies** - The parent colony is moved to a new stand and an empty hive, containing combs or foundation, is put in its place. Find the queen and be certain which hive she is in. Three or four frames of brood and bees are taken from the parent colony and placed in the empty box. A laying queen can be introduced to the queen less half and the new hive will collect the field bees returning to the old site.

**Making up Nucleus Colonies (Nucs)** - A strong colony may be divided into a number of nucs, drawn from one or more hives. The procedure is to place in a hive body, or nuc box, a comb of honey, a comb of brood & pollen and an empty comb. The bees are shaken off two or three other frames of brood into the nuc and it is then moved at least 3k away. A queen may be introduced straight away or a queen cell may be introduced after two days. If it is not possible or convenient to move the nucs away, reasonable results can be usually obtained by placing the nucs on the other side of your yard and facing in the opposite direction. If a new queen or queen cell is not immediately available, provided the nuc is given brood containing eggs, there is a good chance the nuc will raise its own queen and can then be re-queened when available. This may be a slower process, but it can also get the nuc well started for you, in the right season.

Increase should only be made in the spring or early summer to allow the new hives time to build up prior to winter.

## SWARMING

Swarming is a seasonal problem which causes a heavy loss of field force and therefore a reduced honey crop. The problem – and it is a problem – is related to seasonal conditions, particularly those conditions encountered when plenty of thin nectar and pollen is available. The 'swarming season' varies from place to place but occurs around spring and summer.

### **Certain factors which promote swarming are described below:**

- ✧ Strain - Some strains are more prone to swarming than others
- ✧ Type of Hive - Small hives with restricted entrances, containing combs with large amounts of drone comb, bring about overcrowding which helps to cause swarming
- ✧ Queen - Colonies headed by older queens will swarm more readily than those headed by a young, vigorous queen
- ✧ Strength (number of bees) - This is the main factor in swarming, mainly through overcrowding and congestion of the brood nest
- ✧ Number of drones - Usually just before swarming the drone population increases. This is obviously to ensure the mating of new queens produced after swarming.

The first swarm is known as the prime swarm. This is the best swarm and contains the old queen from the colony. "After swarms" may issue after the prime swarm. These after swarms contain one or more virgin queens.

A third type of swarm is the "absconding swarm". This type is not related to the swarming season but occurs when conditions or disease bring a colony to desperate action. In this case all bees leave the colony and seek a more suitable home, hoping to fly into a better area. It very rarely works, as no queen cells are left behind.

Queen cells are raised before the swarm leaves the colony, these cells hatch out to provide a replacement queen for the colony. Swarm queen cells usually occur on the edge of brood combs. They are medium sized cells and numbers may vary from ten to twenty cells.

These queen cells are the beekeepers warning that swarming is inevitable. A number of precautions can be taken to minimise loss from swarming.

### **Control of Swarming**

- ✧ Breed from a non-swarming strain
- ✧ Provide good combs in the brood nest for the queen to lay in
- ✧ Add supers at the correct time to provide adequate room for expanding population, honey storage and nectar ripening
- ✧ Maintain young queens – re-queen regularly
- ✧ Relieve congestion of the brood nest by removal of two or three combs of brood and bees. Replace with foundation. A good opportunity to make up nucleus colonies
- ✧ Regularly extract honey – avoids congestion
- ✧ Break down swarm cells but only as a last resort
- ✧ Move bees to a heavy honey flow.

## PROBLEMS

**Weak Colonies** - It is good management to have all colonies as even in strength as possible for a honey flow. This gives a greater total production than if a few hives are strong and the rest weak. Strong colonies can usually spare bees and brood to assist the weaker ones.

**The first step is to determine the cause of weakness:**

- ✧ If it is because of an inferior queen – replace her
- ✧ If the cause is a food shortage – feed sugar syrup
- ✧ Dead Colony – check the brood combs for evidence as to the possible cause
- ✧ If disease is suspected – have it diagnosed and take the appropriate action.

**Build-up** - Can be accomplished by adding combs of emerging brood and young bees. The bees from one frame of brood will cover about three frames when they emerge. When adding bees and brood give a few good puffs of smoke to allow the new bees to intermingle with the others, a frame can be added every few days until the colony fills a brood chamber.

An alternative to adding brood and bees is:

**Brood Spreading** - This consists of placing a good empty comb in the brood nest. The queen lays eggs in the comb, thereby increasing the size of the brood nest. Chilled brood may result if brood is spread further than the bees can cover or if brood spreading is commenced too early.

It is sound management to build up medium strength colonies first, then later attend to the very weak colonies. Very weak colonies or those with laying workers, are best united with other colonies, restocking the brood box with an active nuc at a later date.

**Winter Feeding** - The essentials of bee nutrition are honey (or nectar), pollen and water. Sometimes, during drought or when regular flora fails, hives are caught with insufficient stores to carry on normal activity. If this happens the bees might need a food supplement.

Often it is economical to move hives to a more suitable area. Alternatively it may be possible to distribute stores from hives with surplus. If stores are distributed, care must be taken to prevent the spread of disease.

If it is not possible to move the hives or to equalise stores, then feeding sugar syrup becomes the most satisfactory method of feeding. Whilst honey is the bees natural food, its aroma tends to over excite them and may encourage robbing.

**Sugar** - White cane sugar (sucrose) is an ideal substitute for honey when feeding bees. The sugar is usually fed as a syrup and in this form it is very easy to handle. The best syrup is two parts (by volume) of sugar to one part of hot water, allow the syrup to cool before giving it to the bees. Other mixtures can be used for special stimulative feeding.

**Types of Feeders** - Special feeders are available from beegoods suppliers and these have particular advantages in various situations. A simple “pepper” tin feeder can be made by punching a series of small holes in the lid of a lever topped tin, e.g. Milo tin or similar. The tin is filled with syrup and the lid pressed on firmly. The tin is inverted and placed on two thin slats of wood on top of the frames above the brood nest. Provided the feeder is kept level, the syrup will not run out and is accessible by the bees. Any empty super is ideal as the hive can be closed off with the normal lid. Syrup will be quickly removed from the feeder and stores in combs. Remove any syrup still left in the tin after a few days otherwise it will ferment. The quantity may have been too large for the size of the colony. Hives too weak to remove syrup quickly, should be fed by mothering. This involves feeding strong hives and distributing combs of stored syrup to the weak hives.

### Points to Remember:

- ✧ Check all hives in the autumn to ensure that they have adequate stores. If they require artificial feeding do so before winter
- ✧ The requirements for winter may not be as great as for early brood rearing in spring
- ✧ American Foul Brood Disease can be spread in honey. Spores of the bacteria can survive in honey for 30 years or more. If feeding honey make sure you know its origin
- ✧ Feeding syrups to bees in the open is not recommended, and the feeding of honey in the open is against the law.

**Pollen** - Is the protein for the bees diet and there is no satisfactory substitute. Pollen may be trapped in times of abundance and stored for use in times of short supply but such practices are limited to queen rearing and for inclusion in pollen supplements.

**Water** - Water is essential for efficient hive operation. Water is used by the bees for preparing brood food and for temperature control in the brood nest. One hive can use up to a litre of water per day during very hot weather. In arid areas bees should be located close to a permanent water supply. Where this is not available water must be supplied by the apiarist. Open drums and tanks provided with floats for the bees to alight on, are quite suitable if the water is kept cool and fresh.

**Wax Moth** - Wax moth (*Galleria mellonella*) is a threat to the beekeeper's valuable combs. To the novice, the damage can be heartbreaking, but this need not be. Wax moth can be controlled by the competent beekeeper.

The life-cycle begins when adult moths find combs and start laying eggs, larvae soon hatch and begin tunnelling through the comb, feeding on pollen, honey and residues from brood rearing. Gradually they form a mass of webbing from which they tunnel searching for more food. Finally the fat larvae make their way to a suitable position where they chew into timber, partially burying themselves, before spinning a cocoon and pupating. The entire cycle from adult to new adult may be as short as six weeks in warm weather but is longer under cool conditions.

Moths will not normally enter a hive occupied by a strong colony and bees will expel any stray larvae that they find. Weak colonies, however sometimes fail to guard the entire hive and the moths gain a foothold in the extremities. As moths take over, the colony will abscond, sometimes giving the impression that the colony has been killed by moth infestation.

Weak colonies of bees are best protected by compacting the hive to an area easily covered by the bees. Surplus combs and boxes must be removed and the entrance reduced in size to allow better guarding. If you have only a few hives regular inspection of the hive extremities and removal and killing of any wax moth larvae present will keep them under control until the colony can fully protect itself.

Stored combs pose a different problem, small numbers can be looked after by strong colonies, but large numbers have to be protected by artificial means.

Only store good combs. Old heavy, dark or broken combs are an unnecessary strain on facilities and should be culled, cleaned, repaired and foundation replaced. The selected combs can now be preserved by fumigation in a closed chamber, which may be a closed room, a tank or a stack of boxes. One fumigant is approved for use but it must be remembered that it is poisonous and must be applied strictly in accordance with the manufacturer's instructions.

Fumigation is of little use where heavy infestation has already occurred. The comb structure has been broken down, and the webbing will impair bee movement and the strength of the frames will be weakened by pupal trenches. Destroy heavily infested frames and replace with new material.

To reduce the incidence of moths around the apiary, general tidiness is a good rule. Remove pieces of burr comb, broken frames, and "dead out" hives from the apiary. The

competent apiarist with good bees, well stored combs and a clean apiary has little to fear from wax moth.

**Small Hive Beetle (*aethina tumida*)** - This is the latest scourge introduced into the Australian apiary field. The SHB is native to South Africa and it has spread to most beekeeping countries, where it can be a serious pest, worse than wax moth. The adult beetle which is the stage most readily seen, is black or dark brown, ovoid in outline and 3 to 6 mm long. There is some variation in size, depending on how well they have been fed, but it may be recognised by its clearly clubbed antennae and short wing cases. The adults lay small elongated whitish eggs in clumps, in bee hives. The eggs are smaller than honey bee eggs but similar in shape and colour. It is the larvae that do the damage in bee hives. They are very aggressive and feed on bee brood and honey and their excrement (slime), contaminates the honey and hive, causing fermentation. The larvae are 6 to 10mm long, cigar shaped and pale whitish cream. Their most distinctive feature, as distinct from wax moth larvae, is the presence of two rows of short spines along the back with the last two projecting beyond the rear of the larvae. When fully grown the larvae enter the soil around the hive and pupate. Emergent beetles are pale yellowish brown at first but darken quickly and fly readily. They are attracted to light. They do not like smoke from a smoker and when present can be seen at the top edge of the super trying to get out of the smoke. They may also be seen under the lid and they drop off the bottom of removed supers on to the upturned lid, when these have been smoked and removed from the hive. They can live and survive in stored hive materials, therefore similar storage techniques are needed, same as for wax moth control. Strong hives can keep the SHB under control but weak hives will die or abscond. Regular inspections and killing of any beetles or larvae found will minimize any damage. "Slimed" combs can be washed in water and will be accepted by the bees for reuse, provided they are not too badly damaged.

Investigations for further controls are currently on-going, for further information refer to the appropriate 'Agnote' by the Department of Primary Industry.

**DISEASE** - Understanding diseases of bees is an aspect of beekeeping that is overlooked by many beginners. Disease can wipe out your apiary of a few hives very quickly, if it is not controlled properly. REMEMBER get help if you do not know how to treat diseases.

### **Diseases of Brood**

**American Foul Brood (*Paenibacillus larvae*)** disease (AFB), is the most destructive disease of bees and the most difficult to control. Outbreaks have been widespread in the past.

A special feature of *Paenibacillus larvae*, the bacterium which causes this disease, is that it produces resting bodies called spores which are very resistant to sunlight, heat, drying, freezing, common disinfectants, and the germicidal action of honey. Some of these spores have been observed to remain alive in old comb for many years. It is the toughness of the spores which make the disease so difficult to control. The organism is harmless to man, and the bee is its only known host.

Bee larvae become infected by eating spore-laden food. These spores germinate and multiply, eventually killing the larvae. After death a typical decay sets in but even then only bacillus larvae are present. Death of the larvae occurs only after the larvae are extended along the floor of the brood cell.

### **Field Symptoms**

- ☆ Sunken, discoloured or perforate cappings, perhaps intermingled with healthy cells, giving a mottled appearance to the comb
- ☆ Mainly sealed cells affected, except in advanced stages where unsealed brood may also be affected.

- ✧ Recently killed larvae will be yellowish, changing to coffee-and-milk brown and dark brown.
- ✧ Remains of dead larvae will be moist and characteristically ropey, i.e. will draw out into a thread from a match into the cell and removed. They eventually dry out and are called scales. These scales lie flat and stick tightly to the lower side of the cell
- ✧ In very advanced cases a foul odour may occur
- ✧ This is a NOTIFIABLE disease and it must be reported to the Department of Agriculture immediately. See appropriate FIELD DIAGNOSIS GUIDE issued by the Department on bee diseases, their notification, recognition and controls.

**European Foul Brood Disease (EFB)** - *Streptococcus pluton*, sometimes together with *Bacterium eurydyce*, these organisms cause the disease but are soon taken over by *Bacillus alvei* a putrefying bacteria, which gives the disease its foul smell.

### **Symptoms**

- ✧ Larvae become restless, wandering about inside the cell. Consequently when they die at about 4 days old, they are found in unnatural attitudes – often across the mouth of cells or twisted spirally or stretched along the base of cells
- ✧ Larvae collapse, as though melted, turning yellowish brown with a brown spot. Eventually they dry out to form a loosely attached brown scale
- ✧ Consistency of recently dead larvae varies – often it is sticky or porridge like but not ropey
- ✧ Smell of infected brood varies from sour to foul, depending on which putrefying organism is present.

**Control** - EFB is a disease caused by a specific organism and in very serious cases the hive is best destroyed. However in most situations in NSW the disease has not reach serious proportions and hives respond rapidly to proper treatment.

Provided that all possibility of AFB has been ruled out, the hive should be re-queened and boosted by the addition of some vigorous young bees from a strong hive. Alternatively the infected colony can be united with a vigorous colony and all trace of EFB will disappear within a week or so.

In either course of action it is essential to keep a close watch on these hives for signs of further trouble. Keep this up for at least two months. Make sure no equipment is interchanged or taken to another apiary.

- ✧ See appropriate FIELD DIAGNOSIS GUIDE issued by the Department on bee diseases, their notification, recognition and controls.

**Sac Brood** - Is a disease caused by a virus. Positive laboratory diagnosis is difficult as the virus is extremely small. The virus does not live on hive material and depends on living bees for survival and occurs most frequently in spring, particularly in bees off winter honey flows. A similar condition is caused by unsuitable pollens, notably from northern NSW, although it has not been positively identified as such.

### **Symptoms**

- ✧ Infected comb has a mottled appearance with sunken and perforated cappings. The perforations being made by the bees inspecting abnormal cells
- ✧ Death usually occurs after the cells have been sealed. The name of the disease is derived from the fact that affected larvae form a swollen sac with a tough skin containing grey granulated material in a watery fluid
- ✧ Affected larvae are yellow or greyish and later darken to black

✧ The scale is broad and flat and lies on the lower side of the cell. The head end is turned up, giving a boat-like appearance. Scales are easily removed.

**Control** - The bees usually recover without treatment. In bad cases, destroy combs and re-queen the colony. If dietary sac brood is suspected, move the bees to a more suitable area.

**Chalk Brood** - Is similar to sac brood, except that both sealed and unsealed brood is affected. The affected larvae are usually fluffy in the early stages and swollen to the full dimensions of the cell. The mummies are generally chalky white, hence its name, but can be grey-black. The mummies are dry and loose in the cell.

**Control** - The bees usually recover without treatment as conditions improve. In bad cases destroy combs and re-queen the colony.

**Diseases of Adult Bees** - Unlike brood diseases, all adult bee diseases look alike in the field. Fortunately they are not as serious as the principal brood diseases and positive diagnosis is not as necessary.

**Nosema disease** - This is the worst of adult bee diseases, causing considerable economic losses. It is prevalent in bees working late autumn and winter honey flows. It mainly occurs when thin nectar and cool damp weather make honey ripening difficult.

The organism *Nosema Apis*, is the cause of the disease and it attacks the intestine of the bee. Spores are formed and these are passed in the faeces, contaminating water supplies and combs.

### **Symptoms**

- ✧ Rapid reduction in colony population with an accumulation of dead and dying bees at the entrance to the hive
- ✧ Individual bees lose the power to fly, and crawl on the ground. Their rear wings may be unhooked from the front ones and carried at unusual angles.
- ✧ The bees look sick, with swollen greasy abdomens
- ✧ Intestines of sick bees are a dull greyish white
- ✧ Dysentery, shown by spotting on the hive and lid, often accompanies serious cases of the disease.

**Control** - The disease is infectious and hygiene in the apiary, particularly with tools and water supplies, is important. Avoid cold, damp situations for the hives and remove any stagnant water that the bees may be using.

Move infected colonies to a favourable breeding area in a warm district or a warm area with minimal shade. If the problem persists re-queen the hive.

**Paralysis** - This term is used to describe a number of diseases, the most common of which is an hereditary weakness.

### **Symptoms**

- ✧ Sick bees that tremble with a weak movement and are weak in the hind legs.
- ✧ Dead bees at the hive entrance
- ✧ Sick bees have a shiny or greasy appearance and sometime the abdomen is smaller.

**Control** - Feeding warm sugar syrup may temporarily check the disease but the permanent answer is re-queening with vigorous queens of a good strain.

Refer to appropriate 'Agnote' by the Department for further information.

## LEARNING MORE ABOUT BEES

Currently the avenues for learning beekeeping are somewhat limited and they vary considerably in suitability and cost. Information is available in libraries and over the internet. However this is of doubtful benefit without practical experience from experienced people. The best approach is a combination of practical work and constant reference to the theory, for a complete understanding.

Possibly the best first contact for an absolute novice is with a Bee Club or Association in this way some knowledge and experience can be gained without major expense. A reasoned decision can then be made as to whether or not you wish to continue with beekeeping.

A complete list of apiarists Associations and Clubs is published monthly in The Australasian Beekeeper magazine, published by Pender Beegoods Pty Ltd, 2 Hunter Street, Maitland, 2320.

### Further Reading

1. Beekeeping by Department of Agriculture – Victoria – Editor Russel Goodman, 7<sup>th</sup> Edition 1991
2. The Bee Book, Beekeeping in Australia, second edition by Peter Warhurst & Roger Goebel, published by Queensland Department of Primary Industry Fisheries, 2005.
3. The ABC and XYZ of Beeculture, by A I Root & Co, Medina, USA, latest edition
4. The Hive & The Honeybee, by Dadant & Sons, Illinois, USA, latest edition
5. Books on Australian Honey Flora
6. Other Beekeeping books and Beekeeping subjects and periodicals
7. Information Notes published by the Department of Primary Industries

### DISCLAIMER

ABA Hunter Valley Branch

The information contained in this publication is based on knowledge and understanding at the time of writing (December 2005). However because of advances in knowledge and changes in regulations, users are reminded of the need to ensure that information upon which they rely is up to date and to check the currency of information with the appropriate officers of the NSW Department of Primary Industries or the users independent adviser.

**BETTER APICULTURE THROUGH KNOWLEDGE**