



# **Wisborough Green Beekeepers Association**

*A division of West Sussex Beekeepers Association*



## **Basic Beekeeping**

An Introductory Guide for Potential and new Beekeepers

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# **Basic Beekeeping**

## **1 A NOTE FROM THE AUTHOR.....**

### **1.1 Introduction**

These notes were originally intended to be part of a beginner's pack that included bees and a hive for members of the Wisborough Green Beekeepers Association. In writing them, it has become obvious that for reasons of explanation the content has gone to a higher level. They are written because I believe there is very little available about beekeeping on a basic level that is easily understood. I feel that many authors make the mistake of trying to cover too much and describe several ways of achieving the same thing, some of which are quite complicated and confusing. They often include all sorts of equipment and gadgets, most of which aren't needed.

Beekeeping is very simple and providing you understand a few important details that I call the "basics", then most things fall into place. I will mention the "basics" and their importance several times. The repetition is really a reminder of their value when trying to understand a technique or problem. Unfortunately, there is an awful lot of twaddle both written and spoken about bees and beekeeping, often by inexperienced people, who simply recycle it from elsewhere, without experiencing it themselves. Quite often, there is contradiction and unnecessary complication too. This is unhelpful to beginners, who obviously don't know what to believe. "Advice" and "information" can be readily obtained from the internet, but be careful, as what is appropriate elsewhere in the world may be poor advice for you in your conditions. It is easy for beginners to think that because the same may be seen in many places, it is correct for you, but it may not be. Beekeepers don't often seem to understand that we are dealing with biology, which can be unpredictable for such reasons as the weather. For that simple reason, some of the rigid teaching needs to be treated with caution. If you progress well in the craft, you will soon gain enough experience to challenge what you are told. Good beekeepers observe what the bees are telling them, not what the book or video says they should be doing. The best teachers of beekeeping have six legs and four wings. Until you are doing well on your own, I strongly suggest taking advice from long standing practical beekeepers. How does the beginner know how good they are? Have a chat to them and look at their bees. If their kit is pristine, without much sign of wear, they are probably new to the craft, but if their kit is older, though well maintained, their hives have roughly the same number of supers on (taking into account smaller colonies building up) and raise their own queens from their own stock, you can be reasonably sure their help and advice will be sound. I hope I haven't given the impression that all advice is suspect. It isn't, but enough is for me to advise caution. There is plenty that's good, but you know the old saying about wheat and chaff.

These notes are written with the beginner in mind, but I hope there is information that will be useful to all. Since the first issue in 2006, many beekeepers have told me they still refer to it. Before I go much further perhaps it might be worth looking at the word "beginner". I looked it up in a dictionary and found this description "A person just beginning to learn a skill etc". Well, I am not sure the use in beekeeping terms is correct, because there are so many skills involved and we are all learning. I have seen many people who have only been keeping bees a short time who are far more knowledgeable, and better handlers of bees than others who have kept bees for very much longer, so who is the beginner? Perhaps we ought to take the dividing line as someone who has enough knowledge and ability to understand the workings of a colony and can handle their bees on their own, but bearing in mind that occasionally we all need help and guidance. Up to that point and for the purposes of these notes we will call them a beginner. New beekeepers are often called "novices", but the dictionary suggests that doesn't really apply either!

I am a practical person and some of what I have written will not be found in books, some might even be seen as controversial by those who rigidly follow mainstream thinking. It has been gleaned from over 50 years experience of managing my own bees - 130 colonies for about 15 years at one time. I have travelled widely, handled bees and spoken to many beekeepers, picking up many hints and tips. I will not pretend that any ideas are entirely mine, as some may well be adapted from those of other people. One of the good things about our craft is that providing you know what the outcome is likely to be, you can modify almost anything to suit yourself.

These 'Basic Beekeeping' notes reflect some of my methods, although in some areas I have modified them or suggested alternatives if I think that will suit others better. They should be read as a whole, as in some places there is a natural progression. They may be modified or added to from time to time, because I am still learning, and things do change, so make sure you have the latest version.

My approach to most things is "Keep it simple". I try to do things right first time, but in a way where I have several options if things go wrong, and in beekeeping they often do. On many occasions I have had two similar colonies that I have done the same thing to, but at the next inspection they have reacted very differently. With a little experience and understanding these problems can often be easily overcome.

I was brought up in the age of "Make do and mend". Why pay for an expensive catalogue item that you may use once a year, when you can improvise and achieve the same result for little or no cost? For that reason, in some areas I have suggested a DIY approach, but I do understand there are others who are not that way inclined and would prefer to purchase.

I have been demonstrating for many years at the Wisborough Green BKA apiary and elsewhere, to a variety of people, varying from non-beekeepers who have never seen inside a hive before, to very experienced beekeepers. This has taught me many things, including the sort of information people need, and the questions they usually ask in order to get started. I have also learnt that some out-and-out beginners have a natural talent for handling bees, and yet some "experienced" beekeepers – lets say those of more than 5 years experience - do not know basic things such as the life cycle of the three castes, or the recognition of common diseases and are often not very gentle when handling bees.

It seems to be felt by many that bees think like humans, but of course they don't. Little is known of their thinking and communicating those thoughts, but you must realize that what might seem obvious to you is not to them, this is why we should work with their natural instincts for our mutual benefit.

It is important to know and understand what I call 'the basics' for greater success and enjoyment of this rewarding craft. It is hoped these notes will help everybody to understand their bees better, which should help in managing and caring for them. They should be seen simply as guidance notes to help the non-beekeeper and the beginner understand honey bees. It isn't intended to be a reference source. My book "*Beekeeping - A Practical Guide*", will provide enough information to allow you to understand and manage bees. Be aware there is another book with a similar title though.

Beekeeping is an outdoor activity of a practical nature. There may be hazards in some apiaries and it must be remembered that honey bees may sting, especially if provoked. The reader must therefore be careful at all times and consider any possible risks before doing something. The information contained in this document is only intended to give a brief outline of what is involved in the craft of beekeeping. It is not intended to be for reference, therefore some important elements may not be included. For enough information to perform a particular task, I suggest consulting more comprehensive sources. Joining a Beekeeping Association should help in this respect.

## **1.2 My approach to teaching**

My approach is to encourage people to quickly learn a few simple facts I think are necessary in order to manage a colony, and to show them how I handle bees. This should give them a good grounding from which they can progress to whatever level they wish.

When demonstrating, I try to encourage people by letting them open hives in a relaxed atmosphere, where I can point out things they might not notice when working with their own bees. I find it amazing how quickly some people become competent, and I think this is made easier by being involved in a group situation with several beginners, especially if they are all at the same level, together with experienced people to help and advise - just one of the benefits of an Association teaching apiary.

I am largely self taught at most things I do, and throughout my life I have learnt mainly by observation and making mistakes, with a bit of lateral thinking, rather than from books. This is probably why I am unorthodox and sometimes question established practices. My ways are not necessarily the best, and may well be frowned upon by some, but they are based on logic, are simple and they work for me. The welfare of bees, that are classified as food producing animals is important. I thoroughly enjoy my beekeeping and want others to as well. In my view beekeeping should be fun.

## **1.3 What makes a good beekeeper?**

Beekeepers take up beekeeping for several reasons, from the person who wants to keep a few colonies of bees as a hobby to provide a few jars of honey for their family and friends, through to those who treat beekeeping as

an academic subject including exams and qualifications. For those who wish to take examinations the British Beekeepers Association (BBKA) have several based on a modular system starting at a basic level. I am not an “exam” type person, but I think the studying would be beneficial to some. I believe one of the roles of a BKA is to help and encourage everybody however far they wish to go, and how they wish to do it.

Some keen beginners get gripped by “Bee Fever”. This can be expensive and if it gets out of control can be a nuisance to others. I suppose I have been there myself as I put 24 colonies into my second winter! I can’t remember how many made the spring, but losses were high, probably in excess of 50%. Far better to ‘start small’, become competent and confident before increasing your stock. It is easy to increase from your own colonies, or by acquiring swarms. The cost is very much less than buying bees, you learn more, and it is much more satisfying.

Beekeepers have to be fairly practical, able to learn – both from other people and their own mistakes and be open-minded to accept new ideas and relevant research. Managing a colony of bees involves lots of detective work – learning basics and applying them to whatever you find when you lift the hive roof off. The ability to think on your feet is essential ! When I started there were many “Let Alone” beekeepers, who put the supers on in spring, took them off in August, fed the colony and that was it. For a variety of reasons, the modern beekeeper can’t do that, otherwise they will soon be without bees, so they must be far better and much more knowledgeable than beekeepers were in the past.

### **In time, experience will give you the ability to.....**

- handle bees confidently and gently and know when to use the smoker,
- understand the workings of the colony,
- “read” a colony and judge its requirements in advance,
- readily identify pests and diseases and know how to deal with them,
- recognise good and bad bees, and be able and willing to improve the bad ones,
- detect duff information. There is unfortunately a lot in beekeeping!
- be open-minded to new research, sift out what is relevant, and apply it to your own beekeeping,

Beekeepers must also be able to tolerate some discomfort – no-one escapes the odd sting! However, with well cared-for, good natured bees and gentle handling, these occasions can be kept to a minimum.

When all these have been achieved, I consider you will be on the way to becoming a “Good Beekeeper” .

### **1.4 What do you need to know?**

- Learn the **life cycle of the three castes**. See the chart below. When you have learnt this try to estimate the age of larvae, it is surprising how often you will need to know.
- Learn to **recognise healthy brood**. This will help you spot a problem. Chalk brood is common, so identification is simple. Study photographs of both Foul Broods.
- Understand what happens in a colony when it is preparing to **swarm**.
- Practice **finding an unmarked queen**. There are many times when you will need to know where your queen is. Later you can learn how to mark her, so you know if the bees have replaced her and clip her wings to help with controlling swarming.
- **Make sure you can see eggs and young larvae**. This is very important and is much easier in good light. Hold a frame up with the sun shining over your shoulder into the bottom of the cells. If you have an eyesight problem, don’t just accept you can’t see very well, use a magnification aid.
- **Be aware of the role of pheromones**. You don’t have to know any detail, only that a pheromone is a chemical stimulus that influences the behaviour of another member of the same species.

Learning the above, that I call the “basics”, is in my view the minimum required to be able to manage your own bees without help. They are factual, simple, and will help the beginner develop their knowledge and skills, so they can become a competent and responsible beekeeper. You should aim to learn all of these within your first full season.

### 1.4.1 Honey bee Life Cycles

	Queen	Worker	Drone
Hatches into larva	3	3	3
Cell sealed	(8) 9	9	9 (10)
Emerges	(15) 16	21	24

The above is in days. Assume the egg is laid on day 0. The brackets are variations that are quite common, and allowances should be made in the case of the queen, as the sealing of the first cell is a signal for a swarm to depart. Occasionally bees have the ability to vary these somewhat. The drone is not so important to learn as the queen and workers are.

## 1.5 How do you learn?

There are many ways to learn and this is an ongoing process that never stops. There is research being done all the time and weather conditions vary, meaning we have to tweak our knowledge in response. The learning of the "basics" is absolutely essential, and will help you develop your own methods, as well as understand others. It is sensible to join a Beekeeping Association (BKA), where you should meet people of all abilities and be able to borrow items from the library if they have one. It is at a local level where the vast majority of teaching is done.

The selection of a Beekeeping Association needs serious thought. From a beginner's point of view, it's easy to think they are all the same, but this is not always the case. They are all amateur organisations with their own characters. BKAs usually reflect the abilities and personalities of the key people at the time, consequently some are very good, having well organised programmes with a high standard of tuition, others may have poorly organised events, if any at all. Some will have a teaching apiary, others won't, where any practical demonstrations may rely on visits to members, or none at all. I suggest the best thing to do before getting too involved with your nearest BKA is to research all those within a sensible distance from your home that you are prepared to travel to on a regular basis and visit each one. By a process of elimination you should find the one that suits you best. As a guide a good BKA will have:-

- An informative and up to date website.
- Details of contacts will be easy to find and accessible.
- Events that are relevant to all abilities and well planned.
- A library that is well stocked with good sound books.
- Teaching facilities with several good Demonstrators and ample colonies of good tempered bees.
- A lively, welcoming and vibrant membership.
- A regular newsletter or other means of informing the membership.
- Some facility for helping beginners.
- Lively and competent Officers and Committee.
- A good mix of beekeeping abilities within the membership.

There are many sayings in beekeeping, one of which is the number of opinions given being roughly equal to the number of beekeepers asked. In reality, there is often a significant multiplication factor too! What the beginner needs to be aware of is that some methods suit different conditions and/or the different types of bees that are kept. Your source of information may not always tell you that. A simple example is that someone may fairly forcefully tell you the best type of hive to have, but won't tell you it is relevant to your management system or the prolificacy of the queen in the colony, if indeed they know in the first place. The further you get in beekeeping the more you will be selective on who to seek guidance from.

At the end of the day, I firmly believe the best way to learn beekeeping is to understand the "basics", then get your head stuck into as many hives of bees as you can. You won't learn very much from a book or online videos.

Different people learn in different ways and the common ones are:-

### 1.5.1 Books

Reading is probably the first thing most potential beekeepers will do. Unfortunately, many books have been written by people who have not had many colonies or the opportunity to give a decent trial to different methods, therefore don't have much beekeeping experience. One writer I can think of didn't even keep bees! Many simply copy mistakes that have been made by previous authors. The problem then is someone reads the same thing in

several places, so assumes it is correct. Many books are good at telling you what to do, but they aren't very good at giving you advice on how to overcome problems their advice gave you.

It is confusing from a beginner's point of view being confronted with a lot of information, much of it contradictory, and very often without sensible or rational explanation. What does the poor beginner believe? For that reason, I suggest a small selection of reliable books:-

**"Bees at the Bottom of the Garden"** by Alan Campion can be read in an evening. This is an excellent starter book that will suit the non beekeeper and beginner up to one season's experience or more.

**"Better Beginnings for Beekeepers"** by Adrian Waring is slightly more advanced, but still suitable for all beekeepers. I still read this myself. As of 2020 it is out of print, but well worth acquiring if you can.

**"Beekeeping. A Practical Guide"** by Roger Patterson. Yes, you guessed right, I wrote it, so I would recommend it wouldn't I? This was written to cover the needs of the beginner for the first few years of beekeeping, but I have had many experienced beekeepers tell me they have got a lot of good information from it. Although suitable for the non-beekeeper, it is in greater depth than the previous two. Throughout I have only given one method of doing things, which avoids confusion. There is another book by the same title, so be careful.

All the above are well written by very experienced beekeepers and are easy to understand. There are not a lot of drawings and photographs in any of them, but the text is so good there doesn't need to be. It is usually a big mistake to select a beekeeping book based on a flashy appearance, good sound content is much more important.

You will find all three of the above books will suit you well for many years, but for those who wish to do further reading you may wish to consider the following, which may be out of print, but readily available second hand.

**"Background to Beekeeping"** by Allan C Waite is a fairly old book that is more advanced than the three mentioned above. It does not include varroa or oil seed rape, but the beekeeping content is very sound.

**"Bees and Beekeeping"** by Irmgard Diemer is a translation from German. It should be seen as an intermediate book, with a very good and easily understood section on bee biology.

Ted Hooper's **"Guide to Bees and Honey"** is a good standard reference book that has stood the test of time, although now getting a bit out of date. In my opinion the first three mentioned are a better bet for the average beekeeper.

I would avoid American books as their methods, bees and hives, climate, legislation, etc are different from ours. If you are not careful you will buy the wrong equipment and be sent down a very expensive road.

When you have gained a reasonable amount of knowledge and practical experience, you can read other books and make your own mind up about which methods to adopt, but when trying out something new e.g. swarm control, it is important that you stick to one method, not mix up different ones from different books.

Beekeeping books quickly date due to such things as research, crops, legislation, diseases, etc, so be careful to read the most recently published versions for your main reference. Some of the older books still have relevant and sound information, but it must be remembered that the weather may be different now than when the book was written, so for that reason timings may be two or three weeks out. It makes sense to have a good book you can rely on and use other sources for up to date information.

## 1.5.2 BKA Meetings

I think local meetings should be attended by everyone, whether a practical demonstration or a lecture. I still reckon to come away from a meeting having learnt something, even if it's how not to do it! In a practical session try to follow what is happening in a colony throughout the season, and in a way treat it as if it is your own. Remember what happened last meeting and try to guess what will happen at the next. Come to that, why not have your own records of colonies in the teaching apiary? Don't be frightened to ask questions, but try thinking about the answer first. Don't turn down the chance to handle bees and concentrate on what is happening, as in a group situation it is easy to get distracted and miss something. Keep your eyes and ears open and you will learn a lot. You will notice such things as those who stand in front of the hive entrance will get covered in bees, or you

will probably see that colonies that are handled gently will behave much better than those handled with less care.

### **1.5.2 Lectures, Conventions and Workshops**

Apart from those specifically arranged for beginners, you need to be aware that many will be aimed at intermediate or advanced level. Workshops usually have practical sessions on a specialist subject. If the presenters are good, you should pick up some useful information. Be aware though that presenters could have their own theories that may conflict with your own methods, or what you have been taught. e.g. their method of swarm control may be complicated and require the purchase of equipment you may discard later if you decide to "try it out", then abandon it. Take pencil and paper with you to make notes and possible questions to ask.

### **1.5.4 Magazines**

There are often useful articles, but equally some that may not interest you, simply because they have to satisfy several functions, including giving practical information, news, and reporting events. Be aware there is little new in beekeeping, so articles may effectively be recycled, but from another writer.

### **1.5.5 Booklets and Leaflets**

For specialist information such as diseases you can refer to some of the excellent booklets now available from the National Bee Unit (NBU) and you will not go far wrong. There are also some useful leaflets from BBKA and other specialist organisations like the Bee Improvement and Bee Breeders Association (BIBBA).

### **1.5.6 Internet**

This is a useful way of gleaning information, but you should be aware of certain things and make allowances. Because the web is international there is a lot of information, but at the same time, quite a lot of it is not relevant to this country e.g. some of the treatments that are allowed for disease control in other countries may not be registered for use here, therefore illegal. I do find it rather annoying to visit a website and be linked to another, then go into another site for the same subject, and be linked to the site you have just been linked to!

When surfing the web for beekeeping sites, I add those I like to the "favourites" and have built up a useful list, but of course they keep changing so it is an ongoing thing. I would suggest that you start with BBKA, NBU, BIBBA and your local and county BKAs. With a bit of patience you can very often find real gems of information hidden away in local BKA sites, and some of these are well worth looking for. It will have to be done regularly, as some of the information is in downloadable newsletters that may not be displayed long. For that reason, it makes sense to do a little "cut and paste" into a file.

Dave Cushman's website <http://www.dave-cushman.net/> is a tremendous resource. It is reckoned to be the world's most comprehensive beekeeping website, with very sound information. Dave was too ill to work and spent 10 years building the website. When he died, he left it to me and I continue to maintain and update it.

If you know what subject you are looking for there is a lot of scientific information, and as this comes from research facilities the standard is usually good, although I sometimes wonder about the value to beekeepers.

There are several online forums, some international. You may need a bit of experience in order to sort the wheat from the chaff and there is a lot of chaff. Unfortunately, the internet gives opportunities to "20 minute experts", but the keen beginner may not know the poster is also a beginner. Some are rather tedious and little more than chat facilities. If the Moderators are good, the abuse and trolling is kept to a minimum.

I find online videos are very variable. Sadly, there are many people who have just entered the craft, but seem to think they are qualified to give advice and information. This is a problem to a beginner, as they don't know the quality and could easily lose a colony by accepting erroneous or inappropriate information. What is done in California or Texas may not be suitable for your location. There are some excellent videos, but you need experience to recognise them.

Social media I quickly gave up on, as I found it very tiresome.



There are some beekeepers who have their own websites, but they too are variable. Try to find out how long the person has kept bees and how many colonies they run. They may be much better at designing a flashy website than keeping bees.

### **1.5.7 Learning from other people**

Over the years I have gathered some good information this way. Listening and discussing things is a two way affair, often the person with the idea or method will be able to modify it by bouncing ideas off others and make further improvements. Much of my early learning was achieved simply by watching someone who turned out to be the best handler of bees I have ever seen, although his knowledge of the working of a colony of bees wasn't great.

You do need to be aware that before you have the knowledge to decide what is good information you can often get into bad habits, simply because of the quality of the information being given.

### **1.5.8 Practical experience**

This is available to everyone, but is only meaningful if used with the basic knowledge previously mentioned. Observation and lateral thinking are important parts of beekeeping. You may see something in a colony you aren't sure about, but you need to know what it is you are seeing. In general, it is good advice to know what should be normal. If there is something that looks different, your knowledge of the "basics" should give you a clue if it is a problem or not. It may be absolutely harmless, but it may be serious, such as a notifiable disease.

You will of course make mistakes, but the best mistakes to learn from are your own. Don't beat yourself up because you have made a mistake. The better beekeepers will soon learn from them, so they reduce the chances of a repeat. In general, during the active season most mistakes can be rectified, but during the winter it often results in a dead colony.

You will soon notice that very often two colonies in the same apiary at the same time, in apparently the same condition, that are treated in the same way will respond very differently. There will often be a reason for it. Don't just accept it, try to find that reason, as it will help build up your knowledge.

## **1.6 How do I start?**

Beekeepers start in a variety of ways, ranging from inheriting bees by accident to making a conscious decision and investing rather heavily. Whatever the reason for starting, it is my experience that in general it is those who do their homework, so they know what is involved, that tend to stay the distance and make good beekeepers. Some charge in head first without considering what is involved, but these rarely last long. I have experience of a significant number of people giving up soon after starting for a variety of reasons, often because they have not thought things through properly. If you decide to take up tennis or painting it doesn't matter if you drop it, but beekeeping involves a box of insects that can quickly become diseased, or can cause problems to others by being aggressive or swarming.

I strongly suggest reading 1.3 again, remember the amount of commitment needed and ask yourself if beekeeping will suit you. Beekeeping is not about having a pretty box at the bottom of the garden that delivers honey on tap, with little or no work or knowledge needed, despite what you might read about one kind of hive. It is full of insects that are potentially dangerous if they don't have careful and knowledgeable treatment. The beekeeper will get stung on a fairly regular basis, although with good bees and good handling the vast majority of stings will be accidental. Sometimes I can inspect 20 or more colonies on the same day and not receive a sting, yet on other occasions I will receive half a dozen or more stings from one colony.

I strongly recommend several visits to your chosen BKA and handle bees several times entirely on your own before making your decision. There are many who are full of initial enthusiasm that quickly wanes after a sting or two, so make sure you can stand it, some can't. If you have passed this hurdle and you have a good tutor, they should be able to guide you. Don't be frightened to ask if the tutor thinks you will make it, as it is usually fairly easy to tell at an early stage.

If you have got to the point where you can progress, you need to decide how you are going to do it. Patience is often well rewarded for those who wait, as there are often opportunities. Someone may give up, reduce numbers or move away, or a swarm may become available. If you keep close to your BKA, possibly some members will let you help with their beekeeping, so if you show ability and willingness to learn you will be in a good position. Make sure you do learn though, not just there to lift heavy supers for them.

Following over 50 years of experience with bees I have developed some firm beliefs about the type of bees that survive here and are good doers. Please see 4. BEES, where I state my opposition to some kinds. The best bees for your location are the ones that have survived there for some time, not recently imported from much warmer climates that struggle to survive when they get here.

A swarm is the cheapest option, but you will probably need help. This is probably the most interesting way to start, and there are likely to be few problems if you take the right precautions.

If you buy bees on combs, I strongly advise you to seek sound advice. If possible, ask someone to view any bees you are considering buying. I have seen some dreadful bees sold commercially that should not in my opinion have been sold to beginners. A week after purchase, bees, especially a nucleus, could be unrecognisable from what was delivered, so if there is a problem, deal with it immediately and take dated photographs. Very often frames of bees are taken from several colonies, slapped together with a cheap imported queen, then sold to beginners who don't know what they should be getting. In my view this is not a good way to start. I must point out that some commercial sources will be good, but I would still prefer bees to be sourced locally, which can be from your own BKA or members. Many commercial suppliers use imported queens, that very often may not be best suited for our climate and conditions. I suggest asking where the queen was raised.

The usual advice is for the beginner to buy a nucleus, but if you have made several visits to a good BKA and you have shown ability and competence they should have progressed you on to handling a full colony on your own, so it doesn't matter what you have. You can usually easily split a full colony into two or three nuclei, but the price will rarely be twice what a nucleus is, so you may get better value with a full colony.

There is a BBKA leaflet (L014) "**Standard and Guidance Notes for Nuclei**" with good sound information on what to expect from a commercially sourced nucleus. Ask the supplier if the nucleus complies with this. If they say "Yes", then ask them a few questions about the content! Remember that a nucleus that is sold to you at a lower price locally may be on a favour basis by a helpful beekeeper, so it is unreasonable to expect it to comply with the standard.

Having started, I suggest that you consider having two colonies fairly quickly. The reason for this is that if you lose one for any reason, you can make good from the other. There is not much more work in two colonies than there is one.

Seek sound advice about what equipment to buy and don't rush to buy everything you are told you will need, very often you don't. The hive types I recommend you consider are detailed under **2.2 Common Hive Types**. When buying new hives, I suggest that you consider what are known as "seconds", which have been made to standard sizes and tolerances, but from lower grade material that may have knots and blemishes. Some are cedar, some pine. The former will last well if looked after, the latter may need a little more care to avoid damp, therefore rotting, but pine is fine for supers that only see the elements for the summer months. Wood preservative is likely to extend the life of hive parts considerably, but make sure it is suitable for use with insects. I won't recommend substances here, in case regulations change and these notes get "dated". When buying seconds, I suggest you look closely at them to make sure there are no knots where you will be driving nails - let someone else have them!

I caution strongly against "Beginners kits". It might seem the obvious thing to do, especially when it is publicised as "everything you need to get started". You get what the supplier decides you are going to get, which may include some cheap imported items of poor quality, or stuff you don't need or want. I only mention this because I have seen kits bought online that are very poor, one having the hive made from recycled wood. I advise buying what you want, when you want it.

## **1.7 My methods**

To be successful at beekeeping it is essential to have some form of system, and you should be flexible enough to change and develop it as new experiences and knowledge are gained. Don't think you have failed because you have abandoned or modified something, see it as a positive move. Although the following might not be totally understood by the beginner, it might help the more experienced to understand why I do things the way I do.

- I favour the native or near native bees that are adapted much better to our climate than most of the imported ones I have come across.

- My bees are normally kept in single brood chamber top bee space (the standard is bottom bee space) national hives, and winter as such.
- I am ruthless in culling the poorest queens. I raise queens regularly to improve the quality of bees. This makes my beekeeping much more pleasant and adds to the interest.
- I do not like bad tempered bees and I don't like getting stung. I assume others don't either.
- I mark all my queens and clip their wings. To have unclipped queens more than doubles the work needed. You will not damage a queen if you hold her by the thorax which is incredibly tough. It is solid muscle that powers the wings and legs. I encourage beekeepers to do this manually and it is probably better to be shown how to do it before attempting it yourself.
- If eggs are laid in queen cells immediately after an inspection no swarm can be lost for 15-16 days if the queen's wings are clipped. For this reason, inspections can have 14 day intervals. Some colonies will not need such regular inspections.
- I am practical and able to make and maintain equipment.

This list is short and simple, but is the basis for my management system. All beekeepers will have their own system, even beginners and they will all be different, as we find our own way of doing things.

## **1.8 "Natural" beekeeping**

There is a worldwide movement towards a type of beekeeping that is termed "natural" or sometimes "sustainable". I have an open mind about methods other than those I use, but it concerns me that some of the information that I see is in my opinion misleading. Even some of the more responsible supporters of this type of beekeeping appear to be distancing themselves from some of it, some now calling it something else.

I have removed many wild colonies from hollow trees, which is as natural as you can get. I don't see some of the ways advocated by some as being very natural. As soon as you put a swarm of bees in a man-made structure, you are moving away from nature, especially if you are using bees that have not evolved to live here.

A different hive type is used with different designs having names like Top Bar, Sun and Warré, all of which can be made by the beekeeper, so at low cost. Bees will live in them quite happily, but some are not easy to use or to check the health of the bees.

I do not object to the way that some of the "natural" movement keep their bees, but I object strongly to the suggestion from some that I am not looking after my bees in a caring way because I don't keep them the same way they do. If you want to keep bees this way, I have absolutely no problem with it, but I suggest strongly that you keep them in a conventional way first, learn about them, then you have the knowledge to explore "natural" beekeeping and decide if it really is natural. If you keep bees both ways side by side for some time, as some do, then you can make your own mind up, but based on your own experience, not the prejudice of others.

There is a lot of propaganda involved, with the media being persuaded to help with publicity. This, understandably, results in a significant number of people wanting to come into beekeeping with rather fixed ideas, mainly based on erroneous information.

## **1.9 Equipment**

A look at a bee appliance catalogue will show an amazing amount of equipment, and it will be easy for the beginner to think they need it all. Quite simply you don't. Before embarking on a spending spree, it would make sense to attend as many bee meetings as you can in order to find out what is needed. Often you can borrow, improvise, or buy second-hand. There are many gadgets available that are supposed to make things easier, but in reality they end up forgotten and hidden at the back of the bee shed.

# **2 BEEHIVES**

## **2.1 What sort to get? What to think about.....**

Bees do not mind what home they are provided with and it must be realised that a beehive is no more than a tool of the beekeeper. It should then be assessed for its suitability and certainly for someone with a few hives, only one type should be used. This will aid interchangeability and make beekeeping much easier.

The type of hive chosen is probably the most important decision a beekeeper will have to make, as it will be expensive and annoying to change, especially if new equipment has been bought. This is probably the one area where it is important to seek sound advice. Also take any opportunity you can to help an experienced beekeeper, handle bees in different hive types, so you feel comfortable with your choice.

It is possible for a reasonable carpenter to make their own hives. Hive plans are available, but be warned that the internal and external dimensions are critical. Between fittings inside a hive the bees need a 'bee space'. This is a gap of approx 8-10mm, that if too large the bees will build brace comb, too small and they will fill it with propolis ('bee glue' in the U.S.), making it difficult to manipulate a colony well. It was the discovery of the "bee space" that led to the introduction of what is known as the movable comb hive we use today.

New hives can be purchased made up, or "in the flat" at a discount for you to assemble yourself.

I have already discussed "natural" beekeeping under **1.8**. Top Bar and Warré Hives are simply designed and constructed, and although they can be bought, they are usually made to whatever design the beekeeper wishes. They can be made from recycled materials without needing the accuracy of conventional hives. They are rarely available second-hand.

When buying second-hand hives look out for the following:-

- That they are machine made. Anything with butt joints is probably home made. If it is, then make sure that all sizes both internal and external are correct and they are square. Home made hives should expect to sell for no more than 25% of the equivalent cost of machine-made new ones.
- They are sound. It is surprising the number of hive parts I have seen that, despite being cedar, have rotted. This is usually down to neglect. If you are capable of repairing them then there will be no problems, but make sure that the price reflects the condition.
- Single walled hives (National, Commercial & Smith) should not be painted, although paint can be burnt off with a blowlamp. Bees create moisture that breathes through the hive wall. Paint doesn't breathe very well and either results in the inside of the hive getting damp or it blisters. I have seen large blisters that are full of water.
- They are in good condition. Hives if treated well will last a lifetime or more. Check the edges for damage by badly used hive tools.

If you acquire empty hives it is sensible to scorch them out with a blowlamp before use, to guard against the transfer of either of the Foul Brood diseases from the previous occupants. This should be done after scraping off any beeswax and propolis and burning it.

It is fairly safe to use combs and frames from a previous owner if you are sure they were disease-free. It may be worth making discrete enquiries to see if the previous owner had a problem with Foul Brood. If there is any doubt at all it would be sensible to burn any frames.

There are three main things to consider when choosing the type of hive and these are:-

- **Size**

There are two issues here. One is the weight of a full super of honey, and the other is the size of brood area available for the queen. The former is a real issue especially for those who have difficulty lifting. A full super of National size is as much as most people would wish to lift on their own. Strains of less prolific bees (those that form smaller colonies) that I prefer will be quite happy with 10 or 11 British Standard (B.S.) frames in the brood box, while prolific bees will need double that. Don't be fooled by those who think that large brood chambers stop swarming, they don't, they just result in bigger swarms!

- **Frame Size**

In this country we have British Standard frames which are the smallest in general use. They normally have long lugs to suit WBC and National hives, and shorter lugs to suit the Smith hive.

- **Looks**

To an untrained eye all single walled hives look the same and I understand that some would like to see a gleaming white WBC hive in the garden. The reverse of this though, is they are difficult to hide and can easily be recognized by vandals, or those who might get stung and are looking for someone to blame.

## 2.2 Common Hive Types

You will find information in books and catalogues on 10-12 different hive types, but I strongly suggest that only hives that use BS frames are considered, these being:-

### 2.2.1 WBC

The traditional English cottage garden picture includes this double-walled type. They look pleasant, and I have successfully used a lot of them, but in my view there are more problems with this type of hive than any other, these being:-

- Over the years there have been many manufacturers of them, all with their own design, some with only minor variations, but just enough so they are incompatible with other parts. This is getting less of a problem, but there are still some old hives in circulation. Beware also of home-made parts for these, as they often don't fit very well.
- If vegetation is not kept clear of the floor then firstly the legs, and secondly the side rails of the floorboard where the legs join will rot. I have seen full hives collapse due to rotten floors giving way.
- The supers are a weak design and the end rails are easily broken.
- Due to damage or poorly fitting supers there are often holes and gaps between them, allowing bees and wasps to come and go as they please. This can result in losing your honey crop if clearer boards are used, as a small gap will be quickly found.
- They must be kept in good condition and well painted, otherwise they will leak. If the gap between the inner and outer walls becomes damp, it will cause the bees problems in the winter.
- It is difficult to fit mouse guards.
- It is difficult to work with Open Mesh Floors which are important in varroa mite control.
- They are the most expensive hive to buy new.
- They are difficult to move due to size and weight.
- In windy weather roofs tend to get blown off and must be weighed or tied down.
- It is very common to see what appears to be gleaming well painted hives sold second hand. Close inspection often reveals bodged repairs, with the paint covering up putty or filler. Inspect carefully.

If you are aware of the problems and can manage them then these are good hives.

### 2.2.2 Smith

The main benefits are that it is a simple and cheap hive to produce, as it uses the least timber of any hive. It is the same capacity as the National but has short lugs, which in my view is its main drawback. Not very popular in the South of England and rarely available second-hand, though the price is usually low. Popular in the north and especially Scotland where it was designed and is well thought of.

### 2.2.3 National

The National is the most popular hive in the UK by some distance, when used with "B.S. Brood" frames in the brood box. What is currently sold as a "National" hive was originally named the "Modified" National, that replaced the original "standard" National. The current hive has a slightly different method of construction that makes it easier to lift. I mention this to avoid confusion, because older books will show slightly different boxes and what we now know as a "National" may be termed "Modified".

There are some variations, including what is known as the "Deep" or "14 x 12", which takes a deeper frame and the "Rose" hive, that uses the same depth frame throughout.

Both "modified" and "standard" are fully interchangeable, although you are only likely to come across the latter if second hand as they were last made in the 1960s. I thoroughly recommend the national.

### 2.2.4 General points on hive types

WBC and National hives both use the same frames and have bottom bee space, i.e. the tops of the frames are flush with the top of the box, the Smith has top bee space as standard, i.e. the bottoms of the frames are flush with the bottom of the box. The height of the frame is a "bee space" less than the height of the box .

My preference is for single brood chamber Nationals, though I have made what I consider to be a slight improvement in my own hives by converting them to top bee space. It is probably not worth most beekeepers doing this, as all fresh hive parts will have to be converted, although it is a simple job. There are a few benefits to top bee space that you might consider at a later date, but quite frankly I don't think them worth it for the ordinary beekeeper with only a few hives. Some people advocate double brood chambers or brood and a half which is one brood chamber and one super below the queen excluder. This is to accommodate the more prolific bees, but I have always found multiple boxes for brood to be a nuisance.

As already mentioned, there is a BS Deep frame size that is known as 14 X 12. This has been in existence for a long time, but gained recent popularity as it is seen by some as an alternative to multiple brood chambers. I have handled them myself and have found them too big and clumsy. Virtually everyone I have known who has used them has quickly reverted to standard brood chambers. If you have read about the "benefits" of 14 x 12, I suggest very strongly that you start with standard depth, otherwise you may be very disappointed. Get some experience first.

Polystyrene (known as "polyhives") hives have been used successfully in other countries for many years. National hives are now made in polystyrene and are becoming quite popular, mainly on price and their lightness, although the contents weigh the same. Apart from nucleus hives, I have not used polyhives myself, but I have handled bees in them on many occasions, both in the U.K. and abroad. I understand there are problems with the density of the polystyrene with some manufacturers. Some aren't compatible with wooden hives, that are made to a standard design. There may be a problem with disposal and cleaning due to environmental reasons. As usual, I have an open mind on different materials, but in my opinion, there are too many downsides for me to recommend polyhives to a beginner. Polyhives do tend to cause arguments.

I have disregarded all other types of hives including the 16" x 10" British Commercial for three main reasons, firstly because I believe they are too big for the type of bees I feel do best in our climate, secondly on availability second-hand, and thirdly they will probably need non standard ancillary equipment such as extractors.

Of the American designs of hives, the only one worth mentioning is the "Langstroth". It is a bigger hive than the National and the supers are heavier, without the benefit of the larger hand holds. There is a larger brood box available called "Jumbo".

There are a few "non-standard" hives available, but I would not consider them. They are unpopular for a reason.

When operational, you should aim at having 3-4 supers available for each hive, otherwise you may need to extract sealed honey to create more space. If not, you could have crowding problems that may contribute to swarming. Other than that, it makes sense to have some spare equipment and I suggest a floor, crown board and brood box as a minimum. This will make spring cleaning easy and there may be occasions during the summer when extra equipment may be needed, often in an emergency.

### **2.2.5 Nucleus Hive**

A nucleus hive is a small hive taking standard frames. Although you can quite easily do without one, nucleus hives can be very handy for making small colonies or for a variety of other uses such as queen rearing. Wooden ones are very expensive to buy new, but as they are not likely to have bees in them during the winter they can easily be made by a half decent carpenter using scraps of material, or you can easily cut down a standard brood chamber. The size I find most useful takes 5 frames, but I make them to take the width of 5 ½ metal/plastic ends and use the normal frame runners, not castellated spacers. This allows room for removing the frames without rolling bees, and a little extra space in case the frames have come from different hives and don't fit together very well.

There are several polystyrene "polynucs" available, but although I initially welcomed them when they were first introduced, I find there are too many problems with them. As of 2020, I have decided to dispense with them after giving a dozen of them a fair trial for 10 years. I accept they are cheap, lightweight and useful for catching swarms, but I prefer wooden ones.

### **2.2.6 Hive Stands**

I don't think many beekeepers give enough attention to hive stands, where a little thought will greatly improve their function. Hives need to be kept as dry as possible to prevent decay and to keep the insides dry in the winter. Most of the time spent examining a colony is when the supers are off, so hives should be at a height

where the top of the brood box is at a comfortable height for manipulating. Beekeeping is much more enjoyable if your back doesn't ache.

WBC hives have their own legs and are stable. A suitable base would be a paving slab with the addition of bricks under the legs if needed.

Single walled hives (National and Smith) will need something different. I have seen a lot of hives perched on very unstable "stands" and although they may be alright with no supers, a colony with 5 full supers is a different matter as the weight is transferred upwards. If they are sited singly, I would use a paving slab as a base, then make a wooden stand that will bring the colony up to the height you need. Bricks may be an alternative, but don't stack them!

My hives are usually set up in pairs, on simple stands. These are two wooden rails placed across two concrete blocks placed on their sides on the ground, with a stake either side of them so they don't fall over "windscreen wiper" fashion. This is much better seen than explained!

What is important is that stands are fairly level, not twisted (so the floor doesn't rock), and can't easily be pushed over. It may be that you can utilize another item, but avoid such things as plastic milk crates, pallets, and tyres, as they are either unstable or will collapse under weight, bearing in mind what a colony with four or five full supers will weigh. I have seen lorry wheels without tyres used, showing that with a keen eye and a bit of ingenuity stands can be made or found at no cost.

## **2.3 Hive Assembly, Care and Maintenance**

There have been many more beehives that have rotted than worn out. This is because most have been subjected to incredible abuse, a pity, because in general the hives made in this country are better quality than some furniture. If you look at American catalogues you will see that some of the manufacturers make their hives out of "sawn lumber", usually pine, yet ours are usually made from Western Red Cedar (*Thuja plicata*), that if well cared for will last a lifetime. It seems a pity to me that a tree takes several hundred years to grow, to then be cut down, and made into a beehive for someone to let rot in a few years by being careless. There is no excuse for rotten hives. If you make sure they are off the ground and free of vegetation, so there is free circulation of air, they will not be constantly damp, and the bees will benefit too.

### **2.3.1 Assembly**

One of the major problems in use is caused by hives not being assembled very well. Often the nails that are supplied have very small heads called "lost head nails", that pull in use. I prefer to use galvanized nails with larger heads that are called "wire nails", and more of them than are usually supplied. The larger heads ensure that the parts stay together better and are easier to remove if you need to take them apart to repair any damage. If assembled well and looked after there is no reason why a beehive, even if made from ordinary softwood will not last a lifetime. I blunt the nails by hitting them on the pointed end with a hammer which stops the wood splitting and drive them in at an angle which pulls the parts together. Modern "Phillips" or "Pozidrive" screws are a good alternative. The benefit is it is easier to dismantle hives if needed.

Some advocate gluing hives, but I would not recommend this because a beehive is constantly moving, whether it is due to changing weather conditions or as the result of manipulations. Any movement on a nailed joint is taken up by the nail, but on a glued joint it is taken up by the wood. It is also difficult to replace any damaged parts if they are glued together.

### **2.3.2 Wood Preservatives**

Although it was widely used by beekeepers in the past, it is now an offence for "amateurs" to use or even store creosote. I am aware of other products, but have little experience of them. Due to environmental and health and safety issues, some products may be withdrawn in the future, so it is probably better not to make any recommendations of proprietary products, as they could easily date these notes. Although I haven't tried it myself, I'm reliably told that rapeseed oil is a good hive preservative. As already mentioned, single walled hives shouldn't be painted, but WBCs will benefit from a regular coat of paint.

### 2.3.3 Damage and Damage Prevention

Equipment is expensive, yet much of it will last a lifetime if cared for. There is nothing worse than finding something you need in a hurry has a problem that could have been avoided with a little care.

#### 2.3.3.1 Hive Tools

A lot of damage is done during manipulations to the top and bottom edges of brood boxes and supers by the careless use of hive tools, thick hive tools, or improvised items such as screwdrivers, chisels and jemmies. This creates holes for wasps to gain access, and I have seen damage so bad that joints between boxes have been taped up with parcel tape. A well-made **thin** hive tool is a very good investment. Make sure it is pushed well into the gap before prising the hive apart.

#### 2.3.3.2 Rats

I have seen many hive parts that have been chewed by rats. This is usually the result of storing wet (with honey) combs in them. Prevention is better than cure – store only dry combs and try to keep your store rat-free.

#### 2.3.3.3 Woodpeckers

Green woodpeckers (Yaffles) occasionally make holes in hives during the winter, which usually only affects the brood boxes. The old-type National boxes (with the machined handholds) and Smiths are much more vulnerable because of the thinner wood. These can easily be repaired by nailing a thin piece of metal on the inside. Woodpeckers are not only a problem in wooded areas, but in gardens too, where they are capable of remembering from one winter to another, so once they have found your hives, you must protect them. Wrapping with thick polythene such as that which builders use as a membrane or DPC that bricklayers use and is sold in rolls just the right width, pinning with drawing pins prevents the birds gaining a foothold.

#### 2.3.3.4 Wax Moth: See under **8 Pests**

### 2.3.4 Checking Roofs

Sometimes in the winter, after several hours of rain, the weather changes rapidly and the sun comes out. This is the time to check for leaking roofs. Find out where the problem is, then wait for it to dry thoroughly and if the holes aren't very big, they can be filled up with propolis, which can be warmed in the hand until pliable and applied like putty. It is free, natural, and will last for years, otherwise completely re-cover them. Metal on roofs can be replaced with printers litho plates. These are thin sheets of aluminium and will need care in use as they are easily damaged. Replacement covers are sold by appliance dealers but make sure they are the right size before buying, as the thickness of the sides of the roof will determine the size of cover needed.

Most damage to hives can easily be mended with the minimum of tools and should be done as soon as convenient. If you look after your hives and repair damage early, they will serve you well. Don't forget they are tools and all tools should be looked after. All my hives are checked at spring cleaning time and any repairs done then.

## 2.4 *Frames and Foundation*

### 2.4.1 Foundation

This is a sheet of beeswax that is embossed with the shape of the base of the cells. The bees build it out to make their combs, that is only a means of managing what they will do naturally. It is fitted in frames making it easy for the beekeeper to manipulate the colony.

Foundation that is used for brood, or super frames for extracting, are wired to make them strong, otherwise they can easily break. If foundation is needed for cut comb (see **12.1.2 Comb Honey**) it is unwired.

In a natural bees nest the same cells are used for rearing brood and storing food, and are based on the sizes needed to raise the bees, smaller for worker, larger for drone. Foundation for brood frames is usually worker based, that for supers can either be worker or drone. I prefer drone base in the supers because it is easier to extract honey from them and bees don't normally store pollen in them, but there is one drawback, if a queen does get through a queen excluder then you can have a lot of drones in the supers.



## **2.4.2 Making up frames and fitting foundation**

The vast majority of beekeepers make up frames and fit their own foundation, although they can be bought made up. Frames shouldn't be twisted, as this will cause problems in use. To avoid this, I find it easier to make them up on a flat surface such as a table or bench and store them in empty boxes. Rather than try to describe the assembly of frames and foundation it would be better to see a demonstration.

Frames can be made up before they are needed, but foundation distorts and quickly goes stale if it is fitted before it is put on the bees. Bees are reluctant to draw comb if it is stale, often building wild comb rather than drawing out the foundation properly. Foundation is usually supplied in plastic bags that keeps it fresh for some time. It is easily damaged and should be kept flat until required. It becomes brittle if cold, but pliable when warm. Damage is less likely to occur if handled in warm conditions

## **2.4.3 Frame spacing**

Frames can be spaced to have "wide" or "narrow" spacing within the same hive.

If wide spacing is used, there is room for 8 frames in a WBC and 9 in a National or Smith. If narrow spacing is used, there is room for 10 and 11 respectively. The length of a sealed worker cell is always the same, yet a cell of food can be different lengths, resulting in different comb widths, as there is usually a bee space between the cappings of adjacent combs. The width of narrow spacing is just right for the length of worker brood cells, so narrow spacing is usually used in the brood chamber, with a choice in the supers to suit the beekeeper.

If new foundation is put on wide spacing the bees would probably build brace comb at right-angles between the sheets of foundation, making manipulations very difficult for the beekeeper. For that reason, foundation in the supers is usually put on narrow spacing until the combs are drawn out, then on wide spacing.

I always use wide spacing in supers of drawn comb because fewer combs are needed, and there is less handling at extraction time because there are less frames to deal with. Uncapping the honeycomb is easier because the cappings are usually clear of the frame.

There are several methods of spacing frames, and all have their drawbacks :

### **2.4.3.1 Hoffman frames**

Hoffman frames were originally designed for American short lugged frames, that are difficult to space by any other means. The side bars are wider, with one square edge and one chamfered, to supposedly make point contact. Although probably the most popular frames worldwide, simply because most frames are short lugged, I think these are a nuisance when used with our long lugs. They use up much more wood in making the frame, bees propolise them up easily and you can't close them up in order to create a gap to get a frame out of the brood chamber without rolling bees. They are always narrow spacing, so the only way you can have wide spacing is to use another spacing method as well. This is the only satisfactory way of spacing short lug frames such as are used in Smith hives.

### **2.4.3.2 Metal and Plastic Ends**

These are made in both wide and narrow spacing and can be variable if you pull some of them back or alternate them. They are not really suitable for frames with short lugs. Bees propolise them badly and this can cause annoyance, as a great deal of effort is needed to remove them from the frames, which is no fun when you have a frame of bees in your hands. Metal ends distort badly and will easily cut fingers unless great care is taken. Plastic ends, which are the modern equivalent of metal ends, are sold in different colours. If one colour is put on one end of a frame, and another colour on the other, it is easy to make sure the frames always go back the same way, but in reality this is of little benefit. They usually have to be removed for honey extraction.

### **2.4.3.3 Castellated spacers**

These are metal strips that are fixed to the box, with slots in to locate the frame lugs. They are disapproved of by many beekeepers for use in brood boxes, although they may have never used them. Unfortunately, this is one topic in beekeeping with an undeserved reputation that is based on little or no experience or knowledge. I have used them throughout my hives for over 50 years and they are my favourite method of spacing frames by some

distance, although by no means perfect. The up side is that they are fixed to the box and are easily cleaned. The down side is that spacing is fixed, which is no problem in the supers, but occasionally can be in the brood chamber if you move frames about and want to put two wide ones next to each other. I have most of my supers on wide spacing, except a few on narrow. These are used for the odd occasion when I need to use foundation, have damaged combs I want the bees to repair, or to use for cut comb honey.

#### 2.4.3.4 No spacers

It is quite possible to space by eye or perhaps some kind of template can be made. This is a reasonable method providing the correct spacing is maintained. The spacing is variable and this is probably its greatest advantage, although it does cause problems if you take a wide comb out of a brood chamber and put it in one with fixed spacing. The down side is that frames will move about if the hive is moved which can cause damage and annoyance.

#### 2.4.4 “Warm way” or “Cold-way”

Hives can be set up to have the frames running in the so-called ‘warm way’ or ‘cold way’, although this normally refers to the brood chamber only.

The “Cold Way” is when the frames are at 90° to the entrance as opposed to the “Warm Way” which is parallel. It is unfortunate that this terminology is used, as some think that the bees are warmer because the cold wind doesn’t blow in the entrance and between the combs, but that is not the case. It is irrelevant with the use of open mesh floors anyway. Standard WBC and Smith hives must have all the frames running the ‘cold way’ because the boxes are not square, but Nationals can be either way because they are square.

See also the notes on **7.1 Wintering**

### 2.5 *Siting Hives*

Bees naturally nest in trees, usually at head height or above. Most beehives are at ground level, so if there are no restrictions in front of them they could fly at a low level for some distance depending on the direction of their forage source. As most people keep their bees in an area where this could be a nuisance to others, steps should be taken to force the bees up above head height. This can easily be done by facing them towards a high dense object such as a fence, hedge or wall. Alternatively, something can be erected such as fence panels or fine netting.

Bees will benefit from a dry site that has plenty of free flowing air that is not damp. Despite what the books may tell you, it doesn’t matter at all which way they are facing. It is thought that if they are facing the morning sun they will fly earlier. What is more important is the temperature of the hive. Many flowers don’t secrete nectar until the temperature rises anyway. Try to avoid full sun during the summer, otherwise the bees’ efforts are concentrated on keeping the hive cool, which can cause stress. Siting in a more shaded spot will make ventilation a lot easier and is more like their natural home in a tree trunk.

When I had a large number of colonies, I had several out apiaries, with the hives in a square all facing inwards, often in woods with a fairly dense canopy. They all did very well and produced good honey crops. In fact, fairly open woods are ideal because there is a good flow of air and slightly warmer in the winter. It is cool in the summer too, where bees will fly out through gaps in the canopy. I believe it is important that the site is warm in the winter so that bees can take short cleansing flights. In a damp, cold site they will not fly so readily, possibly causing nosema disease to build up.

I have seen bees kept in quite small gardens which is no problem if the beekeeper is competent and does not allow them to swarm. We must remember that many people do not share our enthusiasm for bees, and only see them as something that sting. There is no reason why a small area can’t be found away from habitation where an out apiary can be set up. Perhaps a BKA can organise this, so that several members can share, similar to situations I have seen on urban allotments.

Vegetation, such as brambles and roses should be cut away from hives, as they can accidentally rip the netting of veils.

I have seen bees kept in all sorts of places, including inside sheds and on flat garage roofs. There is plenty of scope providing you put a bit of thought into it.

### **3 PERSONAL EQUIPMENT**

This is a subject I have strong and well known views about. It is relevant to the handling and temper of bees as well as efficiency of operation. Good and well maintained equipment is essential. There are many items now available on the internet, but many I have seen are very poor quality. I think it much better to inspect equipment, rather than buy online. There are plenty of opportunities to do so at shows and sales.

#### **3.1 *Hive Tool***

I view a good hive tool as one of the most important parts of my equipment. I find the best ones are the type with a bent end and a nail puller. With this type both ends can be used for scraping, which is very helpful when cleaning equipment. A thin ended hive tool will not damage the boxes and makes it very easy to separate the hive parts. You will find many uses for it and I have even clipped a queen's wing with one in an emergency! Keep it in your hand all the time, as it should be in constant use. Paint it yellow so that you don't lose it in the grass, as I find that colour easiest to see. With the constant pressure to make things cheap there are some poorly made hive tools available. Resist them!!

#### **3.2 *Smoker***

A good reliable smoker is an important part of your equipment that must be alight and available at all times. Sometimes you need it quickly. You may come across people who advocate not smoking bees. This in my view is foolish, can be highly dangerous and should not be attempted by anyone at any time. Sooner or later even the most placid bees can quickly become aggressive for no apparent reason.

I suggest you have a play with as many as you can before buying, but make sure you are comfortable with it. If the internal spring in the bellows is strong it will make your fingers ache. Some of the cheaper smokers are so poorly made you can cut yourself on them, so inspect well before purchase.

Keeping a smoker alight seems to be beyond some beekeepers, many filling the firebox, then lighting the top! The trick is to light a fire in the bottom with something that lights easy like newspaper, add material that will burn easily to get it going, then add whatever fuel you have available, but make sure there is something fairly solid. Useful fuel includes hay, straw, dried grass mowings, wood chippings, old sacking and touchwood, which is my favourite. I collect it in an old rucksack when taking the dogs for a walk. Animal food bags are good for storing it in.

When you have finished the hive inspection, plug the smoker nozzle with something like grass, then lay the smoker on its side, when it should go out quickly. Don't empty it, but use the partly burned material to start it next time, as this will burn easier than fresh material.

When manipulating bees, the smoker needs to be readily available in case they need smoking quickly, so mine is always between my knees when not in use. Some of the "bad temper" in bees is often caused by poor handling techniques and the poor use of smoke is one of them. Once control has been lost it is sometimes difficult to regain, so it is very important that the smoker is used correctly and does not go out.

#### **3.3 *Protective equipment***

Protective equipment is worn to avoid being stung, which few people like, including me. In my view the most vulnerable parts of the body are the eyes, which should always be protected. For that reason, I wear a veil of the old fashioned type, though slightly modified for ease of putting on and taking off.

If you look at photographs of beekeepers before about 1970 you will probably find that they are all wearing just a veil for protection, yet a recent photograph will show the modern beekeepers wearing bee suits. I have no problem with that, and will not say anything against bee suits, except that in my view they give beekeeping a poor image with the general public, many probably thinking that all bees must be "killer bees" if beekeepers have to dress up like that. I am convinced bee suits have contributed to a rapid decline in the handling skills of beekeepers. The reason for this is because when they are wearing a bee suit and don't get stung, they do not realise how many stropky bees there are in the air, where somebody with less protection may initially get stung a

bit more, but they will learn to control a colony much quicker, or not tolerate bees that are aggressive. Either way there is a benefit.

At a demonstration I once said to a person who I thought was handling bees rather roughly and without enough smoke, that the bees were getting a bit angry and would soon start stinging people. His reply was "That's why I wear a bee suit". There was obviously no consideration for the bees that I knew to be normally good tempered, other people, the popularity of beekeeping, or his own handling skills. That was the wrong reason for wearing a bee suit.

I believe it is sensible for beginners to wear bee suits and gloves, as this will help them gain confidence in the early stages. It is in the first year or so that serious mistakes will be made. So often I see them being worn by people who have kept bees for some time, and in some cases, they are clearly being worn to cover up for bad handling, which I think is unfortunate. It is much better in my view to improve the standards of beekeeping and the temper of the bees. Beekeeping will then become much more of a joy and we will be more popular with the general public. I do know of a very small number of people who are good beekeepers but react badly when stung and I fully understand why they wear full protection. They should be applauded for continuing when many others would have given up.

I really see no benefit in wearing Wellingtons, as all you are doing presumably is preventing bees climbing up the inside of trouser legs, and there are simpler ways of doing that. They must be horribly uncomfortable in the hot weather. I have seen several cases of bees getting down wellingtons, being trapped and stinging anyway.

If your bees are so bad that you need to cover up, then you have a genuine problem that needs sorting out and fast. Seek help from somebody, that is what a BKA is for. On the other hand, if you are frightened of bees then in my opinion you shouldn't be keeping them in the first place. Bees will soon detect fright.

I suggest that after you have gained confidence and on a good day when your bees are kind and polite that you first dispense with your gloves. Get used to it for a few sessions, then do the same with your bee suit and just wear a tunic, or veil. You will be able to "feel" things much better and see how much you improve your skills. By all means keep them at hand in case you have a problem.

### **3.4    *Gloves***

These are worn for two reasons, firstly to avoid getting stung, and secondly to avoid getting propolis stained hands, which is understandable if you need "clean" hands for your work. I see the sense of wearing thin disposable gloves to keep hands clean and will make no further comment, except to say that they will not prevent stinging. If the thicker gloves give a beginner confidence, I would support it until they have gained the skills needed to dispense with them. I have never seen anybody that is anything other than clumsy while wearing leather gloves, and there are operations such as queen clipping and marking when they will have to be removed anyway. It is noticeable that those who wear gloves get stung on them much more than those without them get stung on the hands.

#### **3.4.1    *Veil, Tunic or Bee Suit?***

These are obviously worn to avoid being stung in the area being covered. Whatever your choice, make sure there are no holes for bees to gain access, either through damaged areas or up legs or sleeves. They should be kept in good condition and any damage repaired immediately.

I have never worn a beesuit or tunic in my life. I always wear a simple hat and veil and make sure if possible that bees can't gain access. I also tuck my trousers in my socks. If bees get inside your clothing, don't panic, they have probably got there by accident and will try to get out as quickly as they can. If the colony is calm, quietly walk away a few yards and release the bee as gently as you can, then resume your work. Flapping about will almost certainly get you stung. If the colony is a little "touchy" then close it up before releasing the bee, otherwise control may be lost when you return. On many occasions at demonstrations a certain amount of entertainment has been created by someone with a bee that's in the wrong place. If a bee does get up a sleeve or leg of a garment, remember that they will usually go uphill and towards the light.

Make sure any protective equipment is good quality. They vary a lot, and I recommend visual inspection before buying. In recent years there has been an influx of cheap imported garments, some being almost as thin as cheese cloth.

## 4 BEES

To many members of the general public “bees” are yellow and black fluffy stripy creatures. Beekeepers keep honey bees (*Apis mellifera*), that are just one of the 250 odd bee species there are in the British Islands and Ireland. Many, including a lot of beekeepers, are unaware of this. To help with understanding bees overall, it is interesting to study bumblebees and solitary bees, as their lifestyle is very different.

Honey bees naturally live in cavities in trees. All we are doing as beekeepers is to provide them with a substitute home, that satisfies their needs. We manage bees for our own purposes, but exactly the same colony is capable of living in a tree without human intervention.

### 4.1 *Be careful when buying bees and queens*

Even if you scan the rest of these notes, please read this part very carefully. It is important for you and other beekeepers.

There is a temptation when starting beekeeping to enthusiastically acquire bees from any source. There are plenty of sellers of bees, including dealers and the internet, but there are possible dangers that may not be obvious. Many people, including some beekeepers, think that all bees are the same. In fact, they vary considerably. There are around 28 sub species of honey bees worldwide. It is commonly thought by scientists that at some stage in the distant past they resided in Africa. As with all expanding species, they dispersed in several directions, where they became isolated by natural barriers such as water, sand or mountains. In isolation, they evolved to suit their own environment, so developing the sub species, each with their own characteristics. Ecotypes developed in response to local variations, such as climate and forage.

The honey bees that are native to the UK originally followed the retreating ice somewhere between the end of the last Ice Age, say 8-9,000 BC and the closing of the Channel Land Bridge around 6,600 BC. They are the same sub species (*Apis mellifera mellifera*) that are native to the whole of northern Europe north of the Alps, as far west as the Atlantic, east to the Urals and as far north as bees would survive. They have evolved to suit long, often cold winters and cool unpredictable summers, the latter being the key. All the other sub species that are popular worldwide evolved further south, mainly around the Mediterranean, where summers are much more predictable and warmer. They have characteristics that aren't best suited to our conditions.

Some books will state that our native bees are extinct, but that has simply been copied and pasted from earlier material by subsequent writers. It was probably written to discredit native bees by those who had an interest in promoting imported and “hybrid” bees in the first half of the 20th century. Modern morphometric and DNA techniques have shown that native genes exist, both in a “pure” form in the remoter parts with harsher climates and in most of the mongrelised bees that are now widespread elsewhere.

Adverts for bees and queens can be very persuasive, as you would expect from someone who has something to sell. Most beginners are very enthusiastic and are likely to buy what “sounds” the best, probably not knowing that queens mate at random with perhaps 10-15 drones, so the next generation may be very different from what was bought. Understandably, beginners have little or no experience with which to make sensible judgement, so may be seen as soft targets. Many suppliers are really only sellers of imported bees and queens, or their second generation.

The importation of bees and queens has been a concern of sound, experienced beekeepers for a long time. Imports are likely to be pure (or relatively pure) races or “Man-made hybrids”.

There are several issues with importing bees and queens, the main ones being:-

- The possible introduction of pests, diseases and pathogens. There has been evidence that imported bees are likely to be more heavily diseased (*Budge et al 2020*). Varroa was first detected in the U.K. in 1992. It has had a dramatic effect on the health of our bee population and made beekeeping far more difficult. It could only have been introduced on bees. There are several others lined up to get at us, some considered so serious they have been notifiable for many years.
- Possibly unsuited to our climate. It is obvious that if bees evolved to suit a certain climate, they would not do well in another. To survive our fickle climate, many imports need to be mollicoddled, simply to keep them alive. This is by heavy feeding, often summer and winter, treating with “supplements” or medicines and insulating them against the cold. If this isn't done, many would probably die.

- Possible aggression. Although the initial queen may produce a docile colony, subsequent generations of queens can produce aggressive colonies. In beekeeping terms this is called “F2 aggression”. The problem is the new beekeeper becomes used to a docile colony that hardly needs any smoke, but when the bees change their queen (called “supersedure”), she may mate with a drone from another bee type. This change in temper can happen very quickly.

Imported bees and queens are most likely to be one of the exotic sub species, the two most common being “Italian” or “Carniolan”, or what are called “Buckfast”. The latter is not a breed, it was originally a simple cross between an exotic race and our native bee by a monk called Brother Adam, who was in charge of the bees at Buckfast Abbey in Devon. There is no definition of the genetics of Buckfast. Brother Adam was tinkering with it all his life, by adding genes from different sub species, so it has constantly changed. There are many bees sold as “Buckfast” that are nothing to do with the bees that Brother Adam had, or are anything like the Buckfast I saw in my early days. I have seen many bees that I have been told were bought as “Buckfast” that are visually very variable. Unfortunately, they are often sold with the same or similar copied and pasted information on websites. People often buy them because of the romantic link with a monk. Most of the Buckfast I see are obviously based on exotic types, which isn’t surprising, as a large percentage are imported. They have a wide reputation that the next generation can be quite aggressive, with many beekeepers moving away from them and returning to locally adapted types.

You may see queens and colonies being referred to as “prolific” or “non-prolific”. It is easy to think that “prolific” is better, but in our climate it may not be. It refers to the egg laying rate of the queen, “prolific” queens laying more than “non-prolific”, so producing larger colonies. In general, the further south the bees evolved, the more prolific the queens, because the climate is warmer and more reliable, so larger colonies can collect more food. Brood is incredibly hungry, so in times when the weather is unsuitable for flying, there is no income, so the colony has to live on its store. In the British Islands and Ireland in some summers we can sometimes have periods of 2-3 weeks when there is no income. Prolific colonies can be very vulnerable to starvation in these times.

I mention the above about imports because after over half a century of handling more bees in many different locations than most beekeepers, I firmly believe the importation of bees and queens isn’t necessary and we will have a much stronger population of honey bees without them. There is a growing number of beekeepers who agree with me. What we must remember is that drones of undesirable colonies are flying, so mating with other queens and diluting the bee population for everyone.

You should be aware that some dealers may hide the fact their queens are imported, others buy a few imported queens, breed from them and call them “British raised”, or similar. Most imported types build up into massive colonies, which are very hungry, hence starvation is often a problem unless they are fed. It is a fallacy that you need large colonies to produce honey. You don’t.

The best bees for our climate are probably already here. Try to make sure yours have come from stock that has survived for several winters and there is no known importation on the female side. In my opinion the best way of acquiring your first bees and subsequent queens is through a local BKA or a good knowledgeable and experienced beekeeper, where you should have help if something goes wrong, a benefit you don’t often get when buying from elsewhere or online. There are a few good suppliers, where I have seen some excellent bees supplied. Sadly, like everything else there are some poor ones. I have seen some awful bees bought by beginners and it isn’t unknown for bees infected by notifiable disease to be sold commercially.

I have spent a bit of time on this topic because I want beginners to have the best bees available, so they have a good start. They should be docile, healthy and hardy enough to survive our winters. A dead colony is an annoyance to me, so I know it will be to someone who has only just started. Nationally, winter losses are much higher than they should be. I believe one of the reasons is that some bees don’t best suit our environment and nature is simply performing natural selection. Scientific studies show that locally adapted bees do better than those that are brought in from elsewhere. That’s what nature has been telling us for millions of years.

## **4.2 Handling Bees**

### **4.2.1 General considerations**

I believe that in some respects, bees are like any other animals – treat them gently and with respect and they will return the favour. Treat them badly and they will become defensive.

Handling techniques often have a relevance to temper, and many a colony has acquired an undeserved reputation because they have been mistreated. When attending demonstrations pay attention to how others handle bees, you will learn a lot and often it will be how not to do it!

#### **4.2.2 The bees themselves – behaviour traits**

There are two traits of bee behaviour that make handling more difficult, one is 'running' and the other is aggression. Bees that are 'runners' will not stay calm on the comb and will run all over it, often gathering in a lump at the lowest point of the frame. They are then prone to drop off and may take the queen with them, possibly falling to the ground. They are very difficult and time consuming to handle, yet can often be quite mild tempered. Unless over - smoked, they are always runners whoever handles them. The only cure is to breed a strain without the characteristic. You will find that if the bees are "runners" the queens always are, making it very difficult to find them.

'Aggression' is when bees sting deliberately, and although it can depend on handling technique, often it is a trait of the bees themselves.

Aggression can take several forms:-

##### **4.2.2.1 "Ankle tappers"**

Those that come roaring out of the front of the hive like a river of mud, rarely get above knee height, and pin your socks to your ankles. They will do this even with a lot of smoking.

##### **4.2.2.2 "Followers"**

These are the ones that still buzz around your head when you go to another colony, or leave the apiary altogether. They do not always sting but dart around threateningly, where I have known them still be a problem several hundred yards away.

Both the above in my experience will be a problem whoever handles them, although some handlers will keep control better than others. These kinds of bees should not be kept, as they will always be a problem, not only to you but to others as well. You must requeen them and sharpish, otherwise your beekeeping will not be a pleasure, possibly delaying inspections, causing further problems. If you need help to requeen a colony, then you must ask. Beekeepers are usually good at helping others.

##### **4.2.2.3 "General bad temper"**

These are in the majority of bad tempered colonies. Usually when the hive is open they sting, then back off when the hive is closed. You can either walk away or go to another colony and after a time they will leave you alone. The problem with this example is that they can easily be confused with a perfectly good colony that is badly handled.

Bees have a sting to protect their queen, sisters and stores. Some colonies are prepared to use it more readily than others. On many occasions I have handled bees for 8, 10 or occasionally 12 hours in a day with the only stings being accidental ones. It is accepted that bees sting, but it can be kept to a minimum by having calm bees and handling them well. If we keep bees that are docile, we have made a good start, and that is what responsible beekeepers will do, but when badly handled even these can object.

As already mentioned, "F2 aggression" is often the cause of bad temper, occasionally to the point of viciousness. This can be reduced by keeping decent bees.

#### **4.2.3 Stress**

Until fairly recently, the stressing of bees was not considered important and there is very little written about it in past material, but there is no doubt there are many things that put a colony under stress. Such things as poor ventilation, placing hives in full sun for long periods, keeping a colony open for a long time and food shortage all contribute to stress.

### **4.3 Opening the Hive**

It is difficult to advise on how to handle bees because it is something you tend to do by instinct, but when opening a hive attention should be given to the following:

- Bees have no hearing in the way we do. They sense through their antennae, feet and exo-skeleton. In fact, their bodies are packed with sensors, making them very sensitive to vibrations. Do not trigger off their defence before smoking, such as removing hive parts or banging something down on the roof.
- Light the smoker and make sure you have enough fuel available to more than last your inspection. Do not take the slightest bit of notice of those who tell you there is no need to smoke bees. This is extremely foolhardy in my view and can be very dangerous for the beekeeper or bystanders. If you don't want to use smoke, I suggest you still have a smoker alight in case you need it.
- On approaching a colony give a few light puffs of smoke to the entrance.
- Remove the roof and turn it upside down on flat ground or a firm stand, preferably at about 45°.
- Insert the hive tool underneath the supers at the side where the frame lugs are, but above the queen excluder. Lever upwards, so that the pressure on the frame lugs in the lower box is downwards.
- As soon as you create a small gap blow smoke into it and gently prise the gap wider continuing smoking.
- At this point you can use a wedge or small piece of wood to keep them apart if you wish.
- The supers can then be lifted and put on the upturned roof at an angle, so there is only minimal contact to avoid crushing too many bees, as you might if placing on a flat surface.
- Remove the queen excluder, but keep smoking if necessary.

You are now into the brood nest. If a colony is going to be difficult you should know by now.

For those who are working on their own and are unable to lift several supers, I suggest they are taken off singly and covered up by spare crown boards or cloths, so you have as few faces of bees exposed as possible. When a colony decides to get stroppy, they all do, even if they are separated, as it is no fun if they are coming at you from several places. Of course, you will need several things to stack the supers on, such as empty supers or brood chambers. There is no need to remove the existing crown board.

### **4.4 Inspecting the Brood Chamber**

My normal method of inspecting the brood chamber is to stand at one side of the hive with the frames running left to right, but remember I use castellated spacers, although I have assumed the reader may use metal/plastic ends, where the technique is similar. Decide which frames you need to inspect first. Raise a frame just out of the slot and pull it towards you until you feel a little resistance, so that you can rest it on the lug of the castellated spacer. Then do the same with the next frame and rest it on the castellated spacer. This will not harm the bees, but creates a good space in which to remove the selected frame without “rolling” bees (two surfaces moving close to each other rolls the bees sideways – which upsets them). As there is likely to be brood on this frame examine it carefully to see if the queen is on it. If you are satisfied she is not on this frame, rest it on its end on the ground and against the front of the hive, or use a frame rest if you wish. Examine the frames, returning them to the hive. Notice what is happening in the hive and take appropriate action if needed. Of course, if there are queen cells they will need dealing with, otherwise you may have a swarm emerge soon. Return all frames to their previous position unless you have good reason to do otherwise, by reversing the procedure used to open the colony.

NOTE. In recent years there have been problems with queens and summer supersedure is now quite common. I now recommend a full inspection of every frame, including a light shake to remove bees, so you can be sure there are no hidden queen cells.

### **4.5 Returning and Adding Supers**

Unless for a specific reason, put the supers back in the same order, smoke them all underneath before lifting, because very occasionally I have had bees nail my jeans to my legs, especially after a lengthy inspection of a “touchy” colony. In normal circumstances I put empty supers underneath the existing ones. I don't believe it makes much difference, apart from creating space immediately above the brood chamber. My main reason for doing it is that it avoids removing the crown board.



## **4.6 Use of the Smoker During Inspections**

When working a colony, I only use the smoker when necessary, gentle puffs across the frames are all that is generally needed. There is no need for the great blasts of smoke down between the frames you sometimes see, as this panics bees, making them difficult to handle. With experience you will be able to "read" the colony and will find that some bees will cluster on top of the frames without any problem, yet others will need smoking as soon as they get level with the top bars. Some colonies will need regular gentle smoking and others will need very little. It is often the case that colonies of the same type in the same apiary and on the same day will behave very differently, so you will need to make allowances for this. It is important to me that I don't get stung at all and this includes accidental stinging, which often happens when there are bees on the lugs of the frames. For this reason, I probably smoke along the lugs more than anything. It is noticeable that those who wear gloves get stung on the gloves quite a bit, because they squash bees that are on the frame lugs, simply because they can't feel them. It is important that the smoker is close and alight at all times.

## **4.7 Hive Records**

It is useful to make records and many do, which can help improve learning and efficient colony management. Records vary from a "diary" type record that is kept for interest sake up to those kept for research purposes. There are record cards and sheets available from a variety of sources and for a variety of purposes. A web search will find many, but a common problem with some is you need an honours degree in hieroglyphics to use them. It is quite easy to design your own on a computer and I find the following information useful:

- Is the queen laying?
- Is she clipped and marked?
- Are there any queen cells?
- What is the temper like?
- Comments column

That is as simple as you can get, but as an experienced beekeeper it gives me all the information I need to know. By observing the colony and "feeling" it, I can deal with any issue that arises, e.g. giving a frame of food or brood from another colony. I then record it in the comments column.

One of the problems is knowing what to record. Do you record each colony, queen, or the site they are on? I tend to favour the colony wherever it is moved to. If it is split, I leave it with the half that has the queen. My records are on a sheet that is in a plastic document wallet and left in the colony roof in a clipboard.

## **4.8 Points to Remember**

A lot of colonies are what I refer to as "British Standard Mongrels" that have widely varying characteristics, due mainly to lack of selection and tolerance of bad temper by the beekeeper. My bees are constantly assessed with poor queens being replaced, are all very similar and all behave roughly the same, although occasionally some might need slightly different treatment than others. If one of my colonies is "touchy", they usually all are, in which case I assume there is some outside influence (e.g. unsuitable weather), but if one hive is "touchy" for no apparent reason a mental note is made for possible requeening if it persists. Culling queens that head bad tempered colonies is very important in my view.

When manipulating you should be in charge, not the bees, and remember:-

- Keep your smoker alight and available at all times. I always keep mine between my knees.
- Avoid noise and banging the hive before smoking.
- Do not "roll" bees as will happen when frames are pulled out of the brood box without making enough room.
- Use slow and deliberate movements. Fast movements can invite trouble, as bees may see you as a threat.
- Avoid crashing about when manipulating.
- Do not leave a colony open longer than is necessary.
- Cover up supers that are not being inspected

I believe that the handling of bees is a natural ability, much the same as that of an artist or musician, and it just needs a little refining and common sense. I have seen many people handle a colony for the first time and do it very well, yet others are not so good, but with practice become quite competent fairly quickly. What is certain though is that habits good or bad that are picked up early often remain, so it is important that the bad ones are

discarded before they become part of your technique. Watching others at work will give you an idea of good and bad handling and will help you develop your own ways.

I can count on two hands the number of times I have walked away from a colony because it was so bad tempered that it couldn't be controlled, so that is how rarely it occurs. If a colony is that bad it will behave like that whoever handles it. The best thing to do is to close up as best as you can and retreat, there is no point trying to continue. Action must be taken quickly and if you need help you must ask for it, as the chances are you are doing nothing wrong.

## **4.9 Finding the Queen**

Being able to find a queen is very important, as there are many occasions when you need to know where she is. There is no doubt that some people are better than others, some are much better at a distance, others are better close up. If you are not very good, don't give up. Persevere and develop your own way of doing it. If you have the attitude that you can't find queens you are beaten before you start, so be positive.

Remember the following:-

- Virgin queens are much more difficult to find than fertile queens because they are smaller, quicker and behave differently, sometimes scurrying over other bees, other times still. They can be anywhere in the hive, where a fertile queen is usually in the brood area. A trained eye will fairly easily spot a virgin queen.
- Queens from hives that are "runners" will be runners themselves and could be anywhere.
- If brood combs are in good condition there will be fewer places for the queen to hide.
- A laying queen from a colony of non runners should be on a frame of brood.
- You should know if your queen is marked or not.
- It is quite common to have two queens in a hive, that happens after supersedure.
- Fertile queens will avoid the light.
- It is much easier with a single brood chamber than either double brood or brood and a half.
- You normally expect to see a queen moving, but occasionally they can be difficult to spot simply because they are still.

With this knowledge proceed as follows:-

Open the colony as already described under "**4.4 Inspecting the Brood Chamber**". Check thoroughly the comb you are going to rest on the ground to see if the queen is on it. If you don't see her, then firmly shake it over the brood box once to remove most of the bees, then have another look. Take out all the other combs in turn, looking on the dark (unexposed) side first, as fertile queens will move away from light if they can. As you take one comb out, just glance on the exposed side of the next one, as you can often spot a queen before she seeks the dark. Replace the combs and work your way across the brood chamber. If you do not find her, then work back inspecting the combs again, but putting them back in the right place.

If you are still not successful, then close them up and repeat the process half an hour or so later. If you still can't find her and you need to, then you are into more drastic measures. Get an empty brood chamber and put it by the side of your hive. What we are going to do is to split the brood frames into two groups of pairs with a gap of two frames then another pair, so that each pair has two light sides and one dark seam. How you do this is up to you, but you need to put the colony back together in the same order when you have finished. Leave them exposed to the light for a time, probably around 15-20 minutes, sooner or later the pair where the queen is will be seen to behave in a normal way and all the others should be agitated. You should have narrowed it down to two frames. When you have found her, mark her to avoid repeating the performance.

It is difficult to describe how to look on a frame for a queen as it is probably better that the individual develops their own technique. I have a quick scan over the frame, then focus on the outside edges and quickly look round the perimeter. I then scan in rough lines backwards and forwards across the frame, turning the frame over and doing the same on the other side.

## **5 SPRING CLEANING**

This in my view is one of the most important operations of the year, yet so many beekeepers ignore it. I like to do it on a nice warm day before the supers are on, preferably in early April. This is the best opportunity you will

have of checking everything. It is a good chance to make sure that your colonies are healthy, have a good queen and as you are examining all the frames it allows you to sort out the bad ones. In changing all the woodwork (brood chamber, crown board and floor) you are able to do any repairs and make sure that everything is in good condition. One of the main benefits though is that everything is clean and free of wax and propolis, which makes summer manipulations much easier. Although the bees are open for much longer than normal, they should be on their best behaviour at this time of year. Any that aren't should be noted for requeening.

Springs vary considerably, one year can easily be a couple of weeks in advance or arrears of another. If the weather is warm and the spring is early, colonies can be bursting with bees, with strong colonies bringing in a huge amount of nectar from spring flowers and trees such as dandelion and willow. If you have no supers on, this will have the effect of restricting the laying area for the queen. On the other hand, if the spring is cold and the bees are unable to fly very much, colonies may be retarded. In April we usually still get frosts and the bees may retract into semi cluster, giving the appearance they may be weak, but a few days of warm weather and they will expand again, giving a very different impression of their strength.

Just follow these simple steps:-

- Prepare in advance a clean floor, brood chamber, crown board, queen excluder and supers.
- Smoke the hive entrance and move the whole hive to one side.
- Place a fresh floor and brood chamber on the original site of the hive.
- Take the crown board off the colony.
- Scrape the burr comb and propolis off the tops of all the frames when they are still in the brood chamber.
- Transfer all combs to the new brood chamber, putting them in the same order as in the old brood chamber.
- Scrape any propolis or wax off the sides and bottoms of the frames as you go.
- Check all frames to make sure they are sound and the combs are good.
- If there is a problem with the frames or combs e.g. broken or need replacing, I press a drawing pin into the top bar to remind me to deal with it later.
- Check the brood on every frame to see if it is healthy and a good pattern. Check for presence of disease. European Foul Brood (EFB) is most likely to show up during the spring. Small amounts of chalk brood are not worth worrying about, but large amounts should be a concern.
- Find the queen and clip and mark her if not already done. Ask an experienced BKA member for a lesson in this valuable practice if you haven't done it before.
- As oil seed rape will flower shortly, I would put a queen excluder and at least one super on the stronger colonies. They can expand rapidly at this time of year, especially if there is a week of good weather.
- Put a clean crown board on.
- The original roof can be re-used if sound. If it needs attention it can easily be done later.
- Save any wax as it is valuable.

When this is done you can clean off the hive parts you have just removed. Providing they don't need repairing they can be used on the next colony. If the hive floor is of the 'reversible' type, there is no need to clean it. Just turn it over and various bugs will clean the underside ready for next year.

## **6 FEEDING BEES**

In a natural unmanaged honey bee nest there is food stored all the time, although the amount varies depending on the seasons, forage and requirements. We have a false situation in managed colonies because our bees have some of their stored food harvested, sometimes several times a year. This could put them in a vulnerable situation, where the colony can starve if the beekeeper doesn't leave enough food for future needs.

Feeding is usually carried out for three reasons:-

- To replace what the beekeeper removes
- To avoid starvation
- To stimulate the colony for such purposes as queen rearing.

## 6.1 *Spring/Summer Feeding*

This is done for a variety of reasons but most often to avoid starvation (emergency feeding), when there is a shortage of nectar coming in.

There are two reasons why spring feeding is necessary. It could be that the bees have not been fed enough in the autumn or that colonies with prolific queens (see **4.4.1 Be careful when buying bees and queens**) have turned their food into brood, which can rapidly reduce stores if there is no income. In both cases the beekeeper has control over it. I have very rarely needed to feed in the spring, because the type of bees I prefer look after their stores. I feed well in the autumn and that is enough to carry them through until the spring. Any that are short of food I make a mental note of, and if there is no reason why they are short then they are marked for requeening. Some of the older books advocate spring feeding to stimulate the queen into laying, but I have never found this necessary, and am doubtful of its value anyway.

If spring feeding is started it is important to keep going until adequate nectar comes in, otherwise the queen may be stimulated into laying more eggs, so the colony needs even more food. Careful monitoring of the situation is needed to make sure starvation isn't simply delayed.

Emergency feeding in the summer is very rarely needed for non-prolific bees, though it is often a problem with prolific ones. If feeding is needed it would be better to remove the supers, otherwise the syrup might get stored in them, so when you extract honey later in the season it may be a honey and syrup mixture.

Thin syrup at the rate of 1lb sugar to 1 pint of water is often suggested for summer feeding, but I have never used this, preferring the thicker as used for winter feeding.

You will read in some books about the "June Gap". In some areas there is a dearth of nectar in June, but apart from the odd occasion I have rarely experienced it in my area of West Sussex, although it must be remembered that due to the OSR honey having been extracted, there may not be much on the hive for a while. As already mentioned, checking for food should be done at every inspection. Bees will always use up the honey in the brood chamber before the supers, so if there is honey in the brood chamber you are unlikely to have a problem. With experience you will know how much food the colony needs until your next visit, but as a guide a cell of food becomes a cell of brood in 3 weeks.

## 6.2 *Winter Feeding*

The main reason that honey bees store honey is to see them through times when there is not enough food available naturally. The beekeeper harvests this as a crop, which, if not enough is left to ensure winter survival, has to be replaced by a suitable substitute. This is normally in the form of sugar syrup or a commercial equivalent.

Winter feeding is really done in the autumn and should start soon after removing the supers that have been returned to the bees for cleaning up after extracting. September has traditionally been considered the feeding month. The weather is still warm enough, so bees can process the food before they start to form their winter cluster (see **7. Wintering**).

More beekeeper are harvesting less honey, leaving more for the bees, so they don't have to feed. That is fine for the amateur beekeeper, but not for commercial ones who are trying to make a profit from their bees. Resist the temptation to feed cheap foreign honey, as it may transmit diseases that are notifiable here.

## 6.3 *Types of Feeder*

There are several different kinds of feeder and it doesn't really matter what you use. I think it is best for the bees if they are fed fairly slowly, so they have chance to collect pollen to store for the winter and allow their stores to be sealed. Make sure feeders are kept in good condition and don't leak. Store plastic feeders in the dark, otherwise they may become brittle and crack.

### **6.3.1 Frame feeder**

These are designed to replace a frame in the brood box. They are hollow and usually have a float to prevent bees drowning. Many beekeepers own them, but few use them, unless for emergency feeding, as they don't hold very much food.

### **6.3.2 Plastic Bucket Feeder**

As the name implies, it is a plastic bucket, but with a circle of fine gauze in the lid. The bucket is filled, then the lid attached. It is inverted over a container to take the syrup that drips out until a vacuum is formed, then placed over the hole in the crown board. The bees suck the syrup through the gauze. It is useful to have a few of these, but there are problems, such as the bees propolising the gauze and the plastic degenerating.

### **6.3.3 Large Feeders**

These may be large enough to fit over a whole hive or a bit smaller to fit inside an empty super. There are different types, with "Miller" and "Ashforth" being common designs. For the amateur beekeeper I think they are very expensive, considering they are only used for a week or so each year. They are probably ideal for commercial beekeepers, as there are less visits needed to complete feeding.

### **6.3.4 Rapid Feeders**

There are a variety of these including round and flat tray types (Miller and Ashforth are rapid feeders too). There is usually a round tube or ramp that bees come through that has a cover to prevent bees drowning or escaping. These usually need an empty super over them. I think they are ideal for the amateur beekeeper, being inexpensive, easy to clean, can be filled without disturbing bees and if a good design can be stacked to save space. For amateurs, I like the round ones that hold about 2 litres. I suggest buying as an essential with your first hive.

## **6.4 *How to Make Syrup for Winter Feeding***

Many beekeepers find making syrup a chore, to the point where they buy expensive ready made bee food, but I think it is very easy. Traditionally winter syrup has been made using 2lbs sugar to 1 pint of water, which in metric measures neatly equates to 4kg sugar to 2½ litres of water. It is not an exact measure, as the bees will process it to suit themselves.

I use a plastic bucket with a pourer on the top lip. Put the water in first, which can be cold, but the sugar will dissolve quicker if it is hot. Put one 1kg bag of sugar in and stir with a stick until almost dissolved. Then do the same with another, then another. If you put all the sugar in, then the water, it is much harder work to stir. I have a couple of these on my kitchen floor and give a stir every time I pass, so it soon dissolves.

The syrup can then be taken to the bees and feeders filled up without spilling. If you have contact feeders all you need is a spare feeder that you can fill up and replace the one on the bees. Don't forget to smoke them though.

Bees get excited when first fed and this may start 'robbing' – bees raiding each others' hives for food. Make the first feed at dusk to avoid this, as they will have quietened down by the morning. Any subsequent feeding can be done during the day, but if they have finished, then you need to do it in the evening again.

In general, feeding is done when there is little or no nectar coming in. There are usually bees and wasps looking for a free supply, that could be your hive. Make sure there are no holes for them to gain entry into the hive and that feeders don't leak. Make sure entrances are closed down to a couple of inches or so.

In recent years ivy has yielded very well in the autumn, often continuing after the bulk of the feeding has been done. It has the drawback of granulating rapidly. Although we are told to get our feeding completed early, I think there is a case for feeding lightly when there is ivy nectar coming in, so the bees have a chance to put some liquid stores in amongst the granulated. When honey granulates, water is forced out of the crystals and into the gaps between the crystals, so the only way bees can render it down is with fairly large quantities of water. If they are unable to source water, they can starve with plenty of food if there are no liquid stores within reach.

## 6.5 *Candy and fondant*

Some books, especially the older ones, will mention feeding candy. It has always seemed to me that this is an emergency measure and I have rarely done it. If bees have a food shortage, they need food immediately and candy should be put directly on the frames above the bees with an empty super over it. Bakers fondant has become a good substitute for candy. This is usually sold in 12.5kg blocks and a good way of dealing with it is to cut it up and put in plastic bags, then put a few slits in the bag with a sharp knife and place over the frames.

## 7 **WINTERING**

For the purpose of these notes I am defining wintering as the time between removing supers at the end of one season until they are put on again at the start of the next. It is the art of ensuring that the bees are able to survive through the winter until they are able to maintain themselves again. We are dealing with a long period that is more important than the active season. Putting something off because “they will be alright” could mean a dead colony.

### 7.1 *What bees do Naturally to Over-Winter*

We keep our bees in hives, which is a very different situation than they have naturally. We treat them in a very different way as well, giving them substitute food and medications. In a hollow tree, with their nest several feet from the ground, bees are sheltered and with the thickness of the wood the temperature will not fluctuate as much as in a fairly thin walled hive. In order to achieve successful wintering, it is important to understand what is happening in the colony. Bees instinctively prepare for winter, organising their brood nest so they know where everything is. Often the beekeeper disrupts their work by moving frames, so we should be working with our bees, not against them.

In a natural situation a colony will build their nest starting from the roof of the cavity, that is usually in a tree and build comb downwards. Food will always be stored above or behind the brood away from the entrance. In the spring and summer as honey is stored, the brood nest is forced downwards and in the winter it moves upwards as the food is used. There are two main reasons for this, firstly it is easier to defend, and secondly when bees are clustering in the winter, they can easily move onto fresh food without having to overcome any obstacles. A natural nest is normally much higher than it is wide.

In the summer, in a hive with several supers on, the shape is very close to a natural nest, but in the winter when supers are removed the nest is very much shallower, forcing the bees to store their food at the sides, with much less than normal above them. In periods of prolonged cold weather this can cause them problems.

The income of nectar between about the middle of August and the end of April in most years is below the amount the colony consumes, so it has to survive all that time on what they store. There are exceptions such as districts with nectar sources like heather, ivy or water balsam.

It is generally accepted that native bees have evolved to deal with our harsher winters better than most of the imported races, consequently they winter differently. The individual bees live much longer, so there is no need for the queens to lay throughout the winter to replenish losses. This allows them to survive on less food. They are able to store more faecal matter, so dysentery and the possible spread of *Nosema apis* is lessened. They cluster differently, forming smaller and denser clusters. These are important points that most books don't mention. The more prolific bees will still have lots of brood in September and October and may well continue brood rearing throughout the winter. All this does, is turn food into unnecessary bees, so often I have seen colonies starve in winter or early spring with several combs of brood. An added problem with brood in the winter is that bees won't leave it, so if the food runs out on the frames with the brood on in cold weather they will not move to fresh food. This is a pity because not only has a colony been lost, but so has all the food it was given and next years crop. A great disappointment for a beginner.

### 7.2 *Preventing Damp and Vermin*

If you prepare well in the autumn, you should be repaid with good strong colonies in the spring ready for the oil seed rape crop. Bees naturally live in trees several feet above the ground and providing they have enough food and a good queen they should survive all but the coldest winter. Beekeepers provide them with a home that is much nearer the ground than they would normally have. That introduces two problems for them, damp and vermin, both of which they need help to avoid.

Damp can be overcome by clearing vegetation from around the hive, giving a free flow of air and making sure that hive roofs don't leak. In order to keep the inside of the hive dry there should be some through ventilation to take away the damp air that is created by the bees. I remove the cover from the feed hole in the crown board sometime around the end of October or early November, replacing it at the middle/end of February. I have seen some very mouldy combs in the spring due to poor ventilation that can be easily reduced. Damp is far more of a problem to a colony than cold.

It is noticeable that colonies with open mesh floors are dryer than those with solid floors.

Mice and woodpeckers are the only vermin that cause problems. See **8 PESTS**.

### **7.3 General**

Although there are things that can go wrong during the winter, there is little to do until February or March, apart from occasionally checking that all is well. Make sure hives have not been knocked over by animals and roofs, especially on WBC hives, haven't blown off in the wind. It is worthwhile hefting (lifting to feel the weight) the hives every 4-6 weeks estimate the weight of the stores remaining. Experience will tell you what the hive should weigh, bearing in mind its weight without bees in it. Don't forget that older combs weigh more than new ones, due to the accumulation of larval skins that every generation of brood deposits on the inside of the cells.

With crown boards that have an elongated hole that is intended for a Porter bee escape, it is helpful to put them on the colony with the slot at 90° to the frames. When the weather is cold and the bees are tightly clustered this allows you to see if there is sealed food on several frames. If you put it on parallel to the frames you often find it covering a frame and you can't see anything. All the time you can see sealed stores and the bees are well away from the hole all will be well.

If you have made sure that your bees have a low level of disease, a good queen, enough food and a dry mouse-proof hive, they have the best chance of surviving to see the spring. Losses in a normal winter should be less than 10%, but with the arrival of varroa, *Nosema ceranae* and the queen problems mentioned later, this figure may well be higher.

If a colony needs feeding, then candy or fondant is more suitable if the weather is still cold, but once the bees have broken cluster and are active I prefer syrup. It could also be helpful to use frames of food from colonies that can afford it.

## **8 PESTS**

### **8.1 Mice**

Mice are only a problem in the winter when bees are inactive. They will come in the front entrance and make a nest in the brood chamber, destroying some of the combs and disturbing the bees. Either pin metal mouse guards (available from appliance dealers) on the front of the hive with drawing pins, or if you use wooden entrance blocks, make sure that the cut-out is less than 5/16" -8mm high, or if it is, then drive a row of small nails into it so that you have the same gap between the nails. Do not use anything that will scrape pollen off bees legs, such as bits of old queen excluder. As a guide, if you can only just get a standard pencil through the gap then it should be small enough. This should be done any time up to the middle of November, after this the bees could be in cluster and unable to defend their home and you could imprison a mouse. Mouse guards can be removed at spring cleaning time. Occasionally the entrances can get blocked with dead bees so clear them on a cold day.

### **8.2 Woodpeckers**

Green woodpeckers (yaffles) can be a problem anywhere, not only in woodland, where they are treating your bees as a food source. They prefer single walled hives with machined hand holds, where they detect the thinner wood, but will still go for hives made with solid boards such as modified nationals and occasionally double walled WBCs. Cages can be made of chicken-wire, but these are difficult to store in the summer. The best I have found is DPC (damp proof course) or heavy gauge plastic sheet pinned around hives with drawing pins to prevent the

birds gaining a foothold. Unfortunately, a woodpecker will make a large hole in a few minutes, so any damage will be serious. They have long memories and once there is a problem in an apiary you must continue protection.

### **8.3    *Ants***

Can be a nuisance running over the crown board, but are not really a problem to the bees. I have seen them get inside a hive on several occasions. A sprig of mint on the crown board often repels them. Renew it on every inspection until they are no longer a problem.

### **8.4    *Wasps***

Can be a problem later in the season, when there is more need for carbohydrate, rather than protein they need earlier. Over the years I have seen many hives completely robbed out and destroyed by them. Keep your hives strong and the entrances small from early August onwards, so the bees can easily defend them. Block all gaps in the hive and make sure wasps can't gain access to feeders. Wasps will get through smaller gaps than bees can, will fly in much colder temperatures and individually are tougher than bees.

### **8.5    *Wax Moth***

There are two of these and they are both easily managed without the use of the chemicals that are often advised. They are only a problem if they are allowed to be. It should be remembered that combs keep better when they are covered with bees, so keep them on the hive if you can. A week or so in a deep freeze will kill all stages of both wax moths. Many older books advocate the use of PDB (paradichlorobenzene) crystals, but these have been withdrawn due to residues building up in beeswax.

#### **8.5.1    *Greater Wax Moth***

These are really only a problem in combs that have had brood in. It should be remembered that in the wild if a colony dies out then greater wax moth very quickly destroys everything including disease, so they actually do some good. This can be a real pest if allowed to get out of hand and they will quickly destroy brood combs if they are left in a warm place.

I suggest the following:-

- Make sure that you don't allow the queen to lay in super combs.
- Any brood combs that need replacing should be rendered down as quickly as possible after being removed from the hive.
- Don't stack brood combs tightly together. In warm weather they will rapidly become one solid mass of cocoons and the larvae will make a mess of the frames and boxes.

#### **8.5.2    *Lesser Wax Moth***

Many books will tell you lesser wax moth only attack comb that has had brood in, but don't believe it! They will also attack virgin comb and that usually means supers, although they are not as destructive as greater wax moth. Rotate your supers, so that they are used at least every other year and you should have no problems. Even combs that appear to be in poor condition will be quickly repaired by a strong colony if the midrib is still intact.

### **8.6    *Beekeepers***

Think about it from a bees' point of view. You are very fond of your mummy and as a team member you work very hard for her and the rest of your family. You get your home ripped apart by some ham fisted idiot that hasn't a clue what they are doing, anything about your lifestyle or contribution to the food chain. Instead of treating you gently with respect and moving your furniture quietly they clatter and crash about making a dreadful din, then annoy your sisters by rolling them together when ripping frames out of your brood chamber. Us bees have a way of telling people that we don't like being mistreated, and when these clowns have a bit of their own medicine they don't like it, throw our home back together quicker than they ripped it apart, and we get the blame!!



In case you think the above is a bit flippant, I'm afraid that I have seen some dreadful treatment dished out to bees. Yes, some beekeepers can be classified as pests. Make sure you aren't on the list. Treat bees with care and the respect they deserve.

## 9 DISEASES

There is a modern attitude of what I call "over sanitised beekeeping" (you can say that about life as well) where some people are paranoid about disease, and tell you that you must sterilise everything in sight after opening each colony, and imply that you are a bad beekeeper if you don't. I believe this is likely to give some beekeepers the impression that if they follow this advice their bees won't get diseased, therefore they don't have to look for it or need to recognise it. It may also drive some people away from starting beekeeping by making them think that every colony is riddled with disease - it isn't. Yes, there are diseases, and yes, they need understanding and managing, but if you have one diseased colony, either your own or in the vicinity, you won't prevent it spreading to the others by disinfecting everything in sight. I fully accept that sensible procedures should be followed, but I don't think this is one of them.

In my view the sensible thing is to learn about all the diseases, which is probably best done by consulting the booklets that are published by NBU. They all have good photographs and information. You will need to recognise those diseases that are liable to kill a colony, know how to lessen the chances of getting them by sensible means, and know how to deal with them if you do get them. You should be able to identify them all, as some can be confused with other more serious diseases. I suggest that the best approach is to know what a healthy colony looks like and check out anything that looks suspicious.

You may occasionally need to use medications, in which case you should fully understand the instructions and adhere to them. Bees are classified as food producing animals and there is currently a legal requirement to record any treatment. You would be best advised to seek guidance on this matter, as legislation could change, that may date these notes.

### 9.1 *Varroa*

If you live in an area that has varroa, then your bees have got it, even though you may not see mites. I think it is essential that beekeepers learn the life cycle. *Varroa destructor* is a mite that parasitises both brood and adults by consuming fat body tissue. Varroa has certainly changed beekeeping forever, and it must be managed properly as it can quickly kill a colony, probably as a result of the viruses it vectors. It should be monitored regularly in order to know the mite levels. There is absolutely no point in treating colonies unless you know when to treat, or what effect the treatment has had.

I will not give advice on chemical treatments, as this could change due to such things as resistance or the introduction or withdrawal of substances. Under no circumstances should you prepare your own or use substances that are not registered, as it is an offence to do so. It is accepted that chemicals are available on the internet, but you should make sure they are registered for use here. Please bear in mind that we are dealing with a foodstuff and experimenting without specialist knowledge could be dangerous. In the vast majority of cases, chemicals leave detectable residues and if your honey is sampled and residues of unregistered substances are found you could be prosecuted.

There are softer options including IPM (Integrated Pest Management) techniques, and these will probably be relevant for some time to come, with the addition of new ones. These are fairly simple methods that can usually be performed by any practical person and are relatively cheap. The treatments and techniques you should be aware of include:- Drone brood culling, open mesh floors, brood break, shook swarm, artificial swarm, thymol preparations, sugar dusting and organic acids. These and others are well known and information should be obtainable from NBU.

Varroa levels should be monitored and kept as low as possible. The two crucial periods are spring, as you don't want colony build up to be hampered and autumn, as any bees that have been parasitised will have a shortened life, thereby affecting the wintering of a colony. For these reasons any treatment should be done as early as possible. For further information see the NBU booklets or website.

Varroa acts as a vector for other diseases, especially viruses such as Deformed Wing Virus (DWV), that were previously present, but no problem, as they were kept to a manageable level naturally. If you see worker bees with short stubby wings, then you have got a high level of varroa and your colony needs treating.

Varroa probably came here on bees and is one good reason why it is not good practice to use imported bees or queens. Varroa must have a host, so an empty hive will not be contaminated.

There are encouraging signs that some bees are developing resilience to varroa. Some beekeepers are finding they can reduce or eliminate the reliance on chemical treatments. This does need some knowledge and experience though, otherwise a colony could be lost. Until that point is reached, I suggest treating with thymol in autumn as a minimum.

It is fairly certain that the reduced success rate of getting queens mated is partly due to complications caused by varroa and/or its treatment.

## **9.2 Foul Brood**

### **9.2.1 European Foul Brood (EFB)**

A notifiable disease that is more common than it once was. Signs are seen in unsealed brood.

### **9.2.2 American Foul Brood (AFB)**

Also a notifiable disease. Signs are seen in sealed brood.

Both Foul Broods are unrelated bacterial diseases and are killers of colonies, although EFB appears to come and go, and may take some time to kill a colony. There is a very useful booklet that is published by NBU. called "Foul Brood Disease of Honey Bees: Recognition and Control". Read it and look at the very good photographs of both healthy and diseased brood. I quote from it "The beekeeper is the chief spreading agent of the disease". They can both be spread in similar ways, one of which is the dispersal of contaminated equipment. In England and Wales, we have a very efficient bee inspection service, something many other countries don't have. It is known that a lot of imported honey is infected, which is why it is inadvisable to feed honey from an unknown source.

Both EFB and AFB are extremely rare, so the vast majority of beekeepers will never see them, hence the danger. In fact, the vast majority of foul brood is detected by Bee Inspectors, not by beekeepers. It is always important to know what healthy brood looks like and question everything that looks different, so if you think there is a problem you can't handle then seek advice. Early detection is important before it spreads to other colonies in the area. It is much easier to detect foul brood if the bees are alive and have brood. Empty hives that are acquired from an unknown source would be better if scorched out with a blowlamp, and any combs burnt.

There can be a build up of bacteria in the combs before something triggers off the symptoms in a colony, such as stress. For this reason, it is advised to renew brood combs on a regular basis.

## **9.3 Chalk Brood**

A fungal disease that infects the unsealed larvae. Despite a lot of research, we still don't know much about it. Being a fungal disease, it is usually worse in damp conditions. Poor nutrition may also be a factor. On occasions it can be confused with EFB.

Bad cases may be improved by re-queening. Not normally a problem and not often a killer of colonies. I did notice in the spring after wintering bees on Open Mesh Floors (OMFs) for the first time that those colonies on OMFs (about 50% of the total) had little chalk brood, yet those on solid floors did, some quite badly.

## **9.4 Nosema apis and Nosema ceranae**

A protozoa that infects the gut of the bee that inhibits the digestion of pollen. Probably every colony has a level of *Nosema apis*, but most can keep it to a manageable level themselves, providing sensible precautions are taken by the beekeeper. Worker bees that are unable to fly are forced to defecate within the hive, leaving spores behind for other bees to clean up by ingestion. This quickly spreads the disease that is much more of a problem in prolonged cold damp winters when bees can't fly. Native bees are apparently able to store more waste material in the rectum and will fly at lower temperatures than most imported races, so are less susceptible.

In 2007 it was discovered that *Nosema ceranae* had entered the U.K. and was widespread, suggesting it had been here for some time. In fact, stored bee samples in the US were tested and it was discovered that it was present 20 years before being found. It appears that it jumped species and is much more virulent than *Nosema apis*, doesn't have the same signs, and behaves differently. Little is known about it and under a standard microscope it is almost impossible for the untrained eye to tell it from *Nosema apis*. As it is a new species it is unlikely there are any resistant bees, but that is something we will find out over time.

## 9.5 Acarine

A mite that infests the breathing tubes (trachea) of the worker bee. It is known as "tracheal mite" in the U.S. Once again probably every colony is infected, but I have only ever seen a handful of colonies with a serious problem and they were all headed by recently imported queens. The native types of bees are less susceptible to acarine disease because their body hairs are longer and it is more difficult for the acarine mites to enter the trachea. Like nosema, acarine is more likely to be a problem after long periods of inactivity.

Acarine was blamed as being the cause of the "Isle of Wight Disease" that was a malady that affected colonies in the early years of the 20<sup>th</sup> century. In the early 1960s it was shown this wasn't the case, but it is still perpetuated in poorly researched writings.

## 9.6 In general.....

I do not wish to be dismissive of diseases, but we must be realistic. Self help in the form of sensible measures will be useful. If you keep the right sort of bees (e.g. native bees) then acarine and *Nosema apis* should not be a problem. Chalk brood can be improved by keeping the colony dry, and requeening if the problem persists. If you keep on top of varroa and follow current advice it is little different than worming a dog or cat. You should be able to recognize both foul broods and contact the Regional Bee Inspector (RBI) if you think there is a notifiable disease present. You have done all you sensibly can, but please don't think the country is riddled with disease, it isn't, but it will be if nobody can recognise it and don't act quickly.

With the arrival of *Nosema ceranae* I suspect we may need to do more microscopic examinations, which can be done by BKAs.

## 10 MOVING BEES

A new beekeeper will probably need to know how to move their newly acquired bees very early on and will be keen to do it, so it is important to know enough to move them without problems. During summer, honey bees normally fly a distance of up to about 1½ miles from their nest, although on occasions they will go much further, in winter it may be only a few hundred yards. When returning home, they can locate their entrance with incredible accuracy, considering how far they may have flown, so when they are moved within their flight range, they will return to their original site. There is an old rule for moving bees in good flying weather of 'Less than three feet, or more than three miles', the latter because their foraging routes may overlap. In good flying weather, if a hive is moved three feet early in the morning, the returning bees will fly around the original position. A few bees will discover the new position, land near the entrance, raise the tips of their abdomens and start fanning their wings. At the end of the abdomen is a lighter coloured band, which distributes a pheromone that is produced by the Nasonov (you will find several spelling variations) gland. Americans term it a "come hither" pheromone, which I think is a good way of describing it. The fanning aids the distribution of the pheromone to attract the returning flyers to the new location. By the end of the day, probably in only a few hours, the bees will be returning to the new position, with few flying round the old, to the point where you wouldn't notice the hive had been moved. If you move that same hive more than 3 miles away, then after, say, a week or two, it was placed three feet away from the original in the same position as the earlier example, a slightly different thing will happen. The bees that were flying when the hive was moved will fly back to their original position, then relocate as described earlier. Those that have started flying since moving will not recognise the old position, so will orientate to the new position and come back to that. In my experience, it takes about 3 weeks before bees forget an original position. What I have just described is the basic information needed for moving bees.

If you acquire your bees locally, then measure the distance. Remember this should be in a straight line, not by road! If it is more than 3 miles, then move them directly. If they are moved less than 3 miles you will probably lose some of your flying bees if moved directly, those returning to the previous location will go into other hives. Your colony will quickly regain strength. This is not ideal, but if you have no alternative, then it will have to do. There are a few things that are often advised, such as putting vegetation in front of the hive after moving, but I have never found them satisfactory, although probably worth trying. You could leave the hive until the winter,

then move them, but you will have to travel to manage them. If you don't want to lose any bees, then move them right away to a temporary site where you can leave them for 3 weeks, then move them to their new location, providing of course that it is more than 3 miles away from both locations. This means moving them twice.

For shorter distances, perhaps on the same property, experienced beekeepers know what they can get away with and have a few tricks to avoid problems, but I think it advisable for an inexperienced beekeeper to be more cautious and stick to the 3 feet rule. The ideal situation is to place hives where they are going to stay, but it is common for beginners to place hives in a position that may not be very suitable, such as in full sun or the flight line causes a nuisance.

If bees are moved a journey of say an hour or less by road, then all that is needed is to close the entrance with the entrance block or something like grass or sponge and tie or strap the hive securely and gently move it. If the journey is longer and the weather warm, they will need different treatment. A screen board in place of the crown board to give ventilation, so preventing over-heating is advisable. Water poured on the screen board will help the bees to keep cool. Hives with OMFs shouldn't need further ventilation. I have seen colonies die due to the temperature rising, the wax becoming soft and the combs collapsing. This can happen very quickly, as the combs become very pliable well before the temperature reaches the melting point of beeswax, so be careful. Seek advice if you need to. For the journey, in my experience there is no need to have frames orientated in the direction of travel as often advised. Place the hive in the vehicle so it is easiest for you. Obviously drive carefully, with no sharp braking. Close hives up when bees aren't flying, either early morning or late evening and release them when they have been unstrapped.

## **11 COLONY INCREASE**

The natural way that honey bees make increase is for the colony to swarm. All they are doing is replacing losses to maintain a stable population. Very simply, what happens is the existing queen and a proportion of the bees fly from the nest to find another home, but not before making provision for a new queen to replace the old one. I won't give any more than brief details here because the swarming process needs to be fully understood. It isn't as straightforward as some think, as there are differences of opinion, even by experienced beekeepers. I give my version that is based on over half a century of observation. The timings I give are for what happens when conditions are ideal. They may be slightly different than seen elsewhere, but I always work on the cautious side, because we are dealing with biology, that has variations. Delays are usually weather related.

The first visual sign of a colony preparing to swarm is the laying of eggs in queen cell cups. Several are laid in succession over as much as 6-7 days. I will assume the first egg to be laid is the most advanced at all stages, but that may not be the case. After 3 days, the eggs hatch into larvae. They are fed heavily, then after a further 5 days the cells are sealed for pupation. Assuming that everything is in the right condition, including the weather, this is the trigger for a swarm to issue, so about 8 days from the laying of the first egg. A swarm contains the queen, some drones (males) and workers, up to about 70% of them young bees that have never flown. They cluster in the well known ball in a convenient place, such as a tree branch. For several days prior to swarming, scouts are sent out to seek a new home. As soon as the swarm (called a "prime swarm") has issued it is completely independent of the parent colony.

Left behind in the parent colony is the brood, remaining bees and developing queen cells. When the first queen emerges, about 7 days after sealing, one of two things happens. She could, perhaps with the help of the workers, destroy all the remaining queen cells, get mated and take over the colony, or she can take off with another, smaller swarm (called a "cast"), leaving the next queen to emerge to take over the colony.

All swarm control methods are designed to disrupt the process I have just described. In studying the many methods available, it is important to understand what they are trying to achieve. Just doing things with a "beekeeping by numbers" approach may end in failure.

Beekeepers usually make increase in a managed way, which with a little knowledge is easy to do. Increase can be either by obtaining swarms that have clustered as described above or by splitting other colonies within your own apiary and giving them a queen or a means of making one. Although it is always possible to buy bees, it is much more interesting and satisfying to do it yourself. Once you have bees, there is no need ever to buy bees again.

## **12 YOUR HONEY CROP**

I say “your honey crop”, but I think the bees might have a right to think it’s theirs. They are the ones who have worn themselves out collecting and processing it. They know exactly what they are doing, because they have been doing it for millions of years, yet beekeepers seem to think they know better. The majority of bees that have contributed are probably dead, but they have collected and stored it to ensure the survival of their successors, not us.

We call it our crop because we provide a home for the bees and manage them to suit us, not always with their needs in mind. I’m sure bees don’t mind sharing their honey with us and I’m sure they will feel better if they knew we are going to look after it. Careless handling and storage can ruin honey. Try not to spill it, spread it on everything that has a handle on it, overheat it or allow it to ferment. All of these things can be avoided, but on behalf of the bees please remember the hard work they have put in for you to waste.

### ***12.1 Colonies can be worked for :***

#### **12.1.1 Extracted Honey**

Most beekeepers work their bees for extracted honey, where the combs are uncapped and the honey spun out of them and stored, usually in bottles, or in bulk in food grade honey buckets for bottling later. This method needs several items of specialist equipment, with most of the notes in the rest of this section relevant to extraction of honey.

#### **12.1.2 Comb Honey**

This is where the honey is eaten in the comb. Formerly “sections” were used, which were small wooden boxes that had a sheet of foundation inserted in them the bees drew out and filled. These have been largely replaced with cut comb honey, which uses a standard super frame fitted with unwired foundation the bees draw out in the same way, but the whole comb is cut out of the frame, then cut into pieces. An advantage of this is there is no extracting equipment needed, but storage is much more difficult as it will have to be kept in good condition after harvesting. The combs are taken from the bees as soon as they are fully sealed, otherwise the cappings will become “travel stained” by the bees walking over them.

### ***12.2 When to Harvest***

Since the arrival of oil seed rape (OSR) as a crop it has become necessary to extract honey at least twice a year, once when the OSR is predominately green, and again for the main crop at the end of the season, say the third week in August at the earliest. The reason why OSR honey is extracted early is because it granulates very quickly, and it would be solid in the combs if left for very long. It would then have to be melted out of the combs, which is very time consuming and may damage the honey.

### ***12.3 Removing Honey from the Hive***

When removing honey from hives it should never be left exposed outdoors, otherwise bees and wasps will soon find it, so make sure that you get it into a bee proof room as soon as possible. Bees and wasps that find a source of honey go back home and tell their colleagues and within minutes there can be a severe problem. They seem to know when the source is cleaned up, but if it is taken away they search for it and become a nuisance. If bees do find honey left in the open, then take it away and put a small amount on something like a plate, spreading it as much as you can, and when they have cleaned it up they should be satisfied and leave you alone.

Do not leave windows, doors or ventilators open where you store and extract your honey, otherwise you will soon have some unwanted help. Do not collect up bees and put them outside, otherwise they will go home and tell their team mates where their honey has gone. Killing a few will often prevent a huge problem with a much higher death rate.

There are usually two ways of removing bees from supers, shaking and clearing. In both instances you need something to catch the drips of honey. This could be a metal or plastic tray that you can stand supers in, such is sold in garden centres, or failing that a piece of heavy gauge polythene pinned to the underside of a super is as good.

There are chemicals available for clearing bees from supers, but I prefer not to use them.

### **12.3.1 Shaking**

Take an empty super to the colony and make sure it has something underneath to catch the drips of honey. Smoke as normal. Break the seal and lift the top super making sure that you lever down the frames in the super below. Remove the crown board. Remove each frame and shake the bees off them on to the ground in front of the hive. This can be done easily by holding the frame by the lug with one hand, then thumping this hand with the other hand. Any odd bees can be flicked off with a thin green twig that has had the leaves removed. This is much better than a bee brush. Place this frame in the empty super and cover it up immediately with a cloth or spare crown board, then repeat until all the supers are cleared, using the empty supers from the hive to take the frames from the next super. Any empty frames can be left in a spare super in the apiary, but make sure there is no honey at all in them, otherwise the bees will find it and might start robbing

### **12.3.2 Clearer boards**

A crown board with an elongated slot and clearer board are the same thing, so don't be confused.

There are two basic types of clearer board that both work on the same principle. They are flat boards that are placed between the supers and brood chamber, so divorcing the bees in the supers from their queen. In the board there is a mechanism that allows bees to communicate, so the bees in the brood chamber can tell those in the supers they have a queen. Bees in the supers can go through the mechanism, but not return, so clearing the supers of bees.

One type involves a small gadget that has non return springs inside. These are called Porter bee escapes (available from appliance dealers) that fit in the elongated hole of a crown board. All the time they are working they are fine, but if they are left on the hive too long the bees propolise the springs up, so they don't work. For this reason they should be removed with the honey, otherwise if left in the crown board the bees block them with propolis.

A better and quicker option in my view is what is known as either the Canadian or New Zealand style board, of which there are many designs, all with the same principle and using no moving parts. It is a flat board with a maze in it that is covered with gauze, so that, once again, bees can go down into the brood box, but can't easily find a way back up into the supers. Some are available from dealers or they can easily be made from scraps of wood and plywood.

The operation of all clearer boards is the same. All that needs to be done is to remove the supers, put on the clearer board and replace the supers. After several hours the bees will go down through the escape and leave the supers relatively free of bees. I find it makes things easier if at this stage each super is removed and rotated 180°. This breaks the seal and lets the bees clean up the honey that is exposed when the brace comb between the frames is broken, reducing the mess when extracting. There are however a few points to watch when using clearer boards. If there are any gaps above a clearer board e.g. between supers, bees and wasps will soon find them, and as the honey is unguarded you will lose it very quickly. The Canadian or New Zealand board clears bees quicker than Porter spring escapes, 4 hours or less as opposed to 24, but the bees will find a return route fairly quickly. They don't work quite so well with a queenless colony in cool weather.

If you leave supers on the hive too long with no bees in, they will get cold, so get them inside as soon as you can and keep them warm, as cold honey is much more difficult to extract.

## **12.4 *Extracting the honey***

### **12.4.1 What you need**

This can be an area of great expense, together with a possible storage problem. Bearing in mind that most extracting equipment is only in use for a few days a year, it might be useful to seek alternatives and improvise, perhaps share with someone, or borrow from your BKA. It is now illegal to sell honey that has been in contact with anything other than stainless steel or food grade plastic, so be careful if you are buying second-hand extracting equipment.

The equipment normally required is:-

#### 12.4.1.1 Tray for the cappings

When you uncapping the frames prior to extracting you will need some form of container for the cappings to drop into. This will need a support to rest the frame on. For those with only a few hives, this could be a tray or large dish, although this can be messy and wasteful. For those with more honey (and money), there are a number of unheated uncapping trays available. Have a look at them before buying to make sure the quality is good and they suit your purpose.

In the past the heated “Pratley” tray was popular, but they may damage the honey by overheating it. These are freely advised in older books and may be available second hand, but should be avoided, unless you want to use the honey for cooking.

#### 12.4.1.2 Uncapping combs

There are several of ways of doing this. Traditionally a knife was used, but you can use an uncapping fork, which I find very slow, an uncapping roller that has spikes on, which pierce the cappings, but allows a lot of wax to be strained out later, so clogging strainers or a heat gun that melts the cappings. I find an uncapping knife suits me the best, as all the other methods have more faults. It is much quicker too.

The type of knife is down to personal preference. A bread knife or similar is perfectly adequate for those with a few hives. I have always used the “Granton” knife that is available from appliance dealers and so good that I have never needed to seek alternatives. A serrated knife is much easier to use than a flat one and it should of course be kept sharp. There is no need to heat knives in hot water as you will see in some books. As the blade is thin it quickly loses heat when in contact with the comb.

#### 12.4.1.3 Honey Extractor

For an item that is used once or twice a year it is not worth spending too much money on a honey extractor, as it will have to be stored for around 360 days a year, the smaller the better – or borrow one from your BKA. The vast majority of beekeepers will easily get by with a 2, 3 or 4 frame extractor, but for some reason some seem to think it is a status symbol to have a great big gleaming electric driven machine. Even when I had 130 colonies, I only had a 6 frame hand extractor. There is now appearing some imported extracting equipment, and I have to say as an engineer that some of it is quite good, but some is rather poorly designed and made. Be careful when examining an extractor and make sure that your frames will fit, as some of them will not take B.S. brood frames, which although not usually extracted from, may need to be on occasions. Some extractors are very tall compared to the size of the base, so are likely to be unstable in use.

#### 12.4.1.4 Bottling Tank

These are sometimes referred to as “ripeners”, especially in older books, although they do not ripen honey. Honey when extracted has air beaten into it and if bottled immediately, froth will appear on top of the honey in the bottles. For that reason, we usually use a bottling tank and allow the honey to stand for a few days to allow the air bubbles to rise to the surface, allowing clear honey to be bottled.

Clean the bottling tank out so that it is dry and spotless, making sure there is no fluff from your drying cloth. The honey needs to be strained into the bottling tank. There are purpose made metal strainers available, but the old fashioned method of using a strainer cloth is more than adequate. Take a piece of fine mesh nylon curtain material and lay it over the top of the tank making a slight depression. Take a piece of baler twine or strong cord and tie it up so that you have a loose circle. Then put it over the cloth and use something such as an old spoon or stick to make a turnkey and tighten it. When it gets clogged with wax pieces from uncapping, simply remove them, then wash the cloth. Butter muslin or cheese cloth get “tired” when washed several times and separates allowing large particles through it.

### 12.4.2 How to do it

#### 12.4.2.1 Uncapping

When uncapping, you can save yourself a lot of winter work by cleaning the frame at the same time. Stand the frame on end and run the uncapping knife down the top and bottom bars to clean off the brace comb and

propolis. If the wires from the foundation stick through the bottom bar it will hinder cleaning and blunt the knife. Take the opportunity to push them back between the bottom bars, so you don't have a problem next year. I want most of my honey to go through the extractor rather than the uncapping tray, as it takes less time. For this reason, I like to keep my super combs in good condition and now is the best opportunity to prepare for next season.

To uncap, rest the end of a lug on the cross bar of the tray, dish or uncapping tray with the bottom bar towards you. Tilt the frame towards the side being uncapped, then cut upwards with a firm sawing motion so that the slice of cappings falls away from the cut surface of the comb and into the tray, trying to get it in one piece if possible. It is much easier to uncap combs that are flat than those that are undulating, with holes and brace comb, so if you leave a nice level surface this year you will have a much easier job next year. Care should be taken when resting your hand on the frame that you don't cut yourself with the knife. Uncapping is something many don't find easy and I have seen some people make a dreadful mess of it, with honey and wax everywhere and occasionally blood, but that doesn't mix well with honey or wax. Many cut downwards as if they were carving meat and lean the frame so that the cappings fall back onto the frame. If you cut downwards it is difficult to take the cappings off in one piece. Any small areas of uncapped cells can be uncapped with the tip of the knife

If you have no specialist equipment, the cappings can be mashed up and put into a warm place in a large sieve or wrapped in a strainer cloth, so that the honey can drip through into a container, then added to your main crop. This should be done quite quickly, as there is a large area of honey exposed to air. Honey is hygroscopic and readily takes water from the air, which could cause fermentation later.

If a full super of fresh foundation is put on narrow spacing on a strong colony, you will find that the bees should build it out so that the cappings are nice and flat. If you uncap so that you cut just under the capping, you will get a nice flat comb. If next year you put these combs on wide spacing the same should happen, but the comb will be wider.

#### 12.4.2.2 Handling Combs

Honey will extract much easier if it is warm, so don't let your supers get cold. If the temperature is cold, it might pay to keep supers warm with some kind of heater.

I like to use drone base foundation in supers for two reasons, firstly honey extracts much easier and quicker out of them, and secondly the bees are far less likely to store pollen in drone cells than they are worker cells, making it much easier to uncap the combs.

When combs are 'wet' (i.e. wet with honey) it is much easier to repair any that have become distorted. All it needs is to gently push them back into position after extracting, making it easier for you next season. When dry and cold they are brittle and may break.

#### 12.4.2.3 Replacing 'wet' supers on the hive.

Supers should be put back on the hives after the OSR honey has been extracted, for the bees to fill up again. In this case put them back with roughly the same number on each hive in the normal way and continue as before.

When supers are put back on the hives after the main crop has been taken, it is only for the bees to clean up the residual honey, leaving them clean and dry for storage in the winter. This needs to be done slightly differently than if you intend the bees to refill them. If supers are put on the hive over the brood chamber the chances are the bees will store the reclaimed honey immediately above the brood nest in the lower supers. To prevent this, you must partly isolate the bees from the wet combs. This can be done by putting a spare crown board over the brood chamber and cover most of the feedhole up so that the bees can only just get through. An alternative is a sheet of heavy gauge polythene, such as an animal food bag, with a small hole cut in it, so the bees think they are divorced from the honey. The crown board must be put on top as normal. The empty supers can be removed for storage after a day, so feeding can commence.

When returning wet supers to a hive for whatever reason it should be done at dusk. Loose honey causes a lot of excitement, and if done during the day, bees will set off in search of other pickings, and may be a nuisance to other people, as well as possibly setting off robbing of other colonies. If done in the evening, everything will settle down by the morning.



#### 12.4.2.4 Handling Honey

Honey will flow much easier if it is warmed, so put it in a saucepan or similar vessel – I find a large preserving pan ideal, and gently warm it, stirring occasionally with your uncapping knife. When it is more fluid it can be strained into the honey tank, where it should go through the strainer quickly. If it is sluggish it could be because it isn't quite fluid enough or the cloth is blocked up. If this happens, then with something that isn't sharp, such as the end of a palette knife, run it down the strainer cloth from the top. Any wax or granulated honey can be removed. I must stress this is only to warm by a few degrees, not anywhere near hot enough to damage the honey.

If the honey is to be stored in buckets it can be run off the bottom out of the tap immediately, but if it is to be bottled it must be left in a warm room to settle for some time, say a couple of days, for the air bubbles and thin honey (the reason for the name "ripeners") to rise to the top, leaving nice clear honey to be bottled. This can then be kept or sold. The last bit will be thin or full of air bubbles and can be used quickly, for cooking or mead making.

When handling honey, it should be remembered that it is a foodstuff and should be treated as such. A damp cloth is very useful to have by your side at all times for cleaning honey off equipment and sticky hands, which should prevent your house being smeared internally with a thin coating of honey!

### 12.5 Notes on Honey

Nectar is a sugary substance with a high water content that is produced by flowers. It is seen in human terms as a bribe by flowers to attract insects to pollinate them. Nectar is collected by bees and brought back to the hive, chemically inverted by enzymes to change the sugar molecules and some of the water is driven off by bees. It is sealed in the cells with a wax capping when the water content is reduced to around 17%. It is then called honey.

Honey is a combination of several kinds of sugars, nearly 200 identified trace elements, and water. It has natural yeasts and will ferment if it is kept in a warm place and the water content is too high. As already mentioned, honey is hygroscopic and attracts water from the air, so care should be taken when storing it. Storage should be in a cool place, preferably less than 55°F/13°C and in airtight containers. It is helpful to let non beekeepers know that lids of jars should be replaced tightly to reduce the chance of fermentation.

All sugars will granulate, but the rate of granulation depends on the type of sugar. Different honeys have varying amounts of different sugars, and for that reason may granulate at different rates. One of the main sugars, glucose, granulates very quickly and for that reason don't leave honey that granulates rapidly in the settling tank too long, otherwise you will have a solid mass. Some honey will take several years to granulate fully, if ever, which looks unpleasant in the jar, although there is nothing wrong with it. Honey that granulates quickly generally has a finer crystal than that which granulates slowly. Granulated honey can easily be brought back to liquid by gently warming, although it will get damaged if the temperature is too high and for a long period, but these are technical issues that are beyond the scope of these notes. The reader should consult a specialist source for further information.

Commercially packed honey is heat treated to keep it liquid for a long time, and that is why you won't see foreign honey partly granulated on shop shelves.

When honey granulates, water is forced out of the crystal and into the gaps between the crystal, creating a much higher concentration of water locally. This is why granulated honey will ferment quicker than liquid honey.

#### 12.5.1 Liquid Honey

If sold, liquid (runny) honey should be bright and clear, Any that looks "cloudy" is beginning to granulate and should either be left to do so or warmed to bring back to liquid. Demand varies, but liquid honey probably accounts for 70-80% of honey sales.

#### 12.5.2 Naturally Granulated or Crystallised Honey

For the purposes of honey, they mean the same. "Naturally" means granulating in the container without seeding or stirring. The problem with letting honey granulate naturally is that you don't usually know what you are going to get. Some honey will have a fine crystal and others coarse; some will be fairly soft and others will be rock

hard. It doesn't matter much if your honey is for the family and friends, but you should aim at a fairly consistent product if you are selling it.

If you intend to let your honey granulate in the jar it should be kept level in a cool place. If it isn't level, then the top of the honey won't be level and will look as if the producer hasn't taken any care. Sometimes you will get lighter marks or streaks in the honey next to the glass that is called "frosting". There are several theories about the causes, but I don't think the right one has been found yet. It seems to take several forms, and I don't think there is a simple answer to it. There is absolutely nothing wrong with the honey, but it can look a bit unsightly if offered for sale. I have often heard from non beekeepers that frosting is caused by the sugar not being mixed properly! This should quickly be put right with an explanation.

### **12.5.3 Soft Set Honey**

This is honey that has granulated in a controlled way. Sugars when they granulate "hang" onto something else, and if there are other crystals present, they hang on to them. Liquid honey, even if it would naturally granulate slowly with a coarse crystal can be "seeded". Briefly, seeding involves mixing a minimum of 10% fine grained honey with the liquid honey that will mimic the "seed" and granulate quickly with a fine crystal. This can be used to produce what is called soft set honey.

How you achieve this is up to you, but I would not expect the beginner to do it, therefore it might be better to consult books or the internet for the various options. It does make a more consistent product than naturally granulated and is much easier to spread, but would probably only be attempted by those who sell their honey. It is easier to use in recipes that call for "thick" honey.

## **12.6 Bottling and Selling**

If honey is for sale it must meet certain regulations that are regularly updated. I will not mention any here as it will date these notes, but they are readily available from the HM Government website. We are selling a premium product and we should be responsible, making sure that it is of the highest quality - it is when it leaves the bees. Beekeepers selling a premium product should sell it for premium prices – a lot of care and time from you and the bees has gone into the production, and your honey should look good and well presented.

Of course, if you are only using your honey yourself then it doesn't matter what you do and the regulations don't apply, but remember that it is hygroscopic and may ferment if the container is not airtight.

Your local BKA should give advice and demonstrations on presenting honey.

## **12.7 Methods of Selling Honey**

From time to time most beekeepers have surplus honey to dispose of and as there is a production cost it is reasonable to expect some recovery. There are four main ways, these being:-

### **12.7.1 Sale in Bulk**

This is probably the easiest and it is usual to coarse filter it into containers such as 30lb honey buckets. This is then sold to other beekeepers or packers and avoids the problems and work involved in bottling, labelling, selling, etc.

### **12.7.2 Wholesaling**

Where you bottle and label it and sell to an outlet such as a shop. In this case, try to find your own customers without muscling in on someone else's.

### **12.7.3 Retailing**

It is surprising how much honey you will be able to sell at the garden gate, to friends, at work, or for those with the time at such outlets as farmers markets.

#### **12.7.4 Added Value**

For those who are enterprising enough, there is a market for many things with honey in them such as cakes, biscuits, fudge, marmalade, mustard, etc. You need to know the opportunities that are available locally, which could include such facilities as local produce markets. You will need to be well organised, as these products will have a shelf life, you also need to know of any regulations and be able to supply on a regular basis. I see the possibility of several beekeepers working together with this kind of operation.

Whichever way you decide to dispose of your honey you should be responsible about it. It is a foodstuff and a premium one at that. There are regulations that govern it, which are readily available, so there is no excuse for not knowing them. It is important to beekeeping generally that everybody presents honey for sale to the highest standards, as one prosecution will affect everybody.

#### **12.7.5 I offer this advice.....**

- Don't try to sell cheaply. We have a premium product and it should be treated as such. If you are going to sell it cheaply, then you might as well put it straight into honey buckets and sell in bulk.
- Make sure it is well strained and has no scum on the top. Let it settle before bottling.
- Use a pleasant uncomplicated label, if possible - distinctive, with the correct information according to current regulations. Make sure they are stuck on straight. Labels can be bought from suppliers, or it is easy enough to design your own on a computer.
- Avoid selling honey that is part crystallised.
- Deliver regularly to outlets and be prepared to replace any that are partly crystallised.
- If crystallised honey goes frosty don't sell it, melt it down and sell it as liquid.
- Be prepared to offer advice to your customer on how to store and use honey.
- Make sure that you can maintain supply throughout the year. Don't be greedy and try to supply too many outlets, otherwise you will get a bad reputation, and someone else might get the opportunity.
- Don't sell at the gate cheaper than your retailers are selling it for. This will upset them.
- We are competing with professional packers who will present their product to the highest standards.

### **12.8 Using Honey**

The vast majority of people, including many beekeepers only see honey as something to spread on bread. That is a pity! Honey is used in cooking for three main reasons, to add flavour, sweetness and improve the keeping qualities of such things as cakes. There are also drinks that can easily be made and you won't get much easier than mead.

There are many books and websites devoted to the uses of honey, so all I am going to do is encourage you to investigate and enjoy them - and the results.

## **13 STORING EQUIPMENT**

### **13.1 Honey and Wax Extracting Equipment**

I assume that everybody has a place to keep honey and wax extracting equipment so that it doesn't deteriorate. All it needs is a little TLC, just dismantle, wash out and thoroughly dry before storing away.

### **13.2 Hive Parts and Combs**

Attention to hive parts and combs makes a good winter job. They can be repaired, cleaned and supers made ready for use in the spring. Both propolis and wax get brittle when cold and are much easier to remove, which is why I like to do this on a cold frosty day.

Pressed metal queen excluders can easily be cleaned by placing on a flat surface such as a National hive roof. With a hive tool lightly scrape off wax and propolis in line with the slots, but only enough to remove the higher lumps. Then turn over and do the same to the other side. This can be repeated gradually using more pressure until the excluder is clean. By using this method no damage will be done. When you have finished, take hold of one corner and shake it. If it rattles it is broken somewhere, if not it is O.K. Don't dispose of broken excluders as they can be used for protecting boxes of combs from mice. I fold the corners of broken ones over, or cut them

off, so I know not to use them on a hive. In recent years steel has replaced zinc. As an engineer I expect them to be much tougher and last longer. Plastic queen excluders are becoming more widespread and these can be cleaned in the same way as metal ones. They have not been in existence long enough to judge their length of life, or if they will deteriorate in light, as plastic often does.

All woodwork can be scraped clean and checked. Any repairs can be done as advised in **“2.3 Hive assembly, care and maintenance”**.

Super combs should need little attention if the advice in **“12.4.2.1 Uncapping”** is followed, as the worst of the propolis and brace comb has already been removed. If your combs are all in good condition they can be put on wide spacing, but if they are imperfect such as they have holes in, are only partly drawn out from foundation, or have been taken back to the midrib for some reason, such as they have had granulated honey removed from them, then they are better on narrow spacing, otherwise the bees will build comb between them, which will cause problems when extracting them next year.

Bees will store pollen in worker cells in preference to drone, that will quickly go mouldy during the winter. Some will stay soft and some will go very hard. Whatever happens, the bees will have trouble removing it and getting it through the queen excluder. Make it easy for them by scraping it down to the midrib, they will soon build it back again.

If you have combs with holes in, they can be placed in a super on narrow spacing, but do not put holes opposite each other, as the bees might build comb through the holes rather than fill them in. I find it better to put a drawn comb rather than foundation either side of a hole. Bees usually make a good job of repairing combs, but we need to give them help. Make a note of supers with poor combs and make sure that you put them on a strong colony during a honey flow, as the bees will be eager to make wax and will readily work on combs that may appear to be less than perfect.

Super combs, if looked after, will last a lifetime and even those in what appears to be bad condition will be repaired by a strong colony of bees. Bees will readily work on comb that hasn't been used for some time, but for some reason will build irregularly on stale foundation. The latter can be freshened up if warmed that can easily be done in a greenhouse or conservatory, but keep an eye on it as it will quickly melt. All it needs is enough warmth to bring back its aroma and make it pliable, so that you can gently straighten it if it has buckled. Foundation shouldn't be put in frames until it is needed, as it quickly goes stale and brittle.

Frames are usually made from softwood, so if kept damp will rot quickly. They should be stored in a dry place and to deter wax moth, combs will benefit from being cold. An ideal place would be a dry shed or lean-to. When storing supers, all that is needed is a flat surface, otherwise they will twist and cause a problem when they go on the hive. Stack them up with a queen excluder top and bottom to keep out mice, and a cover on the top if needed.

## **14 BEEKEEPING CALENDAR**

Although I have used the term “Beekeeping Calendar”, I dislike it for several reasons that include:-

- It gives a “beekeeping by numbers” approach, where beekeepers may look at a list to see what they should be doing, rather than looking at the bees and assessing their condition and future requirements.
- Years can vary considerably, sometimes being a month different.
- I travel a lot and I know that in some years Cornwall in the extreme South West can be 4-6 weeks different than a more northern county such as Northumberland or Scotland, yet many teachers and writers don't consider that point.

Despite my dislike, I feel I should give the beginner a guide to what is needed during the year, together with approximate timing. As gardeners will know, although springs often vary, by August everything has usually levelled out. This calendar is not intended to be comprehensive, merely an indication of some things that need to be done every season.

### **Spring**

Get most of your planning done. You might change it based on the condition of your colonies coming out of the winter, the weather, fresh advice or your own personal circumstances. It is probably better to change a plan than have nothing in the first place.

In spring, queens are ramping up their egg laying rate, which can quickly deplete the food store. If the weather is poor for flying, then check to make sure that starvation isn't imminent. This is not easy for a beginner to judge, but in most colonies the equivalent of a full frame of liquid stores should be enough to last them for a couple of weeks. Don't feed for the sake of it, because you can crowd the queen out, so she has less room to lay in. This may cause the colony to make preparations to swarm later. In many areas in spring, there is abundant forage of both nectar and pollen from trees, shrubs and flowers. If the weather is warm, as you often get for several days in spring, the bees can bring in copious quantities. This can also have the effect of crowding the queen out. It is surprising how much food can be brought in under such conditions. It is a good idea to put on one or more supers to take this income.

On warm days, pollen should be coming in. This is a sign that the colony has a laying queen. Those that are not bringing in much pollen or the loads are light may have a failed queen or be queenless. Do not be alarmed if you see bees collecting water. They will do this until there is sufficient nectar coming in they can evaporate water from.

First inspections can be made if you are comfortable being in the open in shirt sleeves. Make sure the queen is laying eggs, the brood is good and the colony has enough food and space. Regular inspections can be made when weather and the condition of the bees allows. In some years, colonies may be preparing to swarm. Decide which swarm control method you intend to use and make sure you understand how it works.

### **Summer**

This is when most of the work is done. Regular inspections to check for queen cells and to give colonies supers in advance of requirements. Those in an OSR area are probably best advised to provide more supers than they think they need, as I have occasionally had a strong colony fill and cap a super in a week. An early extraction will be needed in an OSR area.

Colony increase can be done, but make sure you don't overdo it, especially in your early stages. Many a beekeeper has got out of control before they have learnt much about the craft. Learn how to produce your own queens instead of buying them.

Due to the shortening days later in the summer and many of the earlier flowers gone, nectar income will slow down. There will be a tendency for the bees to store nectar and pollen in the brood chamber. Close down hive entrances early in August to prevent robbing by other bees and wasps. Extract the main crop of honey and check the amount of food in the brood chamber when the supers have been removed. Those in a heather district should consult experienced beekeepers about management techniques for that crop

This is the time to start thinking about getting strong healthy colonies in the spring. Next year's success starts here.

### **Autumn**

Many beekeepers slacken off after they have harvested the crop, but it is a busy time. Colonies should be well prepared to have the best chance of survival. Feeding should be completed well before the first frosts. In some areas there are considerable nectar and pollen flows from such sources as ivy and water (Himalayan) balsam. As the queens have probably reduced or stopped laying, there is less need for food, so more can be stored, to the point where a considerable amount can be stored in some autumns.

Make sure that all vegetation is removed from the base of the hive to give a free flow of air. Check the roof doesn't leak. As late as possible inspect the colony to make sure the queen is still laying worker brood. A poor queen won't bring a colony through the winter.

Store all equipment safely, perhaps for checking and repair during the winter.

### **Winter**

Our winters are long, but there is still occasional work to do. There is time to repair equipment and generally prepare for the coming season. Check hives occasionally to make sure all is well. Bees will fly quite strongly on warmer days, but when cold will stay in cluster. Check for food, perhaps every 4-6 weeks before the turn of the year, every 3-4 weeks afterwards.

## **Throughout the year**

There are things that should be done on a regular basis, including checking the brood for disease and monitoring for varroa. Good beekeepers will always be aware of the state of their colonies at all times of the year.

If you don't already know it, take the opportunity to read up on the life cycles of queens and workers, and understand what happens during the swarming process. Learn to recognise diseases, especially the foul broods.

## **15 BEEKEEPING TIMETABLE**

If you learn and understand the life cycles of the Queen, Drone, and Worker and are able to identify two notifiable brood diseases, American Foul Brood (AFB) and European Foul Brood (EFB), as well as understand the life cycle and treatment for *Varroa destructor* at an early stage, that will serve you well. These can be easily learnt from books, but there is a practical side as well, the handling of your bees and this is only learnt by experience and watching and listening to others. I have devised the following suggested timetable that will give the beginner something to aim at, although people, bees, and situations can vary considerably.

### **15.1 Suggested Timetable for beginners**

#### **1<sup>st</sup> Colony Inspection**

There is a lot happening in front of you, so don't try to take too much in. Try to handle the combs gently, but don't worry too much about what is on or in them. If you have any fear and the person supervising you is good, they should detect this and help you. Don't worry how long things take. The most important thing at this stage is to be a confident bee handler. From now on your handling and management techniques begin and any habits should be good ones. Try to think what you are doing and remember some of your learning will be painful! A simple thing like smoking bees off frame lugs will prevent accidental stings.

#### **2<sup>nd</sup> Inspection**

Be aware of the three castes i.e. queen, drone, and worker. Their roles can either be learnt from your tutor, or other sources, but the sooner you learn them the sooner you will understand many things that happen in a colony.

#### **3<sup>rd</sup> Inspection**

Be able to recognise and name the main hive parts, and know their uses i.e. Floorboard, Brood Chamber, Queen Excluder, Super, Crown Board, Roof, Frames and Foundation.

Light a smoker and keep it alight. This is one area where many people have problems, but is absolutely crucial. Keep practicing away from the bees if you want to. Once you have mastered it, keep a constant lookout for fuel that suits you.

Recognise pollen and liquid stores and know their uses.

#### **4<sup>th</sup> Inspection onwards**

Be able to recognise queen, drone, and worker cells and brood in all stages. The earlier you can assess their ages the better.

Learn off by heart the lifecycles of each caste. This is most important and will help you assess the state of a colony and help you address many of the problems that might arise. It is absolutely crucial in any method of swarm control.

Recognise healthy brood in all stages. If it doesn't look right, there is probably something wrong with it. Refer to the NBU booklet "Foul Brood Disease of Honey Bees: Recognition and Control". There are some excellent photographs on Page 5. Do not get paranoid about diseases, but a glance at a comb or two in every colony should be part of your normal inspection and takes no time at all. If you are doubtful about something, then take a photograph of it and email to someone knowledgeable.

Understand why 7 or 14 day inspections are needed.

Be aware of varroa.

You should now have enough knowledge to open a colony on your own and understand its workings. The knowledge gained so far should help you to progress further.

### **Before August**

**Varroa.** Understand the life cycle as this will help you understand treatment methods. Learn about the current treatments that are available and be aware of IPM techniques and the reasons for their use. Learn how to monitor mite levels, as this has become a very important part of beekeeping. It is important that you know the levels of mite infestation both before and after treatment. Varroa and the viruses it vectors have probably become the biggest killer of colonies and it would be disappointing for a beginner to lose a colony when simple measures could have saved it.

Most beginners will only be putting one colony into their first winter, so to help you and avoid disappointment read section **7 Wintering.**

Of course, some of the above can be learnt before you have your own bees, when you should take any chance you can to handle a colony. Although I wouldn't advocate getting stung deliberately, it wouldn't be a disaster if you did. It is surprising how many people take up beekeeping with great gusto and give up quickly because they don't like getting stung.

By the end of the first season you should, as a minimum, be able to open a colony without help. This will give you the basis on which to further your knowledge during the winter, ready for your first full season in the spring. I suggest you concentrate on the following subjects:-

- Queen substance. This is a pheromone which should be seen simply as a chemical stimulus. There is no need to go into any great detail, just try to understand the influence it has.
- Study honey. It is hygroscopic, so find out the relevance and possible results.
- If you intend selling honey be aware of the regulations.
- Investigate the uses for your hive products. There are many books on such things as cooking, honey drinks, candle making, polish making, etc.
- Plan for the coming season.
- Learn the principles of queen rearing. Speak to someone who regularly rears queens and beware of those who "just let the bees get on with it". Bees can be rapidly improved without any great knowledge or equipment.

Providing you had sound tuition and have learnt how to handle bees with confidence, you should be able to open a colony, recognise its condition, and deal with the more common situations.

By the end of the second season many people are actually very knowledgeable and competent and will be able to:-

- Dispense with gloves.
- Dispense with bee suit so that you are only wearing a veil or tunic.
- Find a queen.
- Clip and mark a queen.
- Recognise the signs of EFB, AFB, Varroa, Nosema, Acarine, and Chalk Brood, but bear in mind you may never see some of these.
- Be able to recognise Small Hive Beetle and Tropilaelaps in both adult and larval forms from photographs. I know I haven't mentioned these yet, but although at the time of writing (2020) they have not been detected, they are lining up to invade us. Read about them to discover the threat.
- Clear supers, extract and process your own honey.

## **16 IN CONCLUSION**

If you have got this far well done. I hope you enjoy the craft and when you have gained enough knowledge and experience, I ask you to try to encourage and help others.

I may have appeared to have been critical of some information sources. This is because as an experienced beekeeper I see an increasing amount of “advice” given by people who aren’t experienced enough to give it, with some being “copied and pasted” from sources that are inappropriate for our conditions. A beginner can easily lose a colony if they do something that may be common practise in California or Texas, but unsuitable for our conditions.

Don’t do anything unless you understand clearly what you are trying to achieve, what the end result should be and that you have a “Get out of jail” card up your sleeve. In beekeeping you often need one.

**In the early years of the 21<sup>st</sup> century many beekeepers worldwide have experienced problems with the performance of queens. This includes supersedure of young queens during the summer, failure of young queens and queens simply “disappearing”. These things occasionally happen naturally, but not on the scale currently seen. There has been little research and some beekeepers, often influential ones, are flatly refusing to accept there is a problem. The problems have been well documented.**

I hope that you have found these notes useful, if so, then you can find more detail on certain topics on our website [www.wgbka.org.uk](http://www.wgbka.org.uk). Other useful websites are [www.bibba.com](http://www.bibba.com), where there is good sound information on queen rearing and bee breeding, and Dave Cushman’s website [www.dave-cushman.net/](http://www.dave-cushman.net/) that is probably the world's most comprehensive and informative beekeeping website.

Always remember - Beekeeping is fun!

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