

MY BEEKEEPING YEAR

by Ian Craig

The SBA has recruited a fair number of new members during the past few years. I have been prevailed upon to produce a series of twelve monthly articles on **practical beekeeping**, with these new members in mind. I hope the series will also be thought-provoking for all beekeepers as it is useful to pause for a while and consider if the methods we are using are the most suitable for our individual conditions.

I am writing these notes taking into account the flora and weather conditions in Mid-Renfrewshire. Readers will have to make allowances depending on which part of the country their apiaries are situated. I am giving my opinions based on fifty-five years beekeeping experience beginning in Wigtownshire and now in Renfrewshire. Everyone has their own ideas on colony management which may not coincide with mine so, hopefully, this series of articles might generate some response in the 'letters' page from experienced beekeepers in other parts of Scotland.

JANUARY

At this time of year bees are in their winter cluster and are better left undisturbed except for visual checks every two weeks or after gale force winds. It is also beneficial to clear any dead bees from the hive entrance using a piece of bent wire. I never remove snow from hive entrances because bees will be attracted out by any sunshine, with the possibility of becoming chilled and unable to return to the cluster. There is no danger of suffocation as some top ventilation has been provided.

Food stores should also be checked by gently 'hefting' the rear of the hive. Alternatively, heft **both** sides of a single brood chamber hive as the stores may be concentrated on one side only. If stores are considered to be running short, the beekeeper has been remiss with the autumn preparations. Remove the crown board, place an 'eke' or empty shallow super on the exposed brood chamber, place a block of fondant or four damp 1kg sugar bags over the cluster, cover with an old blanket or sack (these could become damp and, if so, should be changed occasionally during the remainder of the winter), replace the crown board and roof.

My colonies are housed in National hives, consisting of a floorboard; two brood chambers each containing eight combs flanked by two dummy frames; crown board with pieces of glass covering the two feed/Porter holes and matches under the two rear corners to allow excess moisture to escape from the winter cluster; a 50mm thick sheet of polystyrene insulation and a deep metal covered ventilated roof. (See Fig.1). The majority of the roofs are deep enough to almost cover the top brood chamber and they never blow off. Roofs which I have bought in the past fifteen years are of the

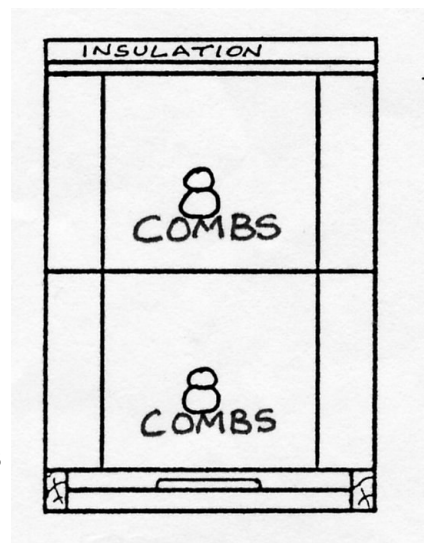


Fig. 1

shallow design, as the deep ones are no longer obtainable. These require to be 'weighed-down' with a brick to prevent them from being blown off. Beginners to beekeeping are advised to keep to a single brood chamber, containing eleven combs, until they gain some confidence in handling their bees, otherwise the set-up is the same as I have just described.

I use wooden entrance blocks which have two 140mm x 6mm slots along the **bottom** to allow for access by the bees, prevent entry by mice and provide extra ventilation. Some beekeepers advocate facing the slots upwards arguing that in that position they are less liable to become clogged with dead bees. I do not agree with this. Placing the slots downwards allows condensation to run out of the entrance. Many beekeepers don't use entrance blocks, instead they prevent mice from gaining access to the hive by covering the entrance with perforated zinc in which a slot of height 6mm has been cut. I dislike the commercially available mouse guards made of sheet metal in which a series of holes have been punched. This type is more prone to becoming clogged with dead bees and it has a tendency to strip valuable pollen loads from the bees' legs in springtime.

My hives are situated on concrete slabs on which two 30mm x 15mm wooden strips have been laid in order to keep the floorboard clear of the slab, thus allowing a free passage of air under the floorboard to alleviate dampness as much as possible. The front strip should be positioned so that laden foraging bees returning to the front of the hive cannot mistakenly fly underneath the floor, thus wasting valuably energy. Slabs containing hives consisting of a solid floor should be tilted forward, enough to allow excess moisture to drain out of the entrance. If solid floors have their original entrance rotated to the rear and a 'varroa floor' (which is different from an 'open-mesh' floor) placed on top, then the slabs should be tilted towards the rear. I do not believe in using hive stands with their resultant maintenance problems. I examine the brood chambers from a kneeling position. In any case, during the summer when, hopefully, up to four or more supers and a top brood chamber are on the hives, lifting heavy crates at eye-level is too much of an effort.

For beginners, and others, this is a good time to purchase hives and other equipment. Some of the suppliers offer much reduced prices during January. I would always advise beekeepers to purchase new (first or second quality) hives or very good second hand hives. Hives must be bee-tight, water-tight and all parts interchangeable.

Hives which I purchased new fifty-odd years ago and kept properly maintained will be good for another fifty years. Beginners who are considering the purchase of second-hand equipment should seek the advice of an experienced beekeeper (not the seller). Beware of a hive in which the bees have died out unless you are sure that their demise was not due to disease.

January is a suitable time to prepare a new hive record book. I keep my hive records in a small loose-leaf folder which can be carried in a pocket of my bee suit. I don't keep my records pinned underneath the hive roofs as my sixty colonies are in eight out-apiaries, it is therefore important to be able to refer to the record book at home prior to visiting the apiaries to plan what is to be done and what equipment might be required. A page is allotted to each colony, in which is recorded: year, colony number, year in which the queen was born, strain, if the queen is marked and clipped, if she is identified as a future breeder, record of manipulations, previous honey record, disease record (eg. chalk brood), feeding record and nuclei.

FEBRUARY

By February colonies should be showing signs of activity. Queens should be laying patches of eggs in the warmth of the cluster and workers will be taking cleansing flights and bringing in pollen on mild days from snowdrops, crocuses and winter heaths.

Around the middle of the month, in order to assist brood rearing by reducing heat loss, the matches should be removed from the rear of the crown board thus cutting off top ventilation and the varroa trays should be inserted under open-mesh floors to cut off the cold air.

Every three or four years, during a spell of cold weather, if the outside of the hives are dry, they can be given a coat of liquid insecticide-free preservative. Choose a cold, windy day when few, if any, bees are flying. Paint should not be used on wooden, single-walled hives as it prevents the wood from 'breathing' thus causing the hive walls to become saturated during winter, leading to a hive which has the comfort of a refrigerator. When the hive walls start to dry out, the paint will blister and flake off.

Fortnightly checks of apiaries should be carried out to see that surrounding fences are stock-proof, no vandalism has taken place and there is no woodpecker damage to the hives. Each hive should be hefted to check on the quantity of food stores remaining. Check the signs at the hive entrance. There should be a considerable amount of fine particles of wax from the uncapping of stores. If large pieces of wax are on the alighting board, you have a lodger in the form of Mr and/or Mrs Mouse. Spots of faeces may be evident on the front of the brood chamber, caused by the bees' over long confinement due to severe weather; or dysentery caused by fermenting stores or Nosema disease. Bees crawling, with fluttering partially spread wings (K-wing), clinging to plant stems and unable to fly suggests Chronic Bee Paralysis Virus which is common in bees suffering from Acarine Disease or one of the viral diseases which are associated with varroa and are becoming more common.

If bees are flying freely and bringing in large pollen loads and, by placing the back of your hand against the crown board, you can detect heat then all should be well. If very small pollen loads are being taken into a particular hive there is either a shortage of plants yielding pollen or the queen may not be laying for some reason. If there are fewer bees flying from this hive compared to others in the apiary or no flying bees at all, a quick check can be made by raising the crown board. If the colony is dead, try to establish the cause and close-up the hive in order to prevent robber bees gaining access to any remaining stores which may be harbouring some infection.

By the end of the month, new hives which were purchased in January should have been assembled and given a heavy coat of preservative. Repairs should have been carried out on any spare equipment damaged during the previous season.

New frames should be assembled and nailed. I have encountered a surprising number of beginners who have never been told to nail their brood and super frames, leading to disastrous consequences. I would advise beginners to purchase Hoffman self-spacing brood frames having 27mm (1 1/16") wide top bars and 35mm (1 3/8") wide side bars with internal grooves. With top bars 27mm wide, very little brace comb will be built between the frames. The grooves in the side bars act as a location for the wax foundation, leading to nice straight combs. Eleven

frames will be required for a National or Smith brood chamber. Never use castellated spacers in the brood chamber as they make it impossible to slide frames along the runners.

For shallow honey-super frames, I consider Hoffman spacing to be a waste of money and a nuisance when uncapping. The Hoffman side bars get in the way of the uncapping knife. It is far better to purchase the cheaper 22mm (7/8") top and side bar frame. When using this frame with foundation in the super, it must be spaced using narrow plastic ends (35mm) during the first year until the foundation is drawn out, filled with honey, sealed and then extracted. The comb is then stored for use during the following year, when the narrow plastic ends can be replaced by wide plastic ends (47mm) or nine-slot castellated spacers. If wide spacing is used with foundation, the bees will probably draw extra combs in the space between the adjacent sheets of foundation. Eleven frames are required using narrow spacing, these will reduce to nine on wide or castellated spacing. In a good honey year, if you have two hundred supers to extract, a great deal of time is saved by using 22mm flat frames on castellated spacing giving nine frames per super. Only nine frames have to be uncapped and extracted instead of eleven and you get a heavier, more easily uncapped frame. Also, you get a heavier super because the nine-frame super has only ten air-spaces between the combs whereas the eleven-frame super has twelve air-spaces.

An alternative is to use supers each containing nine Manley frames which have a fixed spacing of 41mm (1 5/8"). That is the absolute maximum spacing if extra combs are not going to be drawn between adjacent sheets of foundation. I do not like Manley frames because the long shoulders get fixed together with propolis in my district, making them very difficult to remove for extraction. I also find them slower to uncap compared to the ordinary frame described in the previous paragraph.

MARCH

Brood rearing should now be in full swing, depending on the bees having access to fresh or stored pollen and sealed stores. The top of the crown board should be warm and large pellets of pollen should be going into the hives from early sources such as heaths, willows, hazel and gorse. Hive 'inserts' should be checked for the presence of varroa, pending possible treatment early next month. Hives should be lifted off their floorboards and placed diagonally across an upturned roof, without disturbing the brood chamber(s) or crown board. This will allow the floorboards to be scraped free of winter debris. If the floorboards are reversible, this should be done, or better still give a clean recently preservative-treated floorboard. It is a real boost to colonies to get a clean, dry floor at this time. In order to conserve heat, an entrance block with a narrow entrance should then be put in place and the varroa-sampling drawers should be inserted into open mesh floors.

If the bees have been wintered on a single brood chamber there is a likelihood that their food stocks will be getting low. Bees which are short of food must be given spring syrup made by mixing 1kg of white sugar (not brown or castor sugar) with 1 litre of water and fed using a contact feeder. Miller or Ashforth feeders are unsuitable for early feeding because the bees will not go up over the cold 'weir' to reach the syrup.

I don't bother with so-called spring stimulation, but some beekeepers in early districts do try to push their colonies to take advantage of spring rape. Colonies with

ample stores do not need feeding. Weak colonies with adequate stores should not be fed. All that will happen in this case is the queen will be encouraged to lay in the periphery of the cluster and if a period of cold weather follows, the cluster will contract, leaving these eggs to become chilled and 'bee energy' will have been expended in vain. Feeding also causes bees to fly during inclement weather, leading to a further loss of field bees. I don't believe in feeding sugar bags at this time because bee energy will be required to convert the hard sugar into a usable form. Bee life is extremely precious at this time of year when beekeepers are striving to build up their colonies to take advantage of early honey flows from oilseed rape or sycamore. Weak hives should not be united until you have established why they are weak, as there is a danger of spreading disease. If the queen is thought to be at fault she is certainly not worth saving.

The importance of pollen is often not appreciated by the beginner. Bees cannot rear brood without pollen. If the weather is cold and foraging restricted, colony development will be severely curtailed, no matter how much syrup is fed.

Any hive where the bees have died should be taken home for renovation. The inside of the hive and the top and bottom bars of the frames should be scraped clean of brace comb and any inferior combs cut out of their frames and stored in a sealed container, to avoid the attention of wax moths, until they can be rendered into blocks of wax. Actually I dispose of my inferior brood combs by burning. Thus getting rid of disease spores and pyrethroid residues. Very little wax is obtained from old brood combs in any case.

A stack of hive parts together with serviceable combs, some of which might contain stores, should be made in the open air. The stack should be fumigated using absorbent pads, placed between each box and soaked with 80% glacial acetic acid. The stack should be closed off and left for a week, then dismantled and the boxes aired in a bee-proof shed and left until required later in the season. Fumigation should be carried out using goggles, face-mask and rubber gloves because acetic acid is corrosive to flesh, metalwork and concrete. If the brood chamber is some years old it will probably have tinfoil frame runners. These should be smeared with Vaseline to reduce the effects of corrosion.

Now is the time to finally settle on the location of new permanent apiary sites. When making your choice the following should be considered:

- (i) Availability of forage ---- nectar, pollen and water;
- (ii) Colony density. Dr Colin Butler stated that in order to obtain a worthwhile honey crop, colony density should not exceed one colony per ten square kilometres. If my mathematics are correct:

$$3\text{mile flying range} = 4.8\text{km}$$

$$\text{Area} = \pi \times \text{rad. squared}$$

$$= \pi \times 4.8 \text{ squared}$$

$$= 72 \text{ sq.km}$$

ie giving a colony density of $72/10 = \underline{7 \text{ colonies per apiary}}$.

When calculating colony density in a district, colonies owned by other beekeepers must be taken into account.

The above calculation is not valid when considering colony density for intensive crops such as oilseed rape and heather.

- (iii) Danger ---- to other humans, to animals, from animals;
- (iv) Elements ---- wind, air-drainage, frost pocket, too hot, too shaded, winter sunshine, dripping trees, proximity of power

- lines, danger of flooding;
- (v) Access;
- (vi) Out of public view.

Once you have settled on a site, its layout should be considered:

- (i) Allow plenty of room for manipulation of colonies;
- (ii) Consider hive orientation ---- irregular pattern, direction faced;
- (iii) Install hive bases.

APRIL

This month bees will be collecting nectar and pollen from flowering currant, dandelion, willow, cherry, gorse and blackthorn, leading to rapid colony build-up. Continue to monitor the food supply and the number of varroa on the hive inserts.

On the alighting board, hard grey old pollen pellets the size of a cell may be seen. If crushed between the fingers they will break up and show layers and sometimes a trace of colour might still be visible. The appearance of old pollen pellets is a good indication that the bees are expanding their brood nest.

Chalk Brood mummies can also be observed at the hive entrance. These do not crumble into layers, they are usually smaller and flatter than pollen pellets and are often recognisable as poorly developed pupae. Chalk brood can appear if bees have wintered in damp conditions and can be seen in nuclei which are short of bees. In other words, where the bees have been under stress. Some strains of bees are more prone to it than others. If widespread, chalk brood can hinder colony build-up. There is no 100% cure, but I have found that Apiguard encourages hygienic conditions within the hive and reduces the occurrence of chalk brood. In severe cases the colony should be requeened from a different strain and any badly affected combs replaced with acetic acid treated combs. In mild cases I sprinkle table salt on top of the brood frames to encourage hygienic conditions. This is repeated twice at weekly intervals.

If you require to treat varroa in spring, it should be carried out before the hives have honey supers added. I do not use Apiguard or any other thymol-based treatment prior to the honey flow as its odour can remain in honey for some time. Not long ago, a honey judge at one of the major shows rejected some exhibits because he could detect a slight odour of thymol in the honey.

Towards the end of April, when the sun is warm and there is little wind, a first inspection can be made. The hive entrance should be smoked and the beekeeper should wait for two minutes before opening the hive in order to allow time for the soothing effect of the smoke to take effect. Gently lever up the crown board and give it a sharp shake above the open hive to dislodge the queen back into the brood chamber if perchance she has been driven on to the crown board by the smoke. Two manipulating cloths are laid on top of the brood chamber such that only the particular comb which you are going to remove is exposed. This assists in controlling the bees and prevents brood becoming chilled.

The first thing I do at this first inspection is to find the queen. She is more easily spotted at this time because there are fewer bees in the colony and as there are no, or few, drones, she is the largest bee. She is likely to be found on a frame containing eggs in the top brood chamber. She might not be the queen which you are expecting to find. The queen that you saw during your last autumn inspection may have been marked and/or clipped, but a younger unmarked queen may now be

in the hive, the old one having been superseded in late autumn. April is the best time of the year to mark and clip the queen. I do not mark and clip queens during the summer in which they were born because there is a danger that the bees will detect your odour or that of the paint and supersede your new queen. Whereas if the marking is done in April, before the drones are flying and fertile, the bees know that she cannot be replaced and there is little likelihood that she will be killed. As a further safeguard, I never handle a queen. When found, I use a 'press-on' type queen cage to first clip and then mark her. Only about a quarter of one pair of wings need be clipped. When marking, ensure that you allow the paint to reach the hard surface of the queen's thorax. If you only paint the thorax hairs, the paint will very soon wear off. I keep queens for no more than two full seasons, therefore I only use yellow or white marking paint, which are more easily seen in a populous colony. Once marked, I ease the pressure of the cage on the queen and keep her in the cage until the paint has dried. When looking for a queen, concentrate solely on that task. When found, clipped and marked, she should remain in the cage until you have carried out other tasks, so that you know her whereabouts.

The remainder of the brood chambers can now be checked quickly. It is important that you memorise the appearance of healthy, sealed and unsealed brood so that any abnormality can be given a closer examination. Check that there are nice areas of eggs and larvae also slabs of sealed brood containing few 'missed' cells. Check for signs of American Foul Brood, European Foul Brood and Chalk Brood. If AFB or EFB are suspected, consult an experienced beekeeper. Continue to monitor varroa numbers by checking the hive inserts and/or uncapping drone brood with an uncapping fork. Be careful not to kill too much drone brood or you may seriously reduce the drone gene-pool which will be available for queen mating later in the season.

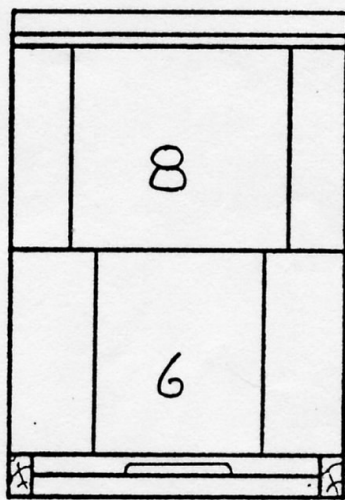


Fig. 2

Check that the colony has enough food to last it until your next visit. If the colony is on double brood chambers, remove the two outer combs from the bottom box. These should be the poorest combs and as such should have been deliberately put on the flanks during the previous autumn so that they could be removed when empty, in spring. The opportunity should also be taken to remove any other misshapen combs or combs clogged with old hard pollen and replace them with drawn combs which you had stored from the previous autumn.

The renewal of three or four brood combs per year helps to rid the brood chamber of the spores of bee disease pathogens and residues of pyrethroid varroa treatment. The hive will now consist of eight combs in the top brood chamber and six in the bottom (See Fig. 2). Finally, don't forget to release the queen before closing the hive. Do not reverse the brood chamber at this, or any other, time as you will split the brood nest and give the colony a severe setback. Let the brood expand downwards naturally as nature

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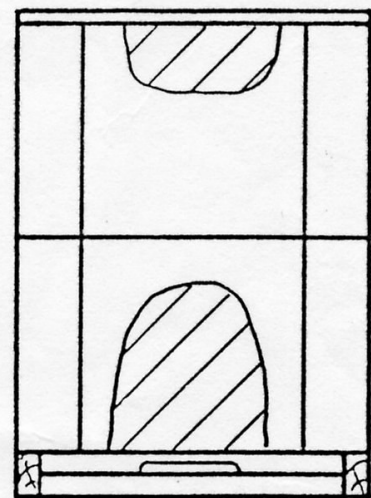


Fig. 3

intended. (See Fig.3).

Now that I know the age and pedigree of my queens I can decide which I am going to deploy as breeders. By consulting my previous hive records I divide my queens into three categories: (i) breeder queens from which I am going to actively raise queen cells, (ii) queens which are satisfactory and from which I will use queen cells if they are produced and (iii) queens with undesirable characteristics which must be eliminated. I do not believe in selecting a so-called 'best colony' and rearing all my queens from it, thus losing the vast gene pool of all the others. In practice, I rear queens from the best forty of my sixty colonies and exchange young queens between my eight apiaries to reduce the chances of in-breeding. In-breeding will become more of a problem now that the feral colonies have been more or less wiped out due to varroa. I shall describe my method of queen rearing in my June article.

Some beekeepers raise queens in May and requeen their colonies as early as possible in the knowledge that queens of the current year rarely swarm. It is also true that the most prolific colonies are the first to raise drones. So the beekeeper who can requeen in May/June with current years queens shouldn't have swarming worries and drones should be from good stock. I prefer to concentrate on maximum colony strength, with the potential to produce a large spring honey crop, by not using bees and brood to make nuclei at this stage and rely on controlling swarming if and when it comes.

MAY

May brings the start of the spring honey flow from sources such as oilseed rape, sycamore, horse chestnut, bluebell, top fruit, etc. and in order to derive maximum benefit from these the colonies must be strong. Indeed, the beekeeper's skill is in keeping colonies as strong as possible from May until August. We have no way of predicting what the weather is going to be like or how long good foraging conditions will last, therefore we must endeavour to maintain our colonies as strong as possible so that they can make the most of any flow. This means that we must deter or delay swarm preparations at least until the spring flow is over and exercise effective control over swarming if or when it comes.

Never open a hive unless you have a reason for doing so and have a plan worked out in advance for what you are going to do and what equipment you require to have on hand. In early May the colonies should be checked in order to see that the queen has not suffered any ill effects as a result of clipping and marking. There is no need to find the queen, just check for the presence of patches of eggs. There should now be drones in the hive. Bees work best when they have some drones, but you don't want too many. Incidentally, drones do not become fertile until they are twelve to thirteen days old.

Check that the queen has plenty of space in which to lay. In a double brood chamber you might have to remove surplus stores of sealed honey and replace them with drawn comb. Do not give frames with foundation at this time unless you are prepared to feed syrup to simulate a nectar flow. Always try to do what nature intended. When do bees in the wild require to draw new comb? During a nectar flow or after they have swarmed. If you don't have a supply of drawn comb the alternative is to scarify the cappings on combs of stores with the corner of your hive tool to encourage the bees to move the stores, thus creating room on the periphery of the present brood nest into which the queen can expand.

You must be able to ‘read’ a colony just like you would read a book. Understand what is normal, then the abnormal will stand out. Answer the following questions: Do you see the queen? Is there sealed brood? Is it in solid slabs with few missed cells? Are the cappings worker or drone? Are there eggs? Are they in slabs? Are the eggs two or more per cell? Are they fixed to the bottom or the sides of the cell? Are there any signs of disease in sealed or open brood? Has the colony got adequate food supplies? Is it as strong as its neighbours? Has it got adequate room?

Keep a watchful eye on the sycamore. (or oilseed rape). A week before it is likely to flower the brood chamber is checked and two combs from the top brood chamber are put into the bottom brood chamber (Remember that the two outside combs were removed from the bottom brood chamber last month) and one deep frame of foundation and one shallow frame of foundation are added to the centre of the top brood chamber. The shallow frame is fitted with worker foundation and this will be drawn out with worker comb. The space underneath the shallow frame will have natural, drone comb built in it. This ‘sacrificial’ drone comb will be preferred by female varroa mites and when it is sealed it must be cut out and destroyed, (or given to a friendly fisherman) thus removing a large number of varroa mites from the hive without the use of chemicals. The frame, still containing its worker brood is then returned to the hive where the bees will repeat the process. Be careful to cut out this drone brood before it hatches or you will be breeding varroa. A queen excluder and the first honey super are put on top. This super should be of drawn comb so that when the flow starts, honey will be stored in the super and not allowed to restrict the space in the brood chamber. (See Fig.4).

If you have been working on the single brood chamber system you might want to experiment with the sixteen-comb doubling system which I advocate. If so, this is the time to double your colony. In the unlikely event that you have spare drawn combs, these should be used, otherwise you will have to use five frames containing foundation. Put the foundation in the top brood chamber and feed three litres of spring syrup to simulate a nectar flow in order to get the foundation drawn. Don’t super the hive until the feeder is removed or syrup may be stored in it. Be aware that on the year that you first double a colony it will be at the expense of the spring honey crop unless it is a very good year, but you should reap the benefits during the summer and in subsequent years.

The advantages of the double brood chamber system are:

1. Adjustable --- 11 combs (or fewer) to 22 combs.
2. Good air circulation and ventilation.
3. Easy to manipulate – no combs propped outside the hive.
4. Easy to check for swarm preparations.
5. Room available when most required – for expansion in spring and to accommodate bees, brood and stores in autumn.
6. Frames are interchangeable between the two chambers.
7. Foundation can be drawn in the warmth of the top brood chamber.
8. Safety valve in case of late supering – this should not be allowed to happen.

After a week of the honey flow more breeding and super room should be provided.

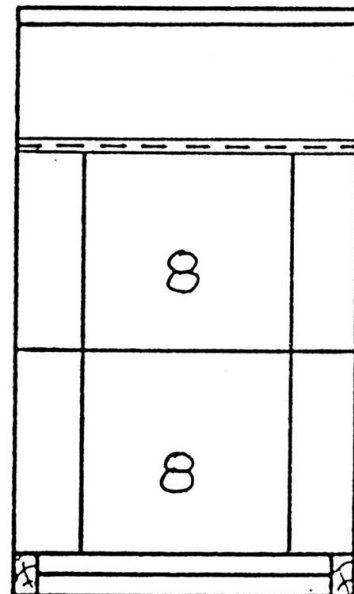


Fig. 4

Move one comb of brood from the top brood chamber into the bottom brood chamber and add two frames of foundation in the centre of the top brood chamber (See Fig.5). If the foundation is given on the flanks of the top brood chamber instead of in the centre, there is a tendency for the bees to draw part of it in drone cells. I have found that another advantage of the shallow frame drone trap which I have described in the penultimate paragraph is that the bees have less need to draw drone comb elsewhere. Add a second super at this time if the bees have occupied the second-outside frames of the first. Even if the weather is wet, provide extra super room for the bees or you will get congestion. This second super could be of foundation which will employ any idle wax makers and take them up out of the brood chamber thus further alleviating congestion. If the second super is of foundation it should be placed below the first, to take full advantage of heat from the brood chamber. As the season progresses, the colonies are checked weekly to see that there is enough super room and that swarming preparations are not being made. My method of checking for queen cells is to remove the supers on to

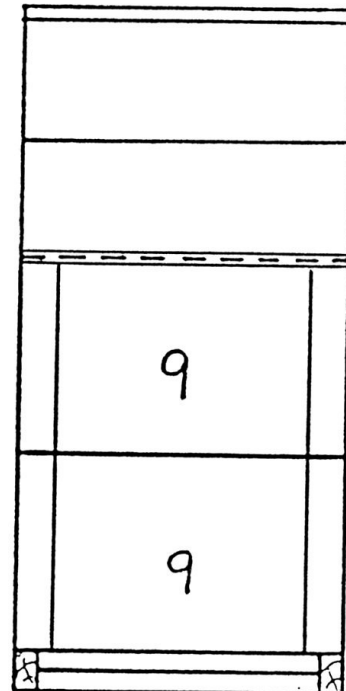


Fig. 5

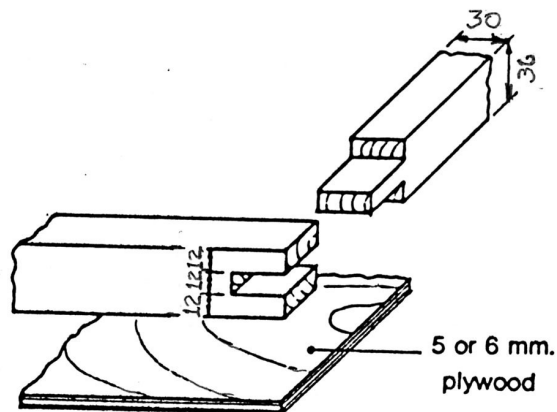
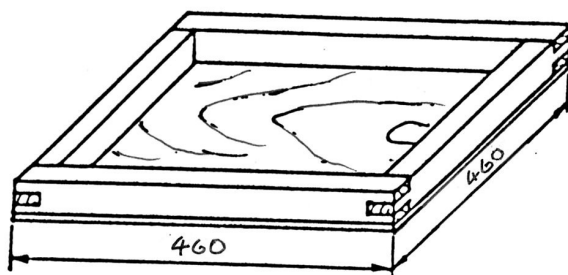


Fig. 6

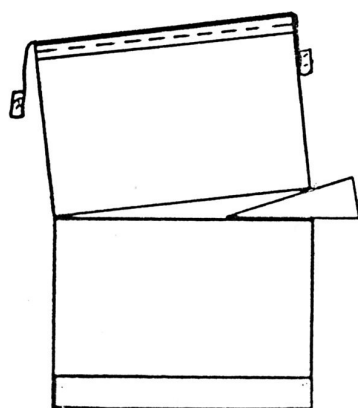


Fig. 7

a manipulating board, (see Fig. 6) cover the queen excluder with a manipulating cloth, lever the two brood chambers apart with the hive tool and insert a wooden wedge (See Fig. 7). The top chamber is then pulled forward 20mm to ensure that it wont slip off when the top chamber is tilted. Smoke is puffed into the opening held by the wedge, then the top chamber is hinged upwards to allow a quick inspection to be made of the centre of the brood nest. By using a little smoke and peering upwards and downwards between the frames, the presence of sealed brood and queen cells can be determined. The whole operation only takes a couple of minutes. When queen cells are built they are usually to be found along

the lower edge of the combs in the top brood chamber which, of course, is the centre of the brood nest. The odd queen cell can be missed using this method, but it is a great time saver and causes minimal disruption to the hive rhythm. In any case, the queen has been clipped. Ensure that there is enough super room for final storage of honey and for the bees to 'hang nectar out to ripen' in spare cells. I tend to over-super in spring and consolidate in late summer.

If queen cell cups, with nothing in them are found, this is quite normal and it is a waste of time removing them. If the cups are being extended and contain an egg, or more critically, a larva being fed, then you must assume that swarming will take place soon after the queen cells are sealed on the ninth day after the egg was laid. I do not believe in cutting queen cells as a method of swarm control as it cannot be relied upon. If cells are removed they will probably be rebuilt the following week and if cut again the bees will sulk, become fed-up and build queen cells on larvae up to three days old, ie. five or six days after egg laying. The cells will be sealed three days later and a swarm is likely to be lost long before your next visit. These cells will produce queens which are inferior to those produced from newly hatched larvae which have been copiously nourished from birth.

The queen cells which were found first of all will contain larvae properly fed from birth therefore they will produce the best queens and should be utilized if the strain is thought to be suitable. In order to go as near as possible to what would happen in nature, I artificially swarm the colony. This prevents the loss of a swarm, (and your future honey crop), satisfies the bees' instincts and provides for requeening later in the year.

First set an empty brood chamber on a manipulating board beside the hive. Find the queen, (she is marked and clipped), and put her together with the comb and adhering bees on which she is found in the centre of the new brood chamber. Put another frame of sealed brood and bees beside the frame containing the queen. Cut out any queen cells which are on these two frames. Without shaking any bees, reassemble the hive as follows: floorboard; new brood chamber with queen and two frames plus seven empty drawn combs, if available, plus the two outside combs from the original bottom brood chamber put on the flanks, (if no drawn comb is available, foundation will have to be used); queen excluder; the original two or three supers; crown board with feed holes open; the original brood chamber(s) with the queen cells; second crown board.

This operation can also be used with single brood chamber management. If you are using double brood chambers, two may be required on top. In practice, these can be reduced to one the following week after some of the sealed brood has hatched, the surplus combs are then used when artificially swarming other hives. If the queen cells are hanging down from what was the original top brood chamber they are likely to be damaged against the crownboard in the rearrangement just described. In which case a small eke, (the one I use in autumn to accommodate Apiguard containers), should be used.

After twenty four hours the colony will have rearranged itself. All the field bees will have joined the queen in the lower part of the hive and most of the nurse bees will be in the top brood chamber(s). The open crown board is now replaced with a solid swarm board, (See Fig. 8), with an entrance open to the front of the hive, (see Fig.9). If the queen cells in the top brood chamber(s) are unsealed a contact feeder containing spring syrup should be placed above the feed hole because the top colony, which is now a big nucleus, will have lost all its field bees. Five days later the top front upper entrance is closed, the top front lower entrance opened and the

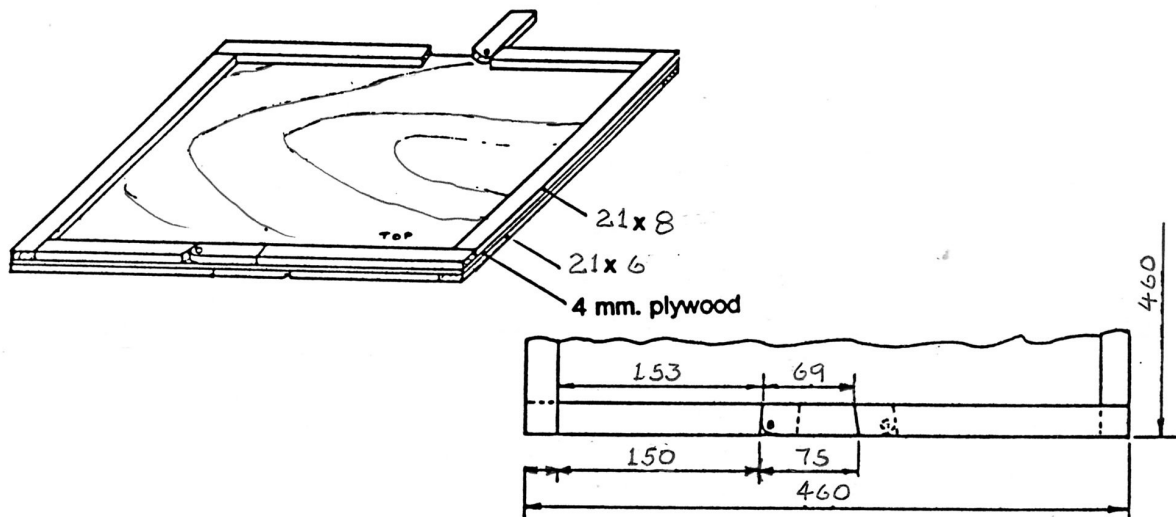


Fig. 8

top back upper entrance opened. This will further divert new field bees to join the queen below thus adding to the artificial swarm. The new field bees from the considerably weakened nucleus will fly from the back. The queen cells in the top brood chamber can be reduced to one, which is really unnecessary because the nucleus is too weak to throw a cast. Or they can be distributed to other similar nuclei

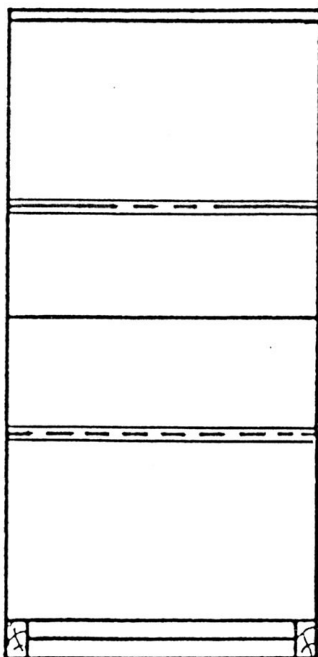


Fig. 9

which are of an undesirable strain. A virgin queen will fly and eventually mate from the rear of the top brood chamber, where her brood and the temperament of her bees can be assessed during the summer. If these are deemed to be satisfactory the top brood chamber with its new queen will be used for requeening the original colony or another colony on another site.

Ten days after the original splitting of the colony, the bottom brood chamber should be checked to see that the colony has settled down and no further queen cells have been drawn. If the original queen cells were being drawn because the bees realised that their queen was failing, they will likely still be trying to replace her and any queen cells will be few in number as they will be supersedure cells. Colonies treated as described usually settle down before the main nectar flow is due and behave like a prime swarm, hopefully producing lots of honey.

If, as in 2006, some colonies still persist in drawing queen cells, you have the option of cutting them out or killing the queen and reducing the queen cells to one. Bear in mind that colonies work better if they have a queen. Also, a virgin queen hatching in a strong colony will not usually

mate and commence laying until most of the sealed brood from the previous queen has hatched. This causes a gap in brood rearing which weakens the colony prior to the main honey flow.

What I would recommend, if you find more than two queen cells seven days after the original split, would be to cut them all out and check again in another seven days. If queen cells are still being drawn, kill the queen and unite one of your top

brood chamber nuclei (you should have some young queens laying by now) using the newspaper method. In this case two sheets of newspaper, one below and one above the young queen's brood chamber, should be used. After a further seven days, reduce the brood chambers to one.

JUNE

Sometime in the first half of June, the spring honey flow will finish. At the end of the month the main flow from sources such as white clover, bell heather, field beans and raspberries will commence. Before the start of the main flow there will be a period referred to as the 'June gap' when, if the weather is good, the bees will just be able to support themselves. If the weather is poor or if you have removed all of the spring honey crop you will have to monitor the food stores and be prepared to feed.

Feeding at this time is a problem. I don't feed syrup when supers are on the hives in case it ends up in the honey. I don't want to take the supers off when feeding as that would cause congestion. My solution is to feed with one or two damp sugar bags laid over the feed holes in the crown board and remove them as soon as fresh nectar is coming in from the start of the summer flow.

About the middle of the month, I remove any full or nearly full supers of spring honey, leaving unsealed honey on the hives. There is no oilseed rape grown in Renfrewshire. I extract the honey when it is still warm, strain it as it is taken from the extractor, run it into honey buckets and put into storage. I shall explain this process more thoroughly in the August magazine. Some beekeepers do not believe in removing any honey at this time, arguing that it should be left to tide the colony over the June gap. My position is that honey is more expensive than sugar. Therefore I am going to remove the honey and am prepared to feed the bees if necessary. In any case, if the summer turns out to be poor, that honey is all I might get.

Continue to monitor the natural mite drop on the varroa floors and estimate the number of mites in the hive to make sure that they don't reach anywhere near to the danger level before late August, when the supers are removed and they can be treated.

Another quick method of checking for mites is to uncap drone brood where varroa are easily visible on pupae at the 'purple eye' stage. Read the free booklet entitled 'Managing Varroa' published by CSL/DEFRA in June 2005. Your Local Association Secretary should have copies.

As the spring honey flow is nearing its end, bees often start to make swarm preparations, especially if they are short of super room, or the brood chamber is congested with semi-idle workers cooped up in a single brood chamber, leading to many being starved of queen substance. Last month I explained how I dealt with swarming as soon as queen cells were being built and how I raised a new queen from these cells provided the queen heading the colony was classed as category (i) or (ii) as described at the end of my April article. I utilize queen cells from the first batch to be sealed, as these are the best cells, made in the bees' own time, from properly fertilised eggs and copiously fed with royal jelly from the moment they hatched. If you break down these cells and use the second batch they are likely to be inferior because they will have been made in more of a hurry and could even have been drawn from old larvae thus producing 'scrub' queens. J Woyke demonstrated that queens produced from eggs were 10% heavier than those produced from 24 hour old larvae, also they had 8% more capacity in their

spermatheca and 3% more ovarioles.

Any colonies which draw queen cells before 20 June will be artificially swarmed as I described in my May article. From these, NATURAL queen rearing will be carried out, provided the original queens were graded category (i) or (ii). Swarming is the natural method by which bees reproduce themselves and therefore cannot be eliminated. Some strains are more prone to swarming than others. As far as I am concerned, if colonies are of a mind to swarm the earlier they show signs of it the better. They can be dealt with as described, the swarming urge satisfied and the bees settled prior to the main honey flow.

All colonies which have not shown signs of swarming by 20 June are reduced to single brood chambers containing eleven combs in order to prevent over-breeding. Bees produced from eggs laid after that time will take no part in the main honey flow. If the summer turns out to be poor or moderately poor you will get little or no surplus honey from colonies on large brood chambers. They will store any surplus in the brood chambers and the supers will be empty. Colonies treated as described will be short of young bees for the ling heather. The treatment of these will be discussed in my August article.

Proceed as follows: find the queen and put her on the comb on which she was found in the centre of the bottom brood chamber; make the chamber up to eleven combs with sealed brood because this will soon hatch making room for the queen to lay; queen excluder; supers; crown board with feed hole open; and the remainder of the mainly unsealed brood on top. The bees in the top brood chamber are remote from the influence of queen substance and are likely to produce queen cells. Check after a week and remove them because the bees will not have been fed therefore any queens produced will be scrubbers. Check the bottom brood chamber at the same time to see that queen cells have not been started there.

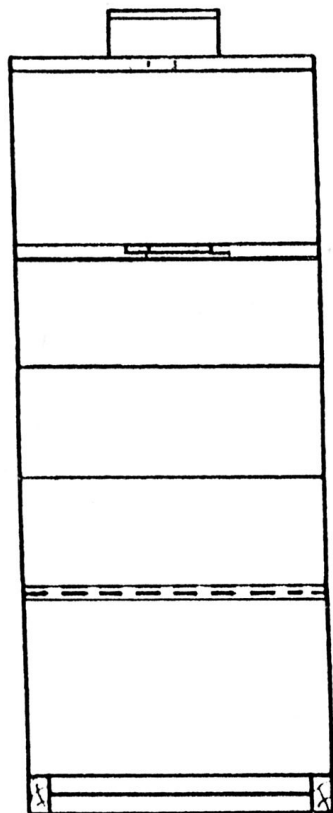


Fig. 10

Contrary to what some beekeepers believe, reducing to a single brood chamber at this time does not induce swarming because you have removed both bees and brood from the brood chamber. The brood in the top chamber should be allowed to hatch. Most of the bees will migrate through the open feed holes to join those below. Some will remain in the top box and will 'look after' the combs during the summer. If the summer nectar flow is good they will even store some honey in the top box which will form part of their winter food when the colony is returned to a double brood chamber in August. Three weeks after the original manipulation, the rear of the top brood chamber should be propped up with a 6mm piece of wood for a day or two in order to allow the trapped drones to escape thus preventing them from clogging the queen excluder.

If the colony has been graded category (i), then they should be INDUCED to produce queen cells in the top brood chamber. The procedure is exactly the same as I described in the May magazine for artificial swarming, except that the top brood chamber must be fed with spring syrup in order to simulate a nectar flow and a frame containing plenty of pollen must be inserted beside

a marked (with a drawing pin) frame containing newly laid eggs in the centre of the chamber. (See Fig. 10). If you don't feed the top brood chamber, which has lost its field bees, inferior queen cells will be produced. The top brood chamber must be checked three days after the artificial swarm was created and any sealed queen cells removed because they will have been drawn from older larvae and will produce inferior queens. When the queen cells are within a couple of days from hatching, they should be reduced to one. The others should be cut out, using a sharp knife, well clear of the cell to avoid damaging it and distributed to other nuclei which are of an undesirable, [(category (iii))], strain.

For more details read my articles on Queen Rearing in the 'Scottish Beekeeper' of April 1997 pages 401-402 and May 1997 pages 431-434.

JULY

This is the month when we will find out if our colony management is going to bear fruit. Given good weather, the bees will be foraging at the main honey flow on plants such as white clover, bramble, bell heather, lime and willow herb. Varroa should continue to be monitored. During the first fortnight, check to see if some colonies are still attempting to swarm, although most if not all will have passed that stage and the brood chamber need not be opened. Make sure that the hives have adequate super room and you can go on holiday during the second half of the month.

Unless you have requeened your colonies in May or June (which I do not) you must check your colonies every week from mid-May until mid-July in order to control swarming thus giving yourself the chance to obtain a good honey crop.

Early in the month, move the shallow frame drone traps described in my May article to the outside of their respective brood chambers or into top brood chamber nuclei. When the worker brood which they contain has hatched, the frames should be removed and stored in a bee proof and waxmoth proof location for deployment during the following May. This will save the bees having to draw the worker foundation from scratch next spring.

Check the top brood chambers, or nuclei, deployed in queen rearing to see if the virgin queens are mated and laying and that the brood pattern is satisfactory. Sealed brood should be in complete slabs with few 'missed' cells. (Except, perhaps, along the lines of the foundation wires). The proportion of empty cells in the sealed brood area is an indication of the extent of in-breeding.

In the honeybee a fertilized egg is diploid, having 32 chromosomes and will develop into a female caste; an unfertilised egg is haploid, having 16 chromosomes and will develop into a male caste. With multiple matings of the queen with, say, up to ten drones diploid females are usually produced. If in-breeding occurs some of the eggs would produce diploid drones. Diploid drones are detected by nurse bees whenever the egg hatches. They are not seen in the colony because they are not tolerated and are eaten by the worker bees leaving a 'pepperpot' appearance to slabs of brood.

In-breeding can occur in isolated apiaries affecting up to 50% of the brood. However, with the demise of the feral colonies of honeybees, due to the ravages of varroa, in-breeding is becoming more likely in the more heavily bee-populated areas of the country. Colonies where in-breeding has taken place fail to build up to full strength. In-breeding should not be confused with any of the brood diseases.

Two further checks should be made on Queen mating nuclei, Check if the Queen has been slow to mate because of bad weather and has become a drone breeder. If you find more than one egg in each cell, the young queen is either just starting to lay or there are laying workers in the hive. If it is laying workers, the eggs will have been deposited on the cell walls because the worker's abdomen is too short to reach the bottom of the cell. If for example the virgin queen has been lost during her mating flight, the bees have no means of raising a replacement. Some workers will develop the ability to lay unfertilised eggs which will only produce drones. By the time laying workers appear in a colony, it is hardly worth trying to save it because the bees will all be nearing the end of their lifespan. In any case, colonies containing laying workers are almost impossible to requeen because the beekeeper has no way of recognising which workers are laying and the bees assume that they are queen-rite.

If I find a colony with laying workers I carry it one hundred metres from its site, shake all the bees on to the ground and return the hive to its original position. The idea being that the laying workers will be too heavy to fly and the others, all being field bees, will fly back home. You can try to unite a queen-rite nucleus to the colony twelve hours later or set it above the open feed hole of another colony.

If it is a good honey year, like 2005 and 2006, early nuclei in top brood chambers, whose queens have been laying since June may be becoming congested. This is an excellent opportunity to add frames with foundation. The developing colony will consist of surplus bees of wax-making age and they will readily draw foundation with few if any drone cells, because they have a young mated queen and drones are no longer required. A larger back entrance may have to be given in hot weather. This is easily achieved by propping up the rear of the top brood chamber with a 6mm piece of wood. When adding foundation to an expanding brood nest during a honey flow, it should be put two positions in. It is a mistake to add it to the flanks as the bees will draw it and quickly fill it with honey before the queen has time to lay in it. New foundation should not be added to weak nuclei if the one previously added has not been drawn.

Some beekeepers like to produce some comb honey from the summer and ling flows. Spring honey is unsuitable for cut-comb or sections because oilseed rape will granulate in the comb and sycamore is too strong in flavour for most palates.

In the past I have produced cut-comb in supers containing nine Manley frames. These frames are spaced at 41mm, (1 5/8in). That is the absolute maximum distance between sheets of foundation if you are going to prevent the bees drawing extra combs between those that you want. I now space cut-comb supers using narrow (34mm/1 3/8in) plastic ends because the resulting sealed combs are a little bit thinner and they fit better under the lid of the cut comb containers which are sold by the suppliers. Another problem I have experienced with the Manley's is that the bees heavily propolise the frame shoulders, making the frames difficult to remove from the crate. This could be overcome by smearing the shoulders with 'vaseline'. When working for cut comb I use thin unwired foundation cut into four horizontal strips, instead of full sheets which tend to buckle when being drawn. The bees will draw the strip of starter foundation with worker comb and the space below with drone comb. I have not experienced any difficulty in getting bees to enter cut-comb supers, they can be used in conjunction with ordinary supers where required. It is preferable not to place a cut-comb super next to the brood chamber as the bees might store some pollen in it, also the cappings soon become 'travel stained' by the bees moving to supers which are above.

I produce square sections in hanging section holders each containing three sections. Eight section holders fit into a shallow super allowing twenty-four sections per crate. Metal 'separators' must be suspended between each section holder otherwise the bees are likely to spoil many of the sections by building comb where the beekeeper does not want it. Bees do not like being restricted in little sections and are often reluctant to enter them. The queen is unlikely to enter, so no queen excluder should be used. Full squares of thin fresh foundation should be used when working for sections. Special crates, holding thirty-two sections can be purchased from the suppliers but bees do not like them. Round sections are preferred by some producers but I have no experience of these.

Strong colonies are required when working for sections and bees must have a laying queen which was reared during the current year otherwise they are likely to swarm due to congestion and their reluctance to enter the 'little boxes'. Colonies chosen for section production should have a section super put on top of the current supers one week before the start of the targeted honey flow so that the bees can become accustomed to it. At the start of the flow the section super should be placed on top of the brood chamber with the queen excluder removed and the original supers put above the clearer board. These supers, cleared of bees, can be given to other colonies to complete. To further entice the bees into the section super a partly completed section, saved for the purpose from the previous year, should be placed in the middle of the super. Do not add a second super until the bees have started to draw comb in the first or they may sulk and start to 'loaf'. The second should be added below the first and if the colony is strong and the flow is good a third super should be placed on top of the first. If the flow continues the third super can be placed below and so on. In this way the bees are given tasks a little at a time, whereas if faced with a huge space containing innumerable 'little boxes' they may give up and sulk, or swarm especially if the queen is of the previous year.

Towards the end of the month I put cut-comb supers, intended for going to the heather, on top of the supers on strong honey producing colonies in the hope of getting them drawn out. This will give the bees a quick start at the heather.

AUGUST

The summer honey flow should be in full swing at the beginning of the month and beekeepers must ensure that the bees have ample super room in order to take full advantage of nectar from the willow herb and Himalayan balsam. During the early part of the month, a check of the supers should be made with a view to removing any which have not been occupied and concentrating partially completed combs on the strongest hives in an attempt to get as much of the honey ripened and sealed as possible by the end of the flow. Flower honey keeps best if its moisture content is in the range of 17-19%. Above 20% there is a danger that the honey will ferment sooner or later depending on storage conditions. The most accurate method of determining the moisture content of honey is to use a refractometer. If you do not possess such an instrument, it is safer to extract only honey which has been sealed. If there is still a combination of sealed and unsealed honey in the supers a week after the end of the flow, select each frame in turn, hold it over the hive and give it a good shake. If no unripe honey splashes out, it could be extracted, but beware that its moisture content could be near to the critical limit. It should be used as soon as possible and not stored for any length of time.

With the exception of the colonies which have been moved to the heather

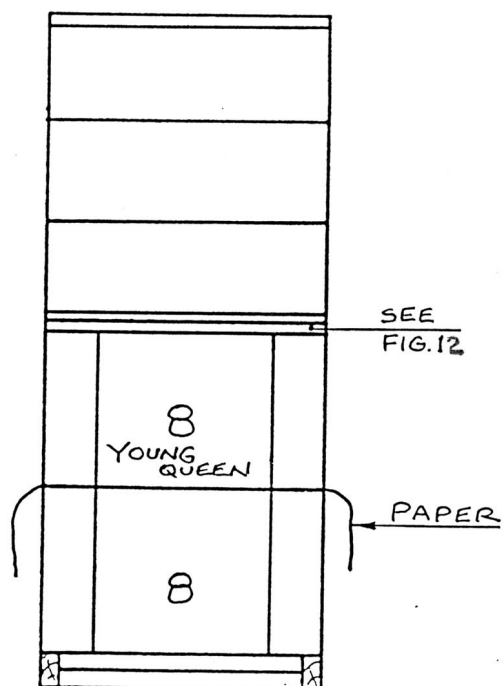


Fig. 11

earlier in August, I remove my honey crop starting about the middle of the month, put the colonies back on double brood chambers and requeen the colonies, where required, all in one operation. (See Fig. 11). The old queen in the bottom brood chamber is removed, the combs reduced to eight flanked by dummies, a sheet of newspaper spread over the top of this chamber and the top chamber containing eight combs and the young laying queen placed on the newspaper. A special frame with a small rear entrance (See Fig, 12) is placed on top of the second brood chamber to allow the field bees from what was the top chamber access to the hive and a clearer board is put on top. Any surplus brood combs are distributed to other hives which are being doubled and don't have a nucleus on top. Great care must be taken to ensure that the stack of supers is bee proof or, as they become cleared of their own bees, they will be robbed out if bees can

gain access from the outside. The supers are removed as darkness begins to descend the following evening. Guard bees do not fly in the dark. The special frame (Fig. 12) is removed after a few days, when the bees using the back entrance will

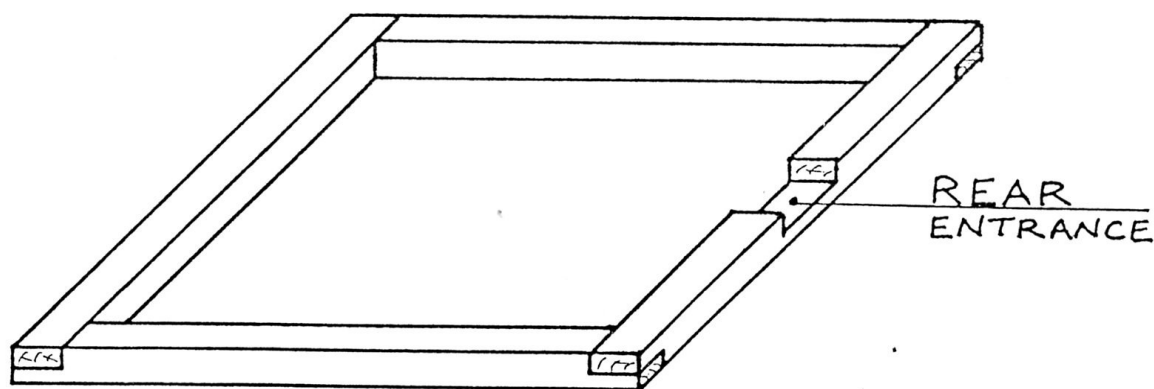


Fig. 12

find their way round the front and be accepted.

The honey supers are taken home, kept in a warm room and extracted that night or the following day. Honey is taken from the extractor and strained, first through a stainless steel sieve and then a 200 micron nylon conical bag suspended in a stainless steel storage tank. A length of cotton tape should have been sewn on to the apex of the cone and be long enough to reach the bottom of the tank. This allows the strained honey to run down the tape, reducing the amount of air gathered in the strained honey. After settling in the tank for a few hours to allow more air bubbles to rise, the honey is run into plastic pails and put into storage. At this time of year when ambient temperatures are fairly high honey can be extracted and

strained with a minimum of effort. Warm honey does not incorporate as much air during the extraction and straining process as it does when it is cold and thick.

Shortly after the removal of surplus honey the colony, now requeened and on sixteen combs, must be treated for varroa. Bayvarol or Apistan or Apiguard or some other effective and suitable varroacide should be used. Remember, if you use either Bayvarol or Apistan (both are pyrethroids) year after year the pyrethroid will build up in the wax combs, thus subjecting the varroa to continuous small doses of the chemical which will lead to the development of pyrethroid resistant mites. It is essential that varroa numbers are reduced to a minimum in order to prevent damage to the young bees which are going to have to carry the colony through the winter months ahead. I have been treating with Apiguard for the past three autumns and have found it to be effective if applied early enough when the ambient temperature is in excess of 15deg.C. In order to conserve heat, I place a 50mm thick sheet of expanded polystyrene on top of the crown board. A 20mm deep eke is placed under the crown board to accommodate the Apiguard. I have also found that Apiguard considerably reduces the incidence of chalk brood. One snag with it is that 50% of colonies refuse to take liquid feeding while the Apiguard is in place.

The ling heather will start to bloom about the tenth of the month. Heather yields more nectar in the first half of its blooming period, weather permitting. This gives me a dilemma because the willow herb and balsam are in full bloom. Consequently, I only move eight colonies to the heather and leave the others on their permanent sites as described above. This means that I can be well on with my autumn work by the end of August and only have the heather colonies to deal with in mid September.

At the beginning of August, I select eight strong colonies to go to the heather. These colonies will have a large force of field bees, but many will be old and would not last long in the harsher conditions often experienced on the moors. It is also important to try to keep the queen laying while at the heather to produce 'winter bees'. Therefore a queen reared during the current year is essential. I treat these colonies destined for the heather almost as I have described in paragraph two above. (Again see Fig. 11). The only difference is that when I remove the old queen from the bottom brood chamber, I leave it on the original eleven combs. I also put two cut comb super above the queen excluder and the clearer board on top. Five days later, when the honey supers have been removed and the young queen has been accepted and laying, the hive is reduced to a single brood chamber; queen excluder and two cut comb supers. As much of the brood as possible is concentrated in the single brood chamber and surplus combs are used to strengthen other nuclei. In rearranging the brood chamber, combs containing mostly sealed brood are placed in the centre and those containing mostly eggs and young larvae are put in the flanks. The sealed brood in the centre will hatch first leaving room for the queen to continue laying. If the brood distribution had been the other way round, space would have been created in the flanks which would have been filled with incoming nectar, leading to a severe reduction in space for egg-laying and less honey in the supers. At this time the crown board is replaced by a ventilation screen and the hive is secured by means of a nylon strap, ready for removal to the heather.

About the tenth of August the hives are moved to the heather. In the evening prior to moving, when flying has ceased, a piece of foam rubber is pushed into the hive entrance. The hives can be moved during the night or first thing in the morning. On arrival at the moor, the hive straps are kept in place, a sheet of insulation is

placed above the ventilation screen, the roof replaced and the bees released.

SEPTEMBER

The main nectar flows are now over except for the end of the heather and Himalayan balsam. As I stated in my notes for August, the honey from all colonies which have not been taken to the heather has been removed and the hives put on to sixteen BS combs. This arrangement gives plenty of room for autumn laying, for winter stores and for the bees themselves; none of which is available in an eleven BS comb single brood chamber. The bees will continue to store honey from late sources, which I leave for the bees themselves and any shortfall is made up to about 25kg by feeding sugar syrup (1kg white sugar to 550ml water) or ready made liquid feeding purchased commercially. I use Miller feeders for autumn feeding which allows the colonies to be fed in a very short time, certainly in less than a week. When feeders are first put on the hives they should be 'primed' by running some syrup down through the feed hole to entice the bees up into the feeder. I try to have all my colonies fed by mid September. Some beekeepers are of the opinion that if bees are fed too early they will use some of the food for breeding and will have to be given more food later. I do not agree with this. What better preparation can there be for next spring than to have colonies going into the winter with an abundance of young bees, even if it means having to top up their food stocks during the last week of September. Bees are thrifty insects, they do not waste food. Some beekeepers make the mistake of feeding syrup far too late in the autumn, causing the bees to become exhausted trying to reduce its moisture content and trying to get it sealed before the onset of cold weather.

After honey has been extracted I usually put the wet supers over the open feed holes of hives which are lightest in stores. When they have been cleared of honey the dry supers are taken home, sprayed with 'Certan' as a preventative against wax moths and stored in my bee shed for the winter. The supers are stacked, with a sheet of newspaper between each, in piles which are made rodent-proof by placing a swarm-board top and bottom. The use of Paradichlorobenzene for preventing wax moth attack is now illegal. Another, much quicker, method of deterring wax moths is to store the supers 'wet' as they come from extraction. This is successful, but it produces a terrible sticky mess in the bee shed the following spring. One advantage is that bees enter the supers very rapidly in spring to mop up the honey which has more than likely fermented due to dampness over the winter. I am always afraid that this fermented honey will taint the future honey crop especially if it is oilseed rape. It is claimed that wax moths only attack combs in which brood has been reared. That being the case, stored spare brood combs are particularly vulnerable and should be sprayed with 'Certan' and made rodent-proof.

Around the middle of the month the heather hives should be brought home. Their honey supers must be removed, the colonies put on sixteen combs, treated for varroa and fed. The air temperature is too low for Apiguard to be used, so some other method of treating varroa must be used. I try to top up the winter stores by feeding autumn syrup. In order to prevent robbing, all colonies needing food in an apiary should be fed at the same time. Feeding should be done in the evening and care must be taken to avoid spilling syrup in the vicinity of the hives and entrances should be reduced to 25mm to deter robbers and wasps. Beekeepers who have many colonies at the heather usually do not have time in September for liquid feeding. They winter their bees on fondant or dampened sugar bags, neither of

which encourage robbing.

Cut comb and sections can be prepared for market as soon as they are removed from the hive. Bees should be removed from the frames using some type of clearer board, never by shaking the combs as they are easily damaged. The use of smoke should be severely curtailed as it can be detected on the comb for weeks.

When preparing cut comb for exhibition it should be cut to the exact shape of the plastic container in which it is going to be exhibited and put on a wire baking tray to allow exposed honey to drain out before it is put in the container. If I am preparing cut comb for the market it is cut out using a 'Price' comb cutter and not drained. I have never had any complaints about liquid honey being in the bottom of the opaque container. It is all good stuff! This does not apply to beekeepers who individually wrap their comb in transparent cellophane bags or sheets. In that case the liquid honey would appear at the bottom of the pack and detract from its appearance. When using a 'Price' comb cutter, I cut close to the bottom of the frame, this leaves 12mm of comb at the top of the frame which will act as a 'starter' for the following year and the frame wont require to be re-waxed. I put the cut comb supers above the feed hole back on the hives to let the bees clean up the surplus honey remaining in the starter comb.

All honey extraction equipment should be cleaned and stored until required the following season. The extractor, metal strainers and tanks should be washed with cold water to remove most of the stickiness, followed by hot water to which washing soda has been added in order to remove any dirt or wax particles. They should then be rinsed in hot water, thoroughly dried, wrapped in polythene and stored in a dry place.

I still use two Porter bee escapes fitted in the crown board when clearing bees from supers. Some beekeepers prefer to use Canadian clearer boards, claiming that Porters get gummed-up and cease to function. In my opinion Porters only cease to function because of lack of maintenance. They should not be left on the hives after the supers have been removed otherwise the bees will propolise the springs to close off the air space. At this time all Porters should be submerged in a pot of water to which a handful of washing soda has been added and heated to a temperature above the melting point of wax. Before storing, the distance between the tips of the springs should be checked and adjusted, if required, so that they are about 3mm apart.

OCTOBER

At this time, weather permitting, the bees could be topping-up their reserves of both nectar and pollen from the ivy. This is the last important bee plant of the year.

At the beginning of the month, winter entrance blocks must be put on the hives to keep out rodents and to allow winter ventilation. Read again my notes for January.

Strips or empty trays used in controlling varroa during late August or September must now be removed after they have been deployed for six weeks. Bayvarol or Apistan strips must not remain in hives for more than this time because the pyrethroid will be losing its strength and varroa coming into contact with it will not be killed. The varroa will adapt to be able to withstand the effects of the

weakened pyrethroid, leading to the evolution of resistant mites. Very soon neither of these pyrethroids will be effective against varroa and alternatives such as Apiguard or Oxalic Acid will have to be deployed, or you will lose your bees.

I place a sheet of 50mm thick expanded polystyrene insulation on top of the crown boards and weigh down the shallow roofs with a brick. Apiary hedges can be cut and trees which are shading the apiary should be pruned. Fences and gates enclosing the apiary must be made stock-proof. Hives should be checked to see that they are watertight.

Drones should have been expelled from the hives by October. Any hives still having drones flying during the second half of the month should be investigated, as there could be something wrong with the queen. If the colony is queenless, it should be united to a nucleus or to another colony.

During the active season I store wax, obtained from cappings, pieces of broken comb and frame scrapings gathered during the manipulation of colonies, in large polythene buckets. This wax is now melted down into cakes and stored until the following spring, then I make and wire my own foundation. Making your own foundation or making candles is the most cost-effective way to utilize the wax crop. I make no effort to extract wax from old brood combs as it is a messy job and for all the wax obtained it is not worth the bother. In any case, if pyrethroids have been used in the brood chambers to treat varroa, residues will have built up in the wax. This also applies to wax purchased from the equipment suppliers. As I stated in my March article, I burn all my old brood combs thus getting rid of pyrethroid residues and disease spores.

I will probably have already marketed some of my spring and summer honey but the bulk of it will be in store. I like also to have in stock a surplus from the previous year in case of a poor current season. In my work for August I described how my honey was extracted and strained without the need to apply heat and stored in sealed buckets to granulate naturally. Now is the time to start to get stored honey ready for the market.

If honey has been allowed to crystallize in a container it cannot be jarred without the application of heat. Great care must be taken not to overheat honey. If it is overheated, especially with the top removed from the storage container, there will be a loss of flavour and aroma by volatile oils and other substances of plant origin being driven off.

Hydroxymethylfurfural (HMF) is a substance produced by the chemical breakdown of fructose in the presence of free acids, a process which is occurring in honey all the time. The rate of production of HMF is dependent upon the temperature to which the honey is subjected. The higher the temperature and the longer the storage time the more HMF the honey will contain. Honey extracted and strained without the application of heat will contain very little HMF. The present EU Honey Regulations state that the HMF of honey must be no more than 40mg/kg at the point of sale. Therefore care must be taken during processing not to heat honey at too high a temperature and/or for too long a time.

If honey is jarred immediately after extraction and straining there is no guarantee how long it will take to set. Some honeys are slower to set than others. Some set with a soft texture and fine grain, others with a hard texture and coarse grain, others with coarse grain in the bottom of a jar and liquid honey at the top. None of the honey just described must go anywhere near the shops. In general, if the honey has a high glucose content it will granulate quickly producing a fine crystal structure and if it has a high fructose content granulation will be slow and the

crystal structure will be coarse.

To produce clear honey, the bucket of stored honey has to be gently heated to completely reliquify it. If any small amount of crystals remain, the honey will become dull in appearance and will reset. The honey should be heated in a thermostatically controlled air heating cabinet at an absolute maximum temperature of 50degC or less for 36 to 48hr. It should then be re-strained into a honey tank and allowed to cool rapidly in a cold place until its temperature falls to 32degC, then run into clean jars which have also been heated to 32degC. The jars should remain in a warm room overnight to allow air bubbles to rise. They should then be stored in a cool room until required for sale. It will have a shelf life of a few months before it starts to granulate again.

Some authorities claim that, if the shelf life is to be extended to six months or more, the hot newly jarred honey with the lids screwed on should immediately be further heated in a thermostatically controlled water bath to a temperature of 60degC for 3/4hr to kill off the yeasts and then cooled rapidly.

To produce soft set honey, first of all check the texture of the stored honey. If it has set with a fine texture and a soft grain which will spread like soft margarine, all that is required is to heat the bucket in the air heating cabinet at a temperature of 32degC until the honey has a consistency of thick porridge, then poured into a honey tank. In this form it should be stirred to ensure even mixing, left to settle to let air bubbles escape and run into clean jars preheated to 32degC. The jars are left in a warm room overnight to allow more air bubbles to rise and then stored at 12deg C to re-set before being put on the market.

Alternatively, if the stored honey has set with a hard (spoonbending) texture and coarse grain it will have to be completely melted and 'seeded' with a fine textured soft set honey like clover or oilseed rape. The stored honey is heated in an air heating cabinet at no more than 50degC for 24 to 36hr to completely remelt. It is then poured into the honey tank and allowed to cool rapidly to 32degC. At the same time 'seed' honey is heated to 32degC and stirred. Then pour the seed into the melted honey in the proportion of 1kg of seed honey to 10kg melted honey. The greater the proportion of seed the faster the mixture will set. The mixture is then stirred with a wooden stick until an even mixing has been attained, left to settle to let the air bubbles escape and run into clean jars preheated to 32degC. The jars are left in a warm room overnight to allow more bubbles to rise and then stored at 12degC to reset before it is put on the market.

Honey treated as described above, paying particular attention to the temperatures at which blending and jarring take place, should set as a smooth textured product which should be free from shrinkage at the edges of the jar and free from 'frosting' which has the appearance of white streaks or patches in the honey. In both cases there is nothing wrong with the quality of the honey, only its sales appeal will have been reduced.

NOVEMBER

November is the start of a period when colonies should be disturbed as little as possible. At the beginning of the month I insert the hive tool under the rear of the crown board to crack open the propolis seal and place a match under both rear corners of the crown board. This will create a small air-gap which will allow moisture-laden air, from the winter cluster, to escape. I don't believe in leaving the feed hole open. If this operation is carried out in October, or earlier, there is a

likelihood that the bees will propolise the gap again.

Many beekeepers believe in giving more top ventilation than I do, also many are now using open-mesh floorboards which allow the winds to sweep upwards through the hives in the belief that this will lead to better wintering conditions. Undoubtedly these floors give a drier hive in winter and it is claimed that 20% of varroa mites will be lost through an open-mesh floor.

As far as I am concerned, the 'jury is still out' on the deployment of open mesh floors. I am experimenting at present, with ten of my colonies on these floors and over the past three years I have lost a slightly higher proportion of them, compared to those on solid floors and they definitely have been slower to build up in spring although by mid-summer there was little difference. I also think that there is a slightly reduced incidence of queen cell production, but this could be because they had not attained full strength by the swarming period in June. Mid-Renfrewshire is an early district, where strong colonies are required for the sycamore flow, therefore a rapid spring build-up is essential not only for the prospect of obtaining early honey but also for the advancement of queen cell production and the consequent satisfying of the swarming impulse prior to the main honey flow.

Dr David Raven, writing in **Beecraft** in September 1989, stated that a level of 1% to 2% carbon dioxide is beneficial in keeping bees in a state of inactivity during the winter. The concentration of CO₂ in normal atmosphere is only 0.03%.

In 1960, the Russian researchers Taranov and Michailov found that a fairly high concentration of CO₂ in the centre of the winter cluster was essential, as it slowed up metabolism and reduced the consumption of stores. Although bees could regulate the concentration of CO₂ and the relative humidity in freely ventilated hives it was attained at the expense of heavy energy expenditure, excessive use of stores and worn-out bees.

The effect on wintering colonies of these findings is contained in the researchers' excerpts:-

"If winter colony death rate is taken as a criterion, better results are obtained from colonies wintering under conditions of good ventilation. However, the real loss in bees can be seen only some time after the spring flight when colonies lose their enfeebled winter bees. An estimation of the number of full frames occupied by bees in autumn and spring has shown that bees are in better condition when wintered under conditions of poorer ventilation. These experiments have shown that increasing hive ventilation considerably weakens the bees and reduces their ability to rear larvae in spring. With a small degree of ventilation in the hive, the concentration of CO₂ at the centre of the cluster is increased, this reduces the consumption of food, conserves more energy and ensures more ability to rear brood by the over-wintered bees. The data obtained suggests that it may be necessary to revise ideas on hive ventilation and the arrangement of hive entrances over the winter period. Reduced air exchange in the hive can mean better wintering of bee colonies and more intensive brood rearing in spring."

For this reason I insert the underfloor varroa tray from 1st February until 1st May to conserve heat.

November is a good time to study hive records from the year just past and select possible breeder queens for the following season. I don't believe in breeding solely from my so-called best colony because there is no guarantee that the new queen's progeny will be as good as their mother and now that we have varroa, the feral colonies will soon be wiped out, leading to the increased chance of in-breeding. By breeding from one best colony a vast gene pool of desirable qualities will be lost.

I have eight out-apiaries and try to cut down the risk of in-breeding by requeening one apiary with queens cells from another, or by exchanging nuclei between apiaries. In doing this, care should be taken not to interchange bees from one part of the country with those from another as it can take years for bees to acclimatise to a new district. Beekeepers who purchase bees please note.

It is a fact that queens reared as early in the season as possible and introduced into their source colonies do not, as a rule, (except for the 2005 season) show any tendency to swarm during the remainder of the current year. However, by requeening all colonies every year you might have cured the swarming problem but that system does not allow for good queen selection. A queen is judged by the performance of her offspring. Therefore you cannot claim to have a worthwhile breeder queen until the qualities of her daughters can be assessed. This might not be possible until the following year. Therefore, queens, thought to be suitable breeders have to be overwintered for use as breeders in the following season.

Good queens in one generation should mean good drones in the next. If we keep on culling unsatisfactory queens we will soon get rid of the poor drones. I don't make any effort to have dedicated drone-producing colonies because the drone will pass on the qualities of his mother, (he has no father), whereas the qualities of the new queen and her workers will depend on those of both their father and mother. If a colony is bad-tempered, it must be requeened from a better strain, unless you try to breed out the bad temper by having its virgin queens mated with drones in a different apiary. Over time, it is possible to obtain a desirable strain by cross-breeding and to fix it by line-breeding.

The beginner will have observed that the colours of all the workers in a colony are sometimes not the same. That is because their mother will have mated with many drones, some of which could have been dark and others yellowish.

DECEMBER

December is a quiet month in the apiary except for an occasional visit to ensure that all is well. It is also an opportunity to conduct a preliminary search for a suitable apiary site. The sun is low in the sky at this time of the year so you will be able to observe if your likely site gets some winter sunshine and is not a frost pocket.

At this time of year there should be little or no sealed brood in the hives, (although I do support the idea about winter breeding put forward by Eric McArthur on p. 330 of the December 2005 SB magazine) consequently the vast majority of varroa mites will be on the adult bees thus exposing them to treatment. All colonies should have been treated for varroa during autumn, after the honey flow. There is a chance that the autumn treatment was ineffective or that there has been a re-invasion of varroa mites from collapsing feral colonies or from the colonies of the 'feral beekeeper'. When the ambient temperature is about 6degC, all colonies should be treated with Oxalic Acid by either the trickle or sublimation methods, the application of which have been adequately described in this magazine in previous years.

During a frosty spell when wax is brittle and easily removed, the opportunity should be taken to clean all queen excluders. I use the wired type which is framed and has a bee-space on one side. The excluder is placed flat on the workbench and then a 20mm x 20mm piece of wood is slipped under the far side thus raising the excluder clear of the bench. The bulk of the wax is removed from both sides in turn

using the hive tool in a 45deg. cutting motion, taking great care not to displace any of the wires. The remainder of the wax is then removed by means of brushing parallel to the slots with a wire brush.

If you are planning to start beekeeping during the coming season or you are thinking of adopting a different hive pattern you should carefully consider which pattern you are going to adopt, prior to placing an order with the supplier early in the new year. You should then ensure that any subsequent equipment which is purchased is fully interchangeable, and that there is only one hive pattern in your apiaries.

My advice would be to decide whether you are going to adopt top or bottom bee-space. If you are going to adopt top bee-space I suggest that you should adopt the Smith hive or if bottom bee-space the National hive. My preference is for the National because the brood chamber is of a suitable capacity in summer and for the heather, it is not too heavy to lift, it takes British Standard frames with long lugs for ease of lifting out, it has excellent hand-holds and, if you are buying or selling hives or bees, the majority of beekeepers have this hive pattern.

Whether you adopt top or bottom bee-space is a matter of personal preference so long as you do not mix the two in one hive. Some beekeepers argue that top bee-space is better because you can set a second brood chamber or super on top of one already there and slide it into position without crushing bees which are on the frame-tops of the lower box. But what about the bees which are hanging from the underside of the frames in the box which is being slid over? They are much more likely to be decapitated because you cannot see to smoke them, whereas those at the top of a bottom bee-space box are easy to see and be driven down with a puff of smoke.

It is my opinion that the WBC hive is fine if you are only having a few of them and are not going to practice migratory beekeeping. They are far too much work for the many-hive beekeeper as well as being far too expensive to purchase. The Langstroth hive is probably the most common worldwide but I consider its brood chamber to be too large in summer. In the west of Scotland, and, I suspect in other areas as well, a brood chamber containing eleven BS frames is adequate during the summer and can be increased by adding a second brood chamber at other times of the year. In summer, the use of a large brood chamber, or double National or Smith brood chamber, will give an excellent honey crop in a good season but little or no honey in a middling or poor season. All that you will do then is rear large numbers of bees which will spend most of their time in brood rearing and store any honey they gather in the brood chamber. The Modified Dadant hive has far too large a brood chamber for Scottish conditions and is far too heavy to lift.

This concludes my series on practical beekeeping throughout the year. I hope that beginners have been assisted in planning their work during each month and that more experienced beekeepers have been stimulated to review their current methods to ensure that what they have been doing is best for their particular conditions. One of the many joys of beekeeping is that there are numerous ways of achieving whatever you desire from the craft.

Happy beekeeping!

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