

# Sustainable Bee-Friendly Beekeeping

By David Heaf

*Everyone must, in reality, take the greatest interest in bee-keeping, for in fact, more in human life depends on it than one usually thinks. (Steiner<sup>1</sup>)*

In the last few years in the USA and Europe there have been unusually high losses of honey bee colonies. Causes blamed range in likelihood from pesticides to exotic diseases, to mobile phone masts, etc. But very few ask whether modern artificial beekeeping is partly responsible for the losses. In this two-part article I present a way of natural beekeeping that would suit anyone with even very basic woodworking skills and access to a modest sized garden, city roof, allotment, or any tiny plot of land that is reasonably secluded.

Bees were once kept in skeps – inverted round baskets – which copy remarkably well a favourite abode of the wild honey bee, namely a hollow tree. But to harvest skep honey the bees were generally asphyxiated. Over the course of the last century or so, skeps were replaced almost completely by hives containing wooden frames. Prominent beekeepers noticed that this led to a rise in brood disease so it became necessary for governments to set up bee disease inspection bureaucracies at public expense.

Beekeepers who witnessed this transition in beekeeping associated the rise in bee epidemics with the introduction of frames and associated artifices. Among them was Abbé Emile Warré (?-1951) whose book *L'Apiculture pour Tous (Beekeeping For All)*<sup>2</sup> ran to twelve editions. Warré showed how to make and run the hive he developed that includes many of the bee-friendly attributes of the skep without resorting to bee-unfriendly frames or killing to harvest honey. His 'People's Hive' is so easy to make and run that it could make beekeeping as commonplace as it used to be in the late 19<sup>th</sup> century when so many rural holdings had skeps. Indeed Warré reminisces:

*Each winter, all my childhood friends ate an abundance of delicious bread and honey, just as I did. Twenty years later, I was the only person who had beehives. In some gardens, there was an abandoned Dadant or Layens hive, empty of course. The owners had let themselves be tempted by the advertisement of some on displays at agricultural shows. They believed*

*they would do better with these modern hives. In fact they abandoned the only hive that suited them. [...] At my parent's home there was always plenty of honey for masters and workers, even for the farmyard animals. All our friends in the village also had their share each year. (Ref. 2, pp. 35 & 37)*

The most important advantage of Warré's hive is that it retains the bee's nest warmth and atmosphere at all times except for a few minutes once a year when the honey harvest is taken off. Bees, though cold-blooded,

maintain a nest temperature close to that of the human body. Under the roof of a 'Warré' is an insulating 'quilt' filled with straw or wood shavings and below that is a cloth that the bees firmly stick down with propolis, a resin gathered from tree buds which the bees use as their antiseptic and draught excluder. In contrast, a frame hive is regularly opened at the top thus chilling the hive and annoying the bees and the frames, which are supposed to be moveable, are welded tight with propolis which repeatedly has to be scraped away. Non-interventionist Warré beekeeping results in more docile bees.

Warrés are frameless but have 'top-bars' at the top of each box on which the bees build natural honeycomb. Without frames they can fill the whole cavity width with combs, fixing them in the natural way to its sides, thus creating inverted pockets of warm air where the work

of rearing the young takes place. Frames cause draughty gaps round the edges letting out heat. The bees then have to work harder to replace the lost heat, and are consequently more stressed, more disease prone, and use up more of their hard won honey.

Frame beekeepers also use foundation in their frames, thinking they are saving the bees work. These sheets of recycled beeswax, which often contains pesticide traces, are embossed with a hexagonal pattern that predetermines the size of the honeycomb cells. But natural comb, as in a Warré, has cell sizes the bees themselves choose and they construct the comb as they do in nature, i.e. not starting on a wax sheet. This removes another artificial



An 'exploded' view of the Warré hive

stressor as a colony instinctively determines how many drones (males), to rear in the cells that are larger than worker cells. A natural colony even varies the cell size of worker brood. The role of the comb, an organ of the superorganism *the Bee*, is very subtle and as yet little understood.<sup>3</sup>

*There is, may be, little in Nature which permits us to look so deeply into Nature herself, as the activities of the insects; the insects are strange creatures and they have still many a secret to disclose. (Steiner<sup>1</sup>)*

Like modern hives, a Warré is a stack of wooden boxes, but the box internal dimensions not only better match the size of a bee swarm or cluster but also more closely approximate to tree hollow proportions by being taller and narrower than the heat-dissipating frame hives. Install a swarm in a Warré and it starts building comb from the top down. After filling the top box with comb, brood, pollen and honey it moves to the top-bars of the one below, and so on. Empty boxes are added always *at the bottom* without letting out the warm air, trapped as in a hot air balloon. Usually four boxes are needed in a season. They sit on a simple wooden floor with a notch for the entrance and an alighting board. The floor rests on any kind of improvised stand.



*Natural comb constructed in a Warré hive*

In contrast, frame beekeepers add honey boxes on top of the hive, thus letting out the heat each time. And to stop the queen from going into these honey boxes to lay eggs a ‘queen excluder’, a metal or plastic grid, is inserted that only the workers can pass through as they are smaller. This exclusion of the queen not only allows the honey to be machine extracted but also permits the comb to be reused for decades. The queen’s access to the comb is unrestricted in a natural honeybee nest and the comb is being constantly renewed, thus reducing the risk of micro-organisms accumulating in it.

If we switch from frame to Warré beekeeping we have to take a smaller crop of honey than we are used to with frames. The whole change in approach requires developing a different attitude to nature. I go into this in

more detail in a separate article on ethics in beekeeping.<sup>4</sup> The main reason is that the bees should winter on their own honey. This ends the practice of robbing colonies of most of their valuable nutritional reserves while replacing them with sugar syrup, which lacks the minerals, nutrients and other bee health-promoting substances in honey. If Warré beekeepers have to feed their bees, say after a wet summer or when settling-in a new swarm, they do so with their own honey. Only as a last resort to prevent colony starvation do they turn to sugar.

To harvest a Warré, the top box is removed in the autumn, checked to ensure it has no brood, and taken indoors to crush the comb and drain its honey. There is no need for expensive stainless steel extractors which, under centrifugal force, throw the honey out of the comb in droplets. Without the machine the ecological footprint of Warré beekeeping is further minimised. Just ordinary kitchen utensils, such as a strainer and bowls will suffice. If it has been a good summer – in the UK 2007 and 2008 summers had very poor nectar flows – then a second box of honey can be taken, provided it does not contain part of the brood nest and there is at least 12 kilograms, or about six combs of honey, left in the remaining boxes for the overwintering bees.

Another important feature of the Warré’s geometry is that the winter stores are situated above the bee cluster, which has a compact football or rugby ball outline, and over several months eats its way upwards into the honey. In contrast, frame hives are broader and flatter, and it can happen that the cluster eats its way to the top and in a cold snap the benumbed bees cannot travel sideways onto the hard-to-reach honey frames at the edges because they are too torpid to move onto a new comb of honey. Consequently they die, even though the box may contain ample food.

In spring, say late March or early April in the UK, one or more boxes, new or emptied at last year’s harvest, are placed underneath the colony. The colony expands down into these and the boxes at the top become the honey harvest later the same year. Thus, there is a constant renewal of comb in a Warré. This is terribly important for maintaining the health of the bees and is rarely achieved in frame hives which can have blackened combs at least five years old.

Frame beekeepers say they need comb in frames to control swarming and disease. The idea is that one can read the hive like a book to see if it is about to swarm or whether there are diseased larvae. But swarming is an essential part of the natural reproductive cycle of a honeybee colony. Suppressing swarming risks gradual weakening of the genetic stock of the bees. A Warré beekeeper aims to work with the power of the swarm and does not use artificially bred queens. We briefly return to the matter of swarming below.

As for monitoring disease, as already indicated,



frames and the excessive interventions that go with them cause physiological and psychological stress for the colony. Stressed organisms are usually more prone to disease. Bees like seclusion. Opening up their home and moving their furniture about every week, as is common practice, goes against their nature. Stop using frames and thereby reduce the need to monitor disease. How Warré beekeepers deal with the ubiquitous *Varroa* is discussed below.

Having covered some of the general principles of this alternative way of keeping bees in the *People's Hive* we move on to the construction of the hive itself and its management. The Warré hive has no frames, foundation, queen excluder or supers (honey boxes) and is designed to preserve the warm nest atmosphere in its natural comb, thus promoting bee health. The description is only in outline but the reader is referred to Internet resources that fill out the detail. Clothing and tools etc. are covered in any beekeeping manual.

First read Warré's *Beekeeping For All*.<sup>2</sup> If you are a beginner, read-up bee biology, e.g. Jürgen Tautz's beautifully illustrated book. He presents several recent discoveries that indicate the importance of natural comb for the health and work of the colony.<sup>3</sup> Join a local association and learn about frame beekeeping.<sup>5</sup> You can hear much of value there. Members who are up-to-date on bee biology and behaviour, not just interested in how to profit from bees, will be interested in your venture. Local beekeepers can help you greatly.

### Making a Warré hive

Download the Warré plans.<sup>6</sup> If it looks too complicated, ready-made Warrés are reasonably priced.<sup>7</sup> These have a shuttered window in each box which makes checking on progress easy – ideal for beginners. Nick Hampshire's site shows woodwork novices how to make Warrés.<sup>8</sup> I made most of mine out of recycled wood, driftwood and pallets. Avoid treated wood and plywood. The latter does not 'breathe' and contains artificial adhesives. Planing is unnecessary.

Make at least four boxes per hive. Provided you keep their internal dimensions to 300 x 300 mm (plan) x 210 mm (high) you can use wood any thickness greater than 20 mm. To support the top-bars, the box fronts and backs have 10 x 10 mm rebates in their top rims. If you cannot cut rebates, nail 10 x 10 battens of wood 10 mm below the rims. Fix the corners together with simple butt joints using seven 65 x 2.65 mm galvanised nails. Fill outside cracks wider than 1 mm with linseed oil putty, leaving the bees to seal the inside with propolis, their universal sealant and antiseptic. Fix a handle batten on each side. Optionally, the box can be painted *outside* with two or three coats of raw linseed oil. Beginners like boxes with glass windows so they can watch progress inside. My



*Der Bienenfreund* 1863, by Hans Thoma (1839-1924)  
Staatliche Kunsthalle, Karlsruhe

own Warré page shows how to make these.<sup>9</sup>

Cut eight 24 x 9 mm top-bars per box and nail them at 36 mm centres to the rebates (or battens) with 25 x 1 mm Japanned pins (beekeeping suppliers). Many beekeepers like to encourage bees to make parallel comb by pouring beeswax into a 2 x 2 mm groove under each batten. Warré describes how.<sup>2</sup>

The floor comprises 15 mm boards nailed to battens underneath. For the entrance, cut a 120 mm wide notch extending 40 mm inwards (for a 20 mm box wall). Bees enter under the rim of the bottom box. Nail an alighting board 160 mm square under the notch, projecting 70 mm.

The top-bar cloth is hessian (e.g. peanut sacks from the pet shop). Warré advises stiffening it with flour paste to stop the bees fraying it. They coat the underside with propolis.

The 'quilt', the same footprint as the boxes, comprises four 100 mm tall pieces nailed into a square. Fix hessian or other coarse natural fabric underneath and fill the quilt with straw or wood shavings etc.

Roof construction is more flexible. It is waterproof, has about a 10 mm clearance all round to ease removal, covers the quilt/box junction, excludes mice from the quilt, can be flat and covered with a metal sheet (e.g. scrap hot-water cylinder, caravan, printers' plates etc) or sloping like Warré's with its ventilated cavity to



shield the hive from the sun.<sup>2</sup> You can make Warré's roof from wood scraps and paint it. Important: there is no updraught via the quilt (and roof). The bees control ventilation via the entrance.

The hive should stand at least 150 mm above ground. Blocks, an old sturdy crate or a wooden stand made of scrap all suffice. Mine have legs just outside the four corners of the hive to maximise stability.

### Apiary site

Common sites include gardens, city rooftops, allotments, field margins (livestock fenced), wasteland etc. Walls, fences, hedges and/or screening nets (windbreak) help funnel flight traffic in the desired direction. The flight path near the hive entrance should not point over thoroughfares or any place where people frequently pass. The entrance should ideally face anywhere between east and south to rouse the colony to foraging at sunrise. Unless foraging conditions are exceptional, limit each site to three hives to avoid stressing the bees otherwise there would be too many bees for too few food resources and this would increase the risk of disease.



*A garden apiary of Warré hives*

### Hiving bees

A natural prime swarm of 2 kg minimum gives best results, but a 1.5 kg bought package of bees works satisfactorily. Tell your local association, police, pest control department and fire station that you will take swarms. At first you may want to enlist the help of another beekeeper. Just before a main nectar flow, ideally May, run the swarm/package into a prepared 2-box Warré up a board sloping up to the entrance. With a package of bees, i.e. a commercially available artificial swarm, release the queen from her cage at the entrance once the inrush has begun. If there is no nectar flow, feed with your own honey syrup (2:1 honey : water by weight), or if none available, syrup comprising 1

kg sugar in 500 ml water. Put it in an open container loosely filled with straw (to stop the bees drowning in it) on the hive floor.

### Monitoring progress

Storch details how a lot can be learnt from entrance activity.<sup>10</sup> All is well if, on rainless days, the bees are busy, many carrying pollen. The first box can fill with comb in a fortnight. In about another fortnight you can add a third box. To see how the comb has progressed, slide the hive backwards a little on the floor to make a satisfactory opening and look upwards with a torch, or use a mirror. Do not do this often. Part of the point of Warré beekeeping is to leave the bees alone.

### Harvesting honey

If you have hived in mid-spring and had an average summer, you should get one box of honey in early autumn when nectar flow largely ends. Remove the roof and quilt. Peel back the top-bar cloth and smoke any bees down into the second box. Loosen the box with a hive tool, if necessary with a gentle twist each way. Check there is no brood by looking underneath the combs. Put the box aside in a covered container such as a plastic sack. Check the next box has at least the equivalent of six combs of honey (about 12 kg.). This is the winter stores. Renew the cloth and quilt filling.



*Underside view of a box of honey harvested from a Warré hive*

### Extracting honey

The lightest coloured comb at the top corners will be suitable for harvesting as cut honeycomb. The rest is crushed with a potato masher and drained through a sieve. The drained wax can either be pressed dry in a cloth,<sup>11</sup> or washed with lukewarm water and the honey syrup either fed back to the bees or made into mead. Wax is most sustainably recovered in a solar extractor.<sup>12</sup> It can be sold or made into candles by melting in a *bain marie* (hot water bath as used by cooks) and dipping candlewick obtainable from any candlemakers' supplies.

## Swarming

Suppressing swarming, part of the natural reproduction of the honey bee, risks the long term fitness of the bee population. You can let them swarm and catch it to start new colonies, if necessary by using bait hives.<sup>13</sup> This is not an option if there is any chance of annoying neighbours. In that case you can split the hive before swarming time in the second year,<sup>14</sup> or artificial swarm it as Warré describes.<sup>2</sup>

## Varroa control

Beekeepers generally use chemicals against Varroa mites. This is not sustainable in the long term and adversely affects bee health. Honeybees need to co-adapt, co-evolve with the mite. Intervention hampers this. I do not treat my Warrés as they create ideal conditions that help bees control mites themselves. But I nevertheless risk losing some colonies. If you don't want this risk, consider dusting the hive with icing sugar: intrusive and messy, but it works.<sup>15</sup>

## Later years

Check the colony survived the winter, clean the floor and add one or two boxes. In later years you might harvest two boxes of honey. But remember that Warré beekeeping means not over-exploiting bees, so they should always be left an adequate amount of their own honey. Golden rule: keep it simple. Happy beekeeping!

*David Heaf lives in North Wales.*



*Bees foraging on cotoneaster showing the range of abdomen colours from black, which is more typical of the indigenous British bee, to partly orange, which reflects the hybridisation with the Italian race imported into the UK last century.*

## References

1. Steiner, R. *Bees* 8 lectures, 3 Feb–22 Dec 1923, GA 351, Anthroposophic Press, NY.
  2. Warré, Emile (2007) *Beekeeping For All*. D.J. & P. A. Heaf (transl.), Llanystumdwy. [http://www.mygarden.me.uk/beekeeping\\_for\\_all.pdf](http://www.mygarden.me.uk/beekeeping_for_all.pdf) (free)
  3. Tautz, J. (2008) *Buzz About Bees*. Springer-Verlag
  4. Heaf, D. J. (2009) *The Beekeepers Quarterly*, in press. See also [http://www.heaf.freeuk.com/towards\\_sustainable\\_beekeeping.pdf](http://www.heaf.freeuk.com/towards_sustainable_beekeeping.pdf)
  5. <http://www.britishbee.org.uk>
  6. [http://www.selbstversorgerforum.de/bienen/bilder/Emile\\_Warre\\_Technische\\_Zeichnungen\\_engl.pdf](http://www.selbstversorgerforum.de/bienen/bilder/Emile_Warre_Technische_Zeichnungen_engl.pdf)
  7. <http://www.massivholz-tischler.at/shopv2//themes/kategorie/index.php?kategorieid=12>
  8. [thebeespace.net/](http://thebeespace.net/)
  9. [http://www.mygarden.me.uk/beekeeping\\_for\\_all.pdf](http://www.mygarden.me.uk/beekeeping_for_all.pdf)
  10. Storch, H. (1985) *At the Hive Entrance*. European Agricultural Editions.
  11. <http://www2.gsu.edu/~biojdsx/press.htm>
  12. [http://www.heaf.freeuk.com/solar\\_extractor.htm](http://www.heaf.freeuk.com/solar_extractor.htm)
  13. [http://www.heaf.freeuk.com/bait\\_hives.htm](http://www.heaf.freeuk.com/bait_hives.htm)
  14. <http://www.ruche-warre.com/fichestechniques.htm> (French videos)
  15. <http://www.bwrrangler.com/lbla.htm>
- Also see:** Warré beekeeping web portal: <http://warre.biobees.com>  
Warré e-group with over 280 members worldwide: <http://uk.groups.yahoo.com/group/warrebeekeeping>

(All pictures courtesy of David Heaf)

