

How to Build a Simple Top Bar Hive



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The Barefoot Beekeeper

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By the same author

The Barefoot Beekeeper

Learning From Bees: a philosophy of natural beekeeping

*Balanced Beekeeping I: Building a Top Bar Hive**

*Balanced Beekeeping II: Managing a Top Bar Hive***

* *Published November 2013*

** *Published December 2015*

About this book

This book will provide all the information you need to build a simple, horizontal top bar hive of what is known as the 'Kenyan' pattern, with design features and adaptations added by the author to make it easier to manage for the beekeeper and more suitable for a northern climate.

I have deliberately kept this book simple, but if you are a little more ambitious, or want to go into the subject in more depth, I suggest you obtain a copy of my book ***Balanced Beekeeping I: Building a Top Bar Hive***, which is much more comprehensive and contains a discussion of hive design theory as well as going into much more detail about alternative materials and recent adaptations to the floor, the roof and the entrance.

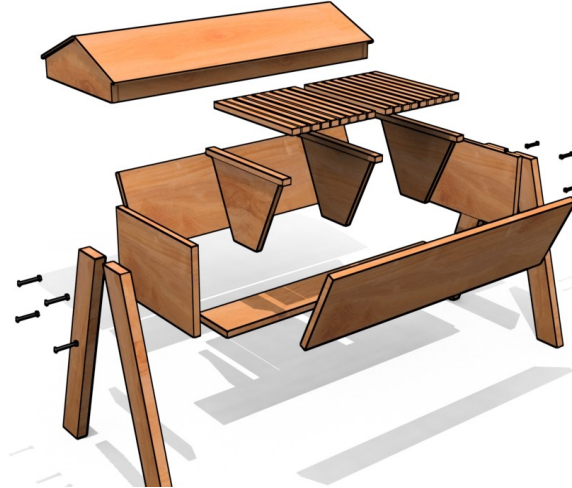
Everything you need to introduce bees to your hive and look after them properly will be found in another book, ***Balanced Beekeeping II: Managing a Top Bar Hive***.

If you want to know how and why I use the top bar hive in preference to other types of hive, read my first book, ***The Barefoot Beekeeper***.

See www.biobees.com for how to order all my books.

How to Build a Simple Top Bar Hive

I have written these instructions with fellow amateurs in mind. I doubt if I could follow a 'proper' woodwork plan myself, so this is a combination of written instructions and photographs, which I hope will prove easy to understand. I suggest you scan through the following pages more than once before starting work.



Exploded view

James Webb

Materials

Traditionally, beehives are made from Western Red Cedar, which will weather pretty well with no surface treatment. However, it is not always easy to find and it is often quite expensive when you do, so Douglas Fir or pretty much any straight-grained, well-seasoned timber can be substituted if cost is important. In wetter climates, the hive can be weather-proofed on the outside using linseed oil, Tung oil or Danish oil. This is optional: as long as the roof is sound and the legs rot-proofed, the rest of the hive will look after itself.

Recycled/reclaimed timber may be used throughout, but ensure it has not had any insecticidal treatment - and watch out for old nails if you use a table saw. If you cannot find 12" wide boards locally, you can glue up 2x6" or 3 x4" boards.

Timber dimensions are shown below; all sawn to size rather than planed, and none is treated except for the legs.

Dimensions

I have shown dimensions in metric and imperial measurements: you should choose the system you are most familiar with and work with that throughout, as there are small differences that will cause you trouble if you try to translate from one to the other.

Cutting list

sides - 2 off - 44" x 12" x 1" or 1100mm x 300mm x 25mm

ends - 2 off - 18" x 12" x 1" or 450mm x 300mm x 25mm

legs - 4 off - 32" x 4" x 1½" or 800mm x 100mm x 38mm (anti-rot treatment advisable)

winter floor - 1 off - 46" x 7" x 1" or 1170mm x 180mm x 25mm

roof frame - 2 off - 47" x 3" x 1" or 1180mm x 75mm x 25mm (check on your hive before cutting to length)

roof frame - 2 off - 21" x 6" x 1" or 530mm x 150mm x 25mm (check on your hive before cutting to length)

roof covering - 2 off - 48" x 12" x 3/8" or 1250mm x 300mm x 10mm external or marine grade plywood or other sheet material, or thin offcuts from a sawmill

top bars - 25 off - 17" x 1 1/2" x 7/8" or 430mm x 38mm x 22mm

shims - 10 off - 17" x ¼" x 7/8" or 430mm x 22mm x 6mm (see text)

comb guides - 25 off - 12" x ½" or 300mm x 12mm half-round dowel (see text)

followers - 1 off - 36" x 12" x 3/4" or 1000mm x 300mm x 18/20/22mm (see text)

You will also need at least 20x 2½" wood screws (preferably brass or stainless steel, but good quality galvanized screws will do) and 8x 3" coach bolts with washers and nuts to attach the legs. Depending on how you choose to build your roof, you will need some galvanized roofing nails or similar to attach the sheet material to the frame. For the mesh floor, you will need some plastic or wire mesh with holes of 2.5 - 3.5mm. Suitable plastic mesh can be found in many craft shops, intended for cross-stitch work.

Preparation

You will need a flat, level bench somewhat longer and wider than the dimensions of the hive, along with some basic tools: a carpenter's saw; plane; screwdriver; drill; square; cramps. A hand-held or bench-mounted circular saw and a power drill are handy if you have them.

Use a strong, waterproof, external grade glue for all joints. If in doubt, ask in your local hardware shop for advice.

The hive is built 'inside out and upside down' - starting with the follower boards. The reason for this is the relative ease of making the sides fit the followers compared with making the followers fit retrospectively to the sides.

I would suggest that you spend some time studying the sequence of photographs and get a feel for how the hive looks and how it works.



You don't need a fully-equipped workshop: a flat surface and basic tools are the essentials. You can build the hive using only hand tools, but a circular saw is helpful, whether hand-held or table mounted.

Order of assembly

Having built a few of them, I can say with some confidence that the easiest way to assemble this style of hive is to make the sliding follower boards first and build the body of the hive around them. That way, you can guarantee they will be a good fit.

The sequence shown here assumes you are making followers from wood that you may have lying around in your workshop, or that you can salvage from somewhere. They can equally well - or better - be made from plywood 3/4"-1" or 18-25mm thick. Avoid using anything that absorbs water too readily - such as hardboard, particle board, MDF, etc.

As you will be needing a couple of top bars to cap the followers, we may as well start by making the top bars.

Making the top bars

The one critical dimension in this whole design is the width of the top bar, which should be 1 1/2" (38mm) unless local knowledge or your own experience say otherwise. (Some people prefer to use 32-36mm bars for the brood area, adding 6-8mm shims when the bees start storing honey in earnest.)

Make them about 7/8" (22mm) thick (measured vertically) and they will be sturdy, unbendable and provide a decent amount of thermal insulation. You will be adding more insulation on top of them, once your bees are inside.

I use 17" (430mm) long top bars, corresponding to the length of the British National hive frame. This results from my early experiments with vertical-sided boxes as transitional hives, bridging the gap between frames and top bars. American beekeepers often use 19" bars for similar reasons, based on the Langstroth dimensions. If you decide to use anything other than 17" bars, you will need to modify other parts of this design, so I suggest you stick with this measurement unless you have a really good reason to do otherwise.

You will get more even and predictable results if you provide the bees with a comb-building guide of some kind. There are a number of ways to do this, perhaps the simplest being a saw kerf down the centre of the lower face of the bar, made with a circular saw. This does not have to extend to the ends, but it may be easier to cut longer lengths like this. The groove should be about 1/8" deep and the width of your saw blade. Fill it with molten beeswax and allow to cool.

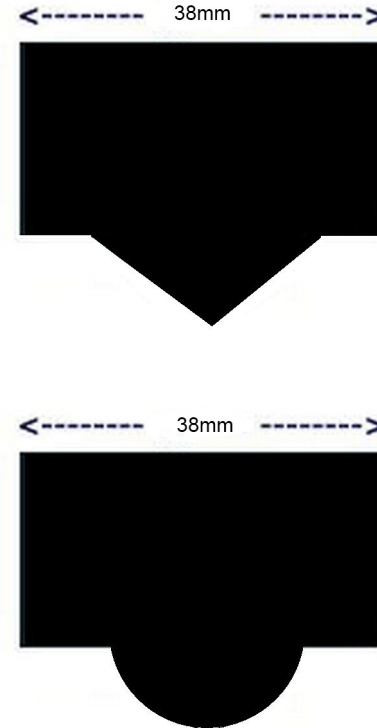
If you do not have access to a circular saw, or you place a high value on keeping all the fingers you were born with, you can pin thin strips of wood conforming to one of the profiles suggested by the diagram on the next page. Make them about 280mm long and fix them centrally onto the bars using thin pins (often called gimp pins). Rubbing the lower edge with beeswax is generally thought to be a good idea.

Comb guides

Shown here are two comb guide profiles that I have successfully used in top bar hives. You could rout these shapes from a solid bar, or you can cut strips of suitable moulding and pin and/or glue them centrally on the bars.

Nothing guarantees straight combs, but once you have some good ones, place an empty bar in between two of them during the build-up period and they will make another straight comb in between. Another trick is to place a top bar between two frames in a conventional hive for a few days in spring or summer.

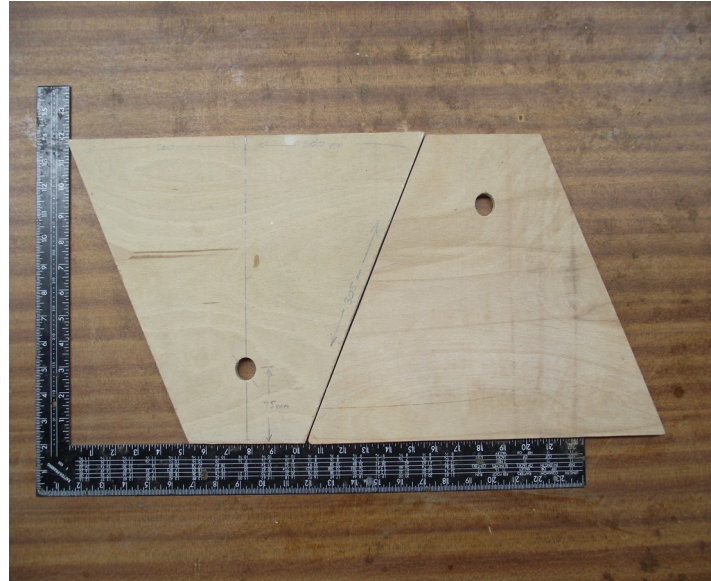
The height of the top bars (excluding the comb guides) should be around 22mm, to help provide temperature stability. Additional insulation should always be used between the bars and the roof.



Making the follower boards

Followers are the key to this hive: they turn what would otherwise be simply a long box into what is probably the most versatile bee-friendly beehive in use today.

The very best material to make them from is 22-25mm marine grade plywood, as this is impermeable to moisture and dimensionally stable. But it is rather expensive and not obtainable everywhere, so exterior grade ply is an acceptable substitute. If that cannot be obtained, then glue together some boards you have lying around and make the best of it. The essence of 'barefoot beekeeping' is making use of recycled and recalimed materials wherever possible – and bees are very accommodating when it comes to judging woodwork.



Although only two are shown here, I recommend you make three followers – the spare one will come in handy later!

You can use a single board, a made-up board or cut followers from plywood, which is more dimensionally stable. Mark 15" (380mm) across the top edge and half way at 7 ½" (190mm). Draw a vertical line accurately as shown.

NB - this board is shown 11" wide (top to bottom) but you can make it a little deeper (12" or 300mm), especially if you use the Eco-Floor (see *How to Build a Modern Top Bar Hive* for details of the Eco-Floor.)





Use a square to make an accurate right angle. Draw the centre line.



From where the centre line meets the lower edge, measure 2 1/2" or 64mm either way.



Extend the geometry to make an identical shape upside down, and then another to make three altogether.



Glue, pin (or screw) a top bar centred on the top edge of each follower board. Cramp and leave to set overnight. The extra pieces of wood are there to prevent distortion through 'springing' under pressure.

Body building

The hive is built upside down and inside out. The follower boards represent the 'inside' and now you are about to add the outer skin.

In *How To Build A Modern Top Bar Hive* you will find details of a jig that will make building multiple hives easy and consistent, but if you will only be building one, you can manage without jigs. Just be sure that your side boards are in close contact with the edges of the followers before you drill holes for screws. A assistant to hold things steady is a great benefit at this stage.



Make up the two sides using a single 12" x 1" (300mm x 25mm) board, or glue two 6" boards or three 4" boards edge to edge. Being able to use whatever timber you have lying around, or can salvage, is one of the many practical aspects of the top bar hive.

On the bench

Start by squaring up the followers on a flat and level bench.

Position two of the follower boards so they are parallel and a couple of feet apart: the exact distance does not matter, but should be less than the overall length of the hive.

Offer up a side panel, resting one edge on the protruding ends of the top bars. This will give the correct offset when the ends are added later, flush to the bench.

Pay attention to making the sides true, squared-up and parallel along their top edges. This will allow the followers to slide smoothly and avoid jamming or a sloppy fit.



Begin the main assembly by inverting the follower boards and squaring them up on your bench about 18"-24" apart. They should be parallel, of course.

To make the next stage easier, it helps to tap a nail into each top bar so the side panel cannot move outwards (see inset).

As I mentioned - If you are planning on building several identical hives, it is worth making a pair of u-shaped jigs to hold the sides at the correct distance apart. Having hives with the same core dimensions means that you will be able to move combs between them, which can be a great advantage at times.

A drilling template for the end boards is another worthwhile item, for similar reasons - see *How To Build A Modern Top Bar Hive* for details.





Place the other side in position and square up the structure, ready for the ends.



Position one of the end pieces centrally against one end. Its bottom edge rests on the bench, giving clearance for top bars. (The plane is not strictly necessary: I used it as a prop as I was photographing single-handed.)

Make a line where the end touches the sides, inside and out. (A friendly ghost helped me with this one!)



Remove the end and mark three points each side for drilling clearance holes for screws. Actual positions are not as important as making them on the centre line and away from the edges.



Drilling holes for screws

Wood screws are really clamps: they draw two pieces of wood together using the thread to apply pressure towards the head of the screw.

This means that the shaft of the screw needs to pass freely through the piece nearest the head by means of a 'clearance hole' drilled very slightly wider than the diameter of the shaft, but considerably smaller than the head.

When screwing into hard woods, a much smaller 'pilot' hole is drilled into the piece that will accept the thread of the screw. You will probably not need pilot holes for this project, especially if you use a



Use a drill bit very slightly bigger than the shank of the screw, which should be brass or stainless steel and at least 2 1/2" (65mm) long. Drill both ends together, using the marked end as a pattern. (The nails are dropped into two drilled holes to ensure perfect alignment.)

It is a good idea to apply a spot of 'bee-grease' (1 part beeswax to 6 parts vegetable oil) to the thread to help drive it home.

powered screwdriver.



While you are drilling, you may as well make bolt holes through the legs and end boards. Mark a point 5" in from the top corner of one of the ends and draw a line to the bottom corner, as shown. The outer edge of the leg will lie on this line. Drill the top hole at least 3" from the top edge, as the tops of the legs will be trimmed to accommodate the lid (see below). Ensure that the lower hole falls comfortably outside the line of the side wall.



The roof frame will rest on the tops of the legs, so they need to be trimmed parallel to the top edge. Lining up the holes you already drilled, mark a straight line across the width of one end, 2" (50mm) from the top edge. Don't fit the legs yet.



Glue and pin strips of thin wood inside at the ends, to ensure there are no gaps. Cut them to the shape of the lower ends of the follower boards.

Plastic, galvanized or stainless steel mesh may be used to cover the base of the hive. This is heavy duty plastic garden mesh, which has the advantage of forming a flexible, convex curve inside the hive, enabling the follower boards to form a bee-proof and moth-proof seal. It must be cut carefully to fit the ends and held in place with flat-headed pins or tacks. A nylon/PVC mesh made from cross-stitch work may also be used. If your area has badgers, or other clawed predators, you will need something much stronger!

See [How to Build a Modern Top Bar Hive](#) for details of alternatives, including the Eco-Floor.



This is what your hive should look like now. The follower boards are a good, sliding fit and the whole thing looks sturdy and almost ready for bees!

Entrances

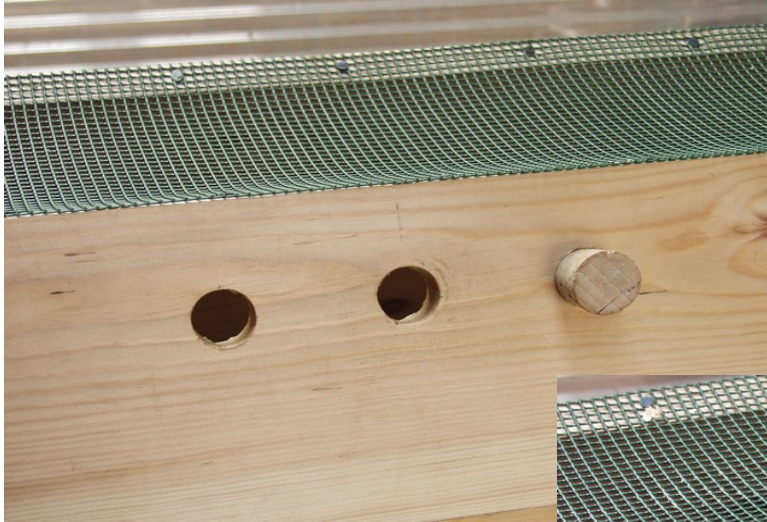
You have a number of options when arranging the entrance holes: I have illustrated the simplest and most flexible arrangement.

Putting three entrance holes in the middle, plus one at each end on the opposite side, gives you the ability to expand the colony in either direction, while leaving room to make splits or artificial swarms if desired.

Commercially-made top bar hives usually have an end entrance slot and a single follower board, or none at all. This means that if you want to inspect the brood area for any reason, you will have to move all the bars away from it first. If you use my system, with two followers, you can open the colony very easily for checking from both ends.

Using no followers at all is an open invitation for the bees to build comb in any direction they please, which will make it very difficult to move any of the bars. Once you have allowed them to cross-comb, managing the hive becomes virtually impossible, and you may as well have put them in a simple box hive to start with.

Some of the states of the USA require combs to be movable for inspection, and if you manage your horizontal top bar hive well from the start, it will comply with this law. Vertical top bar hives, such as the Warré, are generally designed to be used as 'fixed comb' hives, and therefore may not be compliant in those states. It would be as well to check for any regulations in your area that may stipulate the types of hives that are allowed.



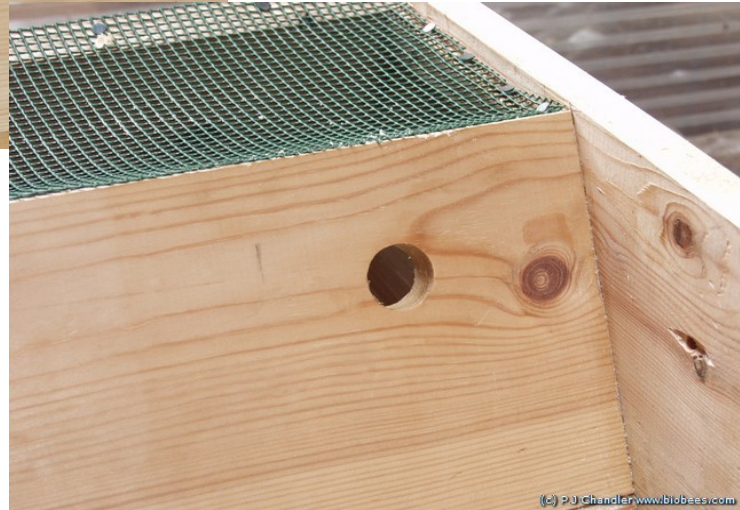
The entrances in this design comprise three 22mm holes on 50mm centres in the middle of one of the side, with a single hole near each end in the opposite side.

This gives great flexibility in managing the hive, using standard wine bottle corks to plug entrances not in use.

Corks are also used to plug the holes in the followers in normal use.

The entrance holes on the 'back' of the hive are useful if you ever need to split a colony - for example, as part of a swarm-preventing strategy - or if you need to house a small colony in the same hive for any reason.

The combination of followers and multiple entrances makes this hive exceptionally versatile and avoids heavy lifting.



The roof

Adding gables makes a more elegant roof that will shed water quickly and be hard even for strong winds to lift, but easy for the beekeeper.

You could use a number of materials here, including thatch, but make sure you keep it reasonably light in weight.

Wheelchair users and people with disabilities involving bad backs would do well to consider a hinged roof: a relatively easy modification.

You can get creative with the roof, but bear in mind that you will want to be able to lift it - so choose your materials accordingly.





The roof frame is a loose fit- a simple, rectangular frame of 3" x 7/8" (75mm x 22mm) timber, glued and screwed at the corners. Be sure to leave about 1/4" slack in both directions to allow movement in the wood. Jamming roofs are a nuisance.

Gable ends are fitted to this frame, and the roof covering material completes the structure. Exterior ply or sawmill offcuts are both suitable, as long as they keep the weather out.

NB - THIS FRAME IS PART OF THE ROOF: DO NOT FIX IT TO THE HIVE BODY!

The purpose of the roof is to keep out rain, snow, hail and excessive heat. Bear this in mind when choosing materials. Avoid roofing felt, which may cause high internal temperatures on hot days.



A simple roof using corrugated plastic, available from DIY stores. If you use this material, be sure to put plenty of insulating material under it, especially if you live in a hot climate.

Legs

You need four legs (obviously), each about 3" x 1 ½" (75 x 38mm) and a length to suit your height.

For example, a man of average height will need the top of the hive to be around 30-32" for comfortable working, so the legs will need to be about 33-34" long. If you are a wheelchair user, you may want the top of the hive to be about 24" from the ground, so make the legs 26". The rule of thumb: decide a working height for the top of the hive and add 2" to arrive at the length of the legs. They will be trimmed a little to accommodate the roof.

You do not *have* to use legs - you could put these hives on various types of stand as used by conventional hives - but this is a cheap and convenient way of achieving a stable, level, rodent- and badger-proof hive at the right working height.

The legs will be bolted to the end pieces, using galvanised or stainless steel nuts and 2 1/2" (65mm) bolts. I advise you to put washers under the head of the bolts and the nuts to prevent them cutting into the wood. Do not be tempted to use wood screws to attach the legs: disaster will inevitably follow and you will regret not spending a little extra for proper bolts.

The lower ends of the legs can be left cut square for maximum stability on a grassed site, or cut level if you intend to keep your hives on hard standing.



A top bar hive in use, with the nearer follower moved aside and some bees sunning themselves on the tops of the bars. See *Balanced Beekeeping: Managing a Modern Top Bar Hive* for your next move!



A 'periscope entrance' fitted to a top bar hive, which also has an Eco-Floor.
See *How to Built a Modern Top Bar Hive* for details of these modifications.



A hive made from Western Red Cedar with an observation window - a useful addition.

Inspection stand

This device is easy to build and a very useful 'third hand' for examining comb. It is especially useful if you want to take photographs and you don't have a handy assistant. I dreamed it up one Sunday morning and built it before lunch out of odd bits and pieces lying around in my workshop. The base is the same width as a top bar - 17" - and about 6" (150mm) wide. The wire is about the same gauge used for coat hangers, bent to accommodate the width of a top bar. A slight inward 'spring' is an advantage, as this grips the comb and helps to keep the bar in position.

A useful feature of this design is that it folds flat for transport.



Other refinements and gadgets

If you are of an inventive turn of mind, you may already have thought of some improvements and extra bits for your hive. Don't let me stop you, but do bear in mind that the essence of 'barefoot beekeeping' is simplicity: resist the temptation to over-complicate.

Having said that, you might want to consider adding a 'landing board' for the bees, similar to those you may have seen on WBC hives. I suspect this idea originated with Victorian beekeepers, who were fond of designing hives that resembled Georgian buildings, sometimes even having Doric columns either side of the entrance, but some people like them, even if the bees couldn't care one way or the other. A landing board - say 6" wide by 2" deep and 3/4" thick - could be added just below the central entrance holes, using a thin piece of wood as a support.

Pollen collectors are a useful means of gathering surplus pollen, either for one's own use or for drying and storing for the bees in case of dearth. In my area (south west England) there is rarely any shortage of pollen in the spring when bees need it most, thanks to plentiful willow, hazel and dandelions, but in other areas this may not be the case. I am still working on a design for a simple pollen collector and this will appear on my web site when ready, as will other notes and developments.

www.biobees.com

The Future of Natural Beekeeping

Historically, we began our relationship with bees when somebody discovered that the taste of honey was worth the pain it cost to harvest. We became honey-hunters, and while there were few of us and many of them, this was sustainable.

When somebody discovered that it was possible to offer shelter to honeybees while they made their honey, and then kill them off to raid their stores, we became bee keepers, and while there were few bee keepers and many honeybees, that too was sustainable.

Then someone invented a way to house bees that did not require them to be killed, but instead allowed people to manage and control them to some extent, arranging things so as to trick them into producing more honey for their masters than for themselves, and we became bee farmers. And that was sustainable for a while because there were still many of them and although there were also many of us, we could manipulate their reproduction so as to make more of them as we needed.

Then it began to become clear that we had gone too far: bees began to suffer from diseases that had been virtually unknown in the old days, and they had to be given medicines in order to keep them alive. And because a whole industry had grown up around the farming of bees, and there was a lot of money and many livelihoods at stake, beekeepers were slow to change their ways and many could not do so for fear of bankruptcy, and so the health of the honeybees became worse and they became subject to parasites and viruses that had never troubled them in the past.

Meanwhile, we forgot how to grow food in the way that we once had done because we were no longer inclined to labour in the fields, and instead devised clever ways to make the soil support more crops. We poured fertilizers onto our fields and killed off inconvenient creatures with 'pesticides' - defining a whole class of living organisms as our enemies and therefore dispensable. This was never sustainable, and never can be: in the bank that is our living soil, we are withdrawing more than we deposit.

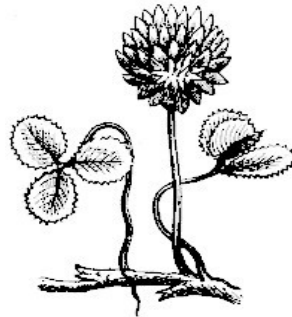
And that is where we find ourselves today, and this is the problem we face: bees that have become weakened through exploitation and a toxic agricultural system, allied to the impossible expectation of continuous economic growth.

As 'natural beekeepers', our most pressing work is to restore bees to their original, healthy state. We need to think of ourselves as 'keepers' in the sense of 'nurturing and supporting' rather than 'enslaving', which is the old way. We must seek to protect and conserve the honeybee by working within their natural capacity, and not constantly urge them towards ever greater production. We must challenge the whole agricultural and economic system that has caused us to arrive at this point, because without change at that level, the future for both us and the bees is bleak.

We can make a start by establishing new and more natural ways of working with bees: neither we nor they have any need of unnatural 'treatments' with synthetic antibiotics, fungicides or miticides. We don't need to operate 'honey factories' - we can content ourselves with providing accommodation for bees in return for whatever they can afford to give us. In some years, this may be nothing at all, while in others there may be an abundant harvest.

Such is nature: bees depend on honey for their survival; we do not.

If the price of returning bees to a state of natural, robust health is a little less honey on our toast, is it not a worthwhile sacrifice?



Further Reading

The Barefoot Beekeeper

My first book – really a manifesto rather than a 'how-to' guide – but this is the one that kick-started the 'natural beekeeping' movement, so you will want to read it for that reason alone!

Learning From Bees: a philosophy of natural beekeeping

A collection of short essays and articles – perfect bed-time reading for the bee enthusiast.

Balanced Beekeeping I: Building a Top Bar Hive

Detailed and comprehensive instructions, with all the background information you need to develop your own variant of the basic hive. A must-read for anyone thinking of building their own hive.

Balanced Beekeeping II: Managing a Top Bar Hive

You have built your hive – now you need to know how to get some bees in there and manage the hive around them. You definitely need this one!

All books are available from links on the author's web site - biobees.com

The author's podcast can be found on iTunes and at <http://biobees.libsyn.com>



Recommended reading



The Natural Beekeeping Network is an informal, worldwide network of beekeepers who are working in the same general direction - www.naturalbeekeeping.org

Friends of the Bees is a UK-based charity that aims to promote natural beekeeping, taking into account the welfare of other pollinators - www.friendsofthebees.org