

BeeFarmer

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Works in Progress ...

Bee Tradex Preview

Bee Farming the
Ethiopian Way



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Comment

As *Bee Farmer* was going to press, Steve Sunderland, Lead Bee Inspector for Scotland, announced his impending retirement to the assembled representatives at the Scottish bee health meeting at Auchincruive. His departure is planned for April this year. This is a big loss to all beekeepers in Scotland and especially Bee Farmers' Association (BFA) members affected by the European foul brood (EFB) outbreak that was discovered in 2009.

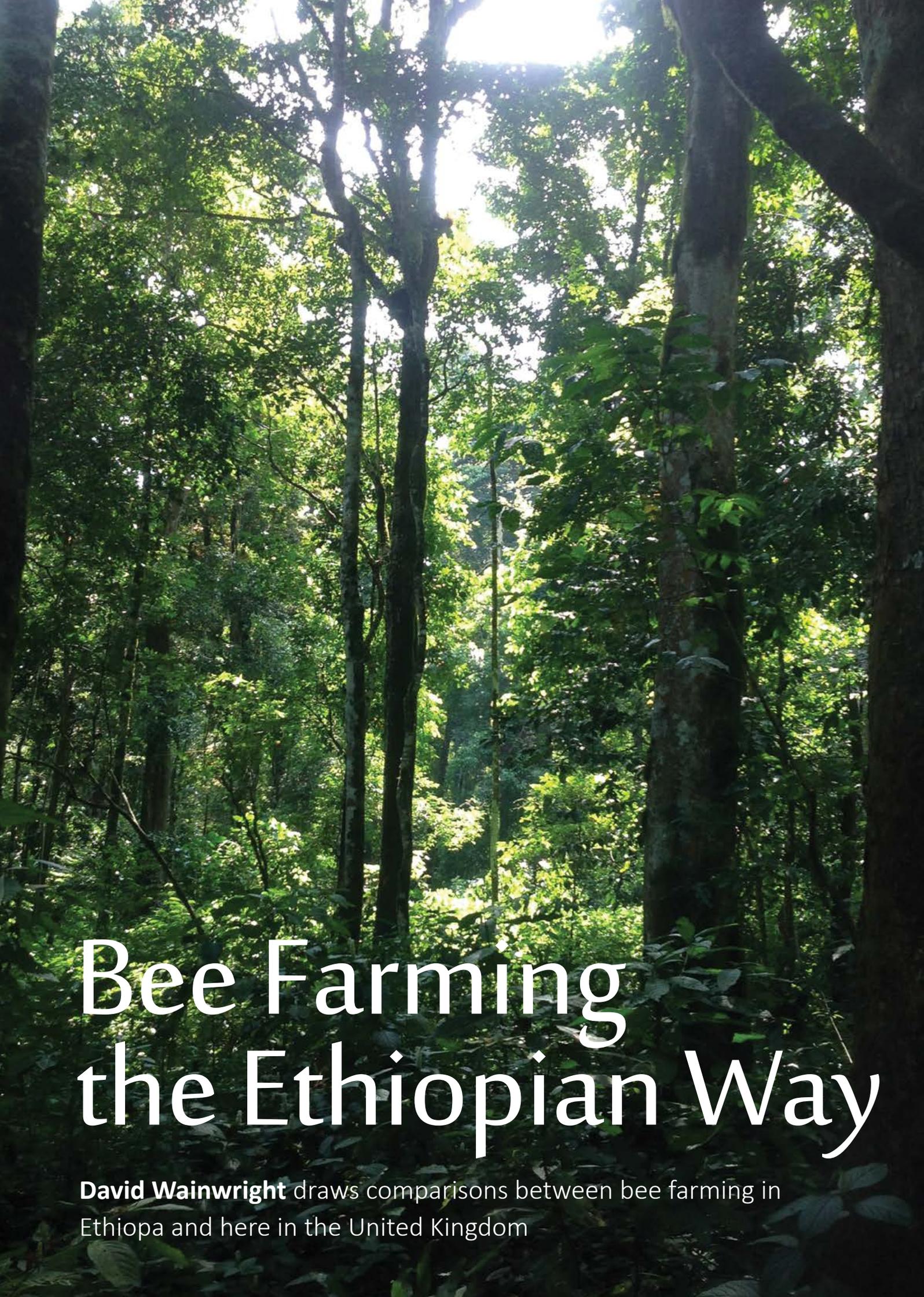
His calm conciliatory manner and open mind on procedures enabled several of our members' businesses to survive. His leadership brought together all the strands in Scotland – from the relevant governmental departments, to scientists, bee farmers and the hobby sector – resulting in the excellent cross-body cooperation we enjoy today, which is the envy of other parts of the United Kingdom (UK). He will be greatly missed and we look forward with some concern to what will happen next.

A fuller article on Steve and his contributions will follow in a subsequent issue.

Murray McGregor

Director with Responsibility for Scotland,
Bee Farmers' Association

Cover: John Paulos placing a hive in a tree
Contents: John Paulos' beekeeping tools:
smoker sticks, calabash back-pack for
carrying honey, cropping basket, rope,
long-handled smoothing adze, big axe for
hollowing out hives, 12 mm axe for making
entrance holes
(Photos: David Wainwright)

A photograph of a dense forest with tall, slender trees and a thick canopy of green leaves. Sunlight filters through the trees, creating a dappled light effect on the forest floor. The overall atmosphere is serene and natural.

Bee Farming the Ethiopian Way

David Wainwright draws comparisons between bee farming in Ethiopia and here in the United Kingdom

Hives in Kedir's village being prepared for hanging, before and after smoking. The small hives are designed for multiple swarming and total cropping in response to driver ant predation



A lot of honey is produced in Ethiopia and has been for centuries. It mostly comes from lush thick forests which cover much of the southern part of the country. The beekeepers here use African hives of various designs, all home-made from whatever materials can be found in the forest. So, everyone is free to experiment with whatever ideas they can come up with. There are no beekeeping equipment suppliers and no standard hive plans are used. Instead, hive designs vary from place to place and have been tweaked and perfected over years to be the most efficient for the local conditions, taking into account honey flows, availability of hive making materials, bee enemies, etc.

I have been to these villages a few times before, but always on a mission; there was never time to just listen to the beekeepers and to understand how they manage their stock of bee colonies through the cycle of the seasons. One day, I wanted to just sit down with these guys, one bee farmer to another, and learn. In December 2018, I took the time to do this and a very interesting experience it was. The more they

Thick forest where John Paulos hangs his hives

talked, the more I pieced together how their systems worked perfectly in their environment, to give them the supply of honey they needed by methods that they found rewarding in many different ways.

Collaboration with Bees for Development

This trip was a collaboration with Bees for Development. Our team consisted of myself, Nicola Bradbear, Tilahun Gebey, Megan Denver and Milan Wiercx van Rhijn from Bees for Development and our translator, Biniyam Abebe.

We wanted to make a start by learning about how the beekeepers manage their bee population through the cycle of the seasons, from occupation of hives by swarms, through honey flows, swarming and, finally, coming home with a crop of honey.

Every beekeeper we talked to had a different system which had obviously been tweaked and improved upon over the years until it was well adapted to the particular bee forage, locally available materials, bee pests, etc. There were a lot of beekeepers, each with a lot of hives. What they all had in common was that these hives were widely distributed throughout the forest – some were one or two days' walk deep into the forest.

In these villages, everyone is a beekeeper. They were tending the bee

population throughout the forest by providing fresh, clean nesting sites on a massive scale. There is not much of a distinction between domesticated and wild bees in this forest; the bee farmers take care of the whole population.

Amongst the beekeepers we met were two living near to one another but with very different bee management systems. Both come from communities which have specialised in beekeeping for many generations. The end result is similar in both cases: they have a good income stream from honey and the forest is full of healthy bee colonies, bee diseases are unknown and there is a thriving honey trade, sending out hundreds of tonnes of good-quality honey to the markets in the capital city. But the annual cycle of population expansion through swarming and mortality caused by bee enemies over the dearth period is totally different.

Kedir

The first beekeeper we talked to was Kedir. He is over 70 years old and has kept bees all his life. It was very surprising to see how nimbly he could climb up tall trees to tend to his hives. All the beekeepers we met were keen to demonstrate their skills in tree climbing, they were as fast and deft as circus acrobats and completely relaxed when balancing on a branch 20 m (65 ft) above the ground.

Photographs: David Wainwright, except where otherwise indicated



A marauding driver ant column, the bees' main enemy in the forest. The colonies number millions and it can take two or three days for a column to pass by

running ants to pass. Bees are vastly outnumbered when driver ants attack and usually the ants overwhelm the colony defences, invade the hives and eat everything. This is survival of the fittest in action. The population of bees must rely on its own fitness to survive; the beekeeper will not be there to help a struggling colony to pull through.

Varroa has invaded this region but has had no impact; the bees have been left alone to adapt to the new threat. Varroa resistant bees have survived; susceptible bees have perished.

So, before the swarming season, Kedir goes into the forest to prepare his hives. He takes down the die-outs and cleans them thoroughly. It is very important to him that when a swarm occupies one of his hives, it finds the hive spotlessly clean and fresh. All empty hives, old and new, are prepared for hanging by smoking over a fire made with various herbs of the rue/citrus family to sterilise them and give them a lemony aroma to attract swarms. By innovation and trial and error over the years, these beekeepers have arrived at a process of hive sterilisation very similar to the one advised by our United Kingdom (UK) bee inspectors. The end result is a hive coated with a shiny tarry surface, all trace of the former occupants has been removed and the hive has a smoky, herbal smell to attract a swarm quickly. Apparently, it is not unusual for a swarm to have occupied the hive by the time you have climbed to the bottom of the tree. This is something I have observed in Zambia as well; one day we hung 40 hives and, by lunchtime, 20 were occupied!

Kedir has 250 hives, 50 are new empty ones, 200 are old hives of which only 20 were occupied in December – the rest had been overrun by driver ants. Swarming is late this season, but when it starts, he must prepare and hang 230 hives; they need to be freshly baited to be attractive to swarms. He expects to have about 170 occupied.

Then, he has to wait while the colonies build up, first on small annuals on the

Kedir lives in a highland area and has established a farm in the forest where he grows arable crops, such as maize, and raises cattle. The vegetation in these fields includes a lot of herbaceous flowers, many of which are familiar garden varieties, such as *Ageratum*, *Bidens*, chicory and many thistles; all were thickly buzzing with bees when we visited. He has plenty of hives on the farm but the majority are out in the forest, up to 20 miles' walk away. The pattern of honey flows and colony development is different in the farm hives because of the presence of these herbaceous flowers.

The beekeeping year starts in June with hive making. The beekeepers work in groups of about 15 and, by working together, they can make about 50 hives per day. Hive making carries on for a couple of months until everyone has 50–100 new hives. Hives are made from the wood of the kararo tree, *Aningeria altissima*. This is a tall umbrella-shaped tree with a long straight trunk and an almost horizontally spreading crown. Up to 16 hives can be produced from one tree. The trunk is cut into sections, split and hollowed out. The two halves fit snugly back together and are tied tightly with lianas (climbing vine). Hives are around 750 mm long by 250 mm diameter, with an entrance hole about 75 x 12 mm cut into one end. The average capacity is 38 litres, so half way between a National brood box at 35 litres and a Langstroth deep at 42 litres.

The hives are stacked in the forest to dry for several months, until the swarming season starts; this is September for the farm bees and November for the forest bees. The swarms start moving during the first flowering, but before the main flow. There was much debate amongst our team about the origin of these swarms: were they migrating bees moving up from the lowlands or were they originating from the beekeepers' hives nearby? It seemed hard to believe that the colonies could grow fast enough

in a few weeks foraging on herbaceous flowers to produce enough swarms to occupy all the hives, so we at first thought that they must be moving in from elsewhere. But Kedir told us that colonies he had observed can produce ten swarms each which, when we did the maths, was enough to occupy all of the empty hives.

On reflection, this is what I am familiar with in my own British bees. The colonies start developing in the winter using stored honey and pollen (monthly consumption of stores increases from 2.25 kg [5 lb] to 5 kg [11 lb] between December and March) so that when the first spring flowers appear, there is a large workforce to take advantage of these resources. There is then a rapid build-up on spring flowers leading to swarming (unless I have taken steps to prevent it), before the main crop in the summer.

The difference in Ethiopia is that these spring swarms grow more rapidly and reach a size where they can get a good crop off the main flow a couple of months later.

When drones start to appear and swarming starts, in the equivalent of our late spring, there are only a few occupied hives left; 'winter' losses are about 90 per cent! The main cause for this is driver ants, fierce biting ants that build up huge nomadic colonies and devour all animal life in their path. I used to see these ants on my way to work in Zambia and it would take two or three days for the thick, seething column of

Getame (*Scheffleria abyssinica*) is a relative of ivy and the main honey crop for Kedir





John Paulos with a large hive designed for partial cropping and low levels of swarming

Some extra empty hives have been hung nearby to provide a nesting site for these homeless bees.

The procedure has the same result as our Ministry-approved shook swarm method. The majority of bees are on new comb, there is very little opportunity for disease transmission or build-up of spores in old combs.

Both honey and brood are cropped. Brood is a nutritious protein-rich food for children and the elderly. Honey is for beer brewing and sale to local traders who have a network of depots throughout the area. All the honey that is sold is used for brewing tej honey wine, the traditional drink of Ethiopians. The local price for good quality, white comb getame honey is about £1.90 per kg.

Production of honey is around 6–10 kg per hive, although in his grandfather's day this was 30 kg*. This gives Kedir a crop of around 640 kg and an income from honey of about £1,200 per year. In a country where many struggle to achieve an income of 1 USD per day, Kedir is getting about 4.3 USD per day from honey, in addition to other sources of income; cattle is the main one and coffee his third income stream.

The strategy in Kedir's village has evolved to enable the bee population to survive under fierce predation from driver ants. Hives are made small to encourage maximum swarming. Large numbers are hung widely spaced throughout the forest to enable the growth of a big bee population at the height of the honey flow. Only a small proportion are cropped, but nearly all the combs are harvested. This leaves the majority uncropped to take their chances with the driver ants. Looked at from the perspective of the health of the bee population across the entire forest, it is better to crop all the combs from a few colonies, as the chances of survival of an individual colony is low.

John Paulos

After leaving Kedir, we travelled down into the valley and along a track which got smaller and smaller as the forest got thicker and thicker. Finally, at the end of the track we arrived at the village of John Paulos. All along the road, shaded by the huge forest trees are small plots of coffee bushes where top-quality coffee is grown. This area is the home of coffee which grows wild everywhere under the forest

forest floor then, finally, on the main flow in March and April, which comes from Getame (*Schefflera abyssinica*). This is a large dominant forest tree, related to ivy and with similar flowers. It also starts life as a creeper, but eventually smothers its host. The honey is white and crystallises fast; its taste is perfumed and fruity like elderflower or lychee.

Kedir says: 'March is my favourite month of the year, my happy time'. This is when he goes into the forest for days at a time, strolling about and checking on his hives which are scattered over miles of territory. He observes each hive from the ground and looks at the number of bees flying, the speed at which they fly and if there are any clustering around the entrance. From these signs, he determines which hives will be full of honey and which hives to leave to crop next year. The number cropped depends on the season: he will crop about a quarter in a poor season and 60 per cent in a good season.

Bee farming in Ethiopia is a bit like a team sport; most tasks are carried out as a group. Climbing tall trees, balancing on a branch 20 m (65 ft) above the ground and cropping honey without a veil or smoke are highly skilled activities where

any mistake can spell disaster. The person on the other end of the rope needs to be someone you have complete trust in. At the end of the day, when the task is finished, you can both celebrate the satisfaction of a difficult task which has been skilfully completed.

So, beekeeping is not just a business. There is a lot more to it – it's a team sport of the extreme variety.

When it is time for cropping, Kedir goes with a team of four (working in two pairs), carrying their tools: a knife, rope, polythene sack, a torch and fire. They start work at 7 pm, as dusk falls. In each pair, one climbs the tree, smokes the hive and lowers it to the ground very carefully. The other gently places the hive on the ground then slowly rolls it over until it is upside down. The bees inside move up to what used to be their floor, away from the roof where the combs are attached. Then, the hive is carefully cracked open with the knife. The upper section with the bees clustered is moved to one side, leaving the combs upside down and largely free of bees.

The combs are cut out and brushed free of bees. A couple of kilos of honey are left for the dispossessed bees to fill up on before they fly off to a new home.

*Footnote: many beekeepers I have met, in the UK or Africa, feel that things were better in the past, but where actual figures are available they often do not support this view. When we look at the production figures from the leading bee farmers of the 50s and 60s, they are less than their counterparts of today.

Ethiopian Technique

Baiting hives
Total cropping

Hives spaced throughout the forest

Swarming
Survival of the fittest

canopy. We set out on a path climbing up from the village and initially passed through coffee groves, but after a mile or two we left the cultivated area behind and entered the cool, shady forest which is where the hives are hung.

In John Paulos' village, everyone is a beekeeper and this is how it has been for generations. In his grandfather's day they were required to pay tribute to the king in the form of honey and they would also exchange honey for bars of salt. The cash market is a recent thing, along with the growing of coffee. In the past they could produce everything they needed themselves, with the exception of iron and salt. Honey had an important part in the self-sufficient village economy. It was a food, source of alcohol when brewed into beer and a medicine. According to John Paulos, honey gives you energy, cures most ills and is anti-ageing.

The bee forage in the lowlands is more varied than the highlands and there is usually something flowering so they can crop up to four times in a year. The terrible driver ants are not so common and the only enemy of bees that John Paulos could think of was a species of bird which sometimes caught a few bees. So, there is not the high mortality and rapid turnover of colonies we found in the highland areas. Bees swarm less here, around four times a year compared with ten times in the highlands. John Paulos and his colleagues have fewer hives, around 20 or 30, but all get occupied and all get cropped. These are long hives accessed from one end and it is only possible to reach in half way. Yields are higher than in the highlands, 24 kg on average, but occasionally a good hive will produce 80 kg in a year. So, the total annual crop is around 600 kg, very similar to the highlands beekeepers.

I was very impressed with the fine craftsmanship of the hives we saw, carved skilfully with an adze to a beautifully smoothness and made of *Cordia* timber, a good choice of timber: light but strong and weather resistant; these hives would last a long time. The design was different to the highland hives and was adapted to taking advantage of multiple honey flows each season. This requires each hive to

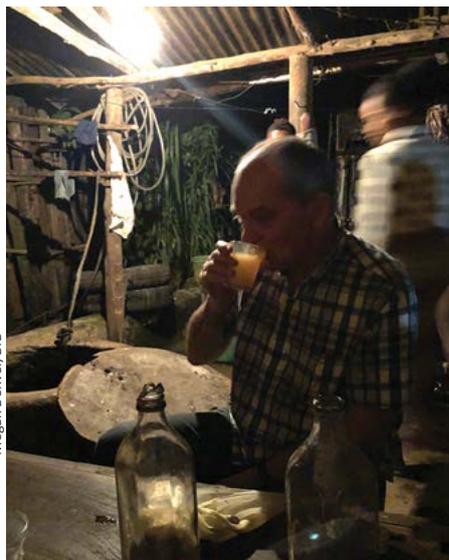
Current UK Technique

Scorching second-hand equipment
Shook swarm;
regular replacement of old combs
Reducing size of apiaries;
face hives in different directions
Breeding from locally adapted stock
'Live and let die' selection for varroa resistance

be occupied by a permanent colony in a constant peak condition, rather than the highland system of a high turnover of colonies reaching peak condition for the one main flow. The lowland hives have a removable grass door at the rear so that the hives could be harvested in situ, high in a tree. In their forest, they could expect to crop honey every couple of months, unlike the highland beekeepers who only have one crop. The colony needs to be left with enough stores, so that it can produce a crop of honey from the next honey flow. So, the system here was to crop only the surplus, leaving some honey and the brood intact. In fact, the hive is made so long that the beekeeper can only reach half way along the hive – the brood and part of the honey have to remain uncropped. Hives cropped in this way would not abscond and could gather another crop from the next honey flow in a few weeks' time. The average volume of these hives was 67 litres, the wall was 50 mm thick and the openings were five holes on the underside around 12 x 25 mm.

While beekeepers in the UK, Europe and most other countries with a honey industry based on frame hives struggle to maintain the health of their bees, these beekeepers in the Ethiopian forest had never heard of bee diseases or seen a sick bee. Even though, for many hundreds of years, beekeepers have filled the forest with hives, what we see now is a forest humming with bees that are

The author sampling tej honey wine in a tavern



Megan Denver, BFD

Problem Addressed

Disease spores on hive walls
Infected larvae;
disease spores on old combs
Diseased bees drifting between hives
Lack of genetic diversity
Weak strains allowed to proliferate

healthy, multiply rapidly and are able to adapt to new threats quickly. Some of the techniques we saw the beekeepers using reminded me of techniques we are debating in the UK as answers to our bees' health problems (see table).

Comparisons

When I learned bee farming in the 70s, we were always on the lookout for colonies that were underperforming. These would be boosted with brood from a neighbouring colony, swapped with a strong one, or maybe given another queen. However, the bottle of terramycin was always to hand because many of these techniques were giving foul brood the means to spread from colony to colony. Now, we have various viruses and varroa, resulting in an increased colony mortality compared to the 70s. In response, many bee farmers I know are producing far more nuclei than they used to. Instead of trying to keep colonies alive forever by boosting and requeening, they are replacing them with fresh stock coming on each year as the nuclei mature. In many ways we are heading in the direction of Ethiopian beekeeping!

We found numerous projects aiming to improve beekeeping productivity by introducing frame hives or top bar hives. Some of the projects are huge: 150,000 Langstroth hives in one project alone, honey factories with state-of-the-art custom built German equipment I was very envious of. Despite the vast amount of dollars being spent on hives and equipment, all the honey we saw was produced from African fixed comb hives, mostly variations on log hives. This did not surprise me as all the honey exported from Africa comes from these African hives.

Why don't Western hives work in Ethiopia? There are many answers to this question: ants, absconding, a general failure to thrive. But maybe the main reason is that these hives are valuable. They need to be kept near the home amongst the chickens and this removes a lot of the skill, excitement, team work and daredevil thrill seeking from beekeeping. At the end of the day, for an Ethiopian forest man there is more to beekeeping than just an income source. □